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INTERNATIONAL MULTIDISCIPLINARY
ACADEMIC CONFERENCE DUBAI 2019

Jan 18-19, 2019


Invited Talks
Special Presentations
Abstracts & Full Papers

Jointly Organized by
International Multidisciplinary Research Foundation Dubai Chapter
Sant Baba Bhag Singh University, Jalandhar, Punjab, India
Proceedings of the
International Multidisciplinary Academic Conference Dubai 2019

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Sant Baba Dlawar Singh Ji (Brahm Ji)
Chancellor
Sant Baba Bhag Singh University
Jalandhar, Punjab, India

Message: “Glory be to God for His beauties and bounties”

The extension of fine and faithful felicitations from the SBBSU family is duly due at this proud moment of triumph coming in the capacity of “International Multidisciplinary Academic Conference Dubai 2019” being jointly organized by IMRF Institute for Research & Education, Dubai Chapter and Sant Baba Bhag Singh University (SBBSU), Punjab, India from 18th to 19th January, 2019 at Dubai.

I stand greatly grateful to Almighty that He has bestowed upon us an auspicious opportunity to welcome the young students, great scientists, dynamic academicians, keen researchers and delegates from different countries to discuss and share their views at this platform. The conference being held will play a prominent part in the discussion of ideas from engineering, science and innovating technology of different streams and incorporate them together to cope up with global challenges. Over last two centuries, man has developed new technologies making the life of human beings easier and more convenient. But with them came certain new challenges such as habitat destruction, biodiversity loss, carbon emission, pollution, global warming, climate change, rising sea level, environment and health hazards worldwide resulting in the contamination of the food we eat, the air we breathe, the water we drink, the mindset along with relations.

In the pursuance of the ideology above “Sarbat da bhala” which means “Well-Being of All” serves only as a key that can actually be achieved through education both at personal and institutional level. Cutting-edge science and ancient wisdom with their interdisciplinary thoughts should come as a Saviour to find breakthrough technologies for the least detriment to Mother Earth. I, therefore, stand hopeful for the researchers from different streams to come forward with their respective contributions to perceive new ideas, exchange views and actively share their valued experiences for the well-being of humanity. “Vidya Vichari taan Parupkari” encapsulating a great wisdom that “True learning stemming from deep discussions and deliberations leads to the betterment and benefit of man at large”.

Wishing this “International Multidisciplinary Academic Conference Dubai 2019” a huge success.

-- Sant Baba Dlawar Singh Ji (Brahm Ji)
Message: As a Vice Chancellor of Sant Baba Bhag Singh University (SBBSU), Punjab, India, it is great pleasure to announce that SBBSU in collaboration with IMRF Institute for Research & Education, Dubai Chapter is going to jointly organize “International Multidisciplinary Academic Conference Dubai 2019” at Dubai on January 18-19, 2019.

I warmly welcome all the delegates in this scientific meeting staged to address the issues in a wide spectrum of interrelated disciplines. I expect the participation of intellectuals from engineering, allied life sciences including clinical, applied, basic sciences and social sciences. The present-day life is faced with plethora of problems related to environmental and health issues requiring immediate addressal and redressal in a sustainable way through interdisciplinary approaches and collaborations worldwide. The conference will surely act as a great stimulus and active platform for students, researchers, academicians, industrial professionals and business delegates belonging to different disciplines from all over the world to present their research works, share ideas and strategies with each other in various areas of Science, Engineering and Technology. The cerebral congregation in question can be an auspicious opportunity to interact with eminent experts of diverse disciplines, to establish research collaborations and to find suitable sites for scientific exchange of ideas and techniques. This philosophy of togetherness can spell development of novel solutions to existing climatic, agricultural and health problems. I believe this conference will help researchers in enhancing their capacities through genuine discussions and healthy interactions.

I express my sincere gratitude to all the delegates and our organising partners for making this conference an international knowledge sharing and dissemination event.

May IMAC DUBAI-2019 be blessed with scintillating success!

-- Prof. (Dr.) Jatinder Singh Bal
Prof.Dr. Ratnakar D Bala  
CEO & Director (Academics)  
IMRF Institute for Education & Research

Dear Associates

Welcome to each and every one of you congregated for the prestigious IMRF’s 98th International Gathering in the name of the International Multidisciplinary Academic Conference Dubai 2019 at IMRF Dubai Chapter, Hotel Omega, Bur Dubai, UAE jointly organized by International Multidisciplinary Research Foundation (IMRF), Dubai Chapter and Sant Baba Bhag Singh University, Jalandhar, Punjab, India, is considered to be one of the premier events for the distinguished academic and research cult.

We know that an academic conference is a symposium for inventive academicians and imaginative researchers to give academics an opportunity to present their academic works, concepts and new discoveries and to exchange their ideas and develop their works and also to share idea in presenting for development in the new research and topics and so forth. Together with academic or scientific journals, conferences plausibly provide a central channel for exchange of information among earnest researchers.

IMRF with its Academic Chapters in many Countries, since inception, has a great academic, research and social priorities to promote the spirit of values and orientations in multidisciplinary research functions of education by working out in dexterity required by the integrity of a sophisticated social world order duly transmitting central heritage with scientific bent of mind forming socialization process in respect of reformation of attitudes to confer a serene status for a rational being called man on this civilized planet, of course, from the threshold of Ratna Prasad Multidisciplinary Research and Educational Society.

IMRF with its collaborative organizations like SBBS University, has left no stone unturned for the accomplishment of its vision and mission catering its influential services in the academic and research disciplines comprising the streams of Human Rights, Social Sciences, Arts and Education, English Studies, Business Sciences, Engineering Sciences, Mathematical Sciences, Life Sciences, organizing International Conferences humbly witnessing the virtuous presence and innovative presentations of investigating pioneers, potential leaders, promising researchers, intellectual academicians, working
faculty, industry magnates, advanced educationists, eminent scientists, rational thinkers, earnest scholars and superior students with their bonafide work of discovery from as many as 50 and more countries in the world (with their recurring presence) including home towards showcasing their professional performance with excellent communication skills based on their accumulated experience in the fields concerned successfully.

Globalization is a fact. Its internalization process integrates multidisciplinary fields to embark on an adventure in the realm of academics and research. As such, this conference by International Multidisciplinary Research Foundation (IMRF). I am pleased to unveil the fact that this Copy of Proceedings marked with ISBN No 978-93-86435-67-5 presents an educative network of research with strength of quality, originality and contribution to knowledge of significant fields of multidisciplinary realms duly identified by the solemn research portals and academic destinations in the world.

While presenting you with this sonata of latest academics and research findings, I humbly place on record my loyal acknowledgement of sincere appreciation, due recognition and heart-felt thanks to all intellectual paper presenters, article contributors, members on the esteemed Editorial Board, centres of higher learning in collaboration with IMRF, foreign-national delegates, erudite plenary speakers, scholarly participants and all those who are directly or indirectly in conformity with this IMRF conferences from home and abroad for their righteous everlasting support in one and all aspects and my sincere thanks to Sant Baba Bhag Singh University, Jalandhar, Punjab, India for their ever dynamic support and cooperation. I place a special note of thanks to Sant Baba Dlawar Singh Ji (Brahm Ji), Chancellor and Prof. (Dr.) Jatinder Singh Bal, Vice-Chancellor for their blessings and strong support. Gratitude is attitude!

With effusive thanks,

Dr. Ratnakar D. Bala
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Physical &
Engineering Sciences
Abstract: The 14th International Conference on the ‘Teaching of Mathematical Modeling and Applications’ ICTMA was held at Hamburg from 27-31 July 2009. The attendance of researchers both from mathematics & mathematics education was overwhelming. The origin of this conference as a conference series started way back in 1983 at Exeter University of England. It was intended to initiate a scientific debate on the evaluation of a new course named ‘Modeling’. This unique innovative course of its time was introduced in England to satisfy the requirements of the industry with the purpose to produce technically skilled engineers, mathematicians and technicians. As the conference series progressed the emphasis shifted from teaching of mathematical modeling and applications from tertiary level to school level. Psychological and cognitive aspect was also intensely studied. In recent times mathematicians around the globe have shown interest in mathematical modeling and applications. In our institution too we have ventured to make mathematics more relevant and applicable through modeling. Through this paper I wish to elaborate our strategy.

I have worked in the higher education department teaching mathematics for more than three decades and had the privilege of interacting with students. I realized from my experience that only few students appreciate the excitement of mathematics as most learn the subject in isolation of its use in real world. Many find difficulty with learning of mathematics and suffer from math-phobia. In my opinion a major reason is the teaching methods adopted, mostly focus on solving problems with crammed up formulae rather than basic concepts and their applications. I strongly believe that while teaching mathematics more emphasis should be given to the process than the result and the process should pass through various stages like intuition, imagination, judicious guessing, experimentation, blundering, fumbling, perseverance, tabulation and thinking.

It is very apt here to quote the ‘The Indian National Policy of Education NPE-1986’ which envisaged that ‘Mathematics should be visualized as the vehicle to train a child to think, reason, analyze and articulate logically. It should be treated as a concomitant to any subject involving analysis and reasoning’.

Teaching of mathematics needs to undergo an innovation. It needs to encompass both logic and creativity such that students come to view, develop, use and make sense of mathematics and contribute to the creation of new knowledge. The method of teaching mathematics significantly affects the nature and outcomes of student learning hence educators have an enormous responsibility for their students’ mathematical well-being. They should train students to think deeply and independently about mathematical ideas, apply previous learning and make connections within mathematics, between mathematics and other bodies of knowledge and between mathematics and real life and for this, teachers need ongoing professional development/training programme from time to time so that they can use new pedagogy and latest technologies in ways that advance the mathematical thinking of their students.

In this context we have started a project though it is at a very elementary level. At the initial level we organized a National Training Programme on the ‘Art of Mathematical Modeling as Teaching Pedagogy’. The purpose was to create a deeper insight into teaching of mathematics and to facilitate critical thinking and mathematical proficiency in educators across disciplines. It provided a platform for participants to gain the requisite knowledge and skills of mathematical modeling to augment teaching, learning and research. This training programme offered educators a clear opportunity to reflect on and expand their pedagogical skills. The training programme was unique and a trendsetter in central India. It brought a sea change in the mindset and vision of the participants. They learnt that to share the deep understanding of a system with a wider audience, in an easy-to-follow manner mathematical modeling plays a crucial role. It not only helps to comprehend the system it also allows one to explore and predict the implications and supports further advancements.

Implementation of any project is a continuous process and in continuation we have introduced an introductory curriculum on mathematical models for our post graduate students from the coming session. From time to time experts shall be invited to transmit new ideas and cutting-edge technologies to support learning within mathematical modeling. Our purpose is to cultivate a vibrant mathematical insight, intuitive thinking across multiple domains and enhanced affective and cognitive power in our students. Also we intend preparing our students for responsible citizenship and societal developments for in the
next phase we plan to send our students to secondary schools where they can initiate this teaching pedagogy- enable school children to understand how mathematical models can be constructed and used effectively in different fields/real world through classroom activities. We foresee that in future our students the primary beneficiaries shall contribute to the holistic development of students in and around Jabalpur.

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qαI- CONNECTEDNESS IN IDEAL BITOPOLOGICAL SPACES

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Abstract: The purpose of this paper is to introduce and study the notion of qαI- connectedness in ideal bitopological spaces. We shall also study the notions of qαI- separated sets in ideal bitopological spaces.

Keywords: Ideal bitopological spaces, qαI- connected, qαI- separated sets, qαI- s-connected.

AMS Mathematics Subject Classification: 54A05, 54C08.

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BLOCKCHAIN – A GUARDIAN FOR BIG DATA INTEGRITY

DR.J.INDUMATHI, DR.J.GITANJALI

Abstract: The concept of Cloud Computing, enables opportune network access to a shared pool of configurable computing resources; and data is the key commodity. Data has to meet the triad CIA-Confidentiality, integrity and availability. To ensure data integrity, there is a necessity to enable public auditability, so that users can select an external audit party to check the integrity of outsourced data when required. Third Party Auditor (TPA) helps the user to audit the cloud data storage and allows the TPA to securely audit the data from the cloud, without asking for a copy and it should not create new vulnerability to user data privacy. TPA should not introduce any additional on-line burden to the cloud user. To accomplish this we need a privacy-preserving public auditing system for cloud data storage or use the blockchain technology. The Blockchain characteristics like decentralization, stability, security, non-modifiability etc., can be the best state of the art technology to provide data integrity. To prove the integrity and validate the performance of proposed schemes through concrete research and comparisons with the state-of-the-art.

Keywords: Blockchain, Decentralization, Stability, Security, Non-Modifiability

1. Introduction: According to Grove, technology is unstoppable, as irresistible as gravity and as relentless as moving water. The same holds true for all cloud and machine learning applications. HIPAA laws, regulatory issues, licensing, data validation and security risks are hurdles to the digital adoption.

2. Blockchain: A Blockchain is a ledger which is dispersed and it operates based on consensus alias validation mechanisms programmed on dissimilar nodes of its networks.

A block chain is a structure of the data, which is used to create a tamper-proof digital ledger of transactions and this is shared among the parties. The technology uses public-key cryptography to sign transactions among the parties and these transactions are stored on a distributed ledger. The ledger comprises of cryptographically linked blocks of transactions, to form a block chain. It is almost impossible or exceedingly tough to change or remove blocks of data that are recorded on the block chain ledger.

Blockchain gives a digital version of etching information into solid stone. Blockchain technology permits dispersed preservation of encrypted data and is at the heart of cooperative cloud storage.

Technologies Used in Blockchain: Blockchain technologies are erected on four different technologies primarily brought together under one parasol by the creator of Bitcoin. They are Peer-to-peer networks, Decentralized, distributed databases, Cryptography and Proof of work algorithm (to solve the so-called double-spending issue).

3. Types of Block Chain: Many types of blockchains have emerged like public, private, semi-private, side-chains etc.

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Blockchains</td>
<td>anyone can participate</td>
<td>bitcoin</td>
</tr>
<tr>
<td>Private Blockchain</td>
<td>Participate on requesting membership</td>
<td>Hyper ledger</td>
</tr>
<tr>
<td>Semi-Private</td>
<td>combination of public and private blockchains</td>
<td></td>
</tr>
<tr>
<td>Side chains</td>
<td>Concept of running a separate distributed ledger off of the main chain but with transactions able to take place in the same currency</td>
<td>bitcoin</td>
</tr>
</tbody>
</table>
4. Blockchain Data Integrity Features:
- Scale: The facility is immensely scalable with reliable performance, irrespective of the volume of clients or the volume of signed and verified data
- Portability: The service is transportable across topographies, organizational boundaries, and service providers
- Real-time protection: Data verification signatures are finalized in milliseconds permitting clients to achieve incessant monitoring and tamper detection
- Long-term signature validity: Proof is constructed on hash functions and does not expire
- Carrier-grade: The solution architecture delivers 99.999 percent accessibility
- Quantum-immune: Proof stays lawful; there is no necessity on asymmetric or elliptic curve cryptography

5. Working: How a blockchain accumulates blocks and constructs a network can be understood as follows:
The genesis node initiates a transaction with a private key. Transaction is propagated to peers which is put to consensus based on a pre-set criteria, if agreed then it is added on the network. It results in a new block (consisting of transactions) becoming part of ledger and is linked to previous block leveraging the concept of hash pointers from the field of cryptography.

Steps(figure.1) involved in the working of blockchain

Step 1. Request Transaction
Step 2. Creation of transaction
Step 3. Blockchain is created
Step 4. Block is sent to every node in the network
Step 5. Nodes authenticate the transaction
Step 6. Nodes collects a incentive for the proof of work
Step 7. Transaction is complete

Figure 1: Blockchain-Working
6. Conclusion: The speed at which technology’s coming at us can be scary, but it also presents amazing opportunities. We’re on the cusp of being able to do some fantastic things to improve the human life style. The financial world has been swept by the storm of created by the rise of crypto currencies like Bitcoin and Ethereum.

The future holds for bitcoin and its peers, is that it will certainly survive and is bound to make inroads in every sector ranging from banking and finance industry, to industries like healthcare, energy, retail, governance, supply chain and agriculture. To conclude, this research has been an prospect to investigate a wide variety of concepts, models and technologies in the information and network security fields.

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AN OVERVIEW OF CELIAC DISEASE PREDICTION
WITH FUZZY LOGIC IN MATLAB

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Abstract: Existing methodologies to diagnose celiac disease can only through clinical testing, but fuzzy logic will yield accurate results on the evidence of symptoms present in an individual. Fuzzy logic is procuring prevalence in a hurried way from last two decades by expressing numerous expert systems using fuzzy rules. So, fuzzy logic can be proposed with celiac disease to diagnose from patient symptoms and historical data. Earlier, celiac disease can be barely be diagnosed by physicians with tTG, Biopsy, Total IgA clinical tests, but with this proposed system, it can offer approximate solutions to recommend clinical testing. There are multiple parameters through which it can be diagnosed but symptoms deviate from person to person with age. In this proposed system using fuzzy logic, celiac disease can be diagnosed using common symptoms like abdominal pain, weight loss and diarrhea for producing the single probable value that will propitious for any individual to avoid clinical testing procedure with pain, time and cost. The proposed system will be implemented in MATLAB which will produce better results with measured values using de-fuzzification. The system will comprise 125 rules to diagnose celiac disease by producing single value using the Mamdani model with 3 inputs and 1 output mode. This proposed system will be beneficial for all individuals and physicians for celiac disease detection.

Keywords: Body Mass Index, Celiac Disease, Fuzzy Logic, MATLAB.

1. Introduction: Celiac disease is a type of disease that causes to intestine and damage if conceiving gluten in the diet [1]. This disease can occur at any age with diverse symptoms. Genetic factor, HLA DQ2/DQ8 is present in all those patients those tested as celiac patients. Gee first to define celiac disease in 1888 with gastrointestinal disorders [2, 3]. Any physician if require to diagnose celiac patient needs tTG test level for identification. It can be further diagnosed via Total IgA test. If any individual is taking gluten in the diet steadily will lead to mucosa problem in a few years which will promote to gastrointestinal cancer [5]. There are some individuals those does not carry any symptoms but yet there is a chance of celiac disease that is difficult to identify called silent celiac patients. ESPHAGN guidelines elaborate gluten-free product is the only way to handle celiac disease [6]. If taking a gluten-free diet for a long period of time strength leads to vitamin deficiency problem. Celiac disease can occur with first degree relative from parents with genes from ancestors, but the chances from first degree are approximately 30-40% [6, 7]. Related symptoms can be found in other diseases so it is not easy for every physician to diagnose celiac disease without clinical testing. But with the notion of fuzzy logic, it can be predicted to some extent. Fuzzy logic is a method to deal with inconsistent and vagueness information. The approach of fuzzy logic was given by Lotfi Zadeh to deal with the problem of intermediate values in 1965 [8]. Fuzzification can be done by getting the inputs from crisp values and convert them into fuzzy values with the help of membership function. The system with suitable knowledge-based requires rule base structure with the entire database which consists of every rule to be erected for optimum accuracy of the system. So, there is a demand to generate such type of intelligent systems that will be effective for physicians to diagnose the celiac disease as early as possible to tackle gut damage in the small intestine [9].

Further section II of the paper presents studies among different diseases using fuzzy logic and celiac disease case studies in last decade with fruitful outcomes. Section III and IV present implementation with MATLAB and outcome with comparison using computed values. Finally, section V defines concluding remarks with celiac disease with fuzzy logic and future outline.

2. Literature Review on Fuzzy Logic and Celiac Disease: A lot of research has been done to diagnose various diseases based on symptoms using fuzzy logic. Various researchers have tried to contribute by formulating expert systems in the field of medicine. The diagnosis procedure for Iris disease was done by Moein S et al. on 150 patients in 2009. The system produced 80% performance rate for correct diagnosis [10]. The proposed system on breast cancer was defined by Adeli and his team member in 2011. The data has been fetched from the UCI repository among 699 samples with 96% recognition [11]. In the next
year, Parewe designed dental disease software with 100 patients for testing in Indonesia with the accuracy of the system was 82% [12]. In 2013, Uduak represented Cholera model with 3 fuzzy inputs. The results were better with MATLAB results by testing 20 patients [13]. The proposed model on liver disease was defined by Hashmi using the fuzzy toolbox. The error in the system is less than 1% with a few conflicted rules [14]. To deal with trending viral infections, Kaur R et al. define the fuzzy system by input 6 fuzzy variables using symptoms [15]. In 2017, Manikandan et al. designed the lung disease model on 271 persons with questionnaire methodology. The system showed 75% specificity and 95% accurate in nature [16]. Zarandi marked kidney problem with fuzzy logic using the Mamdani model. The system having 9 input and 1 output parameters. The testing was performed on 400 samples and produced 80% accuracy of the system [17]. Recently in 2018, Chowdhury defined colorectal cancer detection using fuzzy logic [18].

On the other hand, celiac disease can only be diagnosed with a clinical approach by the number of blood tests by various researchers. Stone et al. studied diagnosis of celiac disease on 119 individuals in which 74 celiac patients having tTG positive test in 2005, Australia. Females were mostly diagnosed with celiac disease as the mean age of 5 years [19]. Sood and its team members study on more than 4000 children’s for celiac disease in Punjab. The methodology opted was questionnaire with outcome only 14 celiac patients [20]. Makharia et al. studied celiac diagnosis in Delhi on 10,000 individuals with questionnaire methodology. 31 celiac patients were registered with 1:96 patient ratio [21]. 6677 population were tested to be celiac by Aronsson with breastfeeding discussion with gluten age. The study was conducted in different countries and proved Swedish children mostly affected because of early gluten consumption [22]. The study can be integrated with fuzzy logic to design hybrid system as the celiac fuzzy prediction.

3. Implementation: The implementation of the celiac system with fuzzy logic has been applied with the Mamdani model in MATLAB using Fuzzy Logic [23, 24]. It can be suitable for real-life problems that are linear in nature. For complex and non-linear procedures, Sugeno Model is best suitable for that. In predictable solutions, multiple literature studies described numerous symptoms that have occurred at a different age or with individuals those having celiac disease. The system has been implemented only with three input parameters as Abdominal Pain, Weight Loss and Diarrhea that is commonly present in mostly all individuals that carrying celiac disease [25]. The below representation is depicted in MATLAB in Figure 1, with Mamdani approach with 1 output as celiac disease prediction.

![Celiac Disease Mamdani Fuzzy System](image)

*Figure 1: Celiac Disease Mamdani Fuzzy System*

The description of all the input and output parameters with crisp values are given below in tabular format. On the basis of crisp values, fuzzification can be done to navigate from crisp to fuzzy input with the selection of membership function as represented in Table 1.
Table 1: Summary of Input and Output Parameters

<table>
<thead>
<tr>
<th>Input Parameters</th>
<th>Crisp Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal Pain (AP)</td>
<td>Very Low, Low, Medium, High, Very High</td>
</tr>
<tr>
<td>Weight Loss</td>
<td>Very Low, Low, Medium, High, Very High</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>Very Low, Low, Medium, High, Very High</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output Parameter</th>
<th>Crisp Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disease</td>
<td>Extremely Low, Very Very Low, Very Low, Low, Medium Low, Medium, Medium High, High, Very High, Very Very High</td>
</tr>
</tbody>
</table>

The input variables that have been used in the system implemented using a triangular membership function. It consists of multiple crisp values for each fuzzy variable, as abdominal pain with crisp values very low; range (0-2), low (0-4), medium (2-6), high (4-8) and very high (6-10). The similar representation with crisp values given to weight loss and diarrhea in Figure 2. The entire range of severity of disease with symptoms is represented from 0-10 using triangular evaluation.

![Figure 2: Summary of Different Crisp Input Values](image)

For, output variable as celiac disease prediction, the crisp values consists of 10 different values range from 0-100 using triangular approach depicted in Figure 3. The plotting has been done with values EL (0-10), VVL (0-20), VL (10-30), L (20-40), ML (30-50), M (40-60), MH (50-70), H (60-80), VH (70-90) and VVH (80-100).
4. Results and Discussions: As per as computed values with membership function, each and every input of a fuzzy variable is having two different intersection points because of crisp junctions. In the below example, assumed values to get the prediction of celiac disease by input Abdominal Pain = 8, Weight Loss = 9.2 and Diarrhea = 6.6. So, from 125 rules, 8 different intersection values have been extracted that coincide with the input to the system without MATLAB. To compute the integration result, each rule should decompose with the upper and lower value of a variable as described in mathematical notation in Table 2 and Table 3.

Table 2: Evaluation of Rules

<table>
<thead>
<tr>
<th>Rule</th>
<th>Input Values</th>
<th>Intersection Points</th>
<th>Membership Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>1^3^5</td>
<td>0.3^0.1^0.2</td>
<td>0.1</td>
</tr>
<tr>
<td>R2</td>
<td>1^3^6</td>
<td>0.3^0.1^0.3</td>
<td>0.1</td>
</tr>
<tr>
<td>R3</td>
<td>1^4^5</td>
<td>0.3^0.4^0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>R4</td>
<td>1^4^6</td>
<td>0.3^0.4^0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>R5</td>
<td>2^3^5</td>
<td>0.2^0.1^0.2</td>
<td>0.1</td>
</tr>
<tr>
<td>R6</td>
<td>2^3^6</td>
<td>0.2^0.1^0.3</td>
<td>0.1</td>
</tr>
<tr>
<td>R7</td>
<td>2^4^5</td>
<td>0.2^0.4^0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>R8</td>
<td>2^4^6</td>
<td>0.2^0.4^0.3</td>
<td>0.2</td>
</tr>
<tr>
<td>( R = R_1 + R_2 + R_3 + R_4 + R_5 + R_6 + R_7 + R_8 )</td>
<td>( R = 1.13 )</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 3: Computational of Singleton Value

<table>
<thead>
<tr>
<th>Rules</th>
<th>Membership Value</th>
<th>Celiac Disease Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1 (0.1)</td>
<td>0.6</td>
<td>0.06</td>
</tr>
<tr>
<td>R2 (0.1)</td>
<td>0.6</td>
<td>0.06</td>
</tr>
<tr>
<td>R3 (0.2)</td>
<td>0.6</td>
<td>0.12</td>
</tr>
<tr>
<td>R4 (0.3)</td>
<td>0.9</td>
<td>0.27</td>
</tr>
<tr>
<td>R5 (0.1)</td>
<td>0.6</td>
<td>0.06</td>
</tr>
<tr>
<td>R6 (0.1)</td>
<td>0.9</td>
<td>0.09</td>
</tr>
<tr>
<td>R7 (0.2)</td>
<td>0.9</td>
<td>0.18</td>
</tr>
<tr>
<td>R8 (0.2)</td>
<td>0.9</td>
<td>0.18</td>
</tr>
</tbody>
</table>

Singleton Value $= \frac{1.02}{1.13} \Rightarrow 90.26$

In MATLAB, from 125 different rules, the prediction of the disease can be analyzed using input variables as fuzzy inputs to fuzzy inference mechanism. The assumed value inputs are Abdominal Pain = 8, Weight Loss = 9.2 and Diarrhea = 6.6. The rule viewer framework has produced an output of disease prediction as 92.5% based on input symptoms as in Figure 4.

Figure 4: Rule Viewer with MATLAB Output

Because of 3 input fuzzy variables, with 5 crisp values, 125 different rules have been formulated to define the prediction of celiac disease. Fuzzy rules can be defined using if-then rules with AND, OR operators to frame the rules. The rule viewer will describe each disease output by inputting 3 input parameters to show the singleton value using the centroid method.
The surface area viewer clearly describes the two vital parameters for the outcome of the system as in Figure 5. The output gets the precise view for the prediction of disease with pain and weight loss growing rapidly. The similar structure can be viewed with other parameters to distinguish the effect of symptom to the accurate prediction of disease.

Table 4: Comparison of Computed and MATLAB Results

<table>
<thead>
<tr>
<th>Computed Values (Input Parameters)</th>
<th>Abdominal Pain=8</th>
<th>Weight Loss= 9.2</th>
<th>Diarrhea= 6.6</th>
<th>Disease Probability= 90.26%</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATLAB Simulation (Input Parameters)</td>
<td>Abdominal Pain=8</td>
<td>Weight Loss= 9.2</td>
<td>Diarrhea= 6.6</td>
<td>Disease Probability=92.50%</td>
</tr>
</tbody>
</table>

From the assumption values; both computed values and MATLAB results, error difference is just 2.24% that is nominally less than 5% in Table 4. So, Prediction of celiac disease can be possible with the symptomatic study. With the help of MATLAB values, simulation can be done at the run time with numerous inputs by different individuals to diagnose the celiac disease. So, MATLAB has shown better results as compared to computed results with the same centroid de-fuzzification approach [26].

5. Concluding Remarks and Future Outline: Due to sharpness in every field of medicine, fuzzy logic is associated to create intelligent machines for determination of diseases. There are several tools available to diagnose diseases but due to accuracy in composing rules and getting an outcome with precise value is the vital role of fuzzy logic. In this proposed system, it is very clear that celiac disease can be foretold with symptoms. Because of multiple crisp values in one crisp input, provides better results to computed values. As multiple expert systems accessible everywhere in the world for diagnosis various diseases, fuzzy logic will be adequate to diagnose celiac disease which will be propitious for society as well as for physicians to predict disease with few symptoms; yet there are ambiguous symptoms for multiple diseases. In future, the system can be expanded with more than five parameters to predict celiac disease with more accurate nature as symptoms might vary in complex individuals. The system can also be expanded to define the recommendation of any test if required after disease prediction.
Conflicts of Interest: No conflict of Interest was reported by the authors

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References:


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AN EMPIRICAL ANALYSIS ON DIGITAL STEGANOGRAPHY 
TO SECURE THE DATA BY HIDING

ER. HARPREEET KAUR, DR. VIJAY DHIR

Abstract: Most of the confidential work is done with the help of the internet. Hence security should be provided to the confidential information. There are number of techniques that are provided to secure the communication. One of them is Steganography. This technique is derived from Greek words ‘steganos’ and ‘graphies’. Steganography is the process of hiding secret information of one medium in other medium. Cover file, Steganalysis, stego-medium and embedded message are the basic terms of steganography. This paper reviews the various types of steganography and the techniques which are used by these types to embed the secret information into the cover file. Steganography is different from that of cryptography as cryptography scrambles the message whereas Steganography hides the information within same or other medium.

Keywords: Steganography, Cover File, Steganalysis, Stego-Medium, Embedded Message.

Introduction: Steganography is a process of hiding the information in same medium or different medium. This term Steganography is derived from greek words ‘Steganos’ and ‘graphite’. ‘Steganos’ means covering the data and ‘graphie’ means writing on it. In other words, we can say that steganography is the art of hiding information. The main aim of steganography is to hide the information within the data, picture, audio and video so that the intruder will not able to judge the existence of the information and it becomes difficult to intruder to read the information [3].

The process of steganography consists of three factors. These are Robustness, Capacity, and Security. Capacity means the amount of data which is going to be hidden in cover medium. Security means how difficult is to detect the information. And Robustness means the amount of modifications resist by the stego medium [2]. Steganography process is different from that of Cryptography. Cryptography attracts the intruder because in cryptography process, the message is scrambled by the sender which provides the clue to the intruder that there is something confidential whereas Steganography hides the information without providing any clue to the intruder [3]. For providing more security to the information, these two techniques can be combined.

Steganography Terms: The following are the main terms which are used in the steganography [5].
1. Cover File: Information is hidden in the cover file.
2. Steganalysis: It is the process of detecting the hidden information covered in cover file [1].
4. Embedded Message: Information parts altered or overwritten inside the file without affecting the file.

Figure 1.1: Steganography terms

Types of Steganography: The following are the basic types of steganography.
Figure 2.1: Steganography Types

1. **Text Steganography**: Text Steganography is the first type of steganography. In this we embed our text file into another text file. This can be done with the help of altering the some characteristics of the textual elements. The three techniques of text steganography are:
   - Format Based Method
   - Random and Statistical Method
   - Linguistic Method.
   a. **Format Based Method**: In this method, the existing text is modified in order to hide the information. This can be done by adding spaces, changing the style of the text and resizing the text to hide the text.
   b. **Random and Statistical Method**: Random method hides the information in random sequence whereas statistical method calculates the amount of the data which is going to hide using variance, means etc.
   c. **Linguistic Method**: Linguistic Method uses syntax and semantic method to hide the information.

2. **Image Steganography**: Image Steganography is the most popular technique for hiding the information. Image Steganography is the technique in which the information is hidden within an image. The contents of the information are hidden in such a way that the cover source is not altered. There are basically three techniques that are used in image steganography are:
   - Least Significant Bit
   - Masking and Filtering
   - Algorithms and Transformations
   a. **Least Significant Bit**: Least Significant Bit generates the random number to distribute and hides the least significant bits of the information which is going to be hidden in the cover image. The sender and receiver have a stego key which is used by them for hiding and retrieving the information.

   **Advantages of Least Significant Bit** are as follows:
   - Simple and easy to implement.
   - Provides hundred percent results.
   **Disadvantages of Least Significant Bit** are as follows:
   - Not Secure.
   - Cause some distortion to the original image.
   - Rotation, addition of the noise, cropping, lossy compression and scaling will destroy the information in the stego image.

   a. **Masking and Filtering**: Masking and Filtering is another technique of image steganography. It is restricted to only 24 bit color image and gray scale image. This technique creates marking on an image like paper watermarking. This can be done by changing the properties of an image. For example, modifying the luminance of an image. Masking and Filtering technique is more suitable technique than Least Significant Bit (LSB) because information in the masking and filtering technique is hidden in the visible parts of an image whereas in LSB information is hidden in the noise level of an image.

   **Advantages of Masking and Filtering** are as follows:
   - It is a robust technique.
• It is very immune to an image manipulation.

Disadvantages of Masking and Filtering are as follows:
• Used for only 24 bit color bit image and gray scale image.

a. Transformation and Algorithms: Transformation and Algorithm technique is another type of image steganography. This technique uses the mathematical functions to hide the data. In this technique, the information is hidden in the least significant coefficients. It uses discrete cosine transformation and fast Fourier transformation for compression of a JPEG image and divides the image into small parts for hiding the information.

The secret information in the cover image is spread throughout the image by using spread spectrum and patchwork methods. With the help of these methods an image is protected from rotation and cropping. Advantages of Transformation and Algorithm technique are as follows:
• It uses redundant pattern encoding to increase robustness.
• Information hiding in high quality JPEG format images will become easy.
• Provides more security to the information as the information is spread throughout the image.

Disadvantages of Transformation and Algorithm are as follows:
• Difficult to implement because it uses mathematical functions.
• Addition of noise changes the whole image because data is spread all over the image.

3. Audio Steganography: The last type of steganography is audio steganography. Audio Steganography is based on hiding the information in the digitized audio sound. The information in audio file is embedded in such a way that results in the alteration of binary sequence of the audio file. Some of the methods that are commonly used for hiding information in audio steganography are as follows:
• Low Bit Encoding
• Phase Encoding
• Spread Spectrum
• Echo Hiding
  a. LSB Coding: This technique is used in VOIP and mobile communications. In this technique, the information is hidden when we predict the pitch period. After the prediction of pitch period, low bit rate encoding takes place. This is done in such a way that synchronization between speech encoding and information hiding is maintained [5].
  b. Phase Encoding: Phase encoding is another type of audio steganography. In this technique, original audio file is divided into blocks and the whole information is embedded only in the first block. As whole information is embedded in only first block it has less message capacity [6].
  c. Spread Spectrum: Another type of audio steganography technique is spread spectrum. In this technique, the information is spread across the whole available frequency. It provides very high robustness and moderate transmission rate. The main disadvantage of this technique is that it introduces the noise in the audio file [6].
  d. Echo Hiding: Echo Hiding is another type of audio steganography. In this technique, echo is introduced to an original signal. After that the text is embedded in it. Hidden information in echo hiding depends on three parameters: initial amplitude, offset and decay rate. One echo produced from original signal means only one bit is encoded [6].

Advantages of Steganography: The following are the some of the advantages of steganography:
1. Information with the help of steganography is done in such a way that no one can get a clue that the information is hidden in the cover medium. In other words, it does not attract the attention of the intruder. This is the main advantage of steganography. Hence, it is very secure.
2. It provides the concept of watermarking. This concept is very useful for providing the copyright protection to the cover medium. Hence, steganography provides confidentiality to the secret information from theft, sabotage.
3. Now a days, all transactions, banking, reservations and shopping is done on the internet so it is important to provide security to the debit cards, credit cards and bank accounts. Hence this can be
easily done with the help of steganography by hiding debit cards, credit cards and account number of user in cover medium.

4. Steganography can be done in audio, text, image and video cover files.

Disadvantages of Steganography: The following are some of the disadvantages of steganography:

1. If someone gets clue that there is some information is embedded in the cover file then it becomes very easy to retrieve the message and read it.
2. If this technology goes to the wrong hands like terrorists, hackers, etc. then this becomes very dangerous for the common people.
3. Message can easily be destroyed by the intruder, if someone knows there is message.

Uses of Steganography: The following are some of the uses of Steganography:

- **Secret Communication:** With the help of Steganography, the communications between the sender and receiver is done very secretly. Steganography hides the messages exchanged between sender and receiver.
- **Copyright Protection:** Steganography provides the copyright protection to the data. It is very much similar to watermarking. It is done by embedding the secret information in the image which ultimately acts as a copyright.
- **Feature Tagging:** The captions, photo’s name, location of map, annotations, also embed inside the image. The person who has the stego key can be able to view and extract the features.
- **Digital Watermarking:** Digital Watermarking is another uses of steganography. Steganography embedded digital watermarks inside the image. This is done to authenticate the identity of the owners and also provides integrity to the data.
- **Industries:** In industries, steganography has number of applications. It provides piracy or copyright to the information.
- **Other Applications:** Steganography is used in other areas like military, market, industries, banking, and medical applications which provide security to the communication takes place between the two parties [4].

Factors Affecting Steganography: The following are some of the factors that affect the steganography:

- **Robustness:** The ability of cover medium to handle the stress after embedment of the message.
- **Imperceptibility:** To what extend the original image is similar to the stego image so that the human eye cannot distinguish between original and stego image.
- **Payload Capacity:** The amount of secret message is embedded in the cover image.
- **PSNR:** Peak Signal to Noise Ratio: It is the ratio of maximum signal to corrupted signal. Higher the value of PSNR, better the results.
- **MSE:** Mean Square Error is the measure of an average square difference between original image and distorted image.
- **SNR:** Signal to Noise Ratio compares the difference between desired signals to background signal.
- **BER:** Bit Error Rate is the ratio of the number of the bit error to the number of bits transferred [4].

Conclusion: This paper overview about the steganography. Steganography is the technique which provides secure means of communication between two parties. This paper also provides information about the types of steganography and the techniques that are used by these types to embed the secret information within same or different medium. This paper includes some of the advantages, disadvantages and uses of steganography. This paper also includes the factors that affect the steganography. But steganography is combined with cryptography it provides better results.

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AN EFFECTUAL REVIEW ON ATTACK DETECTION FOR POPULAR ITEMS BASED RECOMENDER SYSTEMS

AMARJEET SINGH, NIRMAL KAUR, DR. JATINDER SINGH BAL

Abstract: Current studies has revealed the important susceptibilities of cooperative recommender schemes which are basically based on profile injection occurrences, in which bad users add fake outlines into the assessment record in order to bias the output of the system. To decrease this danger, various intelligent approaches have been projected to sense such type of attacks. Though the current detection methods can notice the normal amount of such attacks efficiently, they achieve bad impacts when sensing the recently achieved results on these types of attacks. The very significant example is average over popular items threat. Based on this problem, this paper put light on some various emerging techniques which are useful in detecting these types of such attacks in the real world scenarios.

Keyword: Supervised Learning, Knowledge Discovery, Classifications.

I. Introduction: Collaboration based recommendation systems can assist to resolve the difficulty of data overload on the web interfaces by creating personalized references for the users, which now deals with an imperative part of various e-commerce websites which includes eBay, Amazon, Netflix. Due to the ordinary candidness, still, collaborative systems are susceptible to the one of the popular attack named as ‘shilling’ or ‘injection' threats [1]. In such attacks, bad or we can say the malicious users injects heavy amount of fake outlines into a cooperative recommender schemes to prefer the recommendation consequences to their benefit. To differentiate the unaffected profiles, we frequently call the false outlines as attack profiles. Current investigation on injection of profile bouts has measured adversity of attack representations which are approaches for building attack contours. Collective attack reproductions deal with the random occurrence, movement attack, regular attack [3] etc. These types of threats are also known as standard threats. Standard threats perform seriously in disguising themselves since they are successfully detected by current recognition methods. To evade being sensed, confused attacks are used by various researchers, in which average threats are improved by some complicated arrangements. Average over popular attack is a very frequent attacks projected in current years. The discovery of fake profile injection threats has been deliberated for numerous years in the range of recommender arrangements. A diversity of methods, which deals with both supervised and unsupervised learning, has been used for sensing attack outlines. Both types of learning (supervised and unsupervised) methods achieve well performance when sensing certain normal occurrences. [4] Though, when sensing the average over popular items threat these methods achieve bad consequences. Though threats on various recommendations have been carried out in the past, operators with malicious behavior have found many methods to bias calculations and disturb the arrangement. The difficulty with recommendation systems attacks is up to that extent, if left hidden, the knowledge of the system has becomes cooperated, can produce biased approvals for operators which can cause operators to waste excess time on mistaken and false recommendations which also diminishes the operator’s trust in the complete system. In the Collaborative Filtering context, influenced operators are those who can apply considerable power over the references accessible to other operators. The powers on recommendation systems scores predictions and top approvals lists particularly when the deals with the recommendation system procedures are neighborhood based and that influenced user bouts on user’s arrangements are actual when control users are designated using methods based on the fundamental user to user relationships. Also, new substances can occasionally meet trouble with marketplace awareness to address this subject; dealers may deals with the power operators to help in reducing the threats which degrades the performance of the system.

II. Related Works: This section deals with the varieties of the researched don by the various researchers in the real world scenario to achieve efficient results. So in this paper, this section put lights on different work done for recommendation systems. C. E. Seminario and D.C.Wilson et al. proposed collaborative filtering based recommender system which helps operators to deal with the data surplus they face when look through searching for goods and services. Different power operators are those persons that are able to use substantial effect over the references made to added users, and recommendation operators inspire
the presence of influence communities and control them to assist fellow workers make knowledgeable decisions, particularly on novel items. M. P. O’Mahony and N. J. Hurley and C.M. Silvestre et al. proposed information of certain area statistics which is adequate to allow fruitful attacks to be fixed in contradiction of recommender systems. In their research work, they have examined the degree of domain information that is actually compulsory and found that when small knowledge is identified, then there will be possibility of such attacks. Bamshad Mobasher, Robin Burke, Runa Bhaumik, Chad Williams et al. proposed a secure personalization is examining a range of more complex attack models and recommendation techniques, paying specific consideration to the expenses and assistances of rising an attack. In their research, they have taken a closer appearance at product-based collaborative filtering. In specific, they have proposed a new attack prototype that emphases on a subset of operators with comparable tastes and demonstrates that such an occurrence can be highly fruitful in contradiction of an item-based procedure. Zhihai Yang et al. have developed a novel exposure technique to make recommender arrangements unaffected to such bouts. To illustrate grey rankings, they have exploited rating abnormality of item to distinguish among grey attack outlines and genuine outlines. In addition, they have also employed innovation and popularity of object to construct series of rating. Subsequently it is problematic situation to discriminate among the rating sequence of attacker and honest users, they combine discrete wavelet transform process to strengthen these alterations grounded on the rating sequence of rating abnormality, novelty and acceptance, separately. In conclusion, they have respectively extract topographies from rating sequences of score deviations, novelty and popularity by amplitude analysis technique and syndicate all clustered consequences as our recognition results. They have also conducted a list of trials on various real time datasets to analyze different models of attack. Experimental consequences were comprised to validate the efficiency of their approach in contrast with benchmarked approaches. Wei Zhou, Junhao Wen, Yun Sing Koh, Qingyu Xiong, Min Gao, Gillian Dobbie, Shafiq Alam et al. proposed an efficient systems which are highly robust to shilling bouts, both by person individually and groups. Aggressors, who present biased evaluations in order to disturb commendations, have been exposed to harmfully affect collaborative filtering procedures. They have also focused on previous researchers on the alterations amid genuine profiles and attack outlines, ignoring the cluster features in attack contours. In their research, they have also studied the practice of statistical evaluations to detect rating designs of aggressors and group features in outlines of the attacks.

III. Different Learning Approaches: Learning is normally related to computational information, which also concentrates on prediction process using computers. It has robust ties to precise optimization, which
distributes approaches, model and application fields to the field. Sometime learning is conflated using data mining process, where the final subfield concentrates more on investigative data examination process and is recognized as unsupervised knowledge process.

There are mainly two learning phases.

1. **Supervised Learning**: In this learning process the computer or machine is presented with some inputs and their prefer red productivities and the goal line is to learn an overall instruction that plans outputs based on inputs. As superior cases, the input can be partially accessible, or limited to superior response. There are also sub-categories of the supervised learning:
   a. **Semi-supervised**: In this process the machine is given an incomplete training input which deals with the training set with few of the desired outputs unavailable.
   b. **Active Process**: In this approach the machine can obtain training markers for incomplete instances and also has to enhance its objects to obtain labels for. If this process is used interactively, then this approach is very efficient to solve difficult problems.
   c. **Reinforcement process**: In this approach training data is assumed only as response to the program’s activities in an active atmosphere, such as game playing against a challenger.

2. **Unsupervised Learning**: In his type of learning process no adequate labels are assumed for the learning process, to find construction in its own input. Unsupervised process can be a goal of discovering unseen outlines from the data to extract some information to extract some features of the input data and the classification process will take place. This type of process describes the construction of data which is not labeled which deals with the information that is not classified or characterized. Since the instances given to the knowledge procedure are not labeled, there is no upfront to estimate the accuracy of the arrangement that is formed by the procedure. This is the only one characteristic that differentiates unsupervised knowledge from supervised and reinforcement process. A crucial presentation of unsupervised knowledge is in the density process approximation in figures; though unsupervised approaches encompass many further difficulties involving summarization of the data and explaining numerous key topographies of data.

![Fig 2: The Detecting Attack Process Using Feature Metrics](image)

IV. **Applications of the Machine Learning Process**: A classification is the process that splits its input data into two sections, detached by a linear borderline. Another category of machine learning process rises when one deliberates the preferred production of a machine-learned scheme.

1. In classification arrangement, input data is separated into two or additional modules and the learner must create a prototype that allocates unseen contributions to one or many classes. This is characteristically undertaken in a supervised method. Filtering of spams is an instance of classification.
arrangement, where the input deals with the emails and various other messages and the class deals with the spam and non-spam.

2. In regression process, the output data are the continuous data instead of discrete data.

3. In clustering process, the inputs are divided into cluster or we can say groups. Like in classification process the groups not known which will become a supervised task to achieve efficient classification process.

4. Reduction of dimensions of the data shortens inputs by charting them into a low dimensional data.

Topic exhibition is a related difficulty, where a package is assumed a list of language pamphlets and is related with the of which documents deals with the similar processes.

Some other areas of the learning deals with the robot monitoring and controlling which generates its own arrangements of learning circumstances to acquire collections of novel services through independent self-explaining and social communication with human and using leadership apparatuses such as active knowledge, ripening, motor interactions, and imitation.

V. Conclusion: In this paper we have studied the various researches and also the learning process using supervised and unsupervised techniques for the item attacks. Also this paper put a light on application of the learning system for the automatic classification of the attack scenarios. Also it is discussed some important literatures in the related work section which put heavy impacts on the recommendation systems. This is one of the emerging current scenarios which is having huge impact on real world threats.

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A REVIEW OF INTRUSION DETECTION SYSTEMS IN WIRELESS SENSOR NETWORKS

DR. HARMEEET SINGH, DR. VIJAYDHIR

Abstract: Wireless sensor community (WSN) has emerged as one of the most promising technology for the future. Wireless Sensor Networks (WSNs) are self-configured and infrastructure-less wireless networks to monitor environment or physical conditions, such as temperature, sound, humidity and so on. WSNs cooperatively pass their data gathered through the network to a centre location called base station so that the data can be analyzed for further processing. Secure issue of WSNs is an important research area and applications of WSN have some big security deficiencies. Intrusion Detection System is a second-line of the security mechanism for networks, and it is very important to integrity, confidentiality and availability. we highlight in this paper IDS and for the wireless sensor network. Intrusion Detection in WSNs is somewhat different from wired and non-energy constraint wireless network because WSN has some constraints influencing cyber security approaches and attack types. This paper is a survey describing different wireless sensor network attack and intrusion detection approaches to detect the attacks.

Keywords: WSN, IDS.

Introduction: Wireless Sensor Networks (WSNs) are self-configured and infrastructure-less wireless networks to monitor environment or physical conditions, such as temperature, sound, humidity and so on. WSNs cooperatively pass their data gathered through the network to a centre location called base station so that the data can be analyzed for further processing. WSN are deployed in the environments that are usually unfriendly and unsafe. WSNs have a large number of constraints from which results in new challenges. The sensor nodes have unreliable communication medium and extreme resource limitations which make it very difficult to deploy security mechanism. Figure 1 shows the structure of a typical WSN. Most of the protocols for WSNs in the past assumed that all nodes are trustworthy and cooperative. But this is not the case for many sensor network applications today and a variety of attacks are possible in WSN including Hello flood, Wormhole, Sybil, etc.[1]

Figure 1: A Typical WSN

Intrusion is an unwanted active series of similar events which denied the services and try to cause harm such as system failing to respond, and accessing unauthorized data or manipulate data. In other words, intrusions are described same as an attacks.

Intrusion detection refers to all processes used in discovering unauthorized use of network or information system". It is the technique to monitor and analyzing all the activities happened related to the intrusion and tries to accommodate the availability, confidentiality, Integrity in an information system or communication network. The IDS checks communication information and raises security alarm or message to administrator [2].

Intrusion Detection System (IDS) scrutinize to collect the information of network and any other
mishandlings [3][4]. The conventional Intrusion detection system (IDS) had been construct for wireless Sensor network (WSN) and system to identify mishandling and intrusion. In past due, WSN was focused for employing the Intrusion detection system constructed. Monitoring and analyzing system and user activities, identifying extraordinary network activity, recognizing patterns of attacks and detect coverage violations for WSNs are the features of those wireless Intrusion detection system. Wireless intrusion detection systems gather all local wireless communication and rely both on predefined anomalies and Signatures in the traffic to generate alerts. Wireless IDS detects and identify attackers to minimize the misuse communication network and information systems. There are number of problems in wireless related to protection and to cop up this situation. A number of security methods are available to prevent unauthorized used, duplication and wireless attacks. A number of information security methods are available these days for information systems protection in opposition to, alteration, duplicate data and various and virus intrusions. Intrusion-detection system (IDS) monitoring network to detect cyber-attacks (internal or external). General definition of IDS is about intrusions to network but for WSN it can be added that physical damages to sensor devices. Identifying sensor damage is important in order to serve fault tolerance and reliability. [5].

Attacks INWSN: The wireless nature of wireless sensor network transmission opened the door for the attacks and intruder that can come from any path. WSN transmit and receive the data over radio waves in air that can’t be restricted by the building walls, which made hackers and intruder to get right of entry to the network conceivable from parking zone or throughout the roads. In this phase briefly explain the most occurred attacks, for example. Wireless Sensor Network different from the wired network due to security threats and non-energy constrained wireless networks. These differences are caused from typical properties of WSN. Energy is the most important constraint for wireless sensor network and also components of security like confidentiality, integrity, and availability, there is a new basic aspect that is energy. Following are security aspects of WSN briefly.

- **Confidentiality:** It is the procedure of preserving the information transfer to the network or an information system to unauthorized user. For the confidentiality of data transfer over the network encryption is use, which is a method of combining a piece of data and a key to make the cipher text. To provide confidentiality, the network must encrypt data. This encryption can be served by symmetric and asymmetric encryption techniques. Asymmetric encryption is more powerful than symmetric encryption because of its private key approach, but asymmetric encryption is not cost effective for energy. If WSN users use symmetric encryption, they must be sure about that keeping their key. To provide this confidence, a useful and reliable IDS can warn the user about network security, or a secure key management framework can be established in a WSN system[6].

- **Integrity:** It is the capability of information secure system to maintain the accuracy and consistency. Integrity is protecting data from modified by unwanted and unauthorized sides. If only information is true, users can use the information as a value. Wireless Sensor Networks monitor environment and they work evaluating these data sensed from the environment. To provide a working properly, users must be sure about integrity of the data. In wired and non-energy constrained wireless networks users can provide integrity by digital signatures (hashing the data received and comparing it with the hash of the original data) but this approach is not suitable for WSN because of it can cause addition al by tes for data that transferred from any sensor to other one. Second negative impact of the signature is that it requires extra computational resource. In WSN systems, providing integrity needs extra computational resource and causes additional bytes for transferred data so a successful and energy saver IDS architect can provide an important integrity mechanism.

- **Availability:** Availability means whether an application, a service, a client station is available and not blocked by attackers. If the range of attack variety observes, it can be seen easily that some of the attacks do not target data transferred throughout network. There are some attacks targeting to make the network not working. The information has value of course if it is "true" (Integrity) and user access it in "true time" (Availability). Attackers can damage the availability for WSN by sending fake routing information that does not exist.
Flooding attacks, denial of service attacks, jamming, black hole attacks are some of the attacks that targeting availability.

- **Energy**: WSN has energy constraint, and this affects all security plans created for it. Sensors of WSN has limited computational resource and limited energy. WSN monitors environments and sensor life are so important to serve more time and WSN users avoid from shortening battery life of the sensor. This energy approach is encountered as an additional element to cyber security management components (confidentiality, integrity, and availability). While creating an IDS architect for WSN energy constraint must take into account absolutely.

Additional to classical network security approach, WSN security occurs with different properties. These different proper- ties cause different security management techniques, different attack types and different countermeasures. Four main components of WSN security (confidentiality, integrity, availability and energy) are described above. Following describes cyber-attacks that occur in wireless sensor networks.

A. **Sybil Attack**: Sybil attack in WSNs is one of the main attacks in which malicious node intentionally and illegally presents many forge or false identities to other sensor nodes. This is done by either creating new (fake) identities or by stealing legal identities from others sensor nodes. A variety of countermeasures against Sybil attack are proposed in the literature [7]. Each of the countermeasures has its own limitation and need improvement for producing more efficient one. The Sybil attack is described as a malicious node taking on multiple identities illegitimately. In WSN taxonomy, all nodes need to work in cooperation with other nodes to achieve given order. In sybil attack, the target is to disrupt this cooperation.

B. **Denial of Service (DoS)Attacks**: DDoS attacks commonly overthrow the channel by sending enormous packets outside of different attack sites. At the time that, the channel wastes its important resources. During extensive attacks, distributed denial of service traffic also generates an intense congestion in the Internet that disturbs the normal transmission between all Internet users [8]. Intruders want to use weak points of WSN such as limited memory and limited computation.

DDoS attack is one type of most highlighted attacks of today cyber world. DDoS attack is major problem in WSN. The main aim of DDoS attack to hindering the legitimate user’s access to a target system. There are number of tools that are used in DDoS attack are simply accessible by the intruder or attacker this increase the threats of this type of attack. When the DDoS attack is initiated, its impact and complicity become very high. If the internet structure is not secure or less secure attackers takes the advantages. Due to this the core router have few limitations which helps the DDoS attack. In as a countermeasure to jamming attack, it is described that the mapping protocol for nodes makes situational awareness in the neighboring nodes to notice a jamming attack using message diffusion. Addition to physical layer attacks, attackers can damage sensors and to avoid from this attack, users try to camouflage sensor in environment. [9]

C. **Sinkhole Attack**: Sinkhole attack is a relatively common attack. The nodes attacked claim to be able to provide a single-hop, high-quality path to the base station, which attracts the neighbor nodes to change the original route. And packets sent to the base station are discarded or forwarded to the sinkhole attacker, thus seriously damaging the load balancing of the network. It is easily combined with other attacks, causing greater damage to the network. There are some defects in the former Sinkhole detections, for example, the cooperative malicious nodes could not be detected and the detection algorithm would be complicated [10].

D. **Selective Forwarding**: Selective Forwarding (SF) is an attack where the compromised nodes only forward a fraction of received packets in an attempt to conceal its malicious actions or to bias data being collected. Since the SF attack only drops a subset of packets, it is challenging to differentiate such phenomenon from regular packet drops or poor reception due to variations in wireless link quality. Selective Forwarding (SF) attacks impact the data transmission integrity by not forwarding a subset of received packets from time to time. The 'selective' characteristic makes SF attacks hard to be distinguished
from the normal packet drops or poor receptions in a volatile wireless environment. To understand this stealthy attack, an analytical model is developed to estimate the wellness of a node’s forwarding behavior [11] [12].

**E. Wormhole Attack:** To perform this kind of attack the intruder monitor/watch the packets at particular location and establish tunnel at any other location inside the network, when tunnel the routing control message the network routing are disturbed. The tunnel among colluding intruder is known as Wormholes. This kind of attack are uncompromising threats to WSN routing protocols. Wormholes are dangerous due to the fact they could do damage without even know the network [13].

**F. HELLO Flood Attacks:** An attacker uses high-powered transmitter to trick a large area of nodes into believing they are neighbours of that transmitting node. If the attacker intentionally broadcasts a false superior route to the base station, all of these nodes will choose to transmit through the attacking node, despite many being out of radio range in reality [14]. The intruder can broadcast a powerful advertisement to all the nodes in the network and hence, every node is likely to choose the adversary as the cluster-head. The adversary can then selectively forward information to the base-station or modify or dump it [15].

![Fig 2: Hello Flood Attack](image)

**General IDS Construction:** It is having been discussed various security threats in WSN above. WSN administrators try to avoid from these attacks and use some protection and detection mechanisms. In this security management approaches, Intrusion Detection System (IDS) occurs as a second line security measure. An (IDS) can be defined as software or hardware tools that monitoring network to detect internal or external cyber-attacks. The goals of IDS are detecting attacks, preventing attacks by providing deterrence to attackers, collecting evidence from network, serving situational awareness, enforcement of connection policies. In [20], public (classically known) IDS structure is described as Fig. 2. IDS architecture, as depicted in Fig.2 [20], has four main components: Sensor, Detector, Knowledge Base, Response Component.

Basically, IDSs is classified in to two categories; Host Based IDS and Network Based IDS. [16]

**Host-based IDS:** A host based IDS tracks and monitors the directories and essential files change reside on systems. It takes current system files snap shot for matching with the earlier snap shot. In case that the critical system either deleted or modified, the alert message or notification is send for investigate to system administrator. To monitor the malicious activities Host-based IDS load a small piece of application software on the system. This software, that is basically described either agent based software or personal firewalls/host wrappers, performs the following:

a. The system auditing agents and log file used on the point of data sources, In and Out traffic of one systems.

b. Watches for suspicious processes and Checks integrity of system files, along with changes to user privileges and system files.

Network-based IDS: The intrusion comes from various directions the network-based IDS analyze and watches/monitors the traffic on communication network to detect the same. An Intrusion detection
system can be built from number of sensors, each and every sensor monitoring the traffic in and out by its owned network segments [17].

It performs a complete monitoring of traffic on entire subnet and matches the traffic characteristics with database of already stored signatures/characteristics. Once signatures/characteristics of network traffic matched with anomalies traffic signatures/characteristics it generates security message/alarm to the system administrator. Following are some Implementation that requires:

1. To capture network traffic and traveled packets which crosses its owned segment.
2. Three signatures which are specifically valuable:
   a. String-signatures which find as text string such suggest an attainable attack.
   b. Port-signatures truly monitor the system connection to know the regular attacked port.
   c. Header-signatures which monitor the illogical or dangerous combinations inside packet headers.
These approaches can be divided into two techniques too. Techniques are named as anomaly detection and misuse detection.

A. Misuse Detection: Also termed as misuse detection intrusion detection system. In this mechanism attack patterns are stored inside the database. Each packet of the network traffic is as compared with the attack patterns for abnormal behavior detection. Signature based intrusion detection approach works similar to the antivirus software. Same as the antivirus to detect the attack it matches the signatures/patterns that are already stored in database. It detects known attacks only. It has very high detection accuracy of attacks [18].

B. Anomaly Detection: Anomaly-based detection systems are also called as behaviors based intrusion detection system. It is based on network behavior. The network behavior is defined by the administrator or is learned by dataset for the duration of the training segment of the improvement of IDS. Rules are described for abnormal behavior and normal behavior. They rely upon the data that intrusions may be detected with the aid of observant deviations of the behaviors of system watched/monitored. Anomaly detection model creates a baseline profile of normal traffic activities this process is termed as training part of the system [19] [20].

IDS Approaches INWSNS: Security threats occurring in wireless sensor network are different from wired network threats because of structure of WSN and constraints which it has such as limited battery life. Hence IDS implemented in WSN has different approaches [21]. In this section, it is described that approaches pointed out by some important studies achieved in recent years. All classifications of detection approaches made by different re-searcher occur from public IDS taxonomy (Misuse Detection, Anomaly Detection). Because of different features of WSNs from wired and non-energy constrained wireless networks, different classification types is pointed out in this section.

In [22], classifying is made as intrusion type, intruder type, detection techniques, source of the collected data, analyzing location of the collected data, usage frequency and this classifying is the most comprehensive in the literature. In a network, intruder type is grouped into two categories. These categories are internal intruder (selfish or malicious node) and external intruder (An outside attacker trying to reach the system). In WSN, according to intrusion type, intrusion can be by stealing the data, by creating false data and so altering the system, by denying to access the system, by influencing the energy efficient. For detection methodologies it has been described above as misuse and anomaly detection but additionally some papers point out hybrid or specification based detection. In specification based detection is described as that” to detect particular attacks and to analyze node behaviours, by security rules are created”. If any situation invades rules, then system decide that there is an intrusion. In the literature, source of classified data is pointed out as Network Based Intrusion Detection, Host Based Intrusion Detection and Hybrid Based Intrusion Detection [22]. According to analyzing location of the collected data IDS approach is divided into two parts and these parts are centralized IDS and distributed IDS. All of approaches in WSN explained in this section can be implemented according to system necessities. Following explains detection methodologies used particular researches about IDS inWSNs between 2011 and 2014 detailed.

A. Anomaly Detection Approaches in WSN: According to [23] anomalies of WSN can be grouped as
Network Anomalies, Node Anomalies, Data Anomalies and Other Anomalies.

- Network Anomalies are about connection problems existing in WSNs. Abnormal and unexpected increments and decreases are signal decide whether there is any Network Anomaly or not. These signals are described as Loss of Connectivity, Episodic (Discontinuous) Connectivity, Routing Loops, Broadcast Storms.
- Node Anomalies are hardware or software problems on the sensors. Actually, the signals of node anomalies are caused from failure of solar panel sand power issues.
- Data Anomalies are caused from disorder data sets. These irregularities can be caused from about sensor or environmental problems.
- Other Anomalies can be defined as not fitting to other type anomalies described above.

Additional to types of WSN anomalies, approaches detecting WSN anomalies is important too. These approaches are used to implement an IDS in WSN as a detecting solution and they can be combined with each other. These approaches can be sorted as statistical based, artificial immune system based, machine learning based, data mining based and game theory based.

In Anomaly Detection and Localization in UWB Wide-less Sensor Networks - 2013, author has been proposed an anomaly detection solution specifically designed for the ultra-wideband (UWB) technology. In the paper, it is described that UWB is a key solution to serve low power consumption while wireless connectivity. To identify intrusions, a rule based approach is accepted and performance of the proposed algorithm is studied by simulations. The algorithm proposed in the paper, uses a round-based (There are particular phases) approach towards cluster structure and rule based anomaly detection. The test results shown in paper point out a successful detection accuracy[24].

In A Game-Theoretic Framework for Robust Optimal Intrusion Detection in Wireless Sensor Networks - 2014, it is claimed that instead of approaches using heuristic and ad-hoc solutions, there is an increase to use analytical approaches for security issues in WSN. Hence authors propose a nonzero-sum discounted robust stochastic game framework to analyze intrusion detection problem in WSN. Game’s parameters are modelled by features of WSN and it’s environment[25].

B. Misuse Detection Approaches in WSN: It is also known as signature based IDS and is successful to detect known attacks. It’s drawback is that it can not detect new unknown attacks or attacks having not predefined rules. Using misuse detection technique is a complex task for WSN because of constraints of WSN. For instance, keeping signatures of attacks is very difficult and is less effective. In the literature it is seen that a few studies use misuse detection technique and they propose watchdog approach and mobile agent approach[21].

In Intrusion Detection in Wireless Sensor Networks Using Watchdog Based Clonal Selection Algorithm - 2013, the watchdog approach is used to detect whether a node has abnormal behavior while forwarding data. All nodes in the WSN is responsible for monitoring the neighbors and transferring the information about behaviour. Misbehaviour of nodes affect performance of WSN negatively. With using watchdog based clonal selection algorithm it is aimed that detect malicious and selfish nodes of WSN[26].

C. Hybrid Detection Approaches in WSN: Some detection solutions, because of having detection approaches, can not be involved to misuse detection or anomaly detection classification. Hence, researchers add a different title as hybrid, specification e.g. In [21], it is described that, some specification based solutions have been proposed and the main drawback of this solution is that the development of protocol specifications is created by human. Security protocols of WSN is defined by administrator manually. Author describes this approach with three techniques and hybrid detection is involved in this classification as third subtitle. Classification of is that 1- Decentralized Approach, 2-Pre-defined Watchdog Approach, 3-Hybrid System Approach. For classification made in this paper, Hybrid Approach is not a subtitle but is one of the main titles. Hybrid approach can be explained like that staying out of anomaly and misuse detection, or combining anomaly and misuse detection techniques.

In Novel Hybrid Intrusion Detection System For Clustered Wireless Sensor Network - 2011, it is aimed that
combining anomaly detection based and misuse (signature) based approaches in order to achieve a more accurate intrusion detection system. The anomaly detection uses a distributed learning algorithm for the training of a SVM to solve the two-class problem (distinguish between normal and anomalous activities). The goal of this study is described as to save the energy [27].

**Conclusion And Futurework:** The aim of this paper to prepare the survey of intrusion detection system in WSN. Various internal and external cyber-attacks occur on wireless sensor network are discussed in details like Sybil and DDoS attacks. Host based and Network based IDS also described. Misuse and anomalies of wireless sensor network for intrusion detection are discussed, hybrid intrusion detection of wireless sensor network is pointed out from some studies in recent years. In the future work, it is aim to design the technique for wireless sensor network to detect the Sybil and Wormhole Attack.

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A STUDY AND IMPLEMENTATION OF HYBRID PSO-ACO BASED SWARM OPTIMIZATION TECHNIQUES

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Abstract: Artificial Intelligence play a crucial role in various applications of engineering and sciences. With advancements in Artificial intelligence, it is necessity of the time to implement artificial intelligence in possible areas of medical, agriculture, education, defense and get optimal outputs.

Keywords: Particle Swarm Optimization, Ant Code Optimization.

1. Introduction:
1.1 Swarm Intelligence: The social insect metaphor for solving problems has become a hot topic in the last five years. This approach emphasizes distributedness, direct or indirect interactions among relatively simple agents, flexibility, and robustness. The number of its successful applications is exponentially growing in combinatorial optimization, communications networks, and robotics. Every single insect in a social insect colony seems to have its own agenda, and yet an insect colony looks so organized. The seamless integration of all individual activities does not seem to require any supervisor. In a social insect colony, a worker usually does not perform all tasks, but rather specializes in a set of tasks, according to its morphology, age, or chance. This division of labor among nest mates, whereby different activities are performed simultaneously by groups of specialized individuals, is believed to be more efficient than if tasks were performed sequentially by unspecialized individuals. An insect is a complex creature: it can process a lot of sensory inputs, modulate its behavior according to many stimuli, including interactions with nest mates, and make decisions on the basis of a large amount of information.

The expression “swarm intelligence” was first used by Beni, Hackwood, and Wang in the context of cellular robotic systems, where many simple agents occupy one- or two-dimensional environments to generate patterns and self-organize through nearest-neighbor interactions. Using the expression “swarm intelligence” to describe only this work seems unnecessarily restrictive: that is why we extend its definition to include any attempt to design algorithms or distributed problem-solving devices inspired by the collective behavior of social insect colonies and other animal societies. And, strangely enough, this definition only marginally covers work on cellular robotic systems, which does not borrow a lot from social insect behavior.

The social insects work without supervision. In fact their team work is largely self organized and coordination arises from different interactions among individuals in the colony. Although, these interactions might be primitive (one ant merely following the trail left by another, for instance) taken together they result in efficient solution to difficult problems (such as finding the shortest route to a food source among myriad possible paths). The collective behavior that emerges from a group of social insects has been dubbed “Swarm Intelligence”.

1.2 The advantages of Swarm Intelligence:
- Flexibility: The group can quickly adapt to a changing environment.
- Robustness: Even when one or more individual fails, the group can still perform the task.
- Self-Organization: The group needs relatively little supervision or top-down control.

1.3 Applications of Swarm Intelligence: Swarm Intelligence-based techniques can be used in a number of applications. The U.S. military is investigating swarm techniques for controlling unmanned vehicles. ESA is thinking about an orbital swarm for self assembly and interferometry. NASA is investigating the use of swarm technology for planetary mapping. There is a paper by George A. Bekey discusses the possibility of using swarm intelligence to control nanobots within the body for the purpose of killing cancer tumors. Artists are using swarm technology as a means of creating complex interactive systems or simulating crowds. Tim Burton’s Batman Returns was the first movie to make use of swarm technology for rendering, realistically depicting the movements of a group of penguins using the Boids system. Swarm
technology is particularly attractive because it is cheap, robust, and simple. The inherent intelligence of swarms has inspired many social and political philosophers, in that the collective movements of an aggregate often derive from independent decision making on the part of a single individual. A common example is how the unaided decision of a person in a crowd to start clapping will often encourage others to follow suit, culminating in widespread applause. Such knowledge, an individualist advocate might argue, should encourage individual decision making (however mundane) as an effective tool in bringing about widespread social change.

1.4 Types of Swarm Intelligence:

1.4.1 Ant Colony Optimization: Ant Colony Optimization is a class of optimization algorithms modeled on the actions of an ant colony. Artificial 'ants' - simulation agents - locate optimal solutions by moving through a parameter space representing all possible solutions. Real ants lay down pheromones directing each other to resources while exploring their environment. The simulated 'ants' similarly record their positions and the quality of their solutions, so that in later simulation iterations more ants locate better solutions. One variation on this approach is the bees algorithm, which is more analogous to the foraging patterns of the honey-bee.

1.4.2 Particle Swarm Optimization: Particle Swarm intelligence or PSO is a global optimization algorithm for dealing with problems in which a best solution can be represented as a point or surface in an n-dimensional space. Hypotheses are plotted in this space and seeded with an initial velocity, as well as a communication channel between the particles. Particles then move through the solution space, and are evaluated according to some fitness criterion after each time step. Over time, particles are accelerated towards those particles within their communication grouping which have better fitness values. The main advantage of such an approach over other global minimization strategies such as simulated annealing is that the large numbers of members that make up the particle swarm make the technique impressively resilient to the problem of local minima.

2. Objective: To study and implement optimization problems in Swarm Intelligence A set of conveniently defined artificial ants, the behavior of which is designed after that of their real counterparts, can be used to solve combinatorial optimization problems. Results obtained with ant-based algorithms are often as good as those obtained with other general-purpose heuristics. In the project the basic ant system algorithm is used to solve the traveling salesman problem. Modeling social behavior - aimed at producing computational intelligence by exploiting simple analogues of social interaction, rather than purely individual cognitive abilities, is major objective behind PSO. The goal in developing it has been to keep it simple and robust, and we seem to have succeeded at that. The algorithm is written in a very few lines of code, and requires only specification of the problem and a few parameters in order to solve it. This algorithm belongs ideologically to that philosophical school that allows wisdom to emerge rather than trying to impose it, that emulates nature rather than trying to control it, and that seeks to make things simpler rather than more complex.

3. ANT Colony Optimization-An Introduction:

3.1 Self Organization In Social Insects: Some of the mechanisms underlying cooperation are genetically determined: for instance, anatomical differences between individuals, such as the differences between minors and majors in polymorphic species of ants, can organize the division of labor. But many aspects of the collective activities of social insects are self-organized. Models based on SO do not preclude individual complexity: they show that at some level of description it is possible to explain complex collective behavior by assuming that insects are relatively simple interacting entities. The discovery that SO may be at work in social insects not only has consequences on the study of social insects, but also provides us with powerful tools to transfer knowledge about social insects to the field of intelligent system design. In effect, a social insect colony is undoubtedly a decentralized problem-solving system, comprised of many relatively simple interacting entities. The daily problems solved by a colony include finding food, building or extending a nest, efficiently dividing labor among individuals, efficiently feeding the brood, responding to external challenges, spreading alarm, etc. Many of these problems have counterparts in engineering and computer science. One of the most important features of social insects is that they can solve these problems in a very flexible and robust way: flexibility allows adaptation to changing environments, while
robustness endows the colony with the ability to function even though some individuals may fail to perform their tasks. Finally, social insects have limited cognitive abilities: it is, therefore, simple to design agents, including robotic agents, that mimic their behavior at some level of description. In short, the modeling of social insects by means of SO can help design artificial distributed problem-solving devices that self-organize to solve problems—swarm intelligent systems.

Self-organization is a set of dynamical mechanisms whereby structures appear at the global level of a system from interactions among its lower-level components. The rules specifying the interactions among the system's constituent units are executed on the basis of purely local information, without reference to the global pattern, which is an emergent property of the system rather than a property imposed upon the system by an external ordering influence. For example, the emerging structures in the case of foraging in ants include spatiotemporally organized networks of pheromone trails. Self-organization relies on four basic ingredients:

1. Positive feedback (amplification) often constitutes the basis of morphogenesis in the context of this book: they are simple behavioral “rules of thumb” that promote the creation of structures. Examples of positive feedback include recruitment and reinforcement. For instance, recruitment to a food source is a positive feedback that relies on trail laying and trail following in some ant species, or dances in bees.

2. Negative feedback counterbalances positive feedback and helps to stabilize the collective pattern: it may take the form of saturation, exhaustion, or competition. In the example of foraging, negative feedback stems from the limited number of available foragers, satiation, food source exhaustion, crowding at the food source, or competition between food sources.

3. SO relies on the amplification of fluctuations (random walks, errors, random task-switching, and so on). Not only do structures emerge despite randomness, but randomness is often crucial, since it enables the discovery of new solutions, and fluctuations can act as seeds from which structures nucleate and grow. For example, foragers may get lost in an ant colony, because they follow trails with some level of error; although such a phenomenon may seem inefficient, lost foragers can find new, unexploited food sources, and recruit nestmates to these food sources.

4. All cases of SO rely on multiple interactions. A single individual can generate a self-organized structure such as a stable trail provided pheromonal lifetime is sufficient, because trail-following events can then interact with trail-laying actions. However, SO generally requires a minimal density of mutually tolerant individuals. Moreover, individuals should be able to make use of the results of their own activities as well as of others’ activities (although they may perceive the difference): for instance, trail networks can self-organize and be used collectively if individuals use others’ pheromone. This does not exclude the existence of individual chemical signatures or individual memory which can efficiently complement or- sometimes replace responses to collective marks.

When a given phenomenon is self-organized, it can usually be characterized by a few key properties:

1. The creation of spatiotemporal structures in an initially homogeneous medium. Such structures include nest architectures, foraging trails, or social organization.

2. The possible coexistence of several stable states (multistability). Because structures emerge by amplification of random deviations, any such deviation can be amplified, and the system converges to one among several possible stable states, depending on initial conditions.

3. The existence of bifurcations when some parameters are varied. The behavior of a self-organized system changes dramatically at bifurcations.

**3.1.2 Stigmergy:** Self-organization in social insects often requires interactions among insects: such interactions can be direct or indirect. Direct interactions are the “obvious” interactions: antennation, trophallaxis (food or liquid exchange), mandibular contact, visual contact, chemical contact (the odor of nearby nestmates), etc. Indirect interactions are more subtle: two individuals interact indirectly when one of them modifies the environment and the other responds to the new environment at a later time. Such an interaction is an example of stigmergy. Grasse introduced stigmergy (from the Greek stigma: sting, and ergon: work) to explain task coordination and regulation in the context of nest reconstruction in termites of the genus Macrotermes. Grasse showed that the coordination and regulation of building activities do not depend on the workers themselves but are mainly achieved by the nest structure: a
stimulating configuration triggers the response of a termite worker, transforming the configuration into another configuration that may trigger in turn another (possibly different) action performed by the same termite or any other worker in the colony. Nest reconstruction consists of first building strips and pillars with soil pellets and stercoral mortar; arches are then thrown between the pillars and finally the interpillar space is filled to make walls.

3.2 Application of ACO: Ant-based algorithms have been applied to other combinatorial optimization problems such as

- Quadratic assignment problem,
- Graph coloring
- Job-shop scheduling
- Sequential ordering
- Vehicle routing.

Results obtained with ant-based algorithms are often as good as those obtained with other general-purpose heuristics.

3.3 Particle Swarm Optimization – Introduction: In recent years, it has proved possible to identify, abstract, and exploit the computational principles underlying some forms of swarm intelligence, and to deploy them for scientific and industrial purposes. One of the best-developed techniques of this type is particle swarm optimisation (PSO).

In PSOs, which are inspired by flocks of birds and shoals of fish, a number of simple entities, the particles, are placed in the parameter space of some problem or function, and each evaluates the fitness at its current location. Each particle then determines its movement through the parameter space by combining some aspect of the history of its own fitness values with those of one or more members of the swarm, and then moving through the parameter space with a velocity determined by the locations and processed fitness values of those other members, along with some random perturbations. The members of the swarm that a particle can interact with are called its social neighbourhood. Together the social neighbourhoods of all particles form a PSO social network.

More precisely, in the canonical version of PSO, each particle is moved by two elastic forces, one attracting it with random magnitude to the fittest location so far encountered by the particle, and one attracting it with random magnitude to the best location encountered by any of the particle’s social neighbours in the swarm. If the problem is \( N \)-dimensional, each particle’s position and velocity can be represented as a vector with \( N \) components (one for each dimension). Starting with the velocity vector, \( \mathbf{v} = (v_1, \ldots, v_N) \), each component, \( v_i \), is given by

\[
v_i(t + 1) = \omega v_i(t) + \psi_1 R_1 (x_{\text{best}} - x_i(t)) + \psi_2 R_2 (x_{\text{pbest}} - x_i(t))
\]

where \( x_{\text{best}} \) is the \( i \)-th component of the best point visited by the neighbours of the particle, \( x_{\text{pbest}} \) is the \( i \)-th component of its personal best, \( R_1 \) and \( R_2 \) are two independent random variables uniformly distributed in \([0, 1] \), \( \omega \) is a constant known as the inertia weight, and \( \psi_1 \) and \( \psi_2 \) are two constants, known as the acceleration coefficients, which control the relative proportion of cognition and social interaction in the swarm. The same formula is used independently for each dimension of the problem, and synchronously for all particles. The position of a particle is updated every time step using the equation

\[
x_i(t + 1) = x_i(t) + v_i(t + 1).
\]

The following alternative velocity-update equation is also widely used:

\[
v_i(t + 1) = \kappa (v_i(t) + \psi_1 R_1 (x_{\text{best}} - x_i(t)) + \psi_2 R_2 (x_{\text{pbest}} - x_i(t)))
\]

where \( \kappa \) is a constant called the constriction coefficient. If \( \psi_1, \psi_2 \) and \( \kappa \) (or \( \omega \)) are correctly chosen, the PSO is guaranteed to be stable without the need for special constraints (e.g., bounding of velocities and positions).

The topology of the social network used by a PSO is at least as important in determining its behaviors and performance as are the details of the velocity update equation. Many variants of the canonical PSO and many topologies have been developed and tested in the last decade.
PSO can be and has been used across a wide range of applications. In general, we can say that areas where PSO has shown particular promise include multimodal problems and problems for which there is no specialised method available or all specialised methods give unsatisfactory results.

3.4 PSO Applications:

1. **Antennas**: Applications include the optimal control and design of phased arrays, broadband antenna design and modeling, design of Yagi-Uda arrays, array failure correction, optimization of profiled corrugated horn antennas, optimization of a reflect array antenna, far-field radiation pattern reconstruction, antenna modeling, design of planar antennas, conformal antenna array design, design of patch antennas, antenna miniaturization, design of multi band antennas, design of a periodic antenna arrays, near-field antenna measurements, synthesis of antenna arrays, reflector antennas, adaptive array antennas, design of implantable antennas.

2. **Biomedical**: Applications include human tremor analysis for the diagnosis of Parkinson’s disease, inference of gene regulatory networks, human movement biomechanics optimization, phylogenetic tree reconstruction, cancer classification, and survival prediction, DNA motif detection, gene clustering, identification of transcription factor binding sites in DNA, biomarker selection, protein structure prediction and docking, drug design, radiotherapy planning, analysis of brain magnetoencephalography data, RNA secondary structure determination, electroencephalogram analysis, biometrics.

3. **Communication Networks**: Applications include bluetooth networks, autotuning for universal mobile telecommunication system networks, optimal equipment placement in mobile communication, routing, radar networks, wavelength-division-multiplexed network, peer-to-peer networks, TCP network control, bandwidth and channel allocation, WDM telecommunication networks, wireless networks, grouped-and-delayed broadcasting, bandwidth reservation.

4. **Clustering and Classification**: Applications include clustering, clustering in large spatial databases, dynamic clustering, dimensionality reduction, genetic-programming-based classification, fuzzy clustering, cascading classifiers, classification threshold optimization, classification of hierarchical biological data, electrical wafer sort classification, document and information clustering, data mining, feature selection.

5. **Combinatorial Optimization**: These include applications on floor planning, travelling-salesman problems, packing and knapsack, minimum spanning trees, satisfiability, path optimization, knights cover problem, n-queens problem, layout optimization, vehicle routing, urban planning, FPGA placement and routing.

6. **Design**: These include conceptual design, induction heating cooker design, VLSI design, RF circuit synthesis, worst case electronic design, filter design, antenna design, CMOS wideband amplifier design, motor design, logic circuits design, power systems, transmission lines, mechanical design, electromagnetics, case library search.

7. **Distribution Networks**: Applications include transmission network planning, network reconfiguration and expansion, voltage regulation, congestion management.

8. **Engines and Motors**: Topics include engine data classification, locomotive torque control, motor control in electric and hybrid vehicles, induction motor speed control, direct motor torque control, fault and parameter estimation in induction motors, optimization of internal combustion engines, optimization of nuclear electric propulsion systems.

9. **Entertainment**: Music generation and games have also a small niche in PSO applications. In the area of games, applications include analysis of leaf nodes in game trees, learning to play board games, iterated prisoner dilemma, learning to play solo Pong. In the area of music, swarms have been used for interactive music improvisation.
10. Fuzzy and Neurofuzzy: These include design of neurofuzzy networks, fuzzy rule extraction, fuzzy control, membership functions optimization, fuzzy modeling, fuzzy classification, design of hierarchical fuzzy systems, fuzzy queue management.

11. Graphics and Visualization: Specific topics include graphic presentation of networks, dimensionality reduction, collision detection in graphic models, texture synthesis, interactive particle swarms, 3D graphics.

12. Image and Video: Image analysis applications include iris recognition, fruit quality grading, face detection and recognition, image segmentation, synthetic aperture radar imaging, locating treatment planning landmarks in orthodontic x-ray images, image classification, inversion of ocean color reflectance measurements, image fusion, traffic stop-sign detection, defect detection, image retrieval, human detection in infrared imagery, image registration.

13. Neural Networks: Neural networks are used in combination with PSO in many applications. Some have already been listed under a different heading elsewhere. Topics include inversion of neural networks, neural network control for nonlinear processes, design of radial basis function networks, product unit networks, neural gas networks, feedforward neural network training, design of recurrent neural networks, cellular neural networks, wavelet neural networks, neuron controllers.

14. Power Systems and Plants: Specific applications include automatic generation control, power transformer protection, load forecasting, optimal strategies for electricity production, power loss minimization, production costing, and operations planning.

15. Robotics: Topics include control of robotic manipulators and arms, motion planning and control, robot running, collective robotic search, unsupervised robotic learning, path planning, obstacle avoidance, swarm robotics, unmanned vehicle navigation, soccer playing, robot vision, voice control of robots.


4. Present Work:
4.1 Ant Colony Optimization: The Traveling Salesman Problem:
4.1.1 Foraging Strategies In Ants: Many ant species have trail-laying trail-following behavior when foraging: individual ants deposit a chemical substance called pheromone as they move from a food source to their nest, and foragers follow such pheromone trails. The process whereby an ant is influenced toward a food source by another ant or by a chemical trail is called recruitment, and recruitment based solely on chemical trails is called mass recruitment.

Algorithm:
/* Initialization */
For every edge \((i, j)\) do
\(\tau_{ij}(0) = \tau_0\)
End For
For \(k = 1\) to \(m\) do
Place ant \(k\) on a randomly chosen city
End For
Let \(T^*\) be the shortest tour found from beginning and \(L^*\) its length
/* Main loop */
For \(t = 1\) to \(t_{max}\) do
For \(k = 1\) to \(m\) do
Build tour \(T^k(t)\) by applying \(n - 1\) times the following step:
Choose the next city $j$ with probability

$$p_{ij}(t) = \frac{[\tau_{ij}(t)]^{\alpha} \cdot [\eta_{ij}]^{\beta}}{\sum_{j \in J_k} [\tau_{ij}(t)]^{\alpha} \cdot [\eta_{ij}]^{\beta}},$$

where $i$ is the current city.

**End For**

For $k = 1$ to $m$

Compute the length $L_k(t)$ of the tour $T_k(t)$ produced by ant $\alpha$.

**End For**

If an improved tour is found then

Update $T^+$ and $L^+$

**End If**

For every edge $(i, j)$ do

Update pheromone trails by applying the rule:

$$\Delta \tau_{ij}(t) = \sum_{k=1}^{m} \Delta \tau_{ij}^k(t),$$

$$\Delta \tau_{ij}^k(t) = \begin{cases} Q/L_k^i(t) & \text{if } (i, j) \in T_k^i(t); \\ 0 & \text{otherwise}, \end{cases}$$

and

$$\Delta \eta_{ij}^k(t) = \begin{cases} Q/L^+ & \text{if } (i, j) \in T^+; \\ 0 & \text{otherwise}, \end{cases}$$

**End For**

For every edge $(i, j)$ do

$$\tau_{ij}(t+1) = \tau_{ij}(t)$$

**End For**

Print the shortest tour $T^+$ and its length $L^+$

**Stop**

// Values of parameters used in experiments */

$Q = l.1/3 = 5, \rho = 0.5, m = n, Q = 100, \gamma_0 = 10^{-6}, e = 5$

Dorigo also ran a number of experiments aimed at understanding the way AS functions. Among others, a set of experiments showed that the population of solutions generated by AS does not converge to a single common solution. On the contrary, the algorithm continues to produce new, possibly improving, solutions. It is clear that, although the best solution produced by AS converges toward the optimal solution within 500 iterations, the population maintains a high diversity, as shown by the relatively high standard deviation value and by the fact that the average branching number has a value greater than 5 after 3,000 iterations. If all generated solutions were identical, the average branching number would quickly drop to 2. This "nonconvergence" property of the population of solutions is interesting because:

1. It tends to avoid the algorithm getting trapped in local optima.
2. It makes AS promising for applications to dynamical problems, that is, problems the characteristics of which change at run time.
4.2 General PSO Algorithm:

Figure 1: Concept of modification of a searching point by PSO

sk : current searching point.
sk+1: modified searching point.
vk: current velocity.
vk+1: modified velocity.
vpbest : velocity based on pbest.
vgbest : velocity based on gbest

1. Initialise particles in the search space at random.
2. Assign random initial velocities for each particle.
3. Evaluate the fitness of each particle according to a user-defined objective function.
4. Calculate the new velocities for each particle.
5. Move the particles.
6. Repeat steps 3 to 5 until a predefined stopping criterion is satisfied.

For each particle
    Initialize particles with feasible random numbers
End For

While converge criterion is not satisfied
    For each particle
        Calculate the fitness value
        If the fitness value is better than the best fitness value (pbest) in history
            Set current value as the new pbest
        End If
    End For
    Choose the particle with the best fitness value so far as the gbest

    For each particle
        Calculate particle velocity
        Update particle position
    End For
End While

Formula to Calculate Particle Velocity:
vid = vid + ϕ1*rand()*(pid-xid) + ϕ2*rand()*(pgd-xid); \rightarrow 4

Formula to Update Particle Position:
vid = xid + vid; \rightarrow 5

- Where V is the particle velocity. A constant, Vmax, was used to arbitrarily limit the velocities of the particles and improve the resolution of the search.
• Where \( i \) is the particle.
• Where \( d \) is the \( d \)th dimension.
• \( \phi_1, \phi_2 \) are the cognition and social learning rates – are fixed and set to same value.
• Where \( \text{rand()} \) is a random number between \((0,1)\) – uniform distribution.
• \( P \): The best position so far
• \( X \): The position at present
• Where \( g \) represents the index of the particle with the best p-fitness

Figure 2: Process Flow Chart of PSO

4.3 PSO Topology:
4.3.1 Static and Dynamic Topology:

a) Static Topology

• gbest topology (global best),
  – where the best neighbour in the entire population influenced the target particle.
  – Is conceptualized as fully connected graph
  – Where neighbours and neighborhoods do not change during the run, hence shows static topology.

• lbest topology (local best)
  – Simple ring lattice where each individual was connected to \( k=2 \) adjacent members in population array
  – Allow parallel search as subpopulations can converge in diverse regions of search space resulting in good optima.
  – But result in slow convergence.

b) Dynamic Topology

• In this neighbors are defined in the search space and the number of neighbors was dynamically increased though the course of the run.
• Janson arranged the particle in dynamic heirarchy, with each particle influenced by its own previous success and that of the particle above it.
• Particles with better performance are moved up the heirarchy, thus they have more effect on poorer particles.
• Result was improved performance on most of benchmark problems.
• Clerc developed parameter free particle swarm system called “Tribes”, in which detail of topology including the size of population, evolve over time in response to performance feedback, hence Dynamic Topology.
• The population is divided into subpopulations each maintaining its order and structure.
• Good Tribes may benefit by removal of their weakest member as they already have good problem solution and thus may afford to reduce their population.
• Bad Tribes, benefit by addition of new member, increasing the possibility of improvement.
• New particle are randomly generated.
• Clerc revaluates and modifies the population structure every L/2 iterations, where L is the number of links in the population.

4.4 Types Of PSO
a) 1st form: Basic PSO
\[ vid = vid + \varphi_1 \cdot \text{rand()} \cdot (pid - xid) + \varphi_2 \cdot \text{rand()} \cdot (pgd - xid); \rightarrow 6 \]
\[ xid = xid + vid; \rightarrow 7 \]

Disadvantages:
• Hard Bound on Velocities i.e. velocities in the range \([0, V_{max}]\), When \(V_{max}\) was implemented particles trajectory failed to converge.

b) 2nd form of PSO (Inertia Weight)
• Reduce the importance of \(V_{max}\) and remove it altogether
\[ vid = \omega \cdot vid + \varphi_1 \cdot \text{rand()} \cdot (pid - xid) + \varphi_2 \cdot \text{rand()} \cdot (pgd - xid); \rightarrow 8 \]
where,
\( pid \): pbest of agent \( i \)
\( gd \): gbest of the group.
\( \omega \): weighting function,

The following weighting function is usually utilized in (i)
\[ w = \omega_{\text{Max}} - \left( \omega_{\text{Max}} - \omega_{\text{Min}} \right) \cdot \frac{\text{iter}}{\text{maxIter}} \rightarrow 9 \]
where \( \omega_{\text{Max}} = \text{initial weight} \),
\( \omega_{\text{Min}} = \text{final weight} \),
\( \text{maxIter} = \text{maximum iteration number} \),
\( \text{iter} = \text{current iteration number} \).

\[ xid = xid + vid \rightarrow 10 \]
A large inertia weight (\( w \)) facilitates a global search while a small inertia weight facilitates a local search. By linearly decreasing the inertia weight from a relatively large value to a small value through the course of the PSO run gives the best PSO performance compared with fixed inertia weight settings.

c) 3rd Form Constriction Coefficients:
• This coefficient controlled the convergence of the particle and allowed elegant method for preventing explosion, ensuring convergence and eliminating the arbitrary \( V_{max} \) parameter
• It removes the guesswork for assigning values to \( \varphi_1 \) and \( \varphi_2 \)
\[ vid = K \cdot vid + \varphi_1 \cdot \text{rand()} \cdot (pid - xid) + \varphi_2 \cdot \text{rand()} \cdot (pgd - xid) \rightarrow (i) \]
\[ xid = xid + vid \rightarrow (i) \]
here,
\[ K = \frac{2}{2 - \varphi - \sqrt{\varphi^2 - 4\varphi}} \]
\[ \varphi = \varphi_1 + \varphi_2 \]
where \( \varphi > 4 \)
if \( \varphi_1 = \varphi_2 = 2.1 \) then \( K \) approximately = 0.7298
We see,

PSO with inertia = PSO with constriction if we simply replace $w \rightarrow K$ and $\phi_1 \rightarrow K\phi_1$

So we have $w = 0.7298$ and $\phi_1 = 1.49618$

d) **4th Type – Fully Informed Particle Swarm**: In traditional PSO algorithm, each particle is affected with its own previous performance and single best success found in its neighbourhood but, In this particle is affected by all its neighbours, sometimes with no influence from its own previous success.

$$v_{id} = K(v_{id} + 1/ki \sum_{n=1}^{ki} \phi_1 \text{rand}() \cdot (p_{nbrn} - x_{id}) \rightarrow 12$$

$$x_{id} = x_{id} + v_{id} \rightarrow 13$$

- $ki$ ---- number of neighbours for particle $i$
- $nbrn$ ---- $i$'s $n$th neighbour
- FIPS provide better solution in few iterations, but it has a disadvantage of being dependent on population topology

**4.6 Results:**

![Figure 3: Main Menu of the Project](image1)

![Figure 4: Iterative flow the Ant system algorithm](image2)
Figure 5: The graph depicting Iterative Best Cost and Average Node Branching vs Iterative Time

Figure 6: The Graph depicting the global best path

Figure 7: Global Best Position of Particles At Each Iteration in PSO

Figure 8: Global Best Position of Particle In Entire Swarm
Conclusion and Future Scope: In this work basic Ant System algorithm has been used to solve the traveling salesman problem the variant of ant system algorithm known as rank based ant system can be used to enhance the results. Swarm technology is particularly attractive because it is cheap, robust, and simple. The inherent intelligence of swarms has inspired many social and political philosophers, in that the collective movements of an aggregate often derive from independent decision making on the part of a single individual.

Particle swarm optimization (PSO) has undergone many changes since its introduction in 1995. As researchers have learned about the technique, they have derived new versions, developed new applications, and published theoretical studies of the effects of the various parameters and aspects of the algorithm. Researchers in many countries are experimenting with particle swarms and applying them in real-world applications. Much further research remains to be conducted on this simple new concept and paradigm.

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4. Hybrid Particle Swarm Optimization: An Examination of the Influence of Iterative Improvement Algorithms on Performance -Jens Gimmler, Thomas Stutzle, Thomas E. Exner
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PERFORMANCE ANALYSIS OF HADOOP FOR THE BIG DATA ANALYTICS

JAPNEET KAUR

Abstract: In today’s era of Big Data everything like consumer behavior weather forecast can be analyzed by using the various computer tools. From this analysis future trends can be predicted by using the tool known as Hadoop: “a tool for the Big Data Analytics”. The future can be predicted on the basis of previous data. We can burn tomorrow on the basis of previous data, can be analyzed. The work can be made more efficient work by using Big Data tools rather than passing time on Instagram & Facebook. As Amazon can see every item the customer view, Facebook can analyze the data and can show you the birthdays of your friend. The data has grown to “BIG DATA” and the data kept on increasing everyday Big Data Technology plays a pivot role in doing the decision making.

1. Introduction: Now a day data is very importance role in every organization. As the digital technology kept on increasing, terabytes to Petabytes of digital data is generated on everyday basis, It is very hard to process Big Data using conventional technology. It is very difficult to analyze the terabytes & Petabytes of data by using the conventional technology.

Here, Big Data plays its role for the analysis and analytic for analyzing and predicting future treads for the huge data. The Parallel processing and tools to handle Big Data has made it possible to process large data set at high speed [1].

1.1. 3 V's of Big Data: The 3V's Big Data are

1. Volume
2. Velocity
3. Variety

As shown in fig. 1.1. [2]

Fig. 1.1: Volume, Velocity and Variety of Big Data

Large storage medium is required data for ever growing data Big organizations are already organizing data. Due to lack of parallel processing architecture, Data warehousing cannot analyse the data.

1. A lot of unstructured data can be derived from log files, emails patterns, locations and security investigation. The solutions lies in Big Data technologies.
2. Velocity:- Due to smart phone era the data flow has increased online shopping has changes the market as retailers can now keep the log files and maintains the history.
3. Variety:- Conventional data bases supports’ large objects, but have limitations as the data is very difficult to fit in RDBMS. A data generated by the digital media is rarely structured data (text documents, video, audio data, images etc.) Big Data tools keep all the types of data so, it is not difficult to retain any kind of data (structured and unstructured data).
1.2 Why Big Data is Required: As hardware has become cheaper cloud computing and open source technology has made processing of Big Data cheaper. Cost analyzing of data quickly is required to know the customer behavior, market trends, monitoring and performance analysis etc. Big Data tools uses in-memory data query principle as it improves query performance. Big Data has out performed ORDBMS [5]

2. Hadoop Architecture: Hadoop is open source managed by apache software foundation. It is designed to scale up the servers by thousands of machines. A library is designed in such a way that it can detect and handle failures at the application layer. Hadoop has become the standard for storing & processing of terabytes or petabytes of data. [6]

The Hadoop name is coined by Doug Cutting on the name of his sons elephant toy [7]. No data is big enough that cannot be handled by Hadoop architecture [8] Hadoop is being used by yahoo LinkedIn and Facebook.

2.1 Hadoop Components: Hadoop Distributed file system – HDFS is manufactured that can be run on commodity hardware. It has master slave architecture. As shown in figure 2.1 [10]. The NameNode and DataNode are the Linux server java language is used to build HDFS. A cluster has a dedicated machine that runs only the NameNode software. While the other machines in the cluster operate one instance of DataNode. NameNode manage all the HDFS data. MapReduce is used to process the large database each machine compute data stored locally, which contributes distributed processing. Map and Reduce are the two parts. The Map phase, based on raw input data intermediate data is produced and stored locally whereas the ReducedNode take these intermediate output and combined them and produce final output, the final output is storage in HDFS.

Fig. 2.1: Hadoop Detailed Architecture

MapReduce Example with Word Count Example:
MapReduce illustration with word count example [10]
■ file 1: “Bus truck car jeep scooter Bus”
■ file 2: “scooter cycle car aeroplane scooter”
The following are the operations
■ Map
■ Combine
■ Reduce
Map Phase I - split
■ mapper 1 takes file 1 as input
■ mapper 1 would produce following output in <key, value> format
<Bus, one>
<truck, one>
<car, one>
<jeep, one>
3. Performance Analysis:

Sample Dataset: Rating Datasets (10M database) from MovieLens website is used as sample datasets. Experiments are conducted to compare.

- RDBMS vs Hadoop data load performance analysis

3.1 RDBMS vs Hadoop – Data load Performance: The table shows data load time in minutes between RDBMS and Hadoop with increasing data size. The table describes that Hadoop is more efficient than RDBMS, see table 3.1.

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Data size in GB</th>
<th>RDBMS</th>
<th>Hadoop</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.5</td>
<td>2.58</td>
<td>1.27</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>2.57</td>
<td>1.01</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>4.98</td>
<td>1.67</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>8.57</td>
<td>2.86</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td>14.8</td>
<td>4.12</td>
</tr>
</tbody>
</table>

Conclusion: The data is increasing at a very fast rate. Big Data technology has become the need of every organization to cope up the Big Data problem. The Relational Data Base is not good enough to fulfill the
need of the fast growing organizations, as they are unable to analyze unstructured data. Hadoop is open source framework and most widely accepted tool for the Big Data Analytics as it is reliable, scalable and cost effective tool. MapReduce and HDFS are the main components behind the success of the Hadoop. Hadoop is used in many domains like Social Networking, Security, Health Care, Sensor networks and agriculture etc.

References:


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TO DETECT SIGNIFICANT INFORMATION THROUGH ONTOLOGY ON THE SEMANTIC WEB

NIRMAL KAUR, VIJAY DHIR

Abstract: The term Semantic Web implies an Intelligent Web i.e. a meaningful web. It aims to make computer to understand the meaning of information on the web pages rather than merely presenting them to users. Semantic web is mainly described as the process of the annotating the web documents with some annotations. This paper is mainly focus on to extract desired information with domain vocabulary.

Keywords: Semantic Web, Annotations, Ontology.

Introduction: The term Semantic Web implies an Intelligent Web i.e. a meaningful web. It aims to make computer to understand the meaning of information on the web pages rather than merely presenting them to users. The aim of semantic web [1] is to make the information machine understandable to make information efficient and fast process. Although the Semantic Web (SW) has been the vision for the next generation of the web, where the information is desired to be useful not only for the people but also for the computers. One of the major obstacles in implementing SW is that machines don't have the kind of vocabulary that people have. Since people make use of language from very early years of their lives so it easy for them to make connections between different words and concepts and to make inferences based on contexts. But this is not the case with computers. To make computers to understand the resource and information on the web, semantic of the information is indeed required that can be provided with the help of ontology. SW [3] achieves this goal through Ontologies [2], where ontology is a document or file that formally defines terms and their relations.

Semantic Web is the vision of Tim Berners-Lee [4][5] who proposed four different versions of architectures called as the reference architectures. All of these versions were presented by Berners-Lee in various conferences but were never published in literature or included as part of a W3C recommendation. All four versions namely, versions 1 to versions 4 of the reference architecture were layered architecture and are depicted in fig.1.1.

<table>
<thead>
<tr>
<th>Name of layer</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syntax Description Language</td>
<td>This layer contains all the languages which are used to describe the resources on the web using annotations. XML is one of the most used languages and formal accepted language.</td>
</tr>
<tr>
<td>Meta-data Data Model</td>
<td>This layer is based on RDF which is framework for describing information about resources on the web, using XML tags. RDF/RDF Schema facilitates semantic interoperability.</td>
</tr>
<tr>
<td>Ontology</td>
<td>This includes ontology for particular domain. Ontology mainly describes the meta- tags and annotations on the Web.</td>
</tr>
<tr>
<td>Rules</td>
<td>This cover includes regulations for changing a document from one RDF schema into another RDF schema.</td>
</tr>
<tr>
<td>Logic Framework</td>
<td>This layer incorporates Predicate Logic and Quantifiers in order to encourage derivations. Learning Interchange Format (KIF) is the dialect used to indicate rationale in this layer.</td>
</tr>
<tr>
<td>Proof</td>
<td>This layer includes evidence checking for approval of character. The evidence will be a chain of statements and thinking rules with pointers to all the supporting material.</td>
</tr>
<tr>
<td>Trust</td>
<td>This layer necessitates that the thinking framework must incorporate mark check framework. This will result into a framework which can express and reason about connections over the entire scope of open key based security and trust frameworks.</td>
</tr>
</tbody>
</table>
Information Retrieval on The Web With User Context: The Websites have been traditionally designed to fit the needs of a generic user. However, an adaptive Web Information Retrieval System [6] using Association rules to cluster the user keywords and also to classify the Knowledge base contents is necessary. To build Ontology search Engine, the design of adaptive personalization [7] for user interests of search engine is important [8]. Such a system gathers Information for each user and analyzes it and generates rules. After this point when the user visits the web site, the system analyzes his/her activity by storing tracks (Cookies) [9] and produces the user profile [10].

In this level, the system needs the contextual information for each user The Ontology Mining Search Engine [11] needs the following process.

- Generation of the history of each user to identify the most relevant WebPages for user based on his past histories.
- Classification of the concepts as the tree of concept (interest) and user activity
- Classification of user profile.
Our system comprises of four modules namely query dispensation module (QDM), data analysis module (DAM), context similarity and domain analysis module (CSADAM) and Query match module (QM2M).

**Conclusion:** In this paper we just provided a theory of the Semantic Web Mining provided by the eminent researchers followed by the concept of Ontology based information retrieval. The aim of semantic web is to make the information machine understandable to make information efficient and fast process. In the future we are planning to working on the model provided above.

**References:**

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COLOR AND TEXTURE BASED TECHNIQUE FOR CONTENT BASED IMAGE RETRIEVAL USING KNN CLASSIFIER AND NEURAL NETWORKS

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Abstract: Image processing is a method to transfer an image into digital form. A method has been developed to extracts and recognizes those texts accurately in real time, therefore it can be practical to many important applications like document analysis, text based image indexing and vehicle license plate extraction etc and many applications have become realities in recent years. In this research, novel approach is designed for content based image retrieval based on curvelet based features and KNN classification. This paper represents a technique used Content-Based Image Retrieval by exploiting the advantage of low complexity Ordered-Dither Block Truncation Coding for the generation of image content descriptor. Advantage: That will reduce computation time and yield better image quality. Conversely, ODBTC identifies the minimum and maximum values each image block as opposed to the former low and high mean values calculation, which can further reduce the processing time in the encoding stage. ODBTC Encoding Steps: ODBTC encoding is divided into two parts one is a generation of the bitmap image and second is a calculation of minimum quantizer and maximum quantizer. Neural networks can be very useful for image processing applications.

Keywords: Content-Based Image Retrieval, Ordered Dither Block Truncation Coding, Knn, Neural Networks.

1. Introduction:
1.1 Image Processing: Image processing is a method to transfer an image into digital form. There are various operations can be applied on picture to get an improved image or to take out some important information from it. A method has been developed to extracts and recognizes those texts accurately in real time, therefore it can be practical to many important applications like document analysis, text based image indexing and vehicle license plate extraction etc and many applications have become realities in recent years [1]. Image processing technique provides better results than the original image. An image may be consist of sub-images sometimes referred to as regions-of-interest, ROIs, or simply regions. The accuracy of the entire recognition algorithm highly depends on the accuracy of the segmentation algorithm to break the image to text into individual characters [2]. Image processing basically includes the following three steps.
1. Importing the image with the optical scanner or by digital photography.
2. An Output is the last stage in which result can be altered image or report that is based on image analysis.

Organization Purpose: Firstly, it begins about the concepts of image retrieval. Secondly about the related work.
1.2 Image Retrieval: Image retrieval tasks many thousands, or millions of images from the database are searched by the user. The main objective of the user is to find out a particular image but in some other cases any image from a class can be find out. A very flexible query mechanism is provided by the optimal interface that is possible through a natural language interface [3]. There is difference between the common task of classification and Image retrieval as in case of common classification it includes face detection and character recognition. The potential of number of images in retrieval is very large and example images number is very small. [4].

1.3 Text Based Image Retrieval: Text based image retrieval system is also known as the concept based image retrieval is the most commonly retrieval system. It is the method in which search is based on annotation of images. All the data is selected from the databases which has the similar text, keywords, tags, labels surrounding the image as it is provided in the query string after which similar images are return by the system. Google Images are the commonly used TBIR system. The whole visual content of images is difficult to express in words and irrelevant results are produced by the TBIR system.
1.4 Content Based Image Retrieval: CBIR is the application of computer vision to retrieve images. CBIR aims at avoiding the textual descriptions but it also retrieve images on the basis of their similar properties. The creations of CBIR involve research of databases and image processing and handling problems related to storage issues with friendly interface. Images are particularly complex to manage volume of image they occupied, retrieve in application and context dependent task. It requires transferring of high level user perception to low level image features. The content used term define the set of features such as colors, shapes, textures, or any other information that can be extracted from an image. When this technique was not available to examine the content of image, searchers was dependent on metadata such as captions or keywords [5].

1.5 Feature Extraction Algorithms:
- **Color Feature**: The color feature of an image plays a significant role in the human visual perception mechanism. CBIR can be participated in many ways like Histogram, Color moments, Color etc[6,7]. The color histograms and the statistical methods of color representation have been utilized in order to represent the color of an image. The color histogram of the query image and all database of image are provided by these methods. On the basis of user, the proportion of color can be specified such as its type what kind of result is required. In the process those images will be retrieved whose histogram matches with that of the query image [8].
- **Texture Feature**: Texture is another property of image which is used in pattern recognition and computer vision. Texture [9] is defined as structure of surfaces formed by repeating a particular element or several elements in different relative spatial positions. Another essential property of images is texture. In the pattern recognition and computer vision various texture are represented and investigated. This Texture representation method is divided into three parts such as structural and statistical.
- **Shape-Based Retrieval**: For the query image and all database images various number of characteristic features of object’s shape are calculated. After obtaining all shape features, they are matched with databases for the retrieval. The commonly used method for the extraction of shape feature use the global features like aspect ratio, circularly and moment invariants.

1.6 Content-Based Image Retrieval: Image retrieval is a computer system for searching, browsing and retrieving utilize some methods of adding metadata like captioning, keywords and descriptions to retrieve the image and can be performed over words. Manual image annotation is time consuming and expensive [10]. Image search is a specialized data search to find images. To search an image user can provide query terms such as image link, keywords and click some images. As a result it will return similar query result.

1.7 Ordered Dither Block Truncation Coding in CBIR: ODBTC compresses an image block into corresponding quantizers and bitmap image. Advantage: ODBTC image compression is on its low complexity in generating bitmap image by incorporating the Look-Up Table (LUT), and free of mathematical multiplication and division operations on the determination of the two extreme quantizers. It will reduce computation time and yield better image quality. Conversely, ODBTC identifies the minimum and maximum values each image block as opposed to the former low and high mean values calculation, which can further reduce the processing time in the encoding stage [11]. In addition, the ODBTC yields better reconstructed image quality by enjoying the extreme-value dithering effect. ODBTC Encoding Steps: ODBTC encoding is divided into two parts one is generation of bitmap image and second is calculation of minimum quantizer and maximum quantizer.

1.8 Neural Networks The nearest images obtained using feature extraction techniques are routed to Neural Network classification [12]. Neural Networks are very effective in case of classification problems where detection and recognition of target is required. It is preferred over other techniques due to its dynamic nature of adjusting the weights according to final output and applied input data. This adjustment of weights takes place iteratively until desired output is obtained. And this weight adjustment of network is known as learning of neural network.[13] The architecture of neural network consists of a large number of nodes and interconnection of nodes.

**Uses of CBIR**: There are large numbers of applications in which the CBIR technology has been included.
Few amongst them are mentioned below:

a. Crime prevention: Huge archives are maintained by the law enforcement agencies in order to keep a
track on the past records of individuals [9]. The records of fingerprints, facial images, and shoeprints
and so on are recorded to identify whether a suspect is guilty or not. The records within their archives
are matched with the evidences retrieved from the crime scenes whenever a serious crime is
committed. The identity of a known individual is verified by finding the closest matching records from
the entire databases.

b. The military: The best-developed technology of CBIR is the military application. The enemy aircrafts
are identified from radar screens, targets from the satellite images and the cruise missiles are guided
with the help of these systems. These are however, the very few applications and there are many more
activities performed within military organizations with the help of CBIR.

c. Intellectual property: Another prime application of CBIR is the trademark image registration where
comparisons are made against a new candidate mark and the existing marks for ensuring that no risk
of confusion exists. A potentially important application area is the copyright protection. It is very
difficult to enforce the image copyright when it is easy to transmit the electronic versions of images
over the Internet in different formats. Identifying the unauthorized copies of images particularly when
they have been changes is important for the copyright owners.

2. Related Work: Muhammad Fachrurrozi, Saparudin, Erwin, Clara Fin Badillah, Junia Erlina, Mardiana,
Auzan Lazzuardi, 2017. Presented the use of Agglomerative Hierarchical Clustering (AHC) algorithm by
which automatically the grouping of face images can be possible. In order to obtain the vector feature
from the face image, the pre-processing is utilized for feature extraction [16]. Chaitanya Vijaykumar
Images based on Colour and Texture Extraction”, 2017 International Conference on Computer
Communication and Informatics. To find the digital images this is a specialized search. The images are
extracted out by using text, keywords and other features in most applications of image processing. In the
traditional methods of image retrieval, metadata was included such as captions, important keywords that
describe the features of image [17]. Jing-Ming Guo and Heri Prasetyo, “Content-Based Image Retrieval
Using Features Extracted From Halftoning-Based Block Truncation Coding”, IEEE Proposed a CBIR
technique by exploring the pros and cons of ODBTC for the generation of image descriptor. In encoding,
ODBTC compress an image into corresponding image and bitmap image [21]. Heri Prasetyo, Dwi Riyono,
“Fast Vector Quantization for ODBTC Image Reconstruction”, 2017 International Conference on
Computer, Control, Informatics and its Applications. A simple approach on improving the quality of
Ordered Dither Block Truncation Coding (ODBTC) decoded image is proposed in this paper. In this
approach, the ODBTC decoded image is regarded as noisy-image in which the occurrence of impulsive
noise needs to be suppressed. For the impulsive noise reduction, the proposed method exploits the Vector
Quantization (VQ) for substituting the ODBTC decoded image with the image patch of clean image
codebooks. Herein, the fast VQ is employed to further reduce the computational time compared to that
to the classical VQ approach. The experimental results exhibit the image quality improvement of the
ODBTC decoded image with the proposed post processing image reconstruction.

Prashant Srivastava, et.al (2016) proposed an integration of local and global features to perform image
retrieval. SIFT descriptors and global features are extracted using geometric moments for extracting the
local features [22]. The SIFT and moments are integrated for the retrieval of similar images visually such
that the final feature vector can be generated. It is seen that in terms of precision, the performance of
proposed technique is better as per the results achieved after performing experiments. This work can be
extended by integrating more numbers of features with SIFT in the future.

Poonam A. Wankhede, et.al (2017) presented a study related to several approaches that use various
parameters to perform image retrievals [23]. For enhancing the performance of system and providing
improved results within varieties of applications, the most commonly used technique is CBIR. For the
image that includes corners and edges, higher numbers of key points will be detected for SIFT features.
Thus, in comparison to the image which has fewer corners, the performance of this method is better. A
search image that includes text message on it is shown to be OCR as per the experiments. The basis of
image retrieval is the text retrieval process. Highly accurate results can be achieved when the text and
image feature of retrievals are combined together.

Guohui Wei, et.al (2017) proposed a novel approach in order to classify lung nodules with various ratings for CBIR [24]. From the LIDC lung CT database, a lung nodule dataset is collected. For the depiction of every nodule, two nodule density based features are calculated. For searching ten most similar reference nodules for every queried nodule, a CBIR mechanism is applied. For predicting the malignancy of lung nodules, a malignancy probability is calculated. It is seen here that during the classification of nodules which are moderately suspicious and which are highly suspicious for cancer, improved levels of accuracy and area under curve were achieved.

Behzad Merhrbakhsh Choobari, et.al (2017) proposed a novel technique for CBIR which was known as local full-directional pattern (LFDP) [25]. A new image, which is generated by getting the mean of 3 x 3 sub-regions gray value, is implemented with the algorithm instead of implementing to the image only. The eight different directions are defined within this proposed technique. Depending upon the relationship of every pixel with its surrounding neighbors, one direction is given to that pixel. Within the vertical, horizontal and two diagonal directions, the first-order derivatives are utilized to calculate the relationship amongst the pixel and its neighbors. The LBP and LTrP are used to perform comparative analysis against the proposed approach on the Corel 1000 database. In terms of precision and recall, the performance of proposed approach is shown to improve. For the noisy images, better retrieval results are achieved when the proposed algorithm is applied to mean value of 9 pixel-windows.

Leila Kabbai, et.al (2016) proposed a hybrid approach by using UL-LBP which included both local and global features for enhancing the image retrieval process [26]. The UN-LBP and LN-LBP descriptors are concatenated by the novel descriptor named UL-LBP. Further, the texture feature of a complete image is extracted for every color channel that considers being a global feature by exploiting the new descriptor. For every color channel, the information of area surrounded by IPs is detected independently by local feature which uses SIFT algorithm. A new descriptor named as HLG-SIFT is created by integrating the local and global features. The performance of the HLG-SIFT approach is better in comparison to already existing methods.

Andrea Manno-Kovacs, (2016) proposed a new SBIR system which is based on salient key-point based orientation histogram (SOH) technique [27]. On the basis of texture distinctiveness, the salient image region is extracted initially. Further, the MHEC interest point is detected in the next step. For generating an orientation histogram on an enhanced edge map, it is important to choose the most relevant pixels of image unlike the previous SBIR systems which apply canny edge map. For performing segmentation, the edge map is also adapted. Thus, on the THUR15000 dataset, high performance is achieved by the proposed descriptor. An efficient object detection approach is also achieved by this proposed method.

Jaspreet Kaur, (2017) presented a comparative analysis of various algorithms which are applied for extracting the texture and color features from an image. Various distance measures are used to calculate the similarity amongst two images [28]. In terms of average precision, the performance of each of the algorithms is evaluated. With the help of this, the accuracy of image retrieval is improved however; very less computation speed is involved. The local color texture information of a particular image can be expressed by the LSP. The performance across all color spaces is better by implementing square-chord distance measure. It is seen that the effectiveness of proposed approach is better as the computation cost is less and the retrieval accuracy is high.

Osman Emre Dai, et.al (2018) proposed a new remote sensing (RS) based CBIR system for characterizing the spectral content [29]. There are three various spectral descriptors used in this proposed method. The SIFT-based bag of visual words technique is considered for modeling the spatial content present within RS images. A new sparse reconstruction-based technique is used to achieve RS image retrieval along with the conjunction of spatial and spectral descriptors. A novel measure of label likelihood is considered in the proposed method. For solving both single-label and multi-label RS image retrieval issues, the original sparse classifier is generalized. Finally, a mechanism is proposed using which the sensitivity of sparse reconstruction-based approach is exploited by improving the retrieval performance. The effectiveness of
Abdrolraheem Khader Alhassan, et.al (2017) studied that due to the complexity of images data, several challenges are being faced in CBIR even though it is being applied in different techniques [30]. Few issues are resolved by developing few algorithms by several researchers. During the retrieval of images and distinguishing them, achieving accuracy is the major objective. For the extraction of features and using them for similarity matching, images have been utilized by several proposed algorithms. The grayscale images are used by most of the algorithms. The integration of HSV color moment and Gabor texture features is used within CBIR implemented in this research. The WANG image database is used in this research to implement the proposed method. It is seen through the conducted experiments that the retrieval accuracy of integrated color and texture features is high as compared to the approaches that use them individually.

Rafael S. Bressan, et.al (2018) proposed a novel methodology named as DOCToR through which the deep features that are achieved by transfer learning in CBIR are analyzed. To conduct experiments, the mammographic images are used here [31]. It is seen through the conducted experiments that the usage of deep descriptors by integrating transfer learning with trivial query refinement process has results in improving the precisions. Thus, around 82% of profit is achieved by implementing the proposed technique in comparison to other previously existing techniques. Therefore, within the CBMIR process, new ways are provided through which the deep features can be explored. This technique can be used within various deep architectures also by making improvements in future.

Arif Rahman, et.al (2017) studied that lately, there has been a huge evolvement in the mobile device features. New methods have been raised within the information retrieval is support of the reliable communications network [32]. Camera of mobile devices is used to capture an image and pass it to the retrieval systems such that the required information can be extracted. This system is named as Mobile CBIR and there are two different parts within it. The image features database and indexing structure are created through offline database construction which is the initial part. The images similar to user inputs are searched through online image search which is the second part. The client-side, client-server and distributed are the three various architectural models into which the MCBIR system is categorized depending upon the computational load and required resources. Resources, scalability and latency are the three parameters on the basis of which these three models were analyzed. It is seen through the experimental results that in terms of various aspects, each of the architecture has its own properties and the architecture selection phase of MCBIR development must include this phase.

Fatih Ömrüuzun, et.al (2016) proposed a bad of end members for CBIR by designing a new mechanism [33]. The high resolution spectral signatures of distinct materials present within the hyperspectral images are exploited by the proposed technique. It works in a two-steps procedure. End members based feature extraction approach is used to calculate the feature vector. The representation of query and archive hyperspectral images was done within the initial step. The histogram intersection kernel is utilized in the second step to initially calculate the similarities amongst feature vectors of query image and archive images. Further, the most similar images are retrieved using this similarity factor. It is seen through the experimental results that the performance of hyperspectral image retrieval is improved.

Jingkun Qin, et.al (2018) proposed a hybrid model of deep convolutional network and auto-encoder network to minimize the problems of semantic gap faced in CBIR [34]. For extracting the high-level semantic features of an image, the CNN network is used by this proposed model. Further, the dimension of extracted image features is reduced and the features are compressed into a 128-bit vector representation using the depth auto-encoder network. It is seen that in comparison to the latest deep-network image retrieval algorithms, the performance of proposed technique is better. Accuracy of 100% is achieved by applying proposed technique on the MNSIT dataset.

Mayuri Sadafale et.al (2017) proposed a new feature extraction approach for CBIR on the basis of DWT based Local tetra pattern (LTrP) such that a feature map from input image can be achieved [35]. The sensitivity of CBIR system to noise is increased through the decomposition of DWT up to single level and
the features achieved from it. It is seen that in comparison to the approach that includes only LTrP more robust features are extracted through the integration of DWT and DWT + LTrP. Also, the analysis of effect of various wavelet filters on accuracy is performed. Several performance parameters were calculated in order to perform comparative analysis of proposed and existing techniques. It was seen that the robustness to perform image retrieval task was higher for the proposed spatio-frequency local descriptor as compared to the existing techniques.

3. Problem Formulation: The content based image retrieval is technique which can extract the useful information from the large amount of data. The Data which is extracted from the large amount of data is the image data which is similar to query data. The ODBTC is the technique which can extract the color features of the input image. The images which are in the dataset have also the color features from which training dataset is created. The technique of classification is applied which can classify the most relevant images which have the similar type of features. To improve the accuracy of classification the more number of features need to extract for the classification.

4. Proposed Work:
1. To study and analyze various content-based image retrieval methods (like block truncation coding, Ordered Dither Block Truncation coding with Knn) for image processing.
2. To design and implement proposed technique for improve ODBTC for content-based image retrieval by using KNN and Neural Network.
3. To compare the Improved ODBTC technique with existing ODBTC techniques in terms of accuracy.

5. Results: MATLAB is the tool that is used in this research to perform simulation experiments. Numerical calculations and complex functions are executed through this tool. Within the basic MATLAB, C language is used as a programming language. Hundreds of built-in functions are applied to provide an interactive environment in this tool. Matrix is the basic building block of MATLAB. There are several built-in tools and toolboxes provided through MATLAB. Due to the availability of high graphics, the network is simulated here.

There are three commonly used commands in MATLAB which are:
1. CLC: The command window is cleared through this command and the cursor will be seen on the top of the screen.
2. Clear all: All the variables and functions defined previously in the workspace are cleared through this command.
3. Close all: All the additional windows are closed through this command.

As illustrated in fig 5.1, content-based image retrieval is performed by initially designing an interface which has three different buttons. The dataset is loaded by the first button named load data. The image whose
properties are to be matched with the other image is chosen through the second button named query image. The performance of the proposed technique is analyzed through the third button named parameter.

As shown in fig 5.2, an interface is designed which includes a “load dataset” named button. A “mat” format based dataset is available which is generated from the images present in the folder named “Images”. The dataset named “Mat file” stores the pixel values. The dataset is loaded and given as input to the SVM classifier for performing image classification as shown above.

As shown in fig 5.3, a “mat” format based dataset is generated from the images present in the folder named “Images”. The dataset named “Mat file” stores the pixel values. To perform classification using SVM, the generated dataset is given as input to DCT and curvlet feature extraction.
As shown in fig 5.4, an image which is given as input to CBIR is the query image. The images which have similar features are extracted by matching the features of query image with the remaining images present in the dataset. For selecting the query image dynamically from the “image” folder, the “uiget” function is applied.

As shown in fig 5.6, an input is given which is the query image. For extracting the features of this image, DCT and curvlet techniques are applied. This results in generating a confusion matrix on the basis of which the dataset image is classified by SVM classifier. The interface shows the output achieved.

**Accuracy Comparison:** As shown in fig the accuracy of both existing and proposed techniques is compared. As per this analysis, it is seen that the proposed technique provides higher accuracy results in comparison to the previous technique.
Table 5.1: Accuracy Comparisons

As shown in table, comparative analysis of proposed and existing techniques is done in terms of accuracy which shows that the accuracy of proposed technique is higher.

Comparison Table

<table>
<thead>
<tr>
<th>Image number</th>
<th>ODBTC</th>
<th>Improved Odbtc</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>84</td>
<td>92</td>
</tr>
<tr>
<td>2</td>
<td>84.5</td>
<td>93</td>
</tr>
<tr>
<td>3</td>
<td>85.2</td>
<td>91</td>
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<tr>
<td>4</td>
<td>83</td>
<td>92.7</td>
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<tr>
<td>5</td>
<td>86</td>
<td>94</td>
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<td>6</td>
<td>84</td>
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<td>10</td>
<td>83</td>
<td>92</td>
</tr>
</tbody>
</table>

6. Conclusion: Image retrieval is a computer system for searching, browsing and retrieves utilize some method of adding metadata like captioning, keywords and descriptions to retrieve the image and can be performed over words. Manual image annotation is time-consuming and expensive. Image search is a specialized data search to find images. To search an image user can provide query terms such as image link, keywords and click some images. As a result, it will return the similar query result. The criteria to be used for searching can be Meta tags, color distribution in images and region or shape. The content-based image retrieval has two steps which are feature extraction and classification. In this research work, curved features of the images are extracted and the technique of classification is applied for the similar image extraction. The performance of the proposed algorithm is tested in terms of accuracy.

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A REVIEW ON MULTIMODAL BIOMETRICS FOR SECURE AUTHENTICATIONS

ER. BALDEEPSINGH, DR. JATINDER SINGH BAL

Abstract: Multimodal biometrics has overwhelmed the applied limitations of unimodal grounded biometrics, constructed them ideally suitable for ordinary life applications that need a reliable authentication scheme from untried investigations of present multimodal systems, this paper belongs to the examination of the multimodal biometric system presentation based on the mixture of various techniques used for the biometrics.

The shares of the paper define different methods used for the acknowledgment of different biometric traits, recognized databases and relative presentation obtained by unimodal biometrics scheme. This paper reviews the existing approaches and the challenges for secure biometrics authentications.

Keywords: Biometrics, Multimodal Systems, Learning Systems.

I. Introduction: Biometric schemes for today’s high safety applications must encounter stringent performance necessities. The fusion of numerous biometrics helps to diminish the system error degrees. Fusion approaches include handling biometric modalities successively until an acceptable competition is obtained. More cultured methods combine totals from dispersed classifiers for each modality.

This paper deals with an overview of multimodal biometrics, tests in the progress of multimodal biometrics, the chief research parts and its submissions to develop the security scheme for high security zones [1].

Multimodal biometric arrangements are fetching popular traits, as they have extra accuracy as likened to unimodal biometric schemes. Multimodal biometric schemes capture involvement from solitary or multiple sensors calculating two or more dissimilar modalities of biometric characteristics. Multimodal biometric knowledge makes use of additional biometric identifier to associate the identity of the individual [2]. If one of the skills is not able to identify, the arrangement can still make usage of the other two to precisely identify against. The objective of the paper is to study numerous techniques used for presentation enhancement, safety and level of synthesis in multimodal biometric along with numerous challenges in multimodal biometric [3].

According to worldwide Biometric group, Biometric is mentioned to as an programmed identification of separate person derived from their physical or behavioral topographies to verify identity. This means that the individual do not have to recall password or carry admittance cards. This makes technology very relaxed to use. Biometric can control by looking at your bodily or behavioural features. Physical instances include fingerprint, face and iris acknowledgment. These are typically very accurate, and are the maximum common between biometric readers. Less precise but still useful, behavioural features, is based upon the amount of a person's actions [4].

![Figure 1: Biometric System Categories](image-url)
Components of Biometric System:
1. Devices collect the statistics and change it into digital format.
2. Signal processing procedure performs controller activities and starts emerging the biometric template.
3. Data storage devices keep data to which the new biometric pattern will be compared to.
4. Matching procedure compares the new biometric pattern to one or more patterns in stored data.
5. Decision procedure makes a scheme level decision using the consequence from the matching module.
6. Biometric system obtain signal from one biometric system [5].

II. Issues In Biometrics: There are two types of acknowledgement errors in biometrics. The very first is false accepts rate (FAR) and the second is false reject rate (FRR). FAR occurs when a matchless set of biometric data is acknowledged wrongly as a match by the arrangement using classification. FRR occurs when identical set of biometric data is incorrectly rejected by the arrangement. When we try to overwhelm the errors by fluctuating the threshold then the additional error rate increases repeatedly. Therefore equilibrium should be initialize, with a choice threshold that can be quantified to either minimalize the risk of FAR, or to minimalize the danger of FRR. Other problems are:
1. The system can have noise in sensed data.
2. The system can be variant in terms of the data.
3. Various types of spoofing attacks.

Multimodal biometric systems deal with the merging of more than one biometric category. The most convincing reason to merge dissimilar modalities is to recover the recognition rate and dependability. This is conceivable when the topographies of dissimilar biometrics are statistically autonomous. There are numerous other reasons for joining two or more biometrics. One is the different biometric category can be more suitable for different applications and other motive is simply the customer inclination. Multimodal biometric mentions to merging of two or extra biometric modalities for refining the performance of the human individual systems. The multi-biometric designates the use of extra biometric aspect and some time to cartel these and make a quantified biometric verification decision. The goal of multi biometrics is to decrease the following:
1. False Accept Rate
2. False Reject Rate
3. Failure to Enroll Rate
4. Susceptibility to Artifacts

The system receives input from single or manifold sensors measuring features of two or more dissimilar modalities of biometric. For instance, a system including various characteristics would be measured a multimodal system irrespective of how various images were captured by dissimilar or same strategies [6].

III. Literature Reviews: There are various researches which are done on unimodal but these are not much perfect in terms of securities. Various efficient recent researches done by the researchers on multimodal biometrics are discussed in this paper. Rajvir Kaur, Ishpreet Singh (2015) et al. [7] proposed an efficient approach to detect the Unimodal human iris. They have worked on biometric pattern which is compared with other pre-existing patterns in the record using certain similar algorithms in order to get the authentication of the individual. In their research work they have described the novel methods that are established to generate an Iris appreciation classification system. V. D. Mhaske, A. J. Patankar et al. [8] proposed a procedure which has better presentation as associated to Unimodal methods using independently only a fingerprint or palm print. They have used gabor filter which is used to autonomously extract an impression and palm print characteristics which delivers more accuracy as associated to outmoded Gabor filter In adding to this Short Time Fourier transformation is functional for better excellence of subsequent images. Sheetal Chaudhary Rajender Nath et al. [9] proposed a multimodal biometric acknowledgment system mixing iris, face and impression based on competition score level fusion using numerous support vector machines (SVMs). Umesh Kumar, Karuna Soni et al. [10] proposed an ear biometrics in which feature extraction is the important stage of ear biometrics acknowledgment on which acknowledgment rate can be determined. E. Sujatha, A. Chilambuchelvan et al. [11] proposed a
multimodal biometric algorithm is designed by integrating iris, finger vein, palm print and face biometric traits. Regularized score level fusion method is applied and enhanced, encoded for corresponding decision. Francesco Beritelli, Grazia Lo Sciutoz [12] et al. proposed study of the biometric system presentation based on the mixture of voice, face and autograph recognitions. The author defines dissimilar approaches used for the response of different biometric characters, recognized records and relative presentation obtained by using unimodal biometrics scheme.

IV. Various Fusion Level Techniques:

<table>
<thead>
<tr>
<th>Techniques</th>
<th>Descriptions</th>
</tr>
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<tbody>
<tr>
<td>Score Level Fusion</td>
<td>In this type of level approach, rather than merging feature trajectories, they are handled separately and individual identical score is created and finally these identical scores are combined to mark classification. Numerous statistical learning methods may be used to syndicate match scores. Counterpart score-level synthesis is also named confidence-level synthesis.</td>
</tr>
<tr>
<td>Rank Level Fusion</td>
<td>This type of rank-level fusion states to the use of a subsection of sorted conceivable matches from separate modalities for final decision. Meanwhile all productivities of biometric modalities are uttered in terms of a performance position, there is no query of compatibility between the fusion features.</td>
</tr>
<tr>
<td>Sensor level fusion</td>
<td>The shortest fusion at device level is via a straight concatenation of statistics for fusion. This is trained on the compatibility between the raw data foundations.</td>
</tr>
<tr>
<td>Decision Level Fusion</td>
<td>In this type of level fusion each category is first pre-classified autonomous i.e. each biometric attribute is seized, then features are extracted after that caught trait, grounded on that extracted topographies. The final arrangement is based on synthesis of the outputs of dissimilar modalities.</td>
</tr>
</tbody>
</table>

V. Conclusion and Future Scope: Biometric systems are developed for security purposes in various fields like crime investigation, e-commerce and military purposes. Multimodal biometric system developed using fingerprint, hand geometry, they required the concerned human to make physical contact with a sensing device. Multimodal biometrics is an electrifying and interesting investigation area that makes a synthesis of foundations for better accurateness and security. This paper had a review of prototypes, issues and researches about multi-modal systems. The experiments confronted by multimodal biometric system, likely research areas, various synthesis levels and situations of multimodal schemes are also deliberated in the paper discussed.

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CONTRIBUTION OF CLOUD COMPUTING IN EDUCATION SYSTEM

CHAIHALPREET KAUR, ER.HARPREET KAUR, DR. VIJAY DHIR

Abstract: Education plays an important role in maintaining the economic growth of a country. Now a days the classroom teaching is changing and students are attracted more towards technology. Therefore in this changing environment, it’s important that we think about the latest technologies which will help the society with better teaching and learning process. One of such trending technology is Cloud Computing. The need for education in this time has became a constantly growing and developing and improving e-learning important solutions, so we need the e-learning systems to keep the pace with the technology. The new direction is to use cloud computing, Cloud computing is highly scalable and creates virtualized resources that can be made available to users will have a significant impact on the educational environment in the future. It primarily refers to technology that delivers powerful computing resources via the web. Actually, the word ‘cloud’ is used to refer to internet which has currently eased and revolutionized education. The term cloud-based technologies refers to the act of storing and accessing information and various programs over the internet. This paper focuses on the Importance of cloud computing in education system.

Keywords: Cloud Computing, Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS), Education System.

I. Introduction: The nature of the Internet was constantly changing from a place used to read web pages to an environment that allows end-users to run software applications. The need for education is increasing constantly and the development and the improvement of the e-learning solutions is necessary. Also, the E-learning systems need to keep the pace with the technology, so the new direction is to use cloud computing. Cloud computing is becoming an attractive technology because of its dynamic scalability and effective usage of the resources; it can be utilized under circumstances where the availability of resources is limited. The need for education is increasing constantly and the development and the improvement of the e-learning solutions is necessary. cloud-based applications reduce infrastructure and IT costs, increase accessibility, enable collaboration, and allow organizations more flexibility in customizing their products both for their brand and for their audience. The benefits of cloud computing are being recognized in almost all kinds of institutions across the board, with 90 percent of organizations currently using some kind of cloud-based application. First, let us understand what exactly cloud computing is and what services it provides.

II. Cloud Computing: Cloud computing is a type of Internet-based computing that provides shared computer processing resources and data to computers and other devices on demand. It is a model for enabling ubiquitous, on-demand access to a shared pool of configurable computing resources (e.g., computer networks, servers, storage, applications and services), which can be rapidly provisioned and released with minimal management effort. Cloud computing and storage solutions provide users and enterprises with various capabilities to store and process their data in either privately owned, or third-party data centers that may be located far from the user—ranging in distance from across a city to across the world. Cloud computing relies on sharing of resources to achieve coherence and economy of scale, similar to a utility (like the electricity grid) over an electricity network. In other words, Cloud Computing is a process of delivering/enabling scalable, expandable and almost perfectly elastic software services using internet technologies. It is a method of delivering Software as a Service (SaaS), delivered in a pay-per-use basis. It provides self service capabilities to users with scalable features to increase usage on requirement.

III. Types of Services Provided By Cloud:
A. SaaS (Anytime Anywhere apps): It stands for Software as a Service. It describes any cloud service where consumers are able to access software applications over the internet. The applications are hosted in —the cloud and can be used for a wide range of tasks for both individuals and organizations. Google, Twitter, Facebook and Flickr are all examples of SaaS, with users able to access the services via any internet enabled device. SaaS is beneficial to organizations in many ways like no additional hardware costs, no
initial setup costs, usage is scalable, updates are automated, accessible from any location etc. This cloud service allows educational institutions to subscribe to online software hosted by a cloud provider. If proprietary software is used, educational institutions need to pay for the usage of the software. SaaS removes the need for organizations to install and run applications on their own computers or in their own data centers. This eliminates the expense of hardware acquisition, provisioning and maintenance, as well as software licensing, installation and support.

B. PaaS (The Operating Environment in Which Applications Run): It stands for Platform as a Service. It is a category of cloud computing that provides a platform and environment to allow developers to build applications and services over the internet. PaaS services are hosted in the cloud and accessed by users simply via their web browser (ex: Google App Engines etc.). Platform as a Service allows users to create software applications using tools supplied by the provider. Services are constantly updated, with existing features upgraded and additional features added. It supplies an operating environment for developing applications. Some of the benefits of PaaS are: they don’t have to invest in physical infrastructure, flexibility, adaptability, teams in various locations can work together, security etc. IT courses that require hands-on practice on a client-server structure, such as database systems or application development courses, PaaS is the one to use. PaaS does not typically replace a business’ entire infrastructure. Instead, a business relies on PaaS providers for key services, such as Java development or application hosting.

C. IaaS (The On-Demand Data Centres): It Stands for Infrastructure as a Service. It provides access to computing resource in a virtualized environment,—the Cloud, across a public connection, usually the internet. In the case of IaaS the computing resource provided is specifically that of virtualized hardware, in other words, computing infrastructure. The definition includes such offerings as virtual server space, network connections, bandwidth, IP addresses and load balancers. Some benefits of IaaS are: scalability, no investment in hardware, utility style costing, location independence, physical security of data centre locations etc. Microsoft Windows Azure and Amazon Web Service (AWS) provide IaaS. This service can mainly be used to satisfy the infrastructure needs of the students, faculties or researcher globally or locally with some specific hardware configuration for a specific task. IaaS platforms offer highly scalable resources that can be adjusted on-demand. This makes IaaS well-suited for workloads that are temporary, experimental or change unexpectedly.

IV. Implementing Cloud Computing In Education System: To implement the Cloud on the education we first build the system to create the cloud and upload the documents, files, images, videos on the cloud. Then we can access it from anywhere. In schools and colleges, teachers, students can prepare their own documents and share it with the others. Also by creating the dynamic changes in the documents or in the presentations we can show animations or perform experiments on the documents. The below figure 1 shows how the School Education System can use the Cloud Computing:
For instance, School administration will manage teacher’s profiles, creating account, assign the classes to them. Create and manage the timetable. Keep activity of the students in classroom as well as on grounds based on the teachers engaging them. He can submit the results and activity of the students to their parents and also call for Meetings and many more. Teacher will prepare the class and upload the power points and videos for the next class in home using the account created by administration. They can maintain the records of the students for the subject. Teacher can upload the study materials which can be accessed by the students in home as well as in classroom. Teachers can give them the online presentations or change the content of the any image dynamically during teaching, students can submit their assignments online etc. This sounds very tedious but not impossible. Parents will get to know what all things his child is doing in the school. What are the improvements he/she has achieved from the past? Parents will get to know what are the assignments/homework given to them during that day. They can easily see the results and can attend the meetings and many more. Students will login based on their authentication given to them and access Power Points, Study Materials, Results and Assignment assigned to them, Video Lectures (this will be helpful for those students who couldn’t attend classes for some reason, for slow learners and also for revision purpose). This will improve interactive learning. The advantage of cloud service is particularly useful for supporting lab activities in the teaching and learning process. In classroom students can even able to do some activity based on the teachers instructions. Hence improving their skills and knowledge.

A. Benefits of Cloud Computing in Education System:
- **No more carrying around devices**, such as thumb drives or CDs. You don’t need to worry about losing the device, breaking the CD, or not having your information load properly.
- **Easy access!** Lesson plans, labs, grades, notes, PowerPoint slides – just about anything digital that you use in teaching is easily uploaded and accessed anytime.
- **Stability**: cloud computing is now to the point of being a very stable technology that you can rely on.
- **Security**: Your data, content, information, images – anything you store in the cloud usually requires authentication (ID and password, for example) – so it is not easily accessible by anyone. In addition, should something happen to the technology at school, your content will still be available to you and your students if it is stored elsewhere.
- **Shareability**: Working on an instructional assignment with other teachers? You can share some or all of your files that you have stored in the cloud. No more obtaining an extra thumb drive or burning another CD or DVD. You just need to send a link to the file(s) destination.
• **Trackability**: Make changes to a lesson and want to change it back? No problem. Cloud computing will save multiple revisions and versions of a document so that you can chronologically trace back the evolution of an item.

B. **Drawbacks of Cloud Computing in Education System**:

• Cloud computing depends on the availability of high speed internet access and reliability of the cloud. Without it students cannot access their files or applications.
• If proper authentication is not available then anyone will access to files anywhere, anytime, this is the security concern which must be handled.

V. **Conclusion**: Although still quite a vague term for some, cloud computing is definitely one of the major innovations that entered worldwide classrooms in recent years. With the ability to cut IT costs and at the same time create a modern collaborative environment, educational institutions can see some important benefits from moving to the cloud. Modernizing learning processes and introducing the latest technologies in classrooms encourage students to develop skills and knowledge necessary for achieving their academic and professional goals. From this perspective, it is obvious how valuable a resource the cloud is in the education sector. Together with other forms of technology implementation, the cloud can substantially increase learning opportunities for students all over the world, and eventually contribute to equipping future generations with skills and competences necessary for international career advancements.

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DESIGN OF SEMANTIC FRAMEWORK FOR DETECTING CYBER BULLYING ON SOCIAL MEDIA

GURPINDER SINGH, VIJAY DHIR, VIJAY RANA

Abstract: The generally predominance rate indicates cyber bullying is as yet present after the tutoring years. No significant gender contrasts were noted; anyway females outnumbered guys as cyber bullies and digital unfortunate casualties. Huge contrasts were noted for Internet recurrence with those burned through social media day by day announced being more misled and take part in cyberbullying than the individuals who go through not exactly an hour day by day. Overall it can be concluded that cyberbullying incidences are still taking place, even though they are not as rampant as observed among the younger users.

Keywords: Cyber Bully, Cyber-Victim, Internet Frequency.

Introduction: Web 2.0 has had a significant impact on communication and relationships in today’s society. The attractiveness of online social media has made huge social communication between their users and this leads to a massive amount of user-created communication information. While social network provide huge communication chances, they also raise the susceptibility of young people to threatening situations online [7]. Recent studies report that cyber bullying constitutes a growing issue amongst youngsters. Although the majority of teenagers’ Internet employ is harmless and the gains of digital communication are evident, the liberty and ambiguity experienced online formulates young generation susceptible, with cyber bullying being one of the key problems. It may possibly obtain several forms, e.g. passing messages, e-mail or social media system, distribution spiteful rumors online, and sexing, that is passing sexually evocative images or messages about someone with the purpose to hurt or humiliate people.

For instance, in 2017 a case of cyberbullying resulted in a MBBS student in KMCT Medical College, Mukkom committing suicide after her images of being assaulted were circulated on the Facebook [1]. India is of no exemption and various news reports and investigations have signified that cyberbullying is emergent wildly. As a subject of reality, according to the Microsoft Global Youth Online Behaviour investigation [2], India is ranked 3rd highest in cyberbullying amongst the 25 dataset analyzed.

The occurrence of cyberbullying is rather new; therefore there is small agreement about the various types of this brutality. However, there are many investigations generally classify cyberbullying on following:

- Flaming: an online battle with coarse language and aggressive languages,
- Slandering or denigration: force someone by increasing malicious rumours.
- Harassing: frequently sending distasteful post to someone.
- Masquerading: pretending to be people else and posting messages to create another someone appear bad.
- Exclusion: purposely excluding someone from an online crowd.

In general phrases, cyber bullying usually encompasses nonphysical harasses that may include harmful repartee, telling deceit, creating rude or mean comments, creating fun of another, dispersal rumours, or creating threatening or violent statements towards someone.

The successful prevention of cyber bulling totally depends on the appropriate detection of harmful messages [11] and the data burden on the social media requires intellectual framework to determine probable risks automatically. In these circumstances, sentimental analysis plays a vital role to detect the cyber bulling on social media [12]. Sentimental Analysis [6] is a technique of opinion mining to retrieve knowledge about person’s observations, opinions, and sentiments towards daily occurrence observations. And every person has dissimilar opinions on similar topic. The sentiment analysis process [13] is precisely more difficult but basically more useful. Sentiment analysis is the part of study to examine people’s opinion, feeling, attitudes and sentiment from written languages.

Literature Review: Awekar et.al [4] purposed a system to detect online cyberbullying using Deep
learning technique. This system detects cyberbullying on three different social media platform like twitter, and Wikipedia.

Chatzakou et.al [5] describes a model that detects aggression and cyberbullying on Twitter. They label the aggressive and bully post. They study the properties of bullies and aggressor and find the feature that distinguishes bullies from the regular user. They use 1.6M tweet and collected data over three months and used network based attribute to find aggressive and bully behavior using Random Forest Technique.

Ravana et.al [3] purposed a system to efficiently detect online cyberbullying using supervised machine learning technique. In this model they extract set of unique feature from twitter network, tweets provide feasible solution to detect cyberbullying. To test different features they use SMOTE (synthetic minority oversampling technique and weight adjusting approach.

Kontostathis et.al [4] purposed a system to detect online cyberbullying using formspringer.com website as a medium to collect the queries. They use Support Vector Machine technique of Supervised Machine Learning. In this they firstly label the test data and then generate dataset and then provide ranking how severe cyberbullying exist.

Van Hee et.al [8] describes a model to detect online cyberbullying on social media text. They use ASK dataset and apply linear support vector machine technique of supervised machine learning on English and Dutch social media. They use both language as a training corpus and detect which source of information contribute periodically. They use ten-fold cross validation, unoptimised word n-gram based classifier and keyword matching for comparison.

Sharma et.al [9] purposed a novel system to detect bad and aggressive text from social media that create negative effect. They use Natural language processing and Machine Learning to analyze social media comments and identify the effect of aggression on individual or group. They collect message, comments, posts, status and categories in Bully and Non-Bully.

Nandakumar et.al [10] purposed a system to deal with cyberbullying revelation in e-mail application. They uses naïve bayes classification algorithm for content classification, analyzing document as they relate to one classification or other word prevaleation feature. This technique identifies and filter feature set extraction words. They find feature probability using naive bayes classification algorithm.

Objectives:

- To verify the sentiment difference between normal messages and bullying messages by comparing the sentiment score.
- To indentify the Multilingual Sentiment posts.
- To make a novel algorithms that leverages sentiment information of the message to detect cyberbullying in social media.
- Evaluation of Proposed System and Comparison with Existing Interfaces

Expected Output: Cyber bullying is an observable fact that harmfully influences the someone; the victims suffer from several mental problems, starting from depression, isolation, anxiety to low self-esteem.

Hence, it is essential to extend an intelligent learning to automatically detect cyberbullying behaviors on social media. To achieve this vision, we will propose to semantics sentiment information framework to detect cyberbullying behaviors in social media.

However the detection of cyberbullying posts on social media is a far more complicated job due to the following two reasons: First, the content information in social media is short, noisy and unstructured [5] and secondly, the users in social media purposely confuse the texts or sentences to evade the manual and automatic checking.
In this work, we will effort to execute cyberbullying detection in a supervised way by proposing a semantics learning framework. In particular, we first examine whether sentiment posts is mainly associated with cyberbullying behaviors. Then, we will work on how to deal with noisy, unstructured sentence and how to correctly leverage sentiment system for cyberbullying detection. We will perform an experiments on two real universe social network datasets validate the efficiency of the proposed framework. We will also systematically integrate sentiment information and user-post relationship information into a semantics learning framework unlike other ad-hoc mechanisms.

**Research Methodology:** The basic approach of our research work will to develop a standardized framework to detect the cyberbullying issue in social media. The proposed methodology will be used a hybrid approach. It uses sentiment analysis to categorize given sentence into 'bully' or 'non-bully' model and utilize link analysis to find the most influential opinion. Each step is defined in detail as follows.

1. **Preprocessing & Feature Selection:** The query sentence is an unstructured form of data and in order to convert it to proper structured form automatic methods are used. To achieve this vital preprocessing job, following steps are being carried out: tokenization, stop words and find the polysomy words. The feature selection is a main part to signify information in a feature space as an input to the system. Social media information are noisy, thus regressive preprocessing is used. Also, the numbers of techniques grow with the number of files. Thus, we will propose new intelligent system for detecting cyberbullying automatically.

2. **Detecting Subjectivity:** The second module is to find the subjectivity and objectivity of the text, i.e. sentences can be classified as subjective (having opinions and attitude) or objective (containing facts).

3. **Sentiment Informed Cyberbullying Detection:** Sentiment Analysis deals with analyzing emotions, feelings and the attitude of a speaker or a writer from a given piece of text.

**Conclusion:** The objective of work is to enhance the cyber bullying detection on social media and web-based networking media. The agent based Programmed approach of signs of cyberbullying would improve balance and permit to react immediately when essential. Future work will focus on the detection of participants typically involved in cyberbullying.

**References:**


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REVIEW ON E-WASTE MANAGEMENT - EFFECTS, STRATEGIES AND METHODS

GURPREET SINGH, AMRINDER KAUR

Abstract: Central issue of this study is electronic waste (e-waste) that is rising as a brand new environmental challenge for twenty first century. The rapid growth of the electronic and Information Technology industry, present consumer culture, collective growth of consumption of electronic products have led to disastrous environmental consequences. The paper highlights the associated problems and methods to deal with this rising downside. The paper has three sections. The first section classification, sources and facts of e waste has been presented. Next section is born out of hazardous impact of different chemicals disposed on environment and human health in the process of electronic components usage, disposal and inefficient recycling. The third section proposed the strategies of disposing e-waste and methods of e-waste management.

Keywords: E-Waste, Inventory management, Production-process modification, Volume reduction, Electronic devices.

I. Introduction: Waste generated due to product obsolescence and discarded electronic items, which may be data processing, telecommunications or entertainment in private households and businesses. Such electronic items may be televisions, telephones, radios, microwave ovens, computers, printers, fax machines, mobile phones, DVDs, CDs or computer floppies. Industrial revolution followed by the advances in information technology during the last century has radically changed people's lifestyle. Although this development has helped the human race, mismanagement has led to new problems of contamination and pollution. The technical prowess acquired during the last century has posed a new challenge in the management of wastes. For example, personal computers (PCs) contain certain components, which are highly toxic, such as chlorinated and brominated substances, toxic gases, toxic metals, biologically active materials, acids, plastics and plastic additives. The hazardous content of these materials poses an environmental and health threat. Thus, proper management is necessary while disposing or recycling E-Wastes.

II. Classifications of E-Waste:
   a. Electronic devices such as computers, servers, main frames, monitors, TVs & display devices.
   b. Telecommunication devices such as cellular phones & pagers, calculators, audio and video devices, printers, scanners, fax machines, refrigerators, air conditioners, washing machines, and microwave ovens.
   c. Recording devices such as DVDs, CDs, floppies, tapes, printing cartridges, military electronic waste, automobile catalytic converters.
   d. Electronic components such as chips, processors, mother boards, printed circuit boards, industrial electronics such as sensors, alarms, sirens, security devices, automobile electronic devices.

III. Amount of E-Waste World - Wide: Rapid changes in technology, changes in media (tapes, software, MP3), falling prices, and planned obsolescence have resulted in a fast-growing surplus of electronic waste around the globe. Dave Kruch, CEO of Cash for Laptops, regards electronic waste as a "rapidly expanding" issue. Technical solutions are available, but in most cases a legal framework, a collection system, logistics, and other services need to be implemented before a technical solution can be applied. Display units (CRT, LCD, LED monitors), Processors (CPU, GPU, or APU chips), memory (DRAM or SRAM), and audio components have different useful lives. Processors are most frequently out-dated (by software no longer being optimized) and are more likely to become "e-waste", while display units are most often replaced while working without repair attempts, due to changes in wealthy nation appetites for new display technology.

An estimated 50 million tons of E-waste are produced each year. The USA discards 30 million computers each year and 100 million phones are disposed of in Europe each year. The Environmental Protection Agency estimates that only 15-20% of e-waste is recycled, the rest of these electronics go directly into
IV. The Indian Scenario: While the world is marveling at the technological revolution, countries like India are facing an imminent danger. E-waste of developed countries, such as the US, dispose their wastes to India and other Asian countries. A recent investigation revealed that much of the electronics turned over for recycling in the United States ends up in Asia, where they are either disposed of or recycled with little or no regard for environmental or worker health and safety. Major reasons for exports are cheap labor and lack of environmental and occupational standards in Asia and in this way the toxic effluent of the developed nations would flood towards the world’s poorest nations. The magnitude of these problems is yet to be documented. However, groups like Toxic Links India are already working on collating data that could be a step towards controlling this hazardous trade. It is imperative that developing countries and India in particular wake up to the monopoly of the developed countries and set up appropriate management measures to prevent the hazards and mishaps due to mismanagement of e-wastes.

V. Effects on Environment: Discarding of e-wastes is a precise problem faced in many regions across the globe. Computer wastes that are landfilled goods contaminated leachates which ultimately pollute the groundwater. Acids and sludge achieved from melting computer chips, if disposed on the ground causes acidification of soil. For example, Guiyu, Hong Kong a thriving area of illegal e-waste recycling is facing critical water shortages due to the detoxification of water resources. This is due to discarding of recycling wastes such as acids, sludge etc. in rivers. Now water is being transported from distant towns to cater to the anxieties of the population. Incineration of e-wastes can emit toxic fumes and gases, thereby polluting the surrounding air. Inadequately monitored landfills can cause environmental hazards. Mercury will leach when certain electronic devices, such as circuit breakers are destroyed. The same is true for polychlorinated biphenyls (PCBs) from condensers. When brominated flame retardant plastic or cadmium containing plastics are landfilled, both poly-brominated dl-phenyl ethers (PBDE) and cadmium may leach into the soil and groundwater. It has been found that significant amounts of lead ion are dissolved from broken lead containing glass, such as the cone glass of cathode ray tubes, gets mixed with acid waters and are a common occurrence in landfills.

Not only does the leaching of mercury poses specific problems, the vaporization of metallic mercury and di-methylene mercury, both part of Waste Electrical and Electronic Equipment (WEEE) is also of concern. In addition, uncontrolled fires may arise at landfills and this could be a frequent occurrence in many countries. When exposed to fire, metals and other chemical substances, such as the extremely toxic dioxins and furans (TCDD tetrachloro dibenzo-dioxin, PCDDS-polychlorinated dibenzodioxins. PBDDS-polybrominated dibenzo-dioxin and PCDFspoly chlorinated dibenzo furans) from halogenated flame retardant products and PCB containing condensers can be emitted. The most hazardous form of burning e-waste is the open-air burning of plastics in order to recover copper and other metals. The toxic fall-out from open air burning affects both the local environment and broader global air currents, depositing highly toxic byproducts in many places throughout the World.

VI. Effects on Human Health:

<table>
<thead>
<tr>
<th>Source of e-wastes</th>
<th>Constituent</th>
<th>Health effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solder in printed circuit boards, glass panels and gaskets in computer monitors</td>
<td>Lead (PB)</td>
<td>Damage to central and peripheral nervous systems, blood systems and kidney damage. Affects brain development of children.</td>
</tr>
<tr>
<td>Relays and</td>
<td>Mercury (Hg)</td>
<td>Chronic damage to the brain.</td>
</tr>
<tr>
<td>switches, printed circuit boards</td>
<td>Respiratory and skin disorders due to bioaccumulation in fishes.</td>
<td></td>
</tr>
<tr>
<td>----------------------------------</td>
<td>---------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Corrosion protection of untreated and galvanized steel plates, decorator or hardener for steel housings</td>
<td>Hexavalent chromium (Cr) VI Asthmatic bronchitis. DNA damage.</td>
<td></td>
</tr>
<tr>
<td>Cabling and computer housing</td>
<td>Plastics including PVC Reproductive and developmental problems; Immune system damage; Interfere with regulatory hormones</td>
<td></td>
</tr>
<tr>
<td>Plastic housing of electronic equipment and circuit boards.</td>
<td>Brominated flame retardants (BFR) Disrupts endocrine system functions</td>
<td></td>
</tr>
<tr>
<td>Front panel of CRTs</td>
<td>Barium (Ba) Muscle weakness; Damage to heart, liver and spleen.</td>
<td></td>
</tr>
<tr>
<td>Motherboard</td>
<td>Beryllium (Be) Carcinogenic (lung cancer) Inhalation of fumes and dust. Causes chronic beryllium disease or beryllicosis. Skin diseases such as warts.</td>
<td></td>
</tr>
</tbody>
</table>

VII. **Management of E-Waste**: It is estimated that 75% of electronic matters are stored due to indecision of how to manage it. These electronic scraps lie unattended in houses, offices, warehouses etc. and habitually mixed with domestic wastes, which are finally disposed of at landfills. This necessitates implementable management measures.

In industries management of e-waste should begin at the point of generation. This can be done by waste minimization techniques and by sustainable product design. Waste minimization in industries involves adopting:
- Inventory management,
- Production-process modification,
- Volume reduction,
- Recovery and reuse.

VIII. **Proposed Treatment & Disposal Methods**:

a. **Landfilling**: It is one among the foremost wide used ways for disposal of e-waste. In landfilling, trenches area unit created on the flat surfaces. Soil is excavated from the trenches and waste product is buried in it that is roofed by a thick layer of soil. Modern techniques like secure lowland area unit supplied with some facilities like, run roof liner created from plastic or clay, leachate collection basin that collects and transfer the leachate to wastewater treatment plant. The degradation processes in landfills area unit terribly sophisticated and run over a large time span. The environmental risks from low landing of e-waste cannot be neglected because the conditions in a landfill site are different from a native soil, particularly concerning the leaching behavior of metals. Mercury, cadmium and lead are the most toxic leachates. Lead has been found to leach from broken lead-containing glass, such as the cone glass of cathode ray tubes from TVs and monitors. Cadmium also leaches into soil and ground water. In addition, it’s famous that cadmium and mercury area unit emitted in diffuse kind or via the lowland gas combustion plant. Landfills also are at risk of uncontrolled fires, which fumes. Therefore, landfilling doesn’t seem to be an associate environmentally sound treatment methodology for substances, that area unit volatile and not biologically degradable (Cd, Hg,), persistent (Poly Chlorinated Biphenyls) or with unknown behavior during a lowland website (brominated flame retardants).

b. **Incineration**: It is a controlled and complete combustion method, during which the waste matter is burned in specially designed incinerators at a warmth (900-1000°C). Advantage of burning e-waste is that the reduction of waste volume and also the Utilization of the energy content of flammable
materials. Some plants take away iron from the scoria for use. By burning some environmentally unsafe organic substances square measure regenerate into less unsafe compounds. Disadvantage of burning square measure the emission to air of gear escaping flue gas improvement and also the great deal of residues from gas improvement and combustion. E-waste incineration plants contribute significantly to the annual emissions of cadmium and mercury. In addition, heavy metals not emitted into the atmosphere are transferred to slag and exhaust gas residues and can reenter the environment on disposal. Therefore, e-waste incineration will increase these emissions, if no reduction measures like removal of heavy metals are taken.

c. Recycling of E-Waste: Monitors & CRT, keyboards, modems, telephone boards, hard drives, floppy drives, Compact disks, and mobiles, fax machines, printers, CPUs, memory chips, connecting wires & cables can be recycling. Recycling involves dismantling i.e. removal of different parts of e-waste containing dangerous substances like PCB, Hg, separation of plastic, removal of CRT, segregation of ferrous and non-ferrous metals and printed circuit boards. Recyclers use strong acids to remove precious metals such as copper, lead, gold. The value of recycling from the element could be much higher if appropriate technologies is used.

The existing dumping grounds in India are full and overflowing beyond capacity and it is difficult to get new dumping sites due to scarcity of land. Therefore, recycling is the best possible option for the management of e-waste.

IX. E-Waste in India By 2018: India among the top five countries in e-waste generation as per study by Assocham-NEC (2018). In India, Maharashtra contributes the largest e-waste of 19.8% but recycles only about 47,810 TPA (tons per annum) whereas as its counterpart’s Tamil Nadu (13%) recycles about 52,427, Uttar Pradesh (10.1%) recycles about 86,130, West Bengal (9.8%), Delhi (9.5%), Karnataka (8.9%), Gujarat (8.8%) and Madhya Pradesh (7.6%).

The global volume of e-waste generated is expected to reach 52.2 million tons or 6.8 kg/ inhabitant by 2021 from 44.7 million tons in 2016 at a compound annual growth rate of 20%, according to a study on 'Electricals & Electronics Manufacturing in India,' conducted by The Associated Chambers of Commerce and Industry of India (ASSOCHAM)-NEC joint study on “World Environment Day”.

X. Proposed Management Strategies: Considering the severity of the problem, it is imperative that certain management options be adopted to handle the bulk e-wastes. Following are some of the management options suggested for the government, industries and the public.

a. Responsibility of The Government: Governments ought to started restrictive agencies in every district that are unconditional with the responsibility of coordinating and consolidating the restrictive functions of the assorted government authorities relating to risky substances.

Governments ought to be blame for providing associate adequate system of laws, controls and body procedures for risky waste management (Third World Network. 1991). Existing laws regarding e-waste disposal be reviewed and revamped. A comprehensive law that gives e-waste regulation and management and correct disposal of risky wastes is needed. Such a law should empower the agency to control, supervise and regulate the relevant activities of government departments.

Under this law, the agency concerned should collect basic information on the materials from manufacturers, processors and importers and to maintain an inventory of these materials. The information should include toxicity and potential harmful effects.

- Identify potentially harmful substances and require the industry to test them for adverse health and environmental effects.
- Control risks from manufacture, processing, distribution, use and disposal of electronic wastes.
- Encourage beneficial reuse of "e-waste" and encouraging business activities that use waste”. Set up programs so as to promote recycling among citizens and businesses.
Governments should encourage analysis into the event and commonplace of risky waste management, environmental watching and therefore the regulation of risky waste-disposal.

b. Responsibility of the Industry: Generators of wastes ought to take responsibility to work out the output characteristics of wastes and if unsafe, ought to give management choices. All personnel concerned in handling e-waste in industries together with those at the policy, management, control and operational levels, ought to properly qualified and trained. Companies will adopt their own policies whereas handling E-wastes.As Standardize components for easy disassembly. Create computer components and peripherals of biodegradable materials. Utilize technology sharing significantly for producing and Re-producing. Encourage / promote / require green procurement for corporate buyers.

Companies will adopt waste decrease techniques, which is able to build a major reduction within the amount of e-waste generated and thereby alteration the impact on the setting. It is a "reverse production" system that styles infrastructure to recover and use each material contained among e-wastes metals like lead, copper, aluminum and gold, and numerous plastics, glass and wire. Such a "closed loop" producing and recovery system offers a win-win scenario for everybody, less of the world are deep-mined for raw materials, and groundwater will be protected, researchers explain.

Manufacturers, distributors, and retailers ought to undertake the responsibility of recycling/disposal of their own product.

c. Responsibility of The Citizen: Waste interference is probably a lot of most well-liked to the other waste management choice as well as utilization. Donating physical science for employ extends the lives of valuable merchandise and keeps them out of the waste management system for an extended time. But care ought to be taken whereas donating such things i.e. the items should be in working condition. Reuse, additionally to being associate in nursing environmentally preferred different, additionally society. By donating used physical science, schools, non-profit organizations, and lower-income families will afford to use equipment that they otherwise couldn’t afford. E-waste ought to never be disposed with garbage and alternative social unit wastes. This should be isolated and sold-out or given to varied organizations.

While buying electronic products opt for those that:
- are made with fewer toxic constituents
- use recycled content
- are energy efficient
- are designed for easy upgrading or disassembly
- utilize minimal packaging
- offer leasing or take back options

XI. Conclusion: Solid waste management, that is already a mammoth task in Asian nation, is changing into a lot of difficult by the invasion of e-waste, notably pc waste. There exists AN pressing want for an in depth assessment of the present and future state of affairs as well as quantification, characteristics, existing disposal practices, environmental impacts etc. Institutional infrastructures, as well as e-waste assortment, transportation, treatment, storage, recovery and disposal, have to be compelled to be established, at national and/or regional levels for the environmentally sound management of e-wastes. Establishment of e-waste assortment, exchange and exercise centers ought to be inspired in partnership with personal entrepreneurs and makers. End-of life management ought to be created a priority within the style of recent electronic product.

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PARTICLE SWARM OPTIMIZATION BASED FUZZY APPLIED ON DENTAL IMAGES

ER. JAGDEEP KAUR, PROF. (DR.) JATINDER SINGH

Abstract: Images play a crucial role in various applications of engineering and sciences. Image is an artifact that depicts or records visual perception. With advancements in image capturing devices such as digital cameras, image scanners, most of the data is analyzed from digital images. Dentists use x-rays to find hidden dental structures, malignant or benign masses, bone loss and cavities.

Keywords: Digital Images, X-rays, Dental Carie, Clustering.

1. Introduction:

1.1 What is Digital Imaging?
Digital Imaging has been referred to as the future of dentistry. Digital Imaging provides with
- Immediate Diagnosis with no down time for processing
- Reduced radiation exposure
- Patient records stored electronically

1.2 Why need Digital Dental X-rays?[1]: Digital Radiographs are original X-rays used by dental professionals to better detect, diagnose, treat and monitor oral conditions and diseases. Digital X-rays produce enhanced computer images of teeth, gums and other oral structures and conditions.

1.3 Why study Dental Carie?: The detection of dental caries, in early stage is very important. It is also known as dental decay or tooth decay. Primary diagnosis involves inspection of all visible tooth surfaces using basic tools including a good light source, explorer and dental mirror. Dental radiographs, or Dental X-rays, may show dental caries between the teeth, before it is visible through naked eye. Dental X-ray image analysis is major area of Digital Image processing [1].

1.4 What is Dental Carie?[14][7]: Dental caries and periodontal diseases are the most common dental diseases. If they are not treated in early stages, they may lead to progressive distraction of tooth and infection of the dental pulp.

1.5 How to obtain Dental Images?[2][3]: Dental images are generated simply by placing the patient between an X-ray source and a film sensitive to X-ray energy. Digital dental images are acquired through three methods: the direct method, indirect method and semi-indirect method. The direct method uses an electronic sensor placed in the mouth to record images. The indirect technique uses an X-ray film scanner to view traditional dental X-rays as digital images. The semi-indirect digital technique combines a sensor and scanner to convert dental X-rays into digital film.

1.6 Types of Digital Dental X-rays?[5]:
- Intraoral X-rays[13]: Digital dental X-rays when taken inside the mouth, are called as Intraoral X-rays. These X-rays provide great detail of internal mouth problems, such as cavities, help to check status of developing teeth and monitor teeth and bone health.

Various types of Intraoral X-rays are:
1. Bitewing X-rays[6], show details of the upper and lower teeth in one area of the mouth. This gives details of the tooth from its top to the point where supporting bone exists. These x-rays give details of decay between the teeth and changes in bone density caused by gum disease as well as integrity of tooth fillings.
2. Periapical X-rays, show details of whole tooth starting from its top to beyond the root tips to the supporting bone in one area of either the upper or lower jaw. These X-rays are used to detect root structure and surrounding bone loss around each tooth. Such X-rays help in treatment of advanced gum diseases and lesions.
• **Extraoral X-rays[11]**- Digital dental X-rays which do not provide internal details of mouth or problems related to individual tooth. These X-rays are used to identify critical problems between teeth, such as detect impacted teeth, monitor jaw growth and development and problems related to joints or other facial bones. Various types of Extraoral X-rays are:

1. **Panoramic X-rays** - These X-rays are used for forensic and legal purposes to identify bodies which are not visible after fire, crashes or other fatalities by showing details of all the teeth in the upper and lower arch, in one image. These x-rays are used to plan treatment for dental implants, jaw problems, and to find bone tumors and cysts.

2. **Multi-slice computed tomography (MCT)** - These X-rays do not cover entire details of the mouth instead show a particular layer or slice of the mouth. These x-rays help to view structures that are not visible to naked eye.

3. **Cephalometric Projections** - These X-rays are generally preferred by Orthodontists to develop their treatment plan. These X-rays give details of entire head and help to examine teeth in relation to a patient’s jaw and profile.

4. **Sialography** - These x-rays are used to identify salivary gland problems including blockages.

5. **Cone beam computerized tomography (CBCT)** - These X-rays are used to identify facial bone problems, such as tumors or fractures. These X-rays give three dimensional view and is helpful for evaluating bone for dental implant placement and difficult tooth extractions. This will help dentists to avoid possible complications during and after surgical procedures.

1.7 **Structure of Tooth**: A tooth consists of enamel, dentin, cementum and pulp tissue. The portion of a tooth exposed to the oral cavity is known as the dental crown[12], and the portion below the dental crown is known as the tooth root. The dental pulp cavity exists in the center of the tooth, through which the dental pulp, called the nerve, runs. In order to receive an impact on the tooth and to absorb and alleviate the force on the jaw, the surface of the tooth root area (cementum) and the alveolar bone are connected by a fibrous tissue called the periodontal ligament. The tooth is supported by the tissue consisting of the alveolar bone, gums and the periodontal ligament[12].

![Figure 1: Tooth Structure[12]](image)

- **Enamel**: The hardest bodily tissue covering the surface of the dental crown. It is as hard as crystal.
- **Dentin**: The tissue that forms the tooth from the dental crown to the tooth root, situated inside the enamel and cementum. It is softer than the enamel. A small tube filled with tissue fluid, called the dentinal tubule, runs inside the dentin.
- **Cementum**: The tissue covering the surface of the tooth root. It connects the alveolar bone with the tooth by the periodontal ligament. Its hardness is similar to bone.
- **Dental pulp**: The tissue is called the nerve. Blood vessels and the lymph vessels, as well as nerve fibers, are located in the dental pulp, supplying nutrients to the dentin.
- **Periodontal ligament**: Tissue consisting mainly of the fibrous tissue that connects the tooth root and the alveolar bone. It prevents force applied to the tooth from being directly imposed on the alveolar bone while chewing food.
**Problems Associated With Dental Images:** Several images suffer from low resolution and lighting which would affect the quality of the desired dental feature recognition and labeling of individual tooth or major parts such as crown and root of the tooth. Each tooth or the desired object extracted from the image represents Region of Interest that contains important data used for later steps. Classification of dental diseases is decided based on whether the lesion is within the enamel, dentin or whether it touches the pulp [1]. Based to the extent of attack dental caries may be classified as- Enamel, Dentinal and Pulpal caries. In enamel the caries have affected the outer enamel portion alone and the inner dentine and pulp regions are healthy. In Dentinal, the lateral spread at the dentino-enamel junction occurs with involvement of underlying dentin. In Pulpal, the micro-organisms have spread to root surface and affected roots.

**Clinical Tools Available For Detection of Dental Caries**-[14]: The diagnosis of carious lesions[8] has been primarily a visual process, based principally on clinical inspection and review of radiographs. Tactile information obtained through use of the dental explorer or “probe” has also been used in the diagnostic process. The development of some alternative diagnostic methods, such as fiber optic trans illumination (FOTI) and direct digital imaging continue to rely on dentists’ interpretation of visual cues, while other emerging methods, such as electrical conductance (EC) and computer analysis of digitized radiographic images, offer the first “objective” assessments, where visual and tactile cues are either supplemented or supplanted by quantitative measurements.

**Particle Swarm Optimization**-[15][9][10]: Particle Swarm Optimization (PSO) is a population based stochastic optimization technique inspired by social behavior of bird flocking or fish schooling.

In PSO, the potential solutions, called particles, fly through the problem space by following the current optimum particles. PSO is guided by simple mathematical calculations, involving change in position and velocity of the particle. Each particle remembers its local best position and tends to move towards global best.
2.1. **Pseudo Code For Particle Swarm Optimization based Evolutionary Technique:**

For each particle

```
{
    Initialize particle
}
```

Do until maximum iterations or minimum error criteria

```
{
    For each particle
    {
        Calculate Data fitness value
        If the fitness value is better than pBest
        {
            Set pBest = current fitness value
        }
        If pBest is better than gBest
        {
            Set gBest = pBest
        }
    }
    For each particle
    {
        Calculate particle Velocity
    }

Figure 3: Flow Diagram Illustrating The Particle Swarm Optimization Algorithm.[12]
Use gBest and Velocity to update particle Data

3 Clustering Method[9][10]: There are numerous clustering algorithms that can be used to determine the natural spectral grouping present in a data set. One common form of clustering, called k-means approach, accepts from the analyst the number of clusters to be located in the data. The algorithm then arbitrarily “seeds” or locates, that number of cluster centers in the multidimensional measurement space. Each pixel in the image is then assigned to the cluster whose arbitrary mean vector is closest. After all pixels have been classified in this manner, revised mean vector for each of the clusters are computed. The revised means are then used as the basis to reclassify the image data. The procedure continues until there is no significant change in the location of class mean vectors between successive iterations of the algorithm.

3.1 Fuzzy Clustering[9]: Fuzzy c-Means clustering is an example of Unsupervised clustering, in which particles move around without any guidance and form a part of cluster. Data points which are similar in nature form part of a cluster. In Fuzzy clustering, no particle is bounded to single cluster. A data point can belong to more than one cluster, which is identified by its membership value. The algorithm for Fuzzy C Means Clustering involves a matrix U, which contains values between 0 and 1, and represent the degree of membership between data and centers of clusters.

1. Initialize $U=\left[u_{ij}\right]$ matrix, $U^{(0)}$
2. At k-step: calculate the centers vectors $C^{(k)}=\left[c_{i}\right]$ with $U^{(k)}$
   
   $$
   c_{i} = \frac{\sum_{j=1}^{N} u_{ij}^{m} \cdot x_{j}}{\sum_{j=1}^{N} u_{ij}^{m}} 
   $$

3. Update $U^{(k)}$, $U^{(k+1)}$

   $$
   u_{ij} = \left(\frac{\sum_{i=1}^{C} \left(\frac{\left\|x_{i} - c_{j}\right\|}{\left\|x_{i} - c_{k}\right\|}\right)^{\frac{2}{m-1}}}{\sum_{i=1}^{C} \left(\frac{\left\|x_{i} - c_{j}\right\|}{\left\|x_{i} - c_{k}\right\|}\right)^{\frac{2}{m-1}}} \right)^{\frac{2}{m-1}}
   $$

4. If $\left\| U^{(k+1)} - U^{(k)} \right\| < \varepsilon$ then STOP; otherwise return to step 2.

4 Neural Network[15]: Neural network is based on the working of Human Brain or Neurons. It is used to extract patterns or detect trends that are complicated in nature and difficult for a human being to understand. This is used to solve Questions related to “what if” condition. Various advantages associated with Neural Network involves:

1. Adaptive learning: An ability to learn how to do tasks based on the data given for training or initial experience.
2. Self-Organization: An ANN can create its own organization or representation of the information it receives during learning time.
3. Real Time Operation: ANN computations may be carried out in parallel, and special hardware devices are being designed and manufactured which take advantage of this capability.
4. Fault Tolerance via Redundant Information Coding: Partial destruction of a network leads to the corresponding degradation of performance. However, some network capabilities may be retained even with major network damage.
Figure 4: A Simple Neuron[15]

\[ a = f(p_1w_1 + p_2w_2 + p_3w_3 + b) = f(\sum p_iw_i + b) \]

Figure 5: Working Model of Neural Network[15]

5 Proposed Algorithm:

Figure 6: Proposed Algorithm
Phase 1: Data Collection: Dental Image data must be collected for training and testing the model proposed for X-ray image classification. A sufficient number of data is required to train and test the model successfully.

Phase 2: Data Preprocessing: Data preprocessing is an important and essentials for Dental image data due to noise and other raw information inserted in images and due to high dimensionality of data. Data preprocessing may have three sub phases: Segmentation, feature extraction and feature reduction. In segmentation[4] region of interest (ROI) is selected with important parts of image then various features of the segmented image are extracted and at last irrelevant, incomplete, noisy and inconsistent features available in segmented image are eliminated from the image and subset of features are selected through feature reduction techniques. The prime objective of preprocessing is to improve the image data quality by suppressing undesired distortions and enhancing the required image features for further processing.

Phase 3: Data Partitioning: An optimum size of data is partitioned into different partitions: Training and testing. The ratio of partition may be 70%:30% or 60%:40% respectively for training and testing. Partition size of training and testing data also played crucial role to provide high classification accuracy of dental image data, therefore a suitable partition of training and testing samples are necessary.

Phase 4: Classifier Building: A classifier model is developed using hybrid Intelligent techniques ANN, Fuzzy logic and Particle Swarm optimization algorithm. Model is utilized to classify dental image data either limited to Dentin or Pulpal or Enamel or combination of these. We need to train the model developed with the help of training data set.

Phase 5: Model Validation: To check the robustness of the model testing data set is used. A set of rules will apply to check the validation of classifier and test the proposed model by various performance measures like accuracy, specificity and sensitivity.

6 Dental Image Classification Process:
1. Sample data set is prepared from dental X-ray images taken from various hospitals of Punjab region.
2. Features are extracted using PSO-FCM
3. Principle Component analysis (PCA) is used to get distinguished or important features
4. Training of important features is done using Neural Network[15]
5. Particle Swarm Optimization based Fuzzy clustering is applied on the trained data set to perform testing and classification of the cavity.

7. Gray-Level Co-Occurrence Matrix[13]: A statistical method of examining texture that considers the spatial relationship of pixels is the gray-level co-occurrence matrix (GLCM), also known as the gray-level spatial dependence matrix [13]. The GLCM functions characterize the texture of an image by calculating how often pairs of pixel with specific values and in a specified spatial relationship occur in an image, creating a GLCM, and then extracting statistical measures from this matrix.

7.1 Energy: It is also known as uniformity or the angular second moment. It returns the sum of squared elements in the GLCM.
It is defined for an image C as follows
\[
\text{Energy} = \sum_{i,j=1}^{N} C_{ij}^2
\]

7.2 Contrast: It measures the local variations in the gray-level cooccurrence matrix. It returns a measure of the intensity contrast between a pixel and its neighbor over the whole image.
Contrast is 0 for a constant image.

7.3 Correlation: It measures the joint probability occurrence of the specified pixel pairs. It returns a measure of the intensity contrast between a pixel and its neighbor over the whole image.

\[
\text{Correlation} = \frac{\sum_{i,j=1}^{N} (i - \mu_i)(j - \mu_j)C_{ij}}{\sigma_i \sigma_j}
\]

Correlation is 1 or –1 for a perfectly positively or negatively correlated image.

7.4 Homogeneity: It measures the closeness of the distribution of elements in the GLCM to the GLCM diagonal. Homogeneity is 1 for a diagonal GLCM. It is defined as

\[
\text{Homogeneity} = \sum_{i,j=1}^{N} \frac{C_{ij}}{1 + |i - j|}
\]

8. Results:

Figure 7: GUI for Particle swarm optimization based Fuzzy C-Means on Dental X-ray Images

Figure 8: Neural Network based Training
Figure 9: Sample Dental X-ray Images

Iter = 1, Objective function = 7582767872.318359
Iter = 2, Objective function = 7599052520.3498
Iter = 3, Objective function = 7616906847.464146
Iter = 4, Objective function = 7722025370.365576
Iter = 5, Objective function = 8032087084.959230
Iter = 6, Objective function = 8773607983.170147
Iter = 7, Objective function = 10138612477.787289
Iter = 8, Objective function = 12060614068.943470
Iter = 9, Objective function = 14026857014.350206
Iter = 10, Objective function = 15831292350.605581

Figure 10: Segmented Dentin Images with Features

Conclusion: The paper discussed the Particle swarm Optimization based Fuzzy C Means clustering on dental images to segment image followed by training using Neural Network and PCA and Classification of the type of dental cavity. The features extracted from the segmented image included Correlation, Energy, Entropy, Homogeneity and Maximum Probability. The technique proposed is more economical compared to manual tools present for the detection of dental diseases through visual inspection in dental clinics.
References:


2. Omaima Nomir, Mohamed Abdel-Mottaleb, ”Human Identification from Dental X-Ray Images Based on the Shape and Appearance of the Teeth”, in IEEE transactions on information forensics and security.


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A REVIEW OF NEUROMUSCULAR DISEASE DIAGNOSIS USING ELECTROMYOGRAM SIGNAL ANALYSIS

ER. JAGJEET SINGH, DR. GURMANIK KAUR

Abstract: Neuromuscular diseases (NMD) are an important cause of disability and deaths worldwide. Early finding and diagnosis of neuromuscular diseases by clinical examination is crucial for their management as well as their anticipation through prenatal diagnosis and genetic counseling. This paper presents a review of the latest research work which has been done for identification of neuromuscular diseases using EMG signal analysis. The crux of this paper is that the decision support systems for NMD diagnosis should be developed which incorporate a multimodal diagnostic approach fusing EMG data with inferences from biochemical analysis, neuropathology and clinical observations.

Introduction: Neuromuscular diseases as a group are linked by anatomy with significant differences in pathogenetic mechanisms, clinical expression, and time course of disease. They affect the central nervous system such as the motor-nerve cells in the spinal cord, the peripheral nerves, the nerve-muscle (neuromuscular) junction and the muscles [1]. Each neuromuscular disease is relatively uncommon, yet causes a significant burden of disease socioeconomically. Globally, the burden of neurological disorders has been increasing substantially over the past 25 years because of expanding population numbers and ageing. The number of patients who will need care by clinicians with expertise in neurological conditions will continue to grow in coming decades. Policy makers and healthcare providers should be aware of these trends to provide adequate services [2].

In assisting the diagnosis of neuromuscular diseases, clinical analysis of electromyogram (EMG) signal is a powerful tool [2]. EMG signal is a biomedical signal that measures the electrical activity in a muscle. It is composed of motor unit action potentials (MUAPs) produced by different motor units (MUs). The term MU refers collectively to one motor neuron and the group of muscle fibers it innervates. It is the smallest unit of skeletal muscle that can be activated by volitional effort. MUAPs from different MUs tend to have distinct shapes, which remain almost similar for each discharge. When a person maintains a low level of muscle contraction, individual MUAPs can be easily recognized. As contraction intensity increases, more MUs are recruited causing an interference pattern of MUAPs in which the neurophysiologist cannot detect individual MUAP shapes reliably [3]. Traditionally, neurophysiologists assess MUAPs from their shape using an oscilloscope and listening to their audio characteristics. Hence, an experienced electrophysiologist can identify abnormalities with reasonable accuracy. However, subjective MUAP assessment, although satisfactory for the detection of unequivocal abnormalities, may not be sufficient to delineate less obvious deviations or mixed patterns of abnormalities. These ambiguous cases call for quantitative MUAP analysis. The advent of computer technology has allowed scientists to renew their efforts in the analysis of EMG so as to improve the assessment of neuromuscular disorders. Furthermore, computer-aided EMG analysis saves time, standardizes the measurement and enables the extraction of additional features of EMG signals which cannot be easily calculated manually [4].

The basic steps involved in EMG signal analysis for identification of neuromuscular diseases are as shown in Figure 1:

![Figure 1: Generalized Block Diagram for Neuromuscular Disease Identification](image)

**Pre-Processing:** There are several intrinsic and extrinsic sources of low frequency noise that may
contaminate the EMG signal. The two extrinsic noise sources, the power line noise and the cable motion artifact, can almost be totally eliminated with modern electronics technology and appropriate circuit design. The two intrinsic noise sources originate in the electronics of the amplification system (thermal noise) and at the skin-electrode interface (electrochemical noise), respectively (Huigen et al., 2002). Together, these noise sources form the baseline noise which is detected whenever a sensor is attached to the skin. An additional noise source, the movement artifact noise, also originates at the electrode-skin interface. It is generated when: (a) the muscle moves underneath the skin, and (b) when a force impulse travels through the muscle and skin underlying the sensor causing a movement at the electrode-skin interface. The resulting time-varying voltage produced across the two electrodes can be the most troublesome of noise sources and requires the most attention. These noises can be removed by ordinary filtering methods inclusive of band stop filter, band-pass filter or using the appropriate fine gadget with proper electrode placement [5].

**Segmentation**: The information collected from the EMG signal has great significance for diagnosis and treatment of various neuromuscular diseases and to observe the control mechanism of different neuromuscular organs. Segmentation of EMG signal separates individual MUAPs from the complex EMG without loss of the diagnostic information [4].

**Clustering**: Extracted MUAP-containing segments can either be isolated or overlapped. MUAP waveforms that are found to be overlapped are then resolved into their constituent single MUAPs. Isolated MUAPs of each MU underwent a clustering process that clusters MUAPs of similar shape and for each cluster the average or template MUAP shape is determined [6].

**Feature Extraction**: In this stage, features of identified clusters determined which make us possible to distinguish EMG signal as normal and diseased during classification. Hence, classification accuracy depends on the efficiency of the procedure used for feature extraction.

**Classification**: It is the process to classify the clustered MUAPs into normal and diseased classes for diagnosis of neuromuscular disorders.

The aim of this paper is to briefly review the literature on analysis of EMG signals for identification of neuromuscular diseases, published in last decade.

**Literature Review**: In 2009, Gurmanik Kaur compared several segmentation techniques and the success rate of using peaks of MUAPs for segmentation gave 95.90% accuracy. By using pattern recognition technique for clustering Autoregressive (AR) features were extracted. One-against-all strategy was adopted in multi-class SVM Classifier which gave 100% accuracy [7].

In 2010, Sabri Kocer developed a classification system by using Autoregressive (AR) coefficients for feature extraction of EMG Signals. By using these statistical features with neuro-fuzzy system success rate 90% for classification of EMG Signals was achieved by the author.[8]

In 2011 H. Dagli transformed EMG Signals into recurrence plots and calculate the statistical features such as Recurrence rate (RR), Determinism (DET) and Laminarity (LAM). Support vector machine was used to classify the EMG signals which gave 98.28% classification accuracy[9].

In 2012, Shaikh Anowarul Fattah and Md. Asif Iqbal Jumana did an analysis of time and frequency domain features to separate the normal and the Amyotrophic lateral Sclerosis (ALS) patients EMG signals in which the EMG signals of 7 normal subjects aged 21-37 years and 6 ALS patients aged 35-67 years were considered. For frequency domain the comparison has been done between average values of spectral peak and the mean frequency, for time domain author compares average zero lag values of the autocorrelation function and zero crossing rate. Spectral peak and autocorrelation based features gave better accuracy by using K-nearest neighborhood classifier[10].
In 2012, Anjana Bhardwaj, Manish and A. K. Arora gave the study of pattern recognition technique to classify the MUAPs composed in the EMG signals. In the present study the unsupervised learning artificial neural network (ANN) technique used an advanced version of learning vector quantization (LVQ) and self-organizing feature maps (SOFM) algorithm. The accuracy of artificial neural network was 97.6%[11].

In 2013, Kamali employed both the time and time-frequency features of MUAPs along with Support Vector Machine (SVM) Classifier to get high classification accuracy. The results proved that the multi-classifier approach enhance the accuracy of classification[12].

In 2013, Subasi proposed a novel particle swarm optimization Support vector machine technique to improve the accuracy for classification of normal, myopathic and neurogenic EMG Signals. The kernel parameter settings during SVM training procedure improved its accuracy. Discrete wavelet transform and Statistical features were extracted for decomposition of signals. For final classification accuracy, the results of PSO-SVM were significantly enhanced with 97.41% in comparison to other with 96.75% SVM, 95.17% k-NN and 94.08% for RBF classifiers[13].

In 2014, Anjana Goen introduced the study to discriminate the EMG signals of neuropathic, myopathic and normal subjects. The author considered 34 EMG Signals at 30% muscle contraction for the time period of 5 seconds. For feature extraction mean and standard deviation of time domain functions have been taken. SVM, RBFNN and SVM ensemble were compared to classify the signals as normal, myopathy and neuropathy. It is analysed that SVM ensemble gave best performance with accuracy of 91.2%, specificity 91.9%, sensitivity 91.1% and PPV of 92.2%. The author proves the improved result by adopt large data set and using some exceptional feature.[14].

In 2015, Nahla F. proposed a hybrid technique to identify EMG signals of ALS, Myopathy and Healthy subjects. To extract features from Surface EMG signals wavelet transform and statistical features were calculated to further provide input to classifiers for the identification of neuromuscular diseases. For better classification results a comparison was conducted between SVM and ANN. The result indicated that SVM gave 98% accuracy for identification of ALS and ANN shows 86.6% of accuracy to classify MYO signals. After these results the author developed a hybrid classifier by using SVM ALS classifier and ANN MYO classifier and showed overall 85.5% accuracy[15].

In 2016, M. Khan, J. Singh et al. introduced a multi-classifier approach to predict the labels to myopathic, neuropathic and healthy MUAPs of an EMG signals. time and time-frequency domain features were used to classify the EMG signals. The results showed that the time-frequency domain gave better features as compare to Time domain. To classify the extracted features SVM classifier was used as base classifier. The multi-classifier model Distance Weighted K-Nearest Neighborhood (DWKNN) provided average accuracy of 97%[16].

In 2016, Patcharin Artameeyanant et al. proposed Normalized Weight Vertical Visibility Algorithm (NWVVA) method for feature extraction and classify the EMG Signals to differentiate the amyotrophic lateral sclerosis (ALS) , myopathy and healthy signals by used three classifiers to compare the results and get better accuracy. The three classifier multilayer perceptron neural network, k-nearest neighbor and support vector machine gave accuracy as approximately 97% , 96% and 98%, respectively. The result indicates that support vector machine performs best as compare to other classifiers. The overall performance of proposed normalized weight vertical visibility algorithm (NWVVA) method for feature extraction resulted 98.36% which gave improved accuracy as compared to conventional methods[16].

In 2016, Shijiya S et al. determine both the Spectral features and Temporal features of EMG signal.. Spectral Features include Peak Frequency (PF), Wavelet Average Power (WAP), Total Power (TP), Wavelet Mean (WM), Mean Power (MP), Wavelet Energy (WE) Wavelet Standard Deviation (WSD) and Mean Frequency (MF), Integrated EMG (IEMG), Squared Integral (SI), Variance and Mean Absolute Value (MAV) were taken under temporal features. The extracted features were applied to ANN and a combination of ANN and fuzzy logic classifiers to classify the myopathy, Huntington’s disease,
Amyotrophic Lateral Sclerosis (ALS) and Parkinson’s diseased signals into their corresponding classes and compared the results for the analysis of their accuracy. The hybrid classifier gave improved accuracy of 94.61% [17].

In 2016, J. Defino, S. Mary Vasanthi applied Discrete wavelet transform to reduce the total number of samples for accurate feature extraction and to classify the EMG Signals of Myopathy, ALS and normal person. After getting dominant statistical feature the output of k-Nearest Neighbor (KNN) classifier and Support vector machine (SVM) was compared. SVM gave better result with average accuracy of 88.6% [18].

In 2017, Amit Kumar Singh, N K Agrawal et al. used empirical mode decomposition (EMD) method to find intrinsic mode functions (IMFs) of EMG Signals. Mean, Standard deviation, Variance and entropy was calculated for classifying the healthy, neuropathy and myopathy EMG signals. The features of intrinsic mode functions were then applied as an input to Artificial Neural Network classifier to classification of EMG signals produced by various neuromuscular diseased and healthy person. The author gave the comparison of EMD based feature extraction technique with various other existing techniques. The proposed EMD based technique gave best accuracy of 94% as compared to other reported techniques [19].

In 2017, Kehri et. al. proposed Wavelet Transform, Principle Component Analysis and Independent Component Analysis feature extraction techniques for grouping with Support Vector Machine (SVM) and Probabilistic Neural Network (PNN) Classifiers. The combination of Wavelet Transform and Support Vector Machine gave higher accuracy for classification of neuromuscular disease [20].

In 2018, Jahromi compared Time Domain Features, Morphological Features, Frequency Domain Features, Principal components of features, Wavelet Domain Features to improve decomposition of MUAP for various EMG Signals separation. Among which slop analysis gave most effective results to differentiate the morphological features, Discrete Fourier transform coefficients gave good results for frequency domain features, but the first derivative of time samples outperformed in time domain features as compared to all other existing techniques examined for signal decomposition [21].

**Conclusion:** Since the EMG signals are non stationay, non uniform and easily affected by noise, it is quite difficult a job to process such type of signals. Several traditional algorithms produce very complex methods and the variation rate in result is very high, which can not be tolerated in clinical analysis. The suitable technique should be implemented for every step and the results should be compared. From the review of several techniques it is concluded that preprocessing of the signal has direct impact on the classification of signal. The frequency range of signal should be between 20Hz to 500 MHz to remove the artifacts. The comparison of adjacent and overlapped windowing is not yet identified. The choice of classifier depend upon the number of features extracted. Multi classifier can outperform over base classifiers and a hybrid model can be constructed and preferably used for clinical analysis.

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ANALYSIS OF BIG DATA TOOLS ON THE BASIS OF SPEED AND EFFICIENCY FOR THE WEATHER FORECASTING DATA

HARKAMAL SINGH, PARMINDER PAL

Abstract: Huge information is defined as a lot of information which requires new advances to make it imaginable to separate an incentive from it by catching and investigation process. Examination regularly includes considering previous chronicled information to investigate potential patterns. Climate forecast has been a standout amongst the most intriguing and entrancing space and it assumes a critical part in meteorology. Climate forecast is to gauge of future climate conditions. Atmosphere condition is the state of condition at a given time the extent that atmosphere factors like precipitation, rainstorm, cloud conditions, temperature, weight, wind heading and so forth.

Keywords: Hadoop, Pig, Hive, Cassandra.

1.1 Introduction: Climate determining is well thoroughly considered as the most requesting issue both the sexually and logically by the world in the most recent decade. This inevitably brought about to an incredible interest for creating models which help towards powerful expectation of the climate information. Monstrous information relating to the meteorology is accessible for use in various organizations. This information is produced both from the surface perception stations and an elevated report stations. With the expansion in the quantity of climate stations, tremendous information is accessible on consistent schedule , week after week, month to month and yearly premise and the information is put away exponentially. In any case, in spite of continuing headways in atmosphere models, their utilizations in estimation on the environmental change affect examine are not important. Besides, affect audit examines include a colossal number of inactive rain fall groupings, which can’t be moderately demonstrated because of computational cost.

Monstrous information relating to the meteorology is accessible for use in various organizations. This information is produced both from the surface perception stations and an elevated report stations. With the expansion in the quantity of climate stations, tremendous information is accessible on consistent schedule , week after week, month to month and yearly premise and the information is put away exponentially. This information is put away and is made accessible for powerful investigation of climate expectation, fiasco guaging and for the utilization of different divisions. The examination of the related information from this gigantic information is of vital significance, and necessities mining methods.

In any case, in spite of continuing headways in atmosphere models, their utilizations in estimation on the environmental change affect examine are not important. Besides, affect audit examines include a colossal number of inactive rain fall groupings, which can’t be moderately demonstrated because of computational cost. An extra obstacle is that rain fall estimated ones in light of the climatic information are typically licensed to be poor conversely with different factors, for example, temperature (Randallest. , 2007; Christensenetal., 2007). In this manner, for successful recognizable proof of the precipitation, circuitous sources might be of more prominent utilized. In the greater part of the cases, the expectation is done in specifically utilizing factual strategies, which take the upside of relationship between neighborhood scale precipitation and those huge scale air factors. The approach is considered as factual downs calling (Christensenetal., 2007).

1.2 Objectives of The Study:
1. To study various big data tools such Pig, Hive, Cassandra for Hadoop map reduce.
2. To implement the above tools for the weather forecasting data.
3. To compare the performance of the tools (Hadoop, Hive, Pig, Cassandra) on the weather forecasting data in the terms of response time, efficiency and accuracy.

1.3 Literature Review:
M.Senthilkumar (2018) [1] proposed an apache product which is an open-source, Java based
programming framework is used to support large data sets in a distributed environment. Hadoop has maximum advantage over scalable and fault-tolerant distributed processing technologies. Also,(HDFS)Hadoop Distributed File System is highly fault tolerant and used for applications that have large data sets. Hence HDFS file system using name node, data node and task tracker will perform distribution of job in Hadoop environment. Since Hadoop has overwhelming advantage in optimizing big data, we prefer to use Hadoop to analyze large datasets of weather processing.

M.Senthilkumar (2018) [2] proposed an apache product which is an open-source, Java based programming framework is used to support large data sets in a distributed environment. Hadoop has maximum advantage over scalable and fault-tolerant distributed processing technologies. Also,(HDFS)Hadoop Distributed File System is highly fault tolerant and used for applications that have large data sets. Hence HDFS file system using name node, data node and task tracker will perform distribution of job in Hadoop environment. Since Hadoop has overwhelming advantage in optimizing big data, we prefer to use Hadoop to analyze large datasets of weather processing.

Virginia Tech (2018) [3] proposed the Growth rates of loblolly pine trees Researchers utilized verifiable perceptions on tree development and climate. The capacity to foresee climate designs has helped us settle on garments decisions and excursion designs, and even spared lives. Presently, specialists in Virginia Tech’s College of Natural Resources and Environment are utilizing comparable prescient techniques to figure the development of trees.

Dr. Vijay Dhir (2018) [4] compares the performance of MANET routing protocol such as Ad-hoc On Demand Distance Vector (AODV) and Destination Sequence Routing (DSR) protocol at different Node mobility and node density under different Traffic loads.

Dong Wang ;Daniel Zhang ; Nathan Vance ; Steven Mike ;Yang Zhang (2018) [5] establish solid details inside seeing clamorous data collection by different unvented sources from online electronic communication has been a critical errand in the time of huge data. This duty, suggested as honesty divulgence, centers at perceiving the steadfastness of the sources and the trustworthiness of cases they make without knowing either from the prior.

L.T. Yang ; L.Wang ;Xiaokang Wang ; Xingyu Chen ; Rajiv Ranjan ; Xiaodao Chen ; M. J Deen (2018) [6] enormous organization is a basic use of organization enrolling to give farsighted and expected organizations to individuals. To operationalize immense organization, the diverse data assembled from Cyber- Physical-Social Systems (CPSS) must be arranged beneficially. In any case, for the reason that of the brisk climb in the level of data, speedier and more beneficial estimation strategies are required.

M. Bakratsas ; P. Basaras ; D. Katsaros ; L. Tassiulas (2018) [7] stated the presence of Solid State Drives (SSDs) energized a huge amount of experimentation to look at and experience to the degree possible the conceivable outcomes of the new drive. The point of convergence of this work is on the examination of the relative execution and focal points of SSDs Vs hard circle drives when they are used as fundamental storing for Hadoop’s Map-Reduce.

Bing Pan (2017) [8] proposed forecasting Destination Weekly Hotel Occupancy with Big Data. Neighborliness voting public needs precise determining of future execution of inns in particular goals to benchmark their properties and better improve tasks. As rivalry builds, inn chiefs have dire requirement for exact here and now conjectures. In this examination, time-arrangement models fusing a few tourism enormous information sources, including internet searcher questions, site activity, and week after week climate data, are tried keeping in mind the end goal to build a precise determining model of week after week lodging inhabitance for a goal.

Angkoon Phinyomark ; Esther Ibáñez-Marcelo ; Giovanni Petri (2017) [9] proposed that resting state utilitarian attractive reverberation imaging (rFMRI) can be utilized to quantify useful availability and afterward recognize mind organizes and related cerebrum issue and maladies. To investigate these mind boggling systems, be that as it may, colossal measures of information are important. Ongoing advances
in neuroimaging advances, and the one of a kind methodological approach of rFMRI, have empowered us to a period of Biomedical Big Data. The ongoing advancement of huge information offering activities to their difficulties are talked about.

1.4 Problem Statement:
1. The framework gets temperatures of different urban areas caught at general interims of time on every day in an info record.
2. All urban communities’ climate data for seven days will be inputted to the framework in a solitary information document.
3. Framework will process the info information document and creates a report with Maximum and Minimum temperatures of every day.
4. Produces a different yield report for every Month.
5. Build up a PIG Script to channel the Map Reduce Output in the beneath mold.
6. Fare a similar PIG Output from HADOOP DISTRIBUTED FILE SYSTEM to MySQL utilizing SQOOP
7. Store a similar PIG Output in a HIVE External Table.

1.5 Research Methodology: Irregularity of meteorological components, particularly those climate parameters which are major in charge of Local monsoonal precipitation constrains us to build up an approach which can perceive such a conflicting example and utilize it for future forecast of monsoonal precipitation which will be especially achievable. So long, the procedures utilized for climate anticipating is likelihood dispersion, bend fitting, standardization. Still our predications are flighty. There is a need to build up another approach that utilization idea of soft registering rather than the customary fresh ways to deal with anticipate LMP all the more precisely. The everyday meteorological information comprising of Temperature, Relative Humidity and Vapor Pressure of Hisar will be investigated utilizing Statistical bend fitting and ANFIS in this examination to direct an execution correlation in view of the base mistake rate as far as Output deviation and RMSE in climate estimating. The yield of anticipating in this investigation is the Local Monsoonal Precipitation which is the estimation of aggregate precipitation in monsoonal season. The fundamental Problem of this examination work is to test the capacity of ANFIS Model to foresee climate Phenomena with lesser blunder.

1.6 HDFS: HDFS is a circulated document framework that keeps running on huge bunches of commodity machines. It depends on the plan of the Google File System (GFS), which was initially part of Nutch. HDFS can store a lot of information and is intended to keep running on various machines in parallel, supporting obviously bigger documents than other circulated record frameworks [4]. For better combination with MapReduce and to limit latencies, HDFS information can likewise be handled locally in a bunch. Idleness astute this is a critical advance from arranged capacity (NAS) and capacity zone organize (SAN) -type stockpiling, which don’t permit such territory by any means. Hadoop’s bunch structure is once in a while alluded to as "shared nothing". This implies the main shared part is the system of groups; stockpiling and handling, i.e. the processing hubs, can be viewed as individual units. This cuts down the idleness contrasted with a system document framework (NFS).

1.7 Hadoop: Hadoop is an open source that does the parallel execution in the distributed data system to generate the power of super computers. Hadoop uses apache Lucene and Apache Nutch developed by Doug Cutting. Hadoop used Google File System (GFS) and Map-Reduce to give arise to Hadoop Distributed File System (HDFS).

1.8 Apache Pig: Apache Pig is an execution organize and irregular state scripting vernacular (Pig Latin) for separating generous datasets. Pig substance continue running on HDFS and MapReduce bundles, or locally on a single machine where HDFS or MapReduce are not required. Pig's compiler makes an understanding of Pig Latin into groupings of MapReduce programs. Pig Latin's unusual condition of parallelization and ease of use makes it extraordinarily understood among Hadoop customers. PigLatin empowers customers to depict the dataflow, i.e. how data from no less than one information sources should be scrutinized, arranged and secured to no less than one yields. Dataflow can be everything from a clear direct word count to a more awesome arrangement of joined wellsprings of information and split floods of data sent to different chairman.
1.9 **Apache Hive**: Hive is an information distribution center answer for hadoop that is adaptable to work with substantial scale information volumes and it takes out the need of composing long and complex java programs. Hive bridges the labor between low-level java programming for hadoop and SQL and furthermore use Hadoop underpins apportioning for versatility and execution.

1.10 **Map-Reduce Framework**: Google started then work on map reduce framework in 2004 with a little changes it has grasped various associated with the mapping. The programming issue are accepted into difference pc’s, lit up and assembled back. Map reduce is the better alternative in RDBMS. Map reduce is used when in different application have to be created to be used data set in difference sets. This is a difference between the map reduce and rdbms as map reduce process data in petabyte whereas RDBMS process the gigabyte data. RDBMS is the low integrity RDBMS is the high integrity. RDBMS is the nonlinear data base and Map reduce is the Linear database. Hadoop can be used HDFS, Hive and Pig. Map reduce can be used for instance, Java, Ruby and Python. Map reduce can be work on two phases. The first phases are mapping stage and the second phase is the diminishing stage. Vital differences among RDBMS and Map-Reduce can be found in table.

### Table 1.1: RDBMS and Map-Reduce Main Differences

<table>
<thead>
<tr>
<th></th>
<th>RDBMS</th>
<th>Map-Reduce</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data</td>
<td>Gigabytes</td>
<td>Petabytes</td>
</tr>
<tr>
<td>Access</td>
<td>Interactive and batch</td>
<td>Batch</td>
</tr>
<tr>
<td>Updates</td>
<td>Read + write many</td>
<td>Write once, read many</td>
</tr>
<tr>
<td>Integrity</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Scaling</td>
<td>Nonlinear</td>
<td>Linear</td>
</tr>
</tbody>
</table>

1.11 **Result and Discussion**:

1.11.1: **Weather Data Analytics**: The Big information gathered by NCDC (National Climatic Data Center) is gathered crosswise over in excess of 116 climate stations and in excess of 1000 perceptions focuses. The information created by them is unstructured, which turns into a testing assignment to investigate it. The example photo of the crude information is demonstrated as follows.

![Unstructured Weather Data](image)

1.11.2: **Performance Assessment**: As our thesis deals with working with the fastest tool we perform the
performance evaluation between the pig and hive queries and below are the theoretical comparison between performance of pig and hive. And according to the data analyzing speed and efficiency HIVE proves to be BETTER than PIG.

In this manner as indicated by the analysis did over the execution, the speed of HIVE is observed to be superior to anything the PIG preparing of information.

**Conclusion and Future Scope:** After studying the various literatures done by the authors and experimental study, following conclusions are drawn:

The information elected to form NCDC (National Climatic Data Center) is unstructured data. So the data is produced through the big data tools that is Hive and Pig in terms of speed and efficiency. It has been seen that hive proved to be better than Pig.

The future scope of this paper is that the data can be tested on other tools also apart from Hive and Pig like Map reduce, Cassandra etc.

**References:**


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A REVIEW ON FUTURE SCOPE OF GREEN BUILDINGS

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Abstract: The aim of this paper is to study green/energy-efficient real estate from an engineering and economic perspective. It focuses on energy efficiency and its measures from being undertaken and have a superior indoor environment. The aim of the paper is to study how tenants perceive the indoor environment in green-rated premises, and to compare these results with tenants’ perception of a conventional building’s indoor environment. It assesses whether energy efficiency has an impact on buildings’ income and market values. The key result is that although there is a small impact on building-related income, this does not seem to translate into a higher market value. It included the study hindrances to a more energy-efficient building sector. The study may be rational. However, by introducing different ideas these investments could be triggered today. At last, the green buildings appear to be useful, but that there still appear to be economic barriers to a greener building sector.

Keywords: Green Buildings, Energy Efficient Buildings, Indoor Environment Quality (IEQ), Operations and Maintenance Optimization, Waste and Toxic Reduction.

Introduction-Construction is now an inevitable part of human race we cannot do without constructing new buildings, roads, flyovers, railway station, airports etc. We have to keep up with the comparative developments of infrastructure with the satisfaction of our needs. Buildings have a tremendous impact on the environment, using about 40% of natural resources extracted in industrialized nations, consuming virtually 70% of electricity and 12% of potable water, and producing the waste disposed in our landfills. Additionally, they are responsible for a massive amount of harmful emissions, accounting for greenhouse gases, due to their operation, and an additional induced indirectly by material exploitation and transportation.

Building construction consumes raw stone, gravel, sand used worldwide annually, and the raw timber. From the environmental impact perspective, the building sector has a significant effect on the entire environment. Considerable initiatives have been carried out by the research community worldwide, in order to find alternative sustainable building materials and low technology methods, which result in a more sustainable and affordable construction adhering to the comfort standards needed today. Adopting green building materials is an excellent approach to meet this target. Selection of construction materials which have minimum environmental burdens is useful in the sustainable development of a country. Therefore, building related contribution to environmental issues is large and therefore essential. Selecting environmentally preferable building products is an excellent method to boost a buildings environmental performance. While there is obviously an immediate need for new technologies to optimize the application of low-impact building materials, it is also true that there are several technologies.

We can introduce the concept of green buildings in civil engineering, because we are not engineers who care only for the new inventions or seek profits, rather, we are the engineers who believe that we have borrowed this earth from our ancestors and to present it to our future generations clean and green.

Objectives: Green building is designed to reduce the overall impact of the building environment on human health and natural environment by:

1. To explore and highlight how sustainable building material can contribute to lessen the impact of environmental degradation.
2. To create healthy buildings which can be sustainable to the occupant as well as our natural environment.
3. It can efficiently use energy, water and other resources.
4. It reducing waste, pollution and environment degradation.
5. Protecting occupant health and improving employee productivity.

Fundamental Principles:
Structure Efficiency:
• It is the concept of sustainable building and has largest impact on cost and performance.
• It aims to minimize the environment impact associated with all life-cycles.

Energy Efficiency:
• The layout of the construction can be strategized so that natural light pours for additional warmth.
• Shading the roof with trees offers an eco-friendly alternative to air conditioning.

Water Efficiency:
• To minimize water consumption one should aim to use the water which has been collected, used, purified and reused.

Material Efficiency:
• Materials should be use that can be recycled and can generate surplus amount of energy.
• An example of this are solar power panels, not only they provide lightening but they are also a useful energy source.

Waste and Reduction:
• It is probable to reuse resources.
• What may be waste to us may have another benefit to something else.

IGBC Rating System:
• IGBC has developed green building rating programme to cover commercial, residential, factory buildings, etc. Each rating system divided into different levels of certification are as follows: „Certified” to recognize best practices. „Silver to recognize outstanding performance. „Gold to recognize national excellence. „Platinum to recognize global leadership.

Different from Other Buildings:
• The design, maintenance and construction of buildings have tremendous effect on our environment and natural resources.
• Green Building is different from the other buildings because it uses a minimum amount of nonrenewable energy, produce minimal pollution, increases the comfort, health and safety of the people who work in them.
• It also minimize the waste in construction by recovering materials and reusing or recycling them.

Benefits of Green Building:
• Buildings have a large effect on the environment, human health and the economy.
• The successful adoption of GREEN BUILDING development can maximize both the economic and environmental performance of the buildings.

Environmental Benefits:
• Protect biodiversity and ecosystems
• Improve air and water quality
• Reduce waste streams
• Conserve natural resources

Economic Benefits:
• Reduce operating costs
• Create, expand, and shape markets for green product and services
• Improve occupant productivity

Social Benefits:
• Enhance occupant comfort and health.
• Heighten aesthetic qualities.
• Minimize strain on

Development of Green Building: In order to mitigate the effect of buildings along their life cycle, Green Building (GB) has become a new building philosophy, pushing the application of more environmentally friendly materials, the implementation of strategies to save resources and lower waste consumption, and the improvement of indoor environmental quality, among others [11, 12]. This might lead to environmental, financial, economic, and social benefits. For instance, savings in operation and maintenance costs in GBs can be realized through the installation of high-efficiency illumination and insulation systems [10] or through a suitable material selection process that considers, for example, the
daylight roof reflection\[11,9\]. Other primary advantages of GBs related to indoor environmental quality advancements are the reduction on health costs and the increase on employees' productivity \[11\] through their perceived satisfaction towards work areas \[9\]. Furthermore, intangible benefits, such as the building and builder's goodwill, and perceived added value must also be considered \[8,2\] simply because they could guide the decisions of investors and future owners \[5, 9\]. Despite their demonstrated benefits, GBs are not yet regarded as attractive projects since most builders relate green features with expensive technologies that increase cost (e.g., photovoltaic panels, grey water reuse systems)\[2,4\]. Nevertheless, a careful design process and a comprehensive material selection method, rather than an elevated investment in technology, may be sufficient to accomplish ideal environmental objectives at a lower cost. In reality, some research supports the insufficient difference between the average investment cost per square foot for some GBs, such as academic buildings, laboratories, community centers, and ambulatory care facilities, and that of non-green buildings with the same characteristics \[6\]. Moreover, GBs provide better dividends in the long run recovering up to 10 times the green premium through the realization of anticipated benefits. The achievements of a GB will depend on the quality and effectiveness of the installed green systems. Therefore, the market demands a common approach to distinguish GBs from traditional buildings through the use of standard, transparent, objective, and verifiable measures of green that will ensure that the minimum green requirements have been achieved.

**Design Techniques via Case Study:** It has been designed in an environment friendly manner and conceptualized and constructed as a "building in the garden" that is sustainable. Key Sustainable Features

- The building is fully complaint with the ECBC (Energy Conservation Building Code).
- Sustainable site planning has been integrated to maintain favourable microclimate.
- The architectural design has been optimized as per climate and sun path analysis.
- The building has energy-efficient artificial lighting design and daylight integration.
- Water body to cool the micro climate.
- Orientation of building: North – South.
- It also has energy-efficient air conditioning design with controls integrated to reduce annual energy consumption.
- Passive strategies such as an earth air tunnel have been incorporated in the HVAC design to reduce the cooling load.
- Optimized window design by selection of Low E glass and external shading.
- The school is oriented so classrooms face north and south. They do not get direct western sun during the hottest time of the day.
- The large windows have a special glazing to minimize glare and heat, but bring lots of natural light inside the room.
- The operable windows pull fresh air into one side of the classroom, while ventilation stacks (chimney-like devices) pull the air out on the opposite side of the classroom.
- Building materials were specified to contain post-consumer recycled content.
- Used light-coloured concrete for the parking area to reduce heat “islands.”
- Directed the exterior lighting downward to reduce night light pollution.
- Used local building products when possible to avoid transporting materials long distances and consuming more fuel.
- Stained the concrete walls to look like basalt rock and to blend with the colours of the natural landscape.

**Conclusion:** We have concluded that Green Building concept is the need of the hour. This concept is efficient in each and every aspect of construction. It's not only efficient but also cost effective and economical. Though it may seem expensive in some of the activities like installation of solar panel (in which initial cost is high), however green building has the ability to recover all the investment in 10 years approx. the benefits after it are purely profitable. To give a new edge in the area of civil engineering the concept of green building should be implied to all the new constructional activities.

**References:**
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10. Graham 2002

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CLONE DETECTION IN SOCIAL NETWORK WITH WSN

DAVINDER SINGH, NAVPREET KAUR, MARTINA

Abstract: The brain development of the internet use for all sorts of organizations has created in the meantime an expansion of Clone exercises, which calls for growing new strategies what’s more, devices for distinguishing Clone and different violations against banks what’s more, clients. We demonstrate in this manuscript the inspiration of our investigation and the initial steps of the work. We will center on the development of new coding models in view of Clone attacks and WSN expansions.

Keywords: Graph Partition and Clustering, Parallel Processing, Clone Detection.

I. Introduction: The growth of the internet use for all sort of functions such as data invention and storage, business transactions, professional, cultural and personal information management, etc. are pushing back the frontiers of traditional computer and digital data management. This overwhelming activity allows all kinds of players to propose new services and offers. Unfortunately, some did not hesitate to take advantage of this space to be engaged in Cloneulent activities, such as Identity Theft Clone. The goal of this investigation is to take a shot at another approach to address large scale informal organization Clone detection by joining real time processing and bunch processing in information distribution center and Hadoop Disseminated Document Framework (HDFS).

To address this multi-dimensional issue, we will receive the accompanying methodology:
1. Distinguish group sub networks by utilizing group detection calculations running in a parallel condition.
2. Speak to information and learning put away in these systems in a typical learning plan.
3. Apply Iterative calculations for clustering and partitioning.

The paper is sorted out as takes after. We show in the second area, a portion of the fundamental qualities of OSN information, extraordinarily on account of Cloneulent movement. At that point, we depict some current works in various zones, for example, group detection in informal organizations, the analysis of large graphs, the clustering and partitioning of bi-partite graph and Clone detection.[3] At that point we present the premise of our approach. In the third segment, we exhibit how we expect to build up our investigation, and how we will test the proposed arrangements through trials. In the last part, we will give some preparatory conclusions.

II. Research Gap: We will center on the development of new Coding modes in light of Map Reduce and SQL augmentations, and on graphs ways issues on account of large scale systems architectures. We started examining elective methodologies such as the k-NN, and the conditions for discovering joining criteria on account of recursive calculations.

Show coding in view of SQL joined with SQL Map-Reduce enables calculations to run on parallel stages connecting a few enormous informational indexes i.e. organized information put away in a social database joined with unstructured information put away on Hadoop frameworks. SQLMR too permits to actualize iterative capacities utilizing SQL dialect and Java programming.

The main steps of the research will be:
- Select social network dataset or link several social networks data together (Facebook, Twitter, LinkedIn, Google) by defining a large scale social network for analysis
- Use an algorithm for determining community from the social network such as in [1]. We will compare these different approaches and re-combine the best into a new algorithm derived on k-partite graph clustering/partitioning algorithms that can be applied to such graphs.

Algorithm
a) Generate random Ids for the nodes.
b) Assign the Ids to the nodes.
c) Detect the Clone Entry using firefly algorithm  

If Malicious(clone) then  

Else  

f) Move onto next step in sequence  

End of if  

g) Calculate localization Error  

h) Stop  

III. Proposed Methodology:  

IV. Performance & Results:  

Performance analysis and result associated with the Clone detection is given as under he simulation takes place within the MATLAB. The produced simulation will indicate that the proposed system produces better result as compared to the existing system. The proposed system utilizes the Tabu Search along with power calculations in order to optimize the result obtained through the Grid structure.  

At first place the number of simulations, Clone detected with existing and number of Clone detected proposed are considered. The tabular structure of the proposed scheme is as follows
Table 1: Clone Detected Through Existing and Proposed Techniques

<table>
<thead>
<tr>
<th>Simulations</th>
<th>Clone detection</th>
<th>Firefly Based Clone detection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sim 1</td>
<td>25</td>
<td>50</td>
</tr>
<tr>
<td>Sim 2</td>
<td>30</td>
<td>55</td>
</tr>
</tbody>
</table>

The Plot for the same is given as under:

![Graph showing clone detection through existing and proposed techniques](image)

Figure 1: Plots for Number of Grids, Power and Machines

Time consumption with existing and proposed simulation mechanism is given as under

Table 2: Time Consumption through Existing and Proposed Simulation

<table>
<thead>
<tr>
<th></th>
<th>Fuzzy Based</th>
<th>Firefly Based</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sim 1</td>
<td>12.5357</td>
<td>22.4715</td>
</tr>
<tr>
<td>Sim 2</td>
<td>36.6243</td>
<td>44.4277</td>
</tr>
</tbody>
</table>

![Graph showing time consumption](image)

Figure 2: Plot of Existing and Proposed System Time Consumption

V. Conclusion: We have presented our motivations to study large scale social networks for characterizing communities in this manuscript. Our aim will address the problems of linking information spread over several heterogeneous networks, algorithm parallelization and optimization for network analysis, and
graph partitioning and clustering for structure extraction. We expect that this work will provide an answer to Clone detection.

References:


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HEALTH CONDITION MONITORING OF ELECTRICAL MACHINES: A REVIEW

ER.PARDEEP SINGH, DR.GURMANIK KAUR

Abstract: Electrical machine being in continuous operation round the clock in industrial environment due to heavy production load, their health condition needs to be monitored as a measure of preventive maintenance. The machines that are in stand-by mode can be taken care off by performing certain inspecting procedures as they are off-line; however, the machines that are in operation cannot be inspected using the off-line procedures. An on-line tool either hardware, software or combination of both is required that give the best possible idea about the machine condition. A feature set i.e. machine parameters like sound profile, visual inspection using cameras or x-ray diffract graphs, temperature profile, rate of change of current/power drawn/consumed or color profile can be made use to estimate the machine health while in operation.

Keywords: Infrared Thermography, Acoustic Emission, Vibration Analysis, Ultrasound, Lubrication Oil Analysis, Condition Monitoring.

1. Introduction: Condition Based Maintenance is a form of preventive maintenance which uses the information from a Condition Monitoring System as additional input to adjust the planned activities according to the actual wear and tear condition of a Machinery Component. Condition Monitoring (CM) comprises actions collecting regularly information about machinery condition to detect failures or deterioration of machinery condition. Measurements or observations shall be carried out during operation under defined Reference Conditions. Within the scope of these Guidelines a clear distinction is made between Condition Monitoring and monitoring for control or safety systems [1].

Condition Monitoring System is a system used to detect the condition of a component. It consists of Condition Monitoring Equipment, procedures, schedules as well as methods for data collection and analysis procedures including trend estimation. The condition Monitoring Method describes the technique for the collection and evaluation of information about the condition of components or parts of it. Examples are vibration monitoring, oil analysis, performance monitoring, and thermography or motor current signature analysis. Machinery Components are units, such as diesel engines, generators, pumps, compressors, fans. Machinery Components consist of machinery parts, such as bearings, rotors, etc. Condition Monitoring comprises actions collecting regularly information about machinery condition to detect failures or deterioration of machinery condition. Measurements or observations shall be carried out during operation under defined Reference Conditions.

Condition monitoring of rotating machines has become necessary to stop the unexpected machine shutdown. Several techniques are used for CM of rotating machines such as vibration signature analysis, acoustic emission monitoring, motor current signature analysis (MCSA), but these monitoring techniques are complex and require expensive sensors [2-4]. An effective and efficient CM scheme is capable to give an early warning or predictive fault information at early stages. The CM collects primitive data information about the machine using signal processing or data analysis techniques. The major problem of this type of approach requires human interpretation.

The automation of the CM is the process is a logical progression of the parameter based monitoring technologies. The automate fault detection and diagnostic process require an intelligent system such as fuzzy logic, genetic algorithm, artificial neural network and expert system. In present days, it has become necessary to monitor the machine parameters and detection of predictive failures at their inception, otherwise it may lead to unexpected machine downtime which cause big financial loss. The various CM indicators for fault diagnosis of dynamic machines has been discussed.
2. **Condition Monitoring Techniques**: In electrical equipment incipient faults are often characterized by variations in temperature, vibro-acoustic signature, etc. Different condition monitoring techniques use dedicated sensing and data analysis tools to analyze particular type of variation in operational characteristics. Research in this domain is primarily focused on specific use of a sensing technology. However, this work is aimed to act as a guide for an industrial or academic user to choose the right technique for condition based maintenance of their equipment and to present a comprehensive review of prevalent condition monitoring technologies, i.e. Vibration signal analysis, Acoustic emission testing, Ultrasound condition monitoring, Infrared thermography and lubrication oil analysis. A detailed review of condition monitoring techniques which can be used to detect a particular type of fault is presented with an aim to identify the most suitable technique for fault diagnosis[5].

3. **Vibration Signature Analysis**: Vibration signature analysis Vibration is a cyclic or pulsating motion of a machine or machine component from its point of rest[6]. Vibration of a machine can be represented in time domain in terms of its phase and amplitude (which can be measured as displacement, velocity or acceleration), and in frequency domain by its dominant frequencies, harmonics, etc. Vibration signature analysis (VSA) is a widely used condition monitoring technique to determine the overall condition of a machine, which is based on measurement of vibration severity of the machine under test. Every machine in its working condition produces vibration and this vibration is a characteristic signature of the machine which does not change over time. However, in cases of structural or functional anomaly or failure, the dynamic characteristics of the machine changes National Seminar & Exhibition on Non-Destructive Evaluation[7]. The nature of the developing fault has unique vibration characteristics which can be compared with the vibration signatures of the machine working under normal operating condition. By using various signal analysis techniques one can determine the exact category/type of fault[8].

A. **Signal Analysis**: Vibration signals encountered in rotary machine systems, such as machine tools, wind turbines or electric motors can be broadly classified as stationary or non-stationary. Stationary signals are characterized by time-invariant statistic properties like periodic vibrations caused by a worn out bearing etc. Such signals can be adequately analyzed using spectral techniques based on the Fourier Transform [9]. In contrast, non-stationary signals are transient in nature, with duration
generally shorter than the observation interval. Such signals are generally generated by the sudden breakage of a drilling bit, flaking of the raceway of a rolling bearing, or a growing crack inside a work piece. For analysis of such non-stationary vibration signals, time-frequency techniques like Short-Time Fourier Transform for fault detection during impulse testing of power transformers (STFT), wavelet transform and Hilbert-Huang Transform (HHT) are popularly used.

B. Acoustic Emission Testing: Acoustic Emission Testing (AET) is a condition monitoring technique that is used to analyze emitted sound waves caused by defects or discontinuities. These acoustic emissions (AE) are transient elastic waves induced from a rapid release of strain energy caused by small deformations, corrosion or cracking, which occur prior to structure failure. In electric machines sources of AE include impacting, cyclic fatigue, friction, turbulence, material loss, cavitations, leakage, etc.[10]. These acoustic emissions propagate on the surface of the material as Rayleigh waves and the displacement of these waves is measured by AE sensors which are almost always a piezoelectric crystal, commonly made from a ceramic such as lead zirconatetitanate (PZT).

C. Air Gap Torque Monitoring: In Induction motor, the production of air gap torque depends on the current and flux linkages. The air-gap torque can be measured, while the induction motor in running condition. It is laborious to measure the air-gap torque directly [11]. Kumar et al. presented a Finite Element Analysis (FEA) in the estimation of air-gap torque observation of the induction motor under standard supply systems at different frequencies. The analysis of air gap torque can be done, if differentiated the faults of unbalance stator winding and rotor bar. This can be economically attractive to industrial application, where an unwanted shut down, even facing a heavy economic loss in production of plant.

D. Motor Current Signature Analysis (MCSA): MCSA technique works by acquiring current and voltage signals from the induction motor. As a complement for MCSA, a thermal imaging technique has been used for fault detection of induction motor . The signal processing techniques have been applied to the acquired current signals to produce their power spectrum profile [11]. Park et al. presented the influence of blade pass frequency (BPF) vibration in induction motor on MCSA-based RF detection. The power spectrum profiles are useful in the detection of different kind of faults in the induction motor. Such current and voltage signals are measured through current and voltage sensors followed by utilizing the advance tools such as artificial neural network, fuzzy logic, digital signal processing tools, etc. MCSA technique is highly versatile for CM of the induction motors. It can easily detect these faults at an early stage and provide predictive information about the machine failure.

E. Speed Fluctuations Monitoring: The speed fluctuations monitoring is a technique that can detect failure or defects using speed fluctuations in the operational period of the rotating machines. This technique can be utilized for detecting the rotor faults in induction motor [12]. Traditionally used techniques are air-pap eccentricity, vibrations, rotor asymmetry, misalignment and damaged bearings. In normal rotor bar, current fluctuates sinusoidally with the slip frequency, provide a contribution to developing the torque that will vary sinusoidally with twice the slip frequency. A defected rotor bar will not contribute to the shaft torque. For the rotor, the resulting torque can be divided into two components in which one is constant and other is which varies with twice slip frequency. Mostly, the induction motor has variable load torque, the used instruments are capable of distinguishing between load fluctuations and fluctuations of twice slip frequency indicating rotor faults in induction motor.

F. Induced Voltage: Induction motor, similar as other electrical rotating machines are subjected to both mechanical and electromagnetic forces [13]. So, the design and development of the induction motor is such that the interaction between these forces under equilibrium leads to silent operation whereas in case of fault, the equilibrium is lost hence leads to further enhancement of the fault. The voltage induced along the healthy condition leads to minimum noise and vibrations with a stable operation of the induction motor. When any failure or fault occurs in induction motor, the rotating shaft of the motor provides an indication to the winding or stator core. The induced rotor voltage has not yet proved to be a most useful parameter for CM due to its complexity and non-reliability.
G. **Air Gap Torque Monitoring:** In Induction motor, the production of air gap torque depends on the current and flux linkages. The air-gap torque can be measured, while the induction motor in running condition. It is laborious to measure the air-gap torque directly [15]. Kumar et al. presented a Finite Element Analysis (FEA) in the estimation of air-gap torque observation of the induction motor under standard supply systems at different frequencies. The analysis of air gap torque can be done, if differentiated the faults of unbalance stator winding and rotor bar. This can be economically attractive to industrial application, where an unwanted shut down, even facing a heavy economic loss in production of plant.

H. **Lubrication Oil Analysis:** Lubrication oil is used in electrical and mechanical machines to reduce friction between moving surfaces.

The lubrication oil is important source of information for early machine failure detection. In comparison with vibration based machine health monitoring techniques, lubrication oil condition monitoring can provide approximately 10 times earlier warnings for machine malfunction and failure[24]. Lubrication oil analysis (LOA) includes fluid property analysis (fluid viscosity, additive level, oxidation properties and specific gravity), fluid contamination analysis (moisture, metallic particles, coolant and air) and wear debris analysis[25]. Fluid property and contamination analysis is used to analyze the condition of oil to determine whether the oil itself has deteriorated to such a degree that it is no longer suitable to fulfill its primary function of reducing friction and preventing wear. Wear debris analysis is a technique which is used to monitor equipment’s operating condition (health) by analyzing the content of debris in the lubrication and hydraulic oil samples. For all these techniques methods like particle filtering, spectrographic oil analysis, Analytical ferrography[32] and Radioactive tracer methods etc. are used to study the chemical composition of oil. However, it is an offline analysis requiring the sample to be taken from the machine and tested in laboratory.

<table>
<thead>
<tr>
<th>Techniques</th>
<th>Insulation</th>
<th>Stator Winding</th>
<th>Rotor winding</th>
<th>Eccentricity</th>
<th>Bearing Damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vibration</td>
<td>-</td>
<td>-</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Noise Monitoring</td>
<td>-</td>
<td>-</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Air-Gap Monitoring</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>MCSA</td>
<td>-</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Temperature Monitoring</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Speed Fluctuations Monitoring</td>
<td>-</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Induced Voltage</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Oil- Monitoring Techniques</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

4. **Conclusion:** Condition monitoring has become a very important technology in the field of electrical equipment maintenance, and has attracted progressive attention worldwide. It brings numerous benefits for utility companies like reducing maintenance cost, lengthening equipment’s life, enhancing safety of operators, minimizing accident and the severity of destruction, as well as improving power quality. In this paper an attempt was made to summarize various techniques and methodologies used for condition monitoring of electrical machines. After a detailed study of each technology, it is concluded that the most suitable condition monitoring technique for a particular operation can only be decided by taking in consideration the factors like equipment under test, its loading, defect type and ambient conditions, etc.
It was also observed that there is a great scope for research in the area of advancement in sensing, signal processing and artificial intelligence techniques, this is due to the fact that in near future, diagnostic and prognostic systems will likely focus more on online monitoring with automatic diagnostics and prognostics.

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NEED OF DIGITAL FORENSIC TOOLS IN CYBER SECURITY

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Abstract: Cyber crimes which were initially associated with disaffected genius teenagers have now assumed wider proportions and have grown and matured in content and magnitude and they pose a serious threat to the security, stability and have wider economic repercussions. The entire globe is afflicted by the growing menace of cyber crimes and it has given new dimension to terrorism world over. Now a days, a terrorist do not to board an aircraft in order to hijack it rather he only needs to break into and assume control over their computer system.

Keywords: Cyber Crime, Cyber Space.

1. Introduction: Crime is a commission or omission prohibited by Law for the reason of its social disapprobation. As against a civil wrong, the criminal wrong or a crime is considered more serious because of its larger consequential spectrum. That is why a crime is called a wrong against the society at large and invites State, as its representative to prosecute the criminal and get him punished.

Though punishment is the normal consequence of a crime but the standard requirements of proving the criminal commission lead to the situation where acquittal of the criminal is visibly more rampant than the infliction of punishment. In India, the conviction rates is about 45.1%. Conviction rate implies the number of accused persons found guilty of the offences by the courts. Since it is less than 50% it means that majority of the criminals go scotfree. So far as cybercrimes are concerned the conviction rate is just 39.7%. This trend of criminal jurisprudence in India is not a healthy one because the criminals get encouraged to enter the criminal world and acquittals get encouraged to commit the more serious crimes. Also due to this low conviction rate, the responsible and honest citizens lose faith in the legal system. If this problem will not be dealt firmly and effectively, it may cause disruptions and disaster in the society. That is why there is an essential and urgent need to find the solution for the cause of acquittals.

In India cybercrime is largely increasing. Over the past 5 years, it has increased by more than 800%. The general conviction rate (Criminals Punished) is increasing day by day. But in Cybercrimes in India it is 7% as against normal crimes where it is around 60%. In the developed world like USA and UK, conviction rate in cybercrime is above 80%. Cybercrime is the most serious form of crime related to the cyber terrorism and drugs, etc. and has international dimensions. Lack of use of proper tools in cybercrime investigation as well as the gap of knowledge of criminals vis-à-vis the investigating agencies is the main factor for poor conviction.

2. Cyber Crimes: Cybercrimes are the crimes performed by the computers in the network that have been affected by the viruses. Today, Internet has become an integral part of our lives and everyday criminals attack our computers to steal our personal and confidential information and sometimes we receive false messages from banks and our bank accounts and passwords are being hacked. Such types of crimes are termed as Cybercrimes. Cybercrimes not only affect the individuals but it also affects governments and the businesses. The crimes may specifically target the computers or the computer can be used as the medium to commit the crime. Cyber stalking, credit card frauds, cyber terrorism, intellectual property crimes are some cybercrimes which are increasing day by day. Since the criminals are technological savvy, the only way to save ourselves from cybercrimes is using digital forensic tools.

Forensics includes practiced arts that make use of science to reach the source of an event, such as theft, crime and impact of a criminal act. It exists in forms, such as fingerprints reading, blood typing and DNA mapping. All these are being used to prove crimes and prosecuting the accused.

Cyber Forensics is the process of using scientific knowledge for collecting, analyzing and presenting evidence to the courts. The term forensics means to bring to the court i.e. bringing admissible digital evidence before the court. Cyber forensics not only includes computers but also the networks. The main
aim is to recover the evidence so that it can support or oppose a criminal activity (or actus reus). It requires the investigators to collect and analyses the electronic evidence.

3. Intuitive Steps Need To Be Taken: The use of computers in business commerce and industry has opened up new categories of crimes named cybercrimes. The detection of such crimes is a new challenge for the investigating agencies. It is, however, this type of crime where computer forensics has contributed a lot. With the increase in computer technology and computer networks, the cyber-crimes are also increasing. Cyber forensic techniques are used in the investigations of crimes in cyberspace. Cyberspace is the space in which cyber-crime takes place and their detection through cyber forensics are made. The legal perspective of cyber forensics controls the entry to cyberspace and all which has effect on cyberspace.

Cyber-crime is termed as the crime which involves both a computer and a network. Such crimes may harm the security and financial health of the nation. Cyber-crime has become an international problem so it is the need of the hour to tackle the problem of cyber-crime through a common legal strategy which has universal sanction.

4. Digital Forensic Tools: There are many digital forensic tools used to protect from being a victim of cybercrimes. The use of such digital forensic tools reduces the complexity of investigation and it makes the investigation easier and comprehensible. These tools also aid the investigating officers to find the digital evidences from digital sources that can play an important role in committing the cybercrime. Some of the most common digital forensics tools are discussed below:

A. iSafe: This digital forensic tool is associated with the networking and system monitoring. It can record the keystrokes and mouse clicks, can analyze the network, can show which application is running on the system, and can give the details of the websites visited. This software is simple to install and use and it has the facility to block the activities. It provides content based blocking and can track almost all types of activities.

B. Recurva: It is the file recovery software which is used to back up the unintentionally deleted data. It not only supports the PC but also USB flash drives, memory cards and iPods. It can restore the word documents created in the last 5 hours and have not been saved. It also restores the emails in the .zip file format. But Recurva has no filters and it cannot restore the data deleted with the help of Ccleaner.

C. USBDeview: This digital forensic tool helps in detecting USB devices connected to the systems. It also lists and generates reports on the basis of various factors like date created, device type, serial number, etc. USBDeview can also deactivate and uninstall USB devices. We can use this forensic tool even on remote devices with the admin login. This is a user-friendly tool but it does not allow enable or disable USB devices on 32bit computers.

D. Winhex: This is a universal hexadecimal editor that provides IT safety measures and can recover and process information at the low level. This digital forensic tool can recover deleted files from hard disk and is quick to create. It has the ability to attain all critical file system data but this tool does not work on Linux and Macintosh systems.

Conclusion: Law can not remain aloof from technological advancements rather it usually follows them though it may be slow in reacting to the technological advancements. Accordingly, to cope up with cyber crimes various legal measures have been adopted including amendments in IPC, Evidence Act and Bankers Books Evidence Act etc. and the enactment of Information Technology Act, 2000 which is a mother legislation dealing with cyber crimes.

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WEB SEARCH PERSONALIZATION USING SEMANTIC SIMILARITY MEASURE
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Abstract: Over the past few decades, search engines have turned out to be the dominant source to retrieve the information online. However, despite the most successful search engines, approximately fifty percent of search sessions fail to identify the user context and to find the relevant personalized results. We present a relevance model to personalize search results which is based on query personalization. The user query is directly matched to the keywords of the user profile and the original query is altered according to the keywords which is more likely similar or related according to the similarity measure. By finding the similarity between the user current query and user profile, a linear combination of preference space is generated at run-time to determine more accurately which pages are truly the most important with respect to the modified query. A heuristics based algorithm is used to maintain the user profile and update the profile based on the ongoing behavior. Our experiments prove that retrieving the search results based on query modification is effective in providing the personalized results to the user.

Keywords: Web Search Personalization, Query Modification, Semantic Similarity, Semantic Annotations.

Introduction: Web search personalization is the process of providing the personalized search results to the user for his/her query by taking the advantage of knowledge acquired through the web usage mining. Different clients have diverse interests. Thus for some users the initial document may be related, but for others not. Thus we study web personalization (Berkovsky and Freyne, 2015; Ho and Bodoff, 2014). We have projected an easy way for personalized search based on long-term user queries that matches or outperforms the state-of-the-art for this task. Traditional web search engines are rather impersonal: returned search results which are the outcome of a role applied to the entered query. From a set of documents, those items that best match the query are returned to the user. Personality of the user (Lv et al., 2015) is not considered when processing a query. Personalized web search on the other hand requires the specific profile for each user into the process of finding the considered documents (Ricci et al., 2015) for a search query by mounting the amount of a priori input information offered to the search algorithms. In this personalization process, our main focus on the query modificaton.

For the purpose of query personalization, user preferences are provided in the form of a user profile. The goal is to locate which set of preferences should be considered in the context of a given query and personalize the query accordingly. Our approach to modify the query is based on similarity score between query and user profile data. The user profile contains information like previous searched queries, clicked links, meta-tags, (Lopes and Roy, 2015) and semantic annotation based web documents (Vandenbussche et al., 2017). The system is composed of different modules and algorithms: A simple interface consisting of a search box, web user identification techniques, intuitive algorithms for pre-processing of web user query and for finding the semantic similarity between the current user query and the past queries. The user profile is also continuously being updated while user interacts with the systems. And at the final, the results are being provided to the user after discovering and analyzing the patterns. The patterns are primarily based on the semantic similarity score and data mining techniques (Witten et al., 2016). By using accessible software package, an analyst can find the similarity distance, of words and phrases (Mikolov et al., 2013). But somehow these methods are still insufficient for Natural Language Processing and information extraction in the light of ambiguous keywords. At the end, we present that the proposed work retrieves overall better results than direct approaches such as the KNN method in terms of accuracy.

In the next section, we present some novel work to personalization and describe its theoretical backgrounds. Section 3 describes the detailed methodology with terminologies and the process of Personalization. Section 4 outlines the process and implementation for similarity and using such a system in practice, the experiments in this section analyze the feasibility and usefulness of our approach, followed by the evaluation of the experimental work and the Conclusion. In the conclusion section, we briefly
summarizing our work and outlining our future plan.

**Related Work:** The author in (Smyth *et al.*, 2015) performs web personalization. It mainly focuses on the re-ranking of the results that are already ranked by the search engine for the different users. They have personalized (re-ranked) on the basis of the clicks and dwell time of the user for a web page. The paper begins with probabilistic graph model to identify the relationship between user, user’s query and the ranked documents. Thereafter, the author of paper (Vu *et al.*, 2017) states that using the collected user profile directly for the purpose of personalization is not a good practice because it can deteriorate the web search results. The author starts the paper with a new embedding approach to making user profile. The manuscript is focused on learning user profile for search personalization. To handle these problems, they represent user profile using a user embedding and two projection matrix which are based on LDA-based vector embeddings of the submitted queries and the documents.

In this paper (Nguyen *et al.*, 2018), the author presented a new embedding model to model the 3 way relationships to re-rank the documents for personalization. The 3 way relationship is described as user, query and documents which is represented as three column matrix with three embedding vectors. The general architecture of the proposed model includes three crucial steps. In the first step, they extract feature maps from the embedding triple vectors. In the second step, they do perform the routing algorithm to only 1 final capsule which is the composition of three vectors. Finally, the length of the vector output of this final capsule is a score measured and is used to calculate the objective function. The paper (Bouadjenek *et al.*, 2016) presents Personalized Social Document Representation (PerSaDoR) collected in bookmarking system which is based on the social information. The PSDR is expected to provide social representations for each document in order to rank the retrieved documents. The system is valued with large data sets which shows that it increases linearly as the data sets grows, so eventually it can be employed to large data sets.

However after all, the author in (Kim *et al.*, 2016) presents still there is dearth of personalization which creates problems for the users as well as for the search engine to perceive whether the results presented to the user fit well or not? As the user behaviour presents only false signals. So in response they collected user explicit response.

The other problems that may occur are: A web user seeking for the information on given term would return search results having the specified term but would fall short to get back the web document that is described by its synonymy term (Arenas and Ugarte, 2017), data sets of the information are not interlinked with one another which make mining even more complicated to manage and produce the identical set of outcomes in the equivalent way for all the clients (Lopez *et al.*, 2005; Kim, 2015).

We in this paper purely depend on the semantic similarity between the user query and the user profile. That similarity helps to change the query into the personalized query which matched to annotations based documents for further expanding.

**Methodology:** The Fig. 1 depicts picture of our proposed model for search personalization. The user query is required to be preprocessed before taking it into the approach. The preprocessed query is matched with user profile for semantic similarity. After analyzing it with the user profile, the query is altered to personalized query which is passed to third party search engines. The results from these search engines are parsed in order to extract Meta information. Ontologies are used to describe the web documents. The fetched documents are further ranked and provided to the users. A user profile can be learnt automatically from the past history of the user. The user profile is being updated implicitly while the user is interacting with the provided results. Implementation results show that our technique to web personalization is efficient and effective. A number of ontology based search tools have been developed (Guha *et al.*, 2003; Heflin and Hendler, 2000; Lopez *et al.*, 2005; Rocha *et al.*, 2004; Corby *et al.*, 2004; Zhang *et al.*, 2005). Earlier work (OntoBroker, WebKB, Corese, SHOE OntoSeek) mainly focused on Ontology language for knowledge representation. In this manuscript, we focus on information retrieval.
**User Identification:** Web usage mining is the process of collecting and analysing the web usage logs and it is important to pre-process the web logs before actually using it. One of the key issues in pre-processing (Lopes and Roy, 2015) is web user identification to identify each unique user on the web before personalizing the contents to the user. User can be well identified by three approaches (Saxena et al., 2015) IP address, Cookies, User Identification.

**Query Pre-Processing:** It is better to pre-process the query before passing it to the algorithms for finding the similarity. Web search engine plays a vital role for the user in retrieving the intended information from the web. Nevertheless in many cases, search engines have some difficulties in retrieving the information. These difficulties can be come due to the ambiguous nature of the user query. So in due course, it is important for the search engines to pre-process the user query before taking it in the regards. The pre-processing includes removal of stopwords, Spelling Correction, Stemming and Tokenization. A well defined pre-process approach is stated in the algorithm 1. In our system we exploit supervised learning, can also be described as the corpus-based approach and suitable machine learning based classifiers such as Decision Tree (D-Tree), K-Nearest Neighbor (KNN), etc., are applied to a manually annotated dataset.

**Algorithm 1: Effective Preprocessing for user Query**

**Input:** input query.

**Output:** concept/ tokens.

*parse (): designed library for parsing the sentence,
*stem (): designed library for stemming the keywords,
*sw[]: an array contains all the stopwords.*

1. Import sw[], stemmer, dic[], k=0
2. Input t = query
3. arr[] = parse(t)
4. for i = 1 to size of arr[]
   for j = 1 to size of sw[]
   if words[i] == sw[j]
   Eliminate words[i]
   end if
   end for

**Fig. 1: Overall Working of Personalization**
User Profile: In our system, the ontology based user profile is formed implicitly while the users interact with the system. The user profile is essentially a reference ontology in which each concept has a weight indicating the user’s perceived interest in that concept. It stores user’s hits with meta-tags generated after analyzing the query and the document itself. The user profile is constructed by analyzing the browsing behavior of the user which includes user past queries, hits, specifically the content, length and time spent on each Web page they visit. The Web documents the user visits are implicitly classified into the concepts with meta-tags contained in the reference ontology. User feedback is not required.

Semantic Similarity: We start by describing a general description of our similarity based personalized search and the intuitions behind it. It provides the most personalized results with respect to the user query according to the context in which it occur. It computes the similarity between user query and the user profile. User profiling is a vital part of web personalization. A user profile is a set of personal data includes past queries, hits with Meta tags associated with a specific user. Integrating tagging information can assist to advance personalization and retrieval techniques. The basic plan of the Tag mark extension is to store the search query, e.g., “mobile phones”, in memory when the user evaluates search results. Whenever he finds a relevant web document and clicks on it, our system will automatically convert the search query to tags and automatically stored to the user profile with the clicked link. Tagmarking is a well-situated way to enhance the search and personalization. Before starting any Web project it is imperative to understand the target. Our approach to web search personalization is based on similarity and query modification.

The user query is directly matched to the keywords of the user profile and the original query is altered according to the keywords which is more likely similar or related according to the similarity measure. The similarity measure (Jiang et al., 2014) among words is computed either directly using the terms in WordNet or the associated meanings of terms those defined in WordNet respectively. Probability model & page rank algorithms (Gleich, 2015) have been used to resolve the issues relating to reranking. Probability model is based on probability of relevant & non-relevant results while PageRank computes the back links of web pages. Both these algorithms address the solely problems of ranking not of personalization therefore the motivation to propose Context similarity based web personalization. The working algorithm for finding semantic similarity is given in algorithm 2 and Fig. 2 outlines the algorithm.

Algorithm 2: Semantic Similarity

Input: keywords
Output: similarity distance (user profile, user query)

Len (xi,xj): the length of the shortest path from synset xi to synset xj in WordNet.
depth (ci): the length of the path to synset ci from the global root entity and depth(root)=1
iso(x1,x2): the lowest common subsumer of x1 and x2

1. Import WordNet (wn), user logs as array ul[]
2. Declare the array score[], sw[]
3. sw[] = wn.getSynset(query)
4. for i=1 to size of sw
   for j=1 to size of ul
      score[]=(2*depth (iso (sw[i],ul[j])) / (len (sw[i],ul[j]) + 2 * depth (sw[i],ul[j])))
       j++
   end for
   i++
end for
5. Sort score in descending order.
6. End.

**Fig. 2:** Similarity Between User Query And User Profile

The user query is preprocessed before it passing for semantic similarity. Various algorithms have been designed and used here as removing Stopwords, spelling correction, Stemming and Tokenization which has been describes above. The user query after preprocessing is transferred to the log files where the identification of the user is identified and the data accessed by the user is determined from the database. The similarity match is performed between the users input query and the tags by the semantic similarity algorithms. If the similarity found between the user input and the accessed data is some extent similar then the user receives the result by exploiting some patterns even the data can be provided from the local cache. There is no need of accessing again and again the same inputs. The data of the cookies is stored in the database of the log files. So fetching the data from the database if the probability of the similar data is high then the desired result is given to the user, taking the data from the log files database. That similarity helps to change the current query into the personalized
query which matched to annotations based documents for further expanding illustrated below.

**Query Modification:**

Query personalization is an optimization problem. Query q given by the user u, the intention is to find the parts of the profile of u, when combined with q, will retrieve the personalized results.

![Diagram](image)

**Fig. 3: Personalized Query Construction**

**Preference Space:** Given a query q is modeled to the user profile p, a set of preference space is produced from p which is related to the original query q.

**Parameter Estimation:** It generates estimations on the set of personalized queries generated by integrating preferences of a subset of p into the original query q.

**Personalized Query Construction:** This is the module used for generating the actual personalized query

**Method:** We consider two methods into account: (i) similarity between t and tj, and (ii) similarity between tj and user profile, where query term: t; related term: tj; The user profile is represented as a unit vector: pu = [w1, w2, ..., wn], where wj is user term frequency.

After computation of these two similarities, a merge operation is required to obtain a final ranking value that indicates the similarity of tj with t w.r.t. the user u. We obtain a final ranking for indicating the similarity in terms of Weighted Borda Fuse as Rank U (ti).

**Algorithm 3: Query Modification**

U : a user; Q: a query.

1. Pu [m] <- extract profile of u
2. for all ti € Q do
   1. l <- list of neighbor of ti
   2. for all tj € l do
      1. tj.value <- Rank U ti (tj)
   3. sort l on the basis of tij value and consider only top k terms in l,
   4. make a logical OR between ti and all terms of l, Update Q'

**Ontology Based Retrieval:** Ontology is defined as ‘Explicit specification of conceptualization’. In general it refers to the action or process of framing a concept or idea of something with the use of explicit knowledge. On the Web, It aims to solve the limitations of keywords based search engines. The System takes input query as SPARQL Query, The query is executed using a list of semantic entities that satisfy the query, with the above formal instance and the annotated documents are retrieved, reranked and presented to the user in order to satisfy his/her needs. The documents can be manually annotated or by scanning the whole documents and finding the most frequently used keywords on the page which can be used to annotate the web documents. To make the use of domain knowledge in data mining process or any other sources, the first step is to make the model of domain knowledge in such a way that machine can analyse and process it. Ontology is the best way to make it remarkable. OWL has been an accepted standard language for defining the ontology. Our
framework of ontology-based information retrieval can be viewed as an upgradation of simple keyword-based search retrieval techniques by developing ontology knowledge base instead of keyword-based index. The general outline of semantic retrieval process is shown in Fig. 4. Our system which consists of a usual interface which initially takes a user query which is further analysed to formal RDQL (Resource Description Query Language) query. This query could be generated from the knowledge used as ontology, as in (Rawassizadeh et al., 2017). The RDQL query is analysed next to the knowledge domain, which fetches a list of results that satisfy the user query. A query matching system (Musgrove and Walsh, 2016) is used to match the query to the annotated web documents. Finally, the annotated documents with these instances are fetched, reranked according to the user behaviour and presented to the user.

It is more effective to retrieve the information from the web when having proper domain knowledge. The domain knowledge can be implemented on the web using Ontology. Ontology can be seen as an explicit specification of conceptualization (classification of objects with words and examples) (Vigneshwari and Aramudhan, 2015). All the conceptual knowledge is stored in the Ontology level which further transformed to ontology library using OWL. When a web user interacts with an agent with various data parameters, the agent begins to explore the ontology to discover the entire feasible nodes associated with the user’s specified parameters. Thereafter this intuitive becomes reasonable because all the data sets are well defined in semantic web and interlinked with one another. We design a web of interlinked information for our work where we analyze the Information by following semantic web approach. In this study we reflect on ecommerce data which is downloaded from the eBay, Amazon and other platforms. We wish to explore some manually made ontology. For conciseness, categories like mobile phone, camera, laptop and tablets related information is measured. We encode generic information using OWL. The semantic web technologies XML (Vu et al., 2017) and RDF are used. XML: XML is an extensible markup language which is more than the HTML. It provides the facility of syntax creation for content structure within the web documents. RDF: It stands for Resource Description Framework. RDF is an easy language which is used to describe the resources and the relationships between the different resources.

**Fig. 4: Explicit View of Ontology Based Information Retrieval**

**Experiments and Results:** The modified query is forwarded to third party search engines and the results retrieved are parsed in order to extract information by scanning the whole individual document and looking for the most occurring keywords which can be taken as Meta tags. Ontologies are used to define the different keywords. The entire method of web search personalization works as follows:

1. The user makes a query of his choice on the search engine,
2. The user’s profile is generated on the server side (the user’s computing device)
3. The query goes to the similarity module for finding the similarity with annotations (tagmarking) in user profile and the query is altered to the personalized query
4. With respect to the altered query, the documents are returned from third parties, 5. The personalized documents are reranked and presented to the user

The personalized results are hereby shown in the Fig. 5 for the query “best 4G phones”. The user query is transferred to the User Profile model for developing the patterns. The generated pattern is further exploited to the annotation based documents for generating the personalized results. The results are worth showing in the Fig. 5 that the user is much interested in these phones based on his past history. The user profile is updated every time the user interacts with the system.

![Fig. 5: Personalized Results](image)

The system has been designed on Eclipse, an essential tool for any java developer and implemented on open source general-purpose scripting language java, including, XML, SQL, Workbench. The modules are being implemented with Knowledge based technique and integrated with WordNet 3.0, one of the popular databases for the NLP domain.

**Discussion and Evaluation of Experimental Results:**

**Data Set:** In our experiments, five data sets are collected from five different users in the two sessions and each user is supposed to submit number of queries. Each user is assigned a different computer. For each query, the user identified the set of relevant pages. For each query, at most 10 pages are evaluated by the user as relevant or irrelevant. Each query with relevant documents comprises a search record in the user profile. The statistics of the data set is shown in the table 1 and table 2.

While using search engine, users usually formulate the ambiguous queries to the search engine. The search engine always presents the results to the user however failed to understand the user’s search real intention. On the other hand, web search personalization provides the accurate results as intended by the users even the user tend to formulate the short and ambiguous query. We specially ran our experiments after considering the short and ambiguous queries. The two different users can formulate the exact same query however they want the different results. For example, for the keyword ‘Samsung’ one can prefer the
Samsung phones and the other one can prefer the Samsung camera or tablets. Our experimental results show that reformulation of the user query on the basis of ontological based user profile is an effective approach. The personalized results are hereby shown in the Fig. 5 for the query “best 4G phones” after modifying it to the Q = “Samsung + phones + 4G”.

In order to measure the effectiveness of our method proposed in this paper, the precision is used. Precision is fraction of fetched or retrieved documents that are relevant. The Recall which is also used in many cases is the fraction of relevant documents that were retrieved.

Precision = TP/(TP + FP)
i.e., (number of True Positive (correctly fetched documents))/(Total number of documents retrieved):

Recall = TP/(TP + FN)
i.e., (Number of True Positive (correctly fetched pages))/(Total number of relevant documents retrieved):

F1 is also used to for finding the conservation average: F1 = (2.P.R)/(P+R)
We computed precision as the fraction of predicted documents for query that agree with preferences obtained from the human. We retrieve the results from the different ecommerce platforms: eBay, Amazon and Flipkart, which are further, reranked and provided to the user. The user finds his relevant results with a very general query ‘best 4G phones’ however he is interested in Samsung and apple phones. In the initial stages when the system doesn’t have enough information about the behavior of the user, it becomes tiresome task to provide the results with good accuracy. The precision is measured at the three different sessions. The first session is when the user formulates the query first time and the system have no knowledge about the user intention, the second session is when the user formulate the same search query and gets much better recommendation due to the browsing behavior collected at the first stage. And similarly precision is measured for the third and last stage which is considered as the most personalized results based on the dataset collected in the first and second sessions.

We compared our results to the EBay and Amazon search engines. The same query is submitted three times to these search engines. The personalized results are considered at third times which retrieved a large number of personalized documents but only first ten results were considered to limit the study. The mean precision of the different search engines for the queries is shown in the fig. 6. Comparing the mean precision, our model has high precision followed by the Amazon, while Ebay received the lowest precision. Note that each study used a different set of query logs, so results cannot be directly compared.

**Table 1:** Statistics of the 5 data set (first session)

<table>
<thead>
<tr>
<th>Statistics</th>
<th>User 1</th>
<th>User 2</th>
<th>User 3</th>
<th>User 4</th>
<th>User 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Search queries</td>
<td>13,000</td>
<td>16,000</td>
<td>14,000</td>
<td>23,000</td>
<td>24,000</td>
</tr>
<tr>
<td>Total Relevant documents</td>
<td>21,000</td>
<td>21,000</td>
<td>16,000</td>
<td>21,000</td>
<td>26,000</td>
</tr>
<tr>
<td>Avg of Related Search Records to One Query</td>
<td>1.6151</td>
<td>1.3125</td>
<td>1.142</td>
<td>1.615</td>
<td>1.083</td>
</tr>
</tbody>
</table>

**Table 2:** Statistics of the 5 data set (second session)

<table>
<thead>
<tr>
<th>Statistics</th>
<th>User 1</th>
<th>User 2</th>
<th>User 3</th>
<th>User 4</th>
<th>User 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Search queries</td>
<td>17,000</td>
<td>11,000</td>
<td>18,000</td>
<td>21,000</td>
<td>16,000</td>
</tr>
<tr>
<td>Total Relevant documents</td>
<td>39,000</td>
<td>31,000</td>
<td>31,000</td>
<td>51,000</td>
<td>38,000</td>
</tr>
<tr>
<td>Avg of Related Search Records to One Query</td>
<td>2.2941</td>
<td>2.8181</td>
<td>1.7222</td>
<td>2.4285</td>
<td>2.375</td>
</tr>
</tbody>
</table>
Conclusion: In this paper, we present our system that takes user query as input and offers the personalized results after correlating the user query with the usage logs. We have proposed a new simple and novel approach for personalized search based on long-term behavioural signals that matches or outperforms the state-of-the-art for this task. This study can help developers and other stakeholders in building successful e-commerce business. This study work is in progress. In the future, we devise to validate the findings in this paper by carrying out a user study to verify the efficiency of the ethics identified.

Acknowledgment: This work is supported by the Department of Computer Science, Arni University.

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Ethics: This research manuscript is original and has not published elsewhere.

References:

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BIG DATA ANALYTICS LANGUAGES - MOZILLA RUST VS GOOGLE GO

DR. JATINDER SINGH, NIRMALJIT SINGH

Abstract: A huge warehouse of peta-bytes of data is generated each day from modern information systems and digital technologies such as Internet and Grid computing. Examination of these enormous data requires a lot of hard work at multiple levels to dig out information for decision making. As a result, Big Data analysis is a recent area of research and development. The basic goal of this paper is to explore the potential impact of big data languages and various tools related with it. Therefore, this Paper presents a proposal to look at big data languages at several stages. In addition, it opens a new horizon for researchers to decide which language to use during software development process using big data Analytics, based on the impact and issues related to various languages.

Keywords: Big Data Analytics, Rust, Go, Mozilla, Google, Programming Languages Massive Data, Open Source.

1. Introduction: No entity is as private for programmers as what language they employ. The reason why a programmer, scientist, engineer or a system analyst picks one over the other has as much to do with personal liking and their employers’ IT background as it does the qualities and uniqueness of the language itself. Although when it comes to big data, there are some specific blueprints that come into sight. The main and biggest important factor in deciding a programming language for a big data project is the target to achieve. If the organization is maneuvering data, constructing analytics, and trying out machine learning models, they will probably help select a language that’s best suited for that job. In case the organization is looking to outfit a big data application, there are an additional set of languages that stand out at that. The two most popular languages that we will discuss here are Rust and Go. In addition we will also enquire opportunities present in other languages as applicable.

2. Go: Go is an open source programming language that makes it easy to build simple, reliable, and efficient software. Go was developed at Google, a company which manages a huge software empire with a lot of products. You might get terrified about feeling of being blown out between projects occasionally, and every time, you have to familiarize yourself with a field specific language built on crest of whatever language that project was using. 2018 was a huge year for the Go ecosystem, with package management as one of our major focuses. Go’s designers become aware of another dilemma: they were irritated by C++’s "feature expand," where any job you wanted to do seemed to necessitate its own feature -- and each programmer seemed to employ an completely different subset of C++. It was difficult to toil with another programmer’s code until you become known with "their version of C++.”

As of these problems, solitary major principle of Go’s design is that the meaning of the program ought to be as clear as possible. The language Go is inspired by C: a little language focusing on the most essential tasks that build up the structure blocks of each program, however designed so that the complexities of C are not present. Everything that makes a program difficult to understand is scowl upon by the Go community, liberal use of phrases is powerfully expectant, and a "less is additional" philosophy is to be
found all over the place. Go endeavors to distance itself from complexity, code in Go is best distinguished as "composition from simple, easy to recognize pieces. However if you want to write it quicker, perchance because you have a lot of different services to write, or you have a large team of developers, then Go is your language of selection. Go provides you concurrency as a first-class inhabitant, and does not endure unsafe memory access, but without forcing you to supervise every last factor. Go is rapid and authoritative, other than it avoids bogging the developer down, focusing as an alternative on straightforwardness and consistency.

The relocation to Go modules will be the mainly far-reaching change for the Go ecosystem since Go 1. Changing the entire ecosystem like code, users, tools, and so on from GOPATH to modules will require work in many different regions. The module system will in roll help us deliver better authentication and construct speeds to the Go ecosystem.

2.1 Latest Go Releases:
- Go 1.11, released in August 2018, introduced beginning support for modules. intended for now, module support is maintained next to the customary GOPATH-based mechanism.
- Go 1.12, scheduled for February 2019, will purify module support but still leave it in auto mode by default.
- Go 1.13, scheduled for August 2019, to enable module mode by default and deplore GOPATH mode.

3. Rust: Rust, was developed by Mozilla, a group which tries to help on a few projects, and largely been used by means of Rust for a single project that doesn’t even include whole program. Rust isn’t scared of complexity, and sees complexity as expected as such, Rust’s goal is to make working with that complexity more realistic. Security and concurrency has always been a painfully complex part of programming, and Rust has used up a bunch of effort and focus on making these two parts realistic.
Rust was not destined to be simple. Rust designer’s not at all said that, a beginner ought to be able to select up this language in no time. Rust rented complicated concepts from useful programming and it puts memory management exactly close to you.

Moreover, Rust puts a bunch of reliance into its compiler, and takes many sign of hints from Haskell. If your program compiles, it’s probably accurate, and any bugs are because you used logic which turn out the wrong answer. With little exclusion, obtainable code is secure. You can be convinced you’re using the obtainable code base in an appropriate manner, and not going to determine six months after you write your code that another programmer botched to take into account a null reference that was used years back.

The move toward of Rust code is that you’re happy to give up ease of use, dispute with the compiler a bit, and spend a slight time researching your resolution, if in this way you can write a code stand that’s still going strong. If on the other hand, sopping out every last ounce of performance is a necessity, then Rust should be your selection. Rust is more of a challenger to C++ than it is with Go. It has battled with C++, Rust feels just as powerful except with many happy enhancements. Rust empowers developers to have organize over every last detail of how their threads behave with the rest of the system.
3.1 Importance of Rust: We can build almost anything in Rust. A good example that everything is possible is Redox - which is an actual running OS. Most likely, the major confront is human labor. Apache Spark is out there for quite a while and as far as we bear in mind is build on top of Hadoop or some other backend, which are typically even older. If someone is to build such thing in Rust you will need enough enthusiastic people and people who are well familiar with HPC and distributed computing. We think a lot of the people developing in Rust are well aware of performance in code. Even as Rust is still maturing, there is sturdy community support for it. A number of current examples of rising community projects: redox, an operating system written in Rust; cg math, a linear algebra and computer graphics library; Iron, a concurrent web framework; and even a Doom renderer.

- Data Fusion: Data Fusion is an effort at building a modern distributed compute platform in Rust, by means of Apache Arrow as the memory model
- Rust’s Guarantees: Box with a checksum easy distribution compile everything down to a single binary—no need for your users to have a runtime or libraries installed.
- Error Handling: What if the config file is missing or corrupt? What if the content of that one environment variable is empty? These cases are easy to forget about! But thanks to its approach to error handling and its library design, rust will point out these “what if” situations before you even run your program. Cli is no rocket science
- Easily Expand Later: Rust allows you to be flexible in the way you organize your code. Start with just a single file and, when you need more features, refactor your application with the confidence that you aren’t breaking anything.
- Firm and Quick: Even if you’re just writing a short one-off script, you can be confident it’s fast, easily testable, and gives helpful output.
- Ship Rust Code: A note and a gear robust configuration handle configuration files across platforms with ease. Rust will deal with namespaces and formats for you.
- Manuals: Generate manual pages for your app automatically. Just package the generated files and you’re done.
- Learn How: Pipes data in, data out, in addition to talking to humans, rust has great tools to help you talk to machines.
- Communicate with Machines: Three wood logs stacked on top of each other flexible logging. It’s easy to add logging, and even easier to configure it to different targets and with different styles.

4. Rust Vs Go: Rust and Go languages were designed for the web, Rust by Mozilla and Go by Google, so they’ll equally be good for web browsers and servers. Both languages are designed to be much secured than C or C++. Go and Rust definitely have overlie roles. They were both meant to be Systems languages, and both meant to be used to write something you’d otherwise consider using C or C++ to write. Rust was developed around the same time at Mozilla. Similar to Go, Rust is syntactically a C-like language, but where Go give emphasis to speed, Rust is tilted more toward memory safety and predictable performance. Rust performs no garbage collection and emphasizes manual memory management. Similar to Go, Rust is explicitly designed to support concurrent programming tasks. Dropbox recently rewrote part of their Go-based “magic pocket” system in Rust to reduce the memory footprint of key components. Go and Rust don’t represent the barely leading edge of language development. Yet, most other emerging languages are JVM based—such as Kotlin and Scala—or dynamic languages which optimize programmer productivity at the cost of final run time performance. Wherever runtime performance concerns are paramount, Go and Rust are up-and-coming as convincing successors to C.

Many times distributed computation is needed when there is BIG data, which won’t fit on a laptop like in that example that distribution is needed not only because computation can’t be done on one node, but because data can’t possibly fit on any one node. Generally, both languages are meant for many of the same purposes, and they both attempted to solve the same problem: In a C++ code base, you end up with older code snippets all over the place that everyone’s too afraid to touch in fear of breaking the entire program. Go sought to tackle this problem by making a language simple and easy to understand. Rust tackled this problem by retaining practical abstractions and ensuring the code’s safe. Rust and Go are certainly competing languages with competing philosophical approaches to coding. Sometimes, there is a clear winner in philosophies, a business which frequently switches what code bases its programmers are working on, or cycles through a lot of programmers quickly, such as Google and cutting edge startups,
might prefer Go. A well-known company which works on primarily one, very complex project, such as Mozilla and its Firefox, might prefer Rust. Else the one to select is up to the quirk and personal first choice of the programmers.

5. Rust is Doing Well with Big Data: It really depends totally on what kind of data you're processing. If you're just trying to take the average of twenty gigabytes of integers, that might be a relatively quick operation. If you're trying to apply neural networks to twenty gigabytes worth of books and have it translate them from one language into another, that could take hundreds or thousands of times as long as simply averaging integers. If you're used to working with simple data, terabytes might seem small, but if you're used to working with highly interrelated data, 100GB might be an unreasonable amount of data. Big Data is whatever is big to you in your problem domain. Go is meant to have a smaller scope, but that scope most certainly overlaps Rust's larger scope. Rust and GO are both meant for replacing C++, and emphasize implementing concurrency. Go wants to be better than C++ by being simple and easy to understand. Rust wants to be better than C++ by being practical and safe best for big data applications.

- Rust's model makes a data race impossible when developing safe Rust code. The concurrency model is tested out by the compiler. We've had a number of production bugs Big data software due to data races that were only caught under heavy load. Whilst Go may have channels, it offers no compile time guarantees that you're not creating data races.
- Forced error checking by the compiler is another big win. Yes, your development process can force code reviews, which should catch any code not correctly handling errors, but that's a fallible process. With Rust, the compiler forces you to “do the right thing”, which is great because then you won’t have to worry about it slipping past a code review. In Rust there are entire classes of bugs that are simply impossible to create because of the compile time guarantees. Because it's software, there will be bugs but really
- Rust is an amazing programming language. Its focus on memory safety, efficiency and performance makes it a great candidate for constructing frameworks and tools for machine learning and data analysis, which can make the best of the available resources in a computer. With that said, let’s stop that thought for a moment and keep in mind that many mature technologies for data science exist today. We have R, with a reasonably wide environment designed for statistics. We have MATLAB, which like it or not, is still extensively used in research and widely taught in science degrees, both inside and outside computer science. We even have Julia, which We like to call MATLAB's cool younger cousin, and it boasts some interesting perks of its own. And of course, Python currently holds a pretty large piece of the DS cake.

Here is a indistinct classification of things that we can use for a Big Data distributed data ecosystem:

- Indexing - Lucene is the other thing We think we need a direct replacement for in Rust, not a trivial task.
- RPC - We have used proto RPC which is fast and stable.
- Caching - an in-memory KV store would be a treat to build in Rust.
- Visualization - Web Notebooks are fine, but Rust can do real time, native data.

Our main observation about Rust at the moment is compile times: it takes a few minutes to go from "slightly tweaked Big Data analysis" to "actually running", which is probably the wrong analyst experience. The good performance is certainly due in some part to pushing all of the UDF closures down into the compiled code, so we are immediately clear on whether the slow compilation is fundamental to anything built on a Rust stack, or can it be cleverly bypassed by an appropriate high-level language. It might also
be that the programs we write are different from e.g. re-building rustc, and broader profiling would point out some easy compiler performance wins. However, Rust interops quite nicely with C and FORTRAN, and we can offer a compelling bridge of the HPC worlds and the Hadoop/Spark worlds. For the old school HPC communities, we can offer safety without sacrificing performance. For the Hadoop world we can offer performance without adding complexity.

6. Conclusion: Our impression is that we always want to tackle larger and more complex problems using Easy and secured languages. These typically include solving Problems related to Big Data, Internet of things data, Apps, fluid dynamics, heat transfer, solid mechanics, electromagnetic, chemistry, combustion acoustics and all of these together at the same time. We think that C++ is being used more and more because it allows tackling these more complex problems without losing performance, and because linking with already existing C and Fortran codes and libraries is easy. With time Rust gets easier in more than one sense so that sentiment has a double meaning. To conclude, if you are an aspiring big data professional then Linux and Java are the base for the most popular big data tool like Hadoop. Knowing all the above two languages is an advantage if you want to prosper in Data science and big data arena. However, scaling up gradually make sense for better achievement. Not only do you get better at the language, but the language has been improving. Many things that were missing that make things easy in other languages are slowly but steadily making their way into rust in a very "rusty" way, which is wonderful. Therefore Rust is better to be used with big data projects.

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15. https://datafusion.rs/

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UNIFICATION OF BIG IoT CLOUD DATA ANALYTICS COMPUTING FOR ENHANCED FUTURE: OPPORTUNITIES, AND OPEN RESEARCH CHALLENGES

DR.J.INDUMATHI

Abstract: Voluminous amounts of data, hair-raising speeds of data generation, variety of data formats not only makes the big data to be unique but also is prophesied to be a Cloud cannibal. The genesis of Internet of Things (IoT) devices are churning not only big data, but also fetches us challenges to be resolved. The data’s existence in the cloud has further rubbed salt in the wound, due to its significance. In spite of all these odds the prospect of all industries and businesses banks heavily on the firms completely leveraging Big Data, IoT, Cloud and analytics. The numerous solutions that have been created till date have facilitated people to gain valuable insights into the large data generated by IoT devices; but the proposed solutions are still in their embryonic stage, and the domain lacks a comprehensive survey. This paper investigates the state-of-the-art research issues confronting and directed toward Big IoT Cloud Data Analytics (BIOTCDA). The correlation between big data analytics, cloud, and IoT, big IoT data analytic types, methods, and technologies for big data mining are to be whipped in order to find suitable solutions. The open research challenges are reckoned and discussed with the intent of viewing them as tremendous opportunities brought by the BIOTCDA paradigm and this is presented for the future research directions.

Keywords: Big Data, Internet of Things (IoT), Cloud Computing, Data Analytics.

1. The Relationship Between Big Data, Data Analytics, IoT And Cloud Computing: Internet of Things (IoT), is an ecosystem of devices (each device has a specific IP address), which are all interconnected. These net of devices, are capable of generation, transmission and reception of data, deprived of human intervention. The data generated by Internet of Things (IoT), have to be processed, by the big data, which is a software ecosystem. The infrastructure and the expenses involved in setting up such massive machines for data processing is taken care by the cloud computing. And this is how IoT’s, big data and cloud computing are connected. The unification of the Internet of things, big data and cloud computing leverage a new prospect of decision support system. Furthermore, the convergence of the IoT, big data and cloud computing offers new openings and applications in all the sectors.

IoT’s, big data analytics, and cloud computing are not only transmuting the value of people and the business landscape. Let us look at the High Level relationship design Of Big IoT Cloud Data Analytics (BIOTCDA) which is shown in figure 1.

![Figure 1: Relationship between Big data, IoT, Cloud Computing and Data Analytics](image)

2. Big Data:
2.1 What Is Big Data?: The phrase "big data" is frequently used in enterprise settings to define large amounts of data (does not refer to a precise amount of data), but relatively describes a dataset that cannot be stored or processed using traditional database software. Examples range from targeted publicity, education, colossal industries (like healthcare, manufacturing or banking), to real-life scenarios, in guest service or entertainment. The database of Facebook user profiles, the Google search index, and Amazon.com’s product list are also some of the prevalent companies using the big data analytics to their advantage.

2.2 Characteristics of Big Data: The important Characteristics of big data are as follows:
- **Volume**: The data set is so large; as in the case of e-commerce, mobility, social media and the Internet of Things (IoT) which generate too much of information. The organization has to continuously escalate the hardware, software and face the challenges related to storing or processing it.
- **Velocity**: as the new data is created at a rapid speed, the organization should be capable of responding and handling the speed (perform data analysis).
- **Variety**: data is in different formats. For example, like text, video, images, spreadsheets, databases, email messages, word processing documents, presentations, and data in structured relational database management systems (RDBMSes).

2.3 Common Goals Associated With Big Data Projects: According to the NewVantage Partners survey, the most common goals associated with big data projects included the following:
- Decreasing expenses through operational cost efficiencies
- Establishing a data-driven culture
- Creating new avenues for innovation and disruption
- Accelerating the speed with which new capabilities and services are deployed
- Launching new product and service offerings

2.4 Challenges of Big Data: Many challenges have been put forth by big data. Organizations should find means to overcome these challenges. The most common big data challenges are the following:
- Handling the data growth – both structured and unstructured data
- Generating insights in a timely manner
- Assimilating dissimilar data sources
- Validating data
- Securing big data

3. Data Analytics: Data Analytics with the aid of escalated computing power has empowered industries to extract maximum value from data to get the best comprehensions. Data analytics has empowered analysts to gain valuable insights into the large data generated. Data Lake has become very common and organizations try to create more value out of their data pool.

Data is the new currency. Data is ubiquitous and is congesting networks, inflating storage requirements, overpassing borders in multicloud and hybrid environments, and normally places vast demands on infrastructure, networks, and tools. The data storage still remains a concern. The increase in the miniaturization of Internet of things (IoT) devices has also fueled the fire of issues springing out of the amalgamation.

3.1 Advantages of Data Analytics: The following table shows you the regions of concern and advantages of big data analytics.

<table>
<thead>
<tr>
<th>Table 1: Advantages of Data Analytics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Regions of concern</strong></td>
</tr>
<tr>
<td>Cost-effectiveness</td>
</tr>
<tr>
<td>Marketing effectiveness</td>
</tr>
<tr>
<td>Prediction and Decision making</td>
</tr>
<tr>
<td>Understandings</td>
</tr>
</tbody>
</table>
4. Cloud Computing: The definition issued by the U.S. National Institute of Standards and Technology (NIST) September, 2011 defines, “Cloud Computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. This cloud model is composed of five essential characteristics, three service models, and four deployment models”. (The NIST Definition of Cloud Computing, SP800-145.pdf)

4.1 Cloud Computing – Definition: The NIST definition has been accepted as the “defacto standard” [Bernd Grobauer et al.,(2011)] by researchers. The key security aspects that is anticipated of any data sharing technology are Confidentiality, Integrity, Authentication, Authorization, Non-repudiation and Availability. Despite the doles offered by Cloud Computing (based on 3-4-5 rule), and the fact that many enterprise applications and data are moving into cloud platforms; one should not forget that it still has security issues which is a major barrier for cloud adoption [Bansidhar Joshi et al., (2011)].

4.2. Cloud Security Issues: The cloud security issues, are given more emphasis in this paper due to the currency nature of the data and the issues are as listed below namely:

- Elasticity
- Insecure APIs
- IP address
- Network Insecurity
- Provider Security Malfunction
- Reliability
- Availability
- Virtualization
- Confidentiality and Privacy
- Integrity
- Malfunction Time
- Data Location
- Native Customer Attacks

Having comprehensively discussed the numerous issues apprehensive for data security in the cloud; and spiraled by the human instinct of looking at the problems as wonderful opportunities to find the appropriate technical solutions, this paper is aimed at a trifling step. Security and privacy are like the two eyes and they are indispensable. There are several mechanisms of preserving privacy {Gitanjali J.,(2007, 2008, 2009a, 2009b), Indumathi J.,(2012, 2013a, 2013b, 2013c), Indumathi J., Uma G.V.(2007a, 2007b, 2008a, 2008b, 2008c ,2008d),Murugesan., (2009, 2010a, 2010b), Prakash D.,(2009), Satheesh Kumar K(2008), Vasudevan V et al.,(2007))}.

4.2 What Is An IoT?: Internet of Things (IoT) refers to a system of connected physical objects via the internet. The ‘thing’ in IoT can refer to a person or any device which is assigned through an IP address. A ‘thing’ collects and transfers data over the internet without any manual intervention with the help of embedded technology. It helps them to interact with the external environment or internal states to take the decisions.

5. Challenges of IoT Big Data: The key issues which are an opportunity in disguise to fetch earth-shattering rewards when they are solved are as follows:

- Massive data volumes
- Struggle in data collection
- Mismatched standards
- Novel security threats
- No consistency in the data
- Essential shifts in business models
- Colossal amount of data to analyze
- A speedily growing privacy landscape
- Requisite For Synchronization Across Disparate Data Sources
- Lack of skilled Professionals to Understand Big IoT Cloud Data Analytics (BIOTCDA)
- Receiving Meaningful Insights Through The Use Of Big IoT Cloud Data Analytics (BIOTCDA)
- Receiving Voluminous Data Into The Big Data Platform
- Uncertainty Of Data Management Landscape
- Data Storage And Quality
- Security Of Data

6. Conclusion: The research community is hard-pressed to find an apt technological innovation for an array of challenges presented by the Big IoT Cloud Data Analytics (BIOTCDA) paradigm, which, has so effectively slain off its ancestors. Several unprecedented opportunities brought by data analytics in the Big Cloud (BIOTCDA) IoT domain are introduced. Research challenges that remain to be addressed are identified and discussed in this paper. In spite of gazing these challenges, let us look at them as opportunities in disguise to fetch earth-shattering rewards when they are solved because the prospect of all industries and businesses banks heavily on the firms completely leveraging Big Data, IoT, Cloud and analytics. The prevalent solutions are still in infancy. The correlation between big data analytics, cloud, and IoT, big IoT data analytic types, methods, and technologies for big data mining are to be flagellated in order to find suitable solutions. The open research challenges are reckoned and discussed with the intent of viewing them as tremendous opportunities brought by the BIOTCDA paradigm and this is presented for the future research directions.

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AN APPROACH TO EVALUATE LIKELIHOOD OF GENE FLOW BETWEEN SACCHARUM HYBRIDS AND WILD RELATIVES: A CASE STUDY FROM SOUTH AFRICA


Abstract: South African biosafety legislation requires an assessment of gene flow before approving genetically modified (GM) crops. Proof is required that hybridization cannot occur between GM crop plants and wild relatives. This study presents an approach to assess the likelihood of gene flow using a case study done in South Africa to investigate the possibility of gene flow from sugarcane to wild relatives in the sugarcane production regions. Spatial and temporal assessments of Saccharum and wild relatives was conducted. Eleven Saccharum relatives which are common in the study area were selected from the worldwide phylogeny of grasses confirming their close relatedness. Relevant data for these species were sourced from the literature, herbaria and field surveys. Co-occurrence (spatial overlap) of all target species was confirmed in sugarcane cultivation areas. Imperata cylindrica, Sorghum species and Miscanthidium species scored the highest likelihood for prevalence, flowering and spatial overlap, and seed distribution potential. Although these species were flagged by the approach, the crossing of spatial and temporal barriers is no guarantee for gene flow to occur and needs to be considered together with relatedness. Phylogenetic analyses of the extended Internal Transcribed Sequence (ITS) cassette showed that the closest wild relatives to commercial sugarcane were Miscanthidium capense and M. junceum as they are only 3 million years divergent. Sorghum was found to be more distantly related. Gene flow likelihood was therefore narrowed down to two species using this approach which involves spatial, temporal and molecular techniques. Future work will include aspects influencing gene flow such as cytological compatibility and introgression between sugarcane and Miscanthidium species.

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STUDIES ON FEEDING PREFERENCE BY GRAPE STEM BORER
CELOSTerna ScaBRATOR FAB(CERAMBYCIDAE: COLEOPTERA)

SUNITHA.N.D, BELAVADI.V.V, GIRADDI.R.S

Abstract: Grape (Vitis vinifera L.) is originated in Western Asia and Europe and belongs to berry family. Fruits are fairly a good source of minerals like calcium, phosphorous, iron and vitamins like B1, and B2. They can be eaten as fresh or used for making jam, juice, jelly, vinegar, wine, grape seed extracts and grape seed oil. The major medicinal properties of grape are of antioxidant, anti carcinogenic, immune modulatory, anti diabetic, anti atherogenic, neuroprotective, anti obesity, anti aging and anti infection nature. More than 100 pests are known to attack grape in India. Among them, thrips, mealy bugs, stem borer, mites, bats and birds are considered to cause serious losses in various regions if adequate and timely preventive and curative measures are not taken. Yield losses as high as 80% have been reported on grape due to insect pests in India. In the recent past the grape stem borer C. scabrator has become a major pest on grape in the grape growing areas of Northern Karnataka (India) and was found to cause 90.00 percent vine damage and 50.00 percent reduction in fruit yield. Females lay eggs below loose bark of stem and inside the old tunnels. Both adults and grubs cause damage to the plant. Adult beetles gnaw the shoots whereas grubs damage by feeding inside the trunk/branches and tunneling upward and downward. Extrusion of frass through the holes on the trunk and branches and oozing of gum are the common symptoms of damage. Tunneling prevents the translocation of nutrients, yellowing and wilting of foliage which ultimately results in quantitative and qualitative reduction in grape fruits. Research reports revealed that stem borer C. scabrator (Cerambycidae: Coleoptera) prefers weakened host and feeds on pith. Such studies on feeding preference of C. scabrator on grape vines were scanty. In the backdrop of this the present investigations were carried out between 2016-2018 in the grape orchards of Vijayapura district. Karnataka (India).

Experimental orchards were categorized as unstressed orchards which were not exposed to the attack of any of the biotic stresses like diseases and insect pests prior to the attack of C. scabrator and with no moisture stress and stressed orchards which were under severe moisture deficit and also stressed by the attack of other coleopteran pests and termites. Observations were recorded on number grape vines attacked by C. scabrator by adopting a procedure called frass indexing (Goodwin et al., 1994) in which each selected vine was examined for the external sign of larval infestation, which is the presence of fresh frass or sawdust extruded from the bored tunnels out through cracks in, or damage to the vine’s trunk, or other weaknesses in the wall and which often collects at the base of the vine. Such vines showing the symptoms of damage were tagged on the day first appearance of frass and observations were recorded at fortnightly interval for a period of eight months or till the last appearance of frass ejection from infested vines and recorded as mean number of grape vines preferred by C. scabrator by the end of study period.

The pest C. scabrator displayed differential preferences towards stressed grape vines and unstressed grape vines. Significant difference was observed (t=−5.96, p=0.006) between stressed (M=37.43 ± 5.15) and unstressed (M=20.86 ± 3.48) grape vines with respect to mean incidence by C. scabrator by the end of study period. The incidence showed decreasing trend in unstressed grape vines which was indicated by the gradual reduction in the quantity of frass extruded to absence of extrusion of frass, whereas the grubs continued to tunnel the stressed grape vines till the end of study period which was reflected in the increased quantity of frass extruded from the tunnels. Pooled analysis of two years data revealed significant difference (t=14.75, p=0.000) with respect to mean yield of grape fruits from unstressed but stem borer affected vines (6.73 ± 0.83 kg/vine) and stressed vines (0.95 ± 0.28 kg/vine).

The present investigations revealed that stress conditions favor the tunneling activity by the grubs of C. scabrator and stress management plays significant role for the management of C. scabrator.

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THE EFFECTIVENESS OF ALFACALCIDOL TO REDUCE FALL RISK AMONG ELDERLY PATIENTS: EVIDENCE BASED CASE REPORT

REZA HARYO YUDANTO, FADHIAN AKBAR, EDY RIZAL WAHYUDI

Abstract: Background: Increasing of fall risk is one of the major threat among elderly patients. It can be caused by decreasing muscle strength and exaggerated by frailty which leads to a high number of fracture. Falls are often treated by increasing of calcium level but it is also considered as a not optimal solution, thus we need additional therapy to reduce fall risk. One of the option to solve this problem is by using vitamin D derivate, which is alfacalcidol.

Method: The systematic literature searching was conducted from online databases, which are PubMed, Cochrane, and Proquest. Then, the relevant articles were appraised using guideline from Oxford Center for Evidence-Based Medicine (2011).

Results: One randomized control trial was selected. The article showed clear validity. The treatment of 1 μg alfacalcidol has significant effect to improve serum calcium level which associated with the reduction of fall risk compared to control.

Conclusion: Alfacalcidol could reduce fall risk among elderly patients.

Keyword: Alfacalcidol, Fall Risk, Elderly Patients.

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SPECTRAL AND DFT STUDIES ON REGIOSELECTIVE SYNTHESIS OF THIAZOLO-PYRIMIDINE SYSTEM

AVNEET PAL KAUR, DEEPIKA GAUTAM

Abstract: Unsymmetrical pyrimidine-2-thione 3, obtained from one pot condensation of substituted aromatic aldehyde and thiourea in alc. KOH, on reaction with α-halo acid afforded thiazolo-pyrimidin derivative 4 and not its regioisomer 5 respectively. The structure of the cyclised products has been established by means of spectral data (IR, and Mass). DFT studies on regioisomers further validated the claim for assigned structures.

Keywords: Acetophenone, Thiourea, Aromatic Aldehydes, Pyrimidine-Thiones, DFT Studies.

1. Introduction: Substituted or fused pyrimidine derivatives have proven pharmacological significance [1]. There are enough evidences to suggest that several of them are potentially useful medicinal agents and others are in various stages of development [2]. Quinazoline derivatives have attracted significant attraction due to their diverse pharmacological activities such as antimicrobial [3], anti-malarial [4], anti-inflammatory [5], antihypertensive [6], anticonvulsant [7], anti-diabetic [8], anti-cancer [9], cholinesterase inhibition [10], dihydrofolate reductase inhibition [11], and kinase inhibitory activity [12]. Pyrimidine also exhibit a wide variety of biological functions like cellular phosphorylation inhibition [13], ligands for benzodiazepine and GABA receptors in the central nervous system [14], and some of them have acted as DNA binding agents [15]. Thiazoles are also endowed with a wide range of pharmaceutical activities. The development of new structures which incorporate various biologically active pharmacophores in a single molecule has attracted much attention in medicinal research. This approach encouraged us to undertake the synthesis of new thiazolo-quinazoline and thiazino-quinazoline derivatives in continuation to our previous work on synthesis of such skeletons [16-17]. The regiochemistry of the cyclised products was established by means of spectral data and verified by DFT studies.

2. Experimental:
2.1. Instrumentations: Melting points were determined in sulphuric acid bath and are reported uncorrected. TLC was performed on silica gel G plates using pet ether-ethyl acetate (4:1) as eluent and iodine vapours as visualizing agent. IR spectra were recorded on ABB FTIR spectrometer and the results are reported in cm⁻¹. Mass spectra were recorded on a WATERS, Q-TOF MICROMASS (LC-MS) instrument. The elemental analyses of the compounds were performed on Euro EA 3000 Elemental Analyzer.

2.2 General procedure for the synthesis of 3.
a) A mixture of acetophenone 1 (0.04 mmol), aromatic aldehyde (0.04 mmol) and thiourea (0.032 g, 0.04 mmol) in alc. KOH (2 gm KOH in 25 mL EtOH) was heated under reflux for 4 h. The reaction mixture was then poured into ice cold water. Filtered the solid obtained, dried and recrystallized from ethanol.
b) A mixture of chalcone 2 (0.04 mol), thiourea (0.04 mol) in sodium ethoxide (2 gm in 10 mL EtOH) was heated under reflux for 3 h. Reaction mixture was kept overnight and then poured in to ice cold.

2.2.14,6-diphenyl-3,4-dihydropyrimidine-2(1H)-thione (3a)
Yellow solid, yield 85%, mp=152-55°C, lit [18] mp 158-160°C.
2.2.2 4-(4-chlorophenyl)-6-phenyl-3,4-dihydropyrimidine-2(1H)-thione (3b)
Yellow solid, yield 85%, mp 163-65°C, lit [18] mp 158-160°C.

2.2.3 4-(4-nitrophenyl)-6-phenyl-3,4-dihydropyrimidine-2(1H)-thione (3c)
Yellow solid, yield 85%, mp 152-55°C, lit [18] mp 158-160°C.

2.3 General procedure for synthesis of 4: A mixture of thione 3 (0.16 g, 0.5 mmol), chloroacetic acid (0.5 mmol), anhydrous sodium acetate (0.082 g, 1.0 mmol) in ethanol (10 mL) was heated under reflux for 3-4 h. The progress of reaction was monitored by TLC. After completion of the reaction the volume of the reaction mixture was reduced to half. The cooled reaction mixture was then poured in to ice cold water and filtered the solid obtained. Recrystallization from ethanol–DMF (3:1) mixture furnished pure compounds.

2.3.1 5,7-diphenyl-2H-thiazolo[3,2-a]pyrimidin-3(5H)-one (4a): Yellow solid; yield 62 %; mp 102-04°C.
IR (cm⁻¹): 1728 (C=O), 1589 (C=N). MS, m/z 307.1 (M+H⁺, 60 %). Anal. Calcd. (%) for C₁₈H₁₄N₂O₃S: C, 70.56; H, 4.61; N, 9.14; S, 10.47. found (%): C, 70.67; H, 4.71; N, 9.24; S, 10.51.

2.3.2 5-(4-chlorophenyl)-7-phenyl-2H-thiazolo[3,2-a]pyrimidin-3(5H)-one (4b): Yellow solid; yield 62 %; mp 102-04°C. IR (cm⁻¹): 1695 (C=O), 1665 (C=N). Anal. Calcd. (%) for C₁₇H₁₃ClN₂O₃S: C, 63.84; H, 3.82; N, 8.22; S, 9.41. found (%): C, 63.61; H, 3.71; N, 8.28; S, 9.51.

2.3.3 4-nitrophenyl)-7-phenyl-2H-thiazolo[3,2-a]pyrimidin-3(5H)-one (4c): Yellow solid; yield 62 %; mp 102-04°C. IR (cm⁻¹): 1730 (C=O), 1639 (C=N). Anal. Calcd. (%) for C₁₇H₁₃ClN₂O₃S: C, 61.53; H, 3.73; N, 11.96; S, 9.13. found (%): C, 63.61; H, 3.71; N, 8.28; S, 9.51.

4. Results and Discussion: A mixture of acetophenone 1, substituted benzaldehyde and thiourea in alkaline medium on refluxing for 4 h furnished thione 3. The characterization of the thione was done on the basis of spectral data. The unsymmetrical thione 3 on condensation with chloroacetic acid followed by cyclization of the intermediate in situ was likely to give compound 4 or its isomer 5 or a mixture of both depending upon mode of cyclization (Scheme 1). However, the thione 3 when treated with ethyl chloroacetic acid in the presence of anhydrous sodium acetate in absolute ethanol afforded a single product (TLC) 4 or 5 in 75 % yield. The appearance of a band at 1728 cm⁻¹ (C=O) in the IR spectrum, and exhibition of a quasimolecular ion peak at m/z 307.1 (M+H⁺, 60 %) in the mass spectrum of the TLC pure product suggested the formation of thiazolidinone 4 or 5. The IR and mass spectral data were ambivalent on deciding the structure 4 or 5. However, structure 4 was finally assigned to this cyclization product in preference to the structure 5 on the basis of DFT studies.

4.1 Computational Studies of Compound 4 and Regioisomer 5: The molecular geometry optimization, were performed with the Gaussian 09 W software package[19]by using DFT methods with B3LYP[20] (Becke three parameter Lee-Yang-Parr) exchange correlation functional, which combines the hybrid exchange functional of Becke[21],with the gradient-correlation functional of Lee, Yang and Parr. The 6-31G (d) basis set was used for DFT studies on isomeric pair 4/5. The optimized configurations of compounds 4 and its isomer 5 with atom numbering schemes are shown in (Figure 1). The optimized bond lengths and bond angles obtained by geometry optimization of structure 4 and 5 are reported in (Table 1). In case of structure 4, the optimized bond lengths of C=O and C-S bonds in thiazolidinone ring are 1.214 Å and 1.814 Å, which are close to actual bond lengths. The optimized bond angles for O-C-N and S-C-N were observed at 123.62° and122.95°. In case of structure 5, the optimized bond lengths of C=O and S-C in thiazolidinone ring are 1.19 Å and 1.838 Å. The optimized bond angles for C-N-C and S-C-N were observed at 115.63° and 121.33°. It may be noted here that slight differences in bond parameters are attributed to the fact that theoretical calculations have been carried out for isolated molecules in gaseous phase. The total energy obtained for optimized structures 4 and 5 are -801330.19 Kcal/mol and Total Energy = -801320.1 Kcal/Mol respectively. This shows structure 4 is more stable than isomer 5.

Figure 1: Optimized Structures of Compound 4 and its Isomer 5

Table 1: Selected calculated bond parameters of compound 4 and isomer 5.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Calculated</th>
<th>Parameters</th>
<th>Calculated</th>
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References:

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E-AGRICULTURE AND THEIR RESOLUTIONS IN INDIAN VIEWPOINT

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Abstract: India is basically an farming society and basically depends on agricultural outputs. E-Agriculture is a growing field concentrating on the enhancement of rural and agricultural growth through advanced information and communication procedures. The development of agriculture has been on below development for the past few years due to lack of Agriculture knowledge and ecological changes.

Keywords: E-Agriculture, ICT, Mobile Application

1. Introduction: India is essentially an farmed society and basically depends on agricultural outputs. The Indian Agriculture is highly stretched in terms of its weather, soil, crops, horticultural crops, plantation crops, livestock assets, fisheries resources, water resources, etc. the variety of its agricultural sector is both a bane and boon to the social, economic, and cultural bases of India’s vast population. Moreover, the multiplicity among resources produces communications among many different macro and micro issues, and is further complicated with the interdependencies that exist among these. These assets need to be evaluated, observed, and allotted optimally for balanced and supportable development of the country [1] e-Agriculture is a recent term in ICT that defines a global community exercise, where people from all over the world interchange data, ideas, and resources related to the use of information and communication technologies (ICT) for ecological agriculture and rural development [2]. More advanced applications of e-agriculture in farming exist in the use of sophisticated ICTs such as satellite systems, Global Positioning Systems (GPS), progressive computers and electronic systems to improve the quantity and quality of fabrication [3].

2. Current Scenario of Agriculture Sector: The work-related structure of India is conquered by the “agricultural sector” and the “manufacturing sector” and the “service sector” is covering far behind in this context. This shows that India is primarily an agricultural economy and hence it requires toughest protection and development of its “agricultural resources”. India is facing certain “Agricultural Challenges” that must be determined as soon as possible. The major challenges to “Agriculture Sector in India” are:
   1. Agricultural content development and its up gradations,
   2. Possession issues of the public and government generated data,
   3. Unsatisfactory agricultural infrastructure and support facilities,
   4. Insufficient institutional ability to deliver farmers specific services,
   5. Lack of awareness regarding appropriate agricultural methods among the farmers,
   6. Absence of an “Agricultural Think-Tank” in India,
   7. Insufficient use of ICT for agricultural purposes, etc.
   8. Insufficient use of Public-Private Firms in India,
   9. Lack of “Common Platforms” for the farmers in India,

3. Role of ICT in Agriculture: ICTs play a vital role in agricultural value chains, with different types of ICT having different strengths and weaknesses when applied to particular interferences. ICT is an canopy term that comprises any communication device or application, encompassing: radio, television, mobile and fixed phones, computer and network hardware and software, satellite systems and so on necessary for the supply of information in the form of audio, data, video, image, etc ICT consists of all practical means used to handle information and aid communication. Several reports highlight just how significant and extraordinary ICT productivity gains are not only for individuals and businesses, but for a nation. [4].

4. Application of ICT: ICTs play a vital role in various fields. Role of ICT in Agriculture along with other particular areas like E-commerce, Communication, Education & various Businesses is as shown in Figure 1.
5. Global Trends in E-Agriculture:

A. Technology-based Solutions: Applications of e-Agriculture in rigorous agricultural systems in developed countries are gearing towards using sophisticated technologies to recover the quantity and quality of production, in order to maximize incomes. This is the case in accuracy agriculture in which farmers are harnessing computer and satellite skills to cut costs, improve crops and guard the atmosphere; and e-commerce (or e-marketing) in which the advertising and sale of agricultural products is conducted over electronic networks such as the Internet and extranets. On the other hand in many evolving countries farmers’ access to information is improved complete grass root level edges of using ICTs as well as distance education modalities to increase the knowledge base among service benefactors.

B. Precision Agriculture: In precision agriculture or site-specific farming, farmers are using ICTs and other tools to obtain more accurate data about agricultural resources which allow them to classify, analyze, and manage the spatial and temporal variability of soil and plants for optimum success, sustainability, and protection of the environment [5]. Farming is an information technology based management system now possible because of several skills currently available to agriculture. These include global positioning schemes, geographic information systems, yield monitoring devices, soil, plant and pest instruments, remote sensing, and variable rate technologies for application of inputs [6]. Precision agriculture is an progressive e-agriculture application. It makes use of five major components of technology: 1) Variable Rate Technology (VRT) allowing targeted, site-specific input applications; and 2) Geographical Information Systems (GIS) for study and management of 3-D data and mapping; 3) Remote Sensing (RS) to identify and 4) Global Positioning Systems (GPS) to locate and define spatial features or actions that contribute to the quality of site-specific practices; 5) Yield monitoring for recording crop productivity as an historical database for crop management [7].

C. E-Commerce in Agriculture: Enhanced fabrications and high yields result in the need to look for moneymaking markets beyond local groups, and electronic markets are providing an opportunity to farmers to market and sell their produce to buyers at the global level. Electronic commerce (ecommerce), simply distinct as the general exchange of goods and services via the Internet, is already having a substantial impact on agriculture. Farms had already bought or sold agricultural crops on the Internet [8] and Goldman Sachs had assessed that 12% of all agricultural sales in the U.S. would be conducted over the Internet in 2004, compared to only 4% in 1999 [9]. Further, a study conducted by Rockwood Research on Internet use by commercial farmers in the US found that farmers were mainly using the Internet to access information on goods prices, weather, farm chemicals, and machinery. The study also showed that farmers were migrating quickly toward Web-based transactions such as purchasing seed, crop chemicals, and farm equipment on the Internet [10].

6. Mobile Technology in Agriculture: Mobile communications technology has become the world’s most common way of communicating voice, data, and services, and no technology has ever spread faster. At the end of 2010 there were 5.25 billion cellular telephone donations worldwide. By 2015 the number of
mobile phone connections is expected to exceed the global population. The mobile phenomenon is particularly important for developing countries because that is where it is growing fastest, and in the next few years nearly all new mobile customers will come from developing countries because penetration has reached saturation levels in developed countries. Mobile phone technology has also been key to leapfrogging fixed-line Internet in developing countries and providing mobile broadband to a growing share of people.

A. **The Virtuous Circle of Mobiles and Agriculture**: Advances throughout the mobile phone ecosystem tend to act as a positive feedback loop. This “virtuous circle” of innovation enables a number of benefits, even for smallholder farmers.

- **Access.** Mobile wireless networks are rising as technical and financial novelties widen coverage to more areas.
- **Affordability.** Prepaid connectivity and inexpensive devices, often available second hand, make mobile phones far cheaper than replacements.
- **Appliances.** Mobile phones are continuously increasing in complexity and ease of use. Innovations arrive through traditional trickle-down effects from extravagant models but have also been directed at the bottom of the pyramid.
- **Applications.** Applications and services using mobile phones range from simple text messaging services to increasingly advanced software applications that provide both livelihood developments and real-time

![Diagram of Modern System of E-Agriculture](image)

**Fig 2:** Modern System of E-Agriculture

B. **Mobile Apps that can revolutionize India’s Agriculture Sector Easily**: Farmers make up about 24.8 per cent of India’s total labor force, with over 118.9 million farmers spread across the length and breadth of the country. Agriculture is the largest income breadwinner in India contributing a significant
percentage to its GDP. It has witnessed green, yellow and blue revolt and now it is a proud participant of the mobile revolution too. Here are 3 companies and their services which are helping farmers connect with the market directly, thus making the gap between buyer and farmer smaller by the day.

**RainbowAgri:** On RainbowAgri, they have a mass of services where farmers can talk to groups, users and farmers can buy and sell resident products and buyers can even get live price apprises. One can even connect with vicinity farmers directly and see real images of their crop. Rainbow Sell gets farmers, street vendors and even small stores to reach buyers in their local areas and even modify deliveries to suit the buyer’s needs, by holding supplies for discounts, enter details in local language and even track the status of the order. With Rainbow Live Price, all the crops in India are arranged by location, weather, market names and of course type and is pretty comprehensive. It is often called the internet of farmers.

**MandiTrades:** One can get information about commodity prices directly provided by the Government of India, produce info and a map based view of available farm products with the capability of connecting to a required farmer via just a simple phone call through this app. A buy/sell platform aims to solve the problems of marketing and farmers can avoid the daily fight to sell their produce. When they register with the site, it captures all of their produce and location details and updates its database. Farmers can know of average demand, peak/low demand season, in and off season needs, rare items and their prices and can plan their farms consequently.

**Mpower Social:** Livestock farming is one of the most important forms of livelihood for many families. Unfortunately the ratio of registered veterinarians to cattle is very low and Mpower’s ICT Livestock Management Systems (LMS) aims to decrease this gap by connecting livestock professionals to small holder farmers via Livestock intermediaries. These Livestock workers list the farmers, gather regular updates about their cattle and provide skillful medical advice - all through their mobile application. This reduces the cost of consulting an expert or a doctor.

7. **Conclusion:** The present work on E-agriculture carries the information concerning agricultural details to farmers in SMS via SMS gateway and hereby propose to switch over E-agriculture. The details such as daily alert, seasonal alert and other additional details can be sent to farmers. The daily alert can be sent to all farmers in the database.

8. **Future Scope:** E-agriculture is very helpful for the young farmer and provide them useful information’s concerning the farms that they have grown. The present work on E-agriculture sends the information regarding agricultural details to farmers in SMS via SMS gateway. The details such as daily alert, seasonal alert and other additional details can be sent to farmers. The daily alert can be sent to all farmers in the database. Seasonal alert can be sent to farmers only for selected farmers based on grouping result. Finally the other or additional detail which is broadcasted by agriculture can be sent to all farmers. Experimental result shows improved result when associate with the existing work. This paper has examined efforts taken by major developed countries in order to draft the wide canvas of ICT for agricultural developments. This is then thought in the lines for the potential benefit of Indian agricultural developments in actual and rural developments in general. Majority of farmers in the state or country are alert that mobile phones can be used to conduct businesses and accept information. Mobile phone costs should be lowered to enable majority of farmers for having access to the current information about agroindustry within the state or country. The government should also conduct sensitization to create awareness for the farmers on how best they can use information technologies to conduct agribusiness.

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BIOACTIVE POTENTIAL AND NUTRITIONAL COMPOSITION OF CHAYOTE: AN UNDERUTILIZED VEGETABLE CROP

JASMANPREET KAUR, KAJALPREET KAUR, ANKITA CHOUDHARY, ASHUTOSH SHARMA, INDU SHARMA

Abstract: Chayote [Sechium edule (Jacq.) Swartz] is an underutilized vegetable plant of family Cucurbitaceae. Although it is distributed throughout world yet it is least commonly used vegetable crop. Among 10 species of Sechium, generally the Sechium edule (Jacq.) Swartz is cultivated. The roots, shoots, leaves and seeds of Chayote possess rich amount of essential nutrient ingredients. Research on the Chayote have revealed that the extracts of various parts have diverse bio-active properties such as antioxidant, anti-microbial, anti-bacterial, anti-proliferative etc. In some regions of the world, Chayote is also utilized in the folk medicine. This article is an attempt to briefly review its nutritional composition and bioactive potential for the futuristic implications of Chayote in both food and nutraceutical industries.

Keywords: Antioxidant potential, Chayote, Cucurbitaceae, Nutritional Value.

Introduction: Sechium edule (Jacq.) Swartz commonly known as chayote (in English) is a single seeded squash which belongs to family Cucurbitaceae [1]. It is ubiquitously distributed throughout the world from America to India [1, 2, 3]. Although Sechium edule (Jacq.) Swartz has many common/regional names [Table 1] but the most common name is Chayote (English) which have been originated from a Middle American state, Mexico [1, 2]. Besides, the name Chayote, it is also referred to as Lonku (in Himachal Pradesh, India), Iskut (in Mizoram, India), Piskot (in Meghalaya, India) [3], cajot (in Russia), Buddhism’s hand (in China), zucca (in Italy), leong-siam (in Indonesia) [1]. During Pre-Columbian times, Aztecs and Mayas were the first human beings to domesticate Sechium edule (Jacq.) [4]. However, Western missionaries introduced chayotes in India [5, 6], and it is restricted to few specific regions of India [7, 8]. In North-eastern India, Chayote is grown from Mizoram to Himachal Pradesh along the Himalayas as well as adjoining areas such as Nepal, Bhutan and Myanmar. In Southern India, it is distributed in Tamil Nadu (Madurai and Nilgiri hills), few regions of Karnataka and Kerala [3, 7, 8].

Table 1: Distribution and Common Names of Chayote Sechium edule (Jacq.) Swartz

<table>
<thead>
<tr>
<th>Continent</th>
<th>Province/State</th>
<th>Common name</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Europe</td>
<td>Portugal</td>
<td>Caiota</td>
<td>[9]</td>
</tr>
<tr>
<td>Meso America</td>
<td>Mexico-Michoacan and Tarasco,</td>
<td>Apupo, Aropu</td>
<td>[1]</td>
</tr>
<tr>
<td>Mexico</td>
<td>Chayotli or Chayutli</td>
<td>[9]</td>
<td></td>
</tr>
<tr>
<td>Oaxaca</td>
<td>Niktin, nana, itu-tse, rign,nn</td>
<td>[1]</td>
<td></td>
</tr>
<tr>
<td>Mixteco</td>
<td>Nana</td>
<td>[1]</td>
<td></td>
</tr>
<tr>
<td>Mazahua</td>
<td>Mu-u, shamu, xamu</td>
<td>[1]</td>
<td></td>
</tr>
<tr>
<td>Veracruz</td>
<td>Chayotes de monte and erizos de monte</td>
<td>[1]</td>
<td></td>
</tr>
<tr>
<td>Central America</td>
<td>Guatemala, El Salvador</td>
<td>Rasi-cima, bisquil, chuma, chima, guisquil, huisquil, chimaa, huisayote, guisayote, perulero.</td>
<td>[1, 9]</td>
</tr>
<tr>
<td>Nicaragua</td>
<td>Chaya</td>
<td>[1]</td>
<td></td>
</tr>
<tr>
<td>Costa-Rica</td>
<td>Pis, pog-pog-iku, seuak, suru, tsua-us.</td>
<td>[1]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chinta, chintla or alconcha</td>
<td>[9]</td>
<td></td>
</tr>
<tr>
<td>Latin America</td>
<td>Cuba</td>
<td>Tayote, tavon, chocho, chioke, chote.</td>
<td>[1, 7, 9]</td>
</tr>
<tr>
<td></td>
<td>Colombia</td>
<td>Chayote, cidrayota, huisquila,</td>
<td>[1, 7, 9, 10]</td>
</tr>
</tbody>
</table>
Table: Chayote Common Names in Various Countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Common Name</th>
<th>Reference(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peru</td>
<td>starprecianté, citrayota, citrayote</td>
<td>[1, 7, 9]</td>
</tr>
<tr>
<td>Venezuela</td>
<td>Chayote</td>
<td>[1, 7]</td>
</tr>
<tr>
<td>Brazil</td>
<td>Chuchu, chocho xuxu or machuchu</td>
<td>[1, 7, 9]</td>
</tr>
<tr>
<td>Argentina</td>
<td>Cayota</td>
<td>[1, 7]</td>
</tr>
<tr>
<td>Puerto Rico</td>
<td>Tayote or tallote, talon</td>
<td>[7, 9]</td>
</tr>
<tr>
<td>Southern USA</td>
<td>Mango squash</td>
<td>[9]</td>
</tr>
<tr>
<td>England, Australia</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Russia</td>
<td>-</td>
<td>[1]</td>
</tr>
<tr>
<td>China</td>
<td>-</td>
<td>[1]</td>
</tr>
<tr>
<td>Italy</td>
<td>-</td>
<td>[1]</td>
</tr>
<tr>
<td>India</td>
<td>-</td>
<td>[1]</td>
</tr>
<tr>
<td>Himachal Pradesh</td>
<td>Lonku</td>
<td>[3]</td>
</tr>
<tr>
<td>Mizoram</td>
<td>Iskut</td>
<td>[3]</td>
</tr>
<tr>
<td>Meghalaya</td>
<td>Piskot</td>
<td>[3]</td>
</tr>
<tr>
<td>New Zealand</td>
<td>Choko, christophene, vegetable pear, mirliton, merleton choko</td>
<td>[9, 10]</td>
</tr>
<tr>
<td>Africa</td>
<td>-</td>
<td>[9]</td>
</tr>
<tr>
<td>Indonesia</td>
<td>-</td>
<td>[1]</td>
</tr>
<tr>
<td>Malaysia</td>
<td>-</td>
<td>[1]</td>
</tr>
<tr>
<td>Java</td>
<td>-</td>
<td>[1]</td>
</tr>
<tr>
<td>West Indies</td>
<td>-</td>
<td>[1]</td>
</tr>
<tr>
<td>Jamaica</td>
<td>Choco</td>
<td>[9, 10]</td>
</tr>
<tr>
<td>French Indies</td>
<td>-</td>
<td>Christopheine [9]</td>
</tr>
<tr>
<td>British Indies</td>
<td>-</td>
<td>Vegetable pear [9]</td>
</tr>
<tr>
<td>Nepal</td>
<td>-</td>
<td>pear squash or iskus [10]</td>
</tr>
</tbody>
</table>

Chayote is mainly produced by Brazil, Costa Rica, Dominican Republic and Mexico [11] whereas Costa Rica and Mexico are its major exporters [12]. Its fruit, tuberous roots, young stems and tender leaves have been consumed through various cooking methods but the fruit is the most preferred for the conventional cooking [1, 13]. The recent studies have explored the nutritional value and nutraceutical properties such as antioxidant, diuretic potential, anti-cancerous [3, 10, 14-21]. The fruit extracts of Chayote also possess antihypertensive effect, antifungal, antibacterial, anti-cancerous, anti-proliferative, antihyperglycemic, capacity of dissolving kidney stones and central nervous system depressant activities suggesting its potential implications in medicine [3, 10, 14-21]. Keeping in view, diverse potentials of Chayote in folk medicine, biologically active nutritional composition and perspectives in nutraceuticals or pharmaceutical industries, the present article is a short review comprising the most warranted updates on the underutilized vegetable Chayote.

Botanical Description: The chayote plant is a fast growing herbaceous, perennial, monoecious, vigorous creeper with tendrils and tuberous roots [1, 3, 9, 12]. The fruit is fleshy, light green in colour; ovoid, sub-ovoid, globose or pear-shaped; with or without longitudinal ridges or shallow furrows; 4.3 to 26.5 cm long and 3 to 11 cm wide, up to 2-3 pounds weight and possess various types of spines. [10, 12, 22]. It most commonly in pear shaped or pyri-form and are narrower near the point of attachment and broader towards the apex [1]. Chayote fruit is highly perishable and have only a single, compressed and smooth seed. After harvesting, its seeds may germinate within one month. Its stems are long, slightly compressed and generally longitudinally furrowed with green colour at young stage which turn brownish-grey at maturity. The length of stems may be up to 9 to 15 m within one year [1, 9, 10]. The stems usually appear woody and thicken towards the base whereas numerous thin, firm and herbaceous branches are present.
towards the apex [1].

The leaves of Chayote are heart shape at base, strongly three-angled or lobed; ovate or triangular with 2 to 5 pointed lobes; leathery with rough hair beneath, dark green adaxial side whereas light green on abaxial side [9]. Flowers are axillary, small, whitish or yellowish green, unisexual, or occasionally bisexual flowers (staminate and pistilate) may be present on the same axis [1, 9, 12]. The staminate flowers are pentamerous, pedunculate with erect racemes whereas the pistilate flowers are generally solitary and grow in pairs [1, 9]. Both the filaments and style are connate into a central column and thus anthers appear as lobes. The stigma is more closely set together to form a small head. The ovary is one-celled with single ovule having many different shapes.

Taxonomically, Chayote have been classified under *Embryophytes*; class: *Magnoliopsida*; order: *Violales*; family: *Cucurbitaceae*; genre: *Sechium* and species: *Sechium edule* (Jacq) Swartz. [1, 10-11]. In the genre *Sechium*, there are total ten species. Out of which, eight species viz., *S. compositum*, *S. chinantlense*, *S. talamancense*, *S. panamense*, *S. pittieri*, *S. venosum*, *S. hintonii* are wild and two species viz., *S. tacaco* and *S. edule* are cultivated [1, 12]. In Porto Rican markets five varieties of chayote fruits have been identified and these fruits may be grouped according to their colour, size, form, surface and quality of flesh as “Round White”, “Long White”, “Pointed Green”, “Broad Green”, “Oval Green” [12]. It has been documented that the chromosome number of *S. edule* varies and haploid (n) and diploid (2n) numbers of *S. edule* may also differ [1]. Some reports revealed that n=12 and 2n=24 whereas according to others n=13 and 2n = 26 or 28 or 22 [1]. Recent studies have revealed the genetic diversity among 42 accessions of chayote from Costa Rica [23] and 74 landraces of Chayote collected from the North Eastern area of India [3].

**Nutritional Composition:** The chemical composition of the Chayote is dependent upon various agro-climatic conditions such as relative humidity, temperature, rainfall and light; age of plant, harvesting and post-harvesting methods. The optimum temperature range is 13-21°C for growth; temperatures below 13°C cause fruit damage whereas above 28°C ensue more growth resulting in fall of flowers as well as immature fruits [10]. The immature fruits generally consumed raw as salad, may be boiled/fried/steamed/stuffed or baked which are a rich source of vitamin C [12]. In 1901 [24], the constituents present in edible tuberous roots of Chayote have been described [Table 2].

**Table 2:** General Chemical Constituents (in %) in tuberous roots of Chayote

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Constituents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Water</td>
<td>71%</td>
</tr>
<tr>
<td>2.</td>
<td>Starch</td>
<td>20%</td>
</tr>
<tr>
<td>3.</td>
<td>Resinous material soluble in ether</td>
<td>0.20%</td>
</tr>
<tr>
<td>4.</td>
<td>Sugars</td>
<td>0.32%</td>
</tr>
<tr>
<td>5.</td>
<td>Vegetable albumen</td>
<td>0.43%</td>
</tr>
<tr>
<td>6.</td>
<td>Cellulose</td>
<td>5.60%</td>
</tr>
<tr>
<td>7.</td>
<td>Extracted material, tartrate of potash, chloride of sodium, sulphate of lime and silica.</td>
<td>2.25%</td>
</tr>
</tbody>
</table>

*Source of table 2: Cook [24]*

According to Saade [1], the edible parts of chayote have relatively less amount of fibres [Table 3], vitamins and proteins when compared to other vegetables. But, the young stems, roots and seed of chayote is relatively high contents of carbohydrates. Several essential amino acids such as glycine, asparagine/aspartic acid, proline, leucine, isoleucine, threonine, phenylalanine, tyrosine, valine, glutamine/glutamic acid and histidine are also present both in fruit and seed [1, 10, 25]. About 61 volatile compounds were reported in the fruits of Chayote and the major constituents observed were octadeca-9,12 dienoic acid, docosane, oct-1-en-3-ol and (Z)hex-3-en-1-ol [26]. Among these, oct-1-en-3-ol and (Z)hex-3-en-1-ol contributes to the characteristics odour of the green fruits of Chayotes.

**Table 3:** General nutritional composition of different organs of *S. edule* (Jacq) Swartz
An array of polyphenols such as phenolic acids, stilbenes and tannins have been also reported in Chayotes. Besides this, flavonoids including anthocyanins, anthroquinones, and coumarins, apigenin 6-C-β-D-glucopyranosyl-8-C-β-D-apiofuranoside, diosmetin 7-Orutinoside, vicenin-2 and vitexin, luteolin 7-O-rutinoside, luteolin 7-O-β-D-glucoside, and apigenin 7-O-rutinoside have also been identified from various parts of the chayotes [10]. They also produce the bitter chemical constituent known as cucurbitacins in various plant organs. Cucurbitacins, exclusively produced by members of family Cucurbitaceae are a group of tetracyclic triterpenoids, highly oxygenated, bitter tasting plant substances which are derived from cucurbitane skeleton [12]. The fruit composition of 8 different varieties [27] of S. edule has been described in Table 4.

### Table 4: Composition of Cucurbitacins, Total soluble solids and Ascorbic acid different varieties of S. edule

<table>
<thead>
<tr>
<th>Variety</th>
<th>Cucurbitacin (100g)</th>
<th>Total Soluble Content (Brix index)</th>
<th>Ascorbic acid (mg/100g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virens levis</td>
<td>0.0116</td>
<td>5.14±0.2</td>
<td>6.76±0.16</td>
</tr>
<tr>
<td>Nigrum xalapensis</td>
<td>0.0195</td>
<td>4.93±0.2</td>
<td>6.53±0.53</td>
</tr>
<tr>
<td>Nigram spinosum</td>
<td>0.0190</td>
<td>6.43±0.3</td>
<td>4.95±0.49</td>
</tr>
<tr>
<td>Nigrum levis</td>
<td>0.0660</td>
<td>5.47±0.2</td>
<td>6.65±0.18</td>
</tr>
<tr>
<td>Amarus silvestrys</td>
<td>0.1456</td>
<td>10.92±0.3</td>
<td>3.99±0.16</td>
</tr>
<tr>
<td>Albus minor</td>
<td>0.0039</td>
<td>7.66±0.7</td>
<td>7.82±0.42</td>
</tr>
<tr>
<td>Albus dulcis</td>
<td>0.0027</td>
<td>7.21±0.9</td>
<td>7.42±1.27</td>
</tr>
<tr>
<td>Albus levis</td>
<td>0.0088</td>
<td>8.08±0.6</td>
<td>7.75±0.22</td>
</tr>
</tbody>
</table>

*Source of Table 4: Cadena-Iñiguez et al. [27]; Total Soluble Content and Ascorbic Acid Content: mean ± standard errors.*

The detailed nutritional composition in the fruit, root and young shoots have been described as the
minimum and maximum values per 100g of edible portion [9] in Table 5. Besides this, an important plant growth regulator i.e., Gibberellins and Sechiumin, a ribosome-inactivating protein have been characterised from the seeds of Chayote. The inhibitory activity against carbohydrate-hydrolysing enzymes have also been reported in Chayotes [30-32]. This activity has been found to be against α-amylase, β-Glucosidase and α-glucosidase enzymes. The peel extracts and fresh pulp have revealed more activity against α-amylase, β-Glucosidase and α-glucosidase respectively. These α-amylase as well as α-glucosidase inhibitory activities have been observed to be positively correlated with that of amounts of flavonoids and total phenolics in Chayotes [14].

Table 5: Nutritional composition of different parts of Chayote

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Elements</th>
<th>Fruit</th>
<th>Roots</th>
<th>Young Shoots (vine)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Minimu m value</td>
<td>Maximu m value</td>
<td>Minimu m value</td>
</tr>
<tr>
<td>1</td>
<td>Moisture</td>
<td>88.8g</td>
<td>95.1g</td>
<td>69.8g</td>
</tr>
<tr>
<td>2</td>
<td>Fat</td>
<td>0.12g</td>
<td>0.47g</td>
<td>0.03g</td>
</tr>
<tr>
<td>3</td>
<td>Crude Fibre</td>
<td>0.36g</td>
<td>0.91g</td>
<td>0.5g</td>
</tr>
<tr>
<td>4</td>
<td>Protein</td>
<td>0.64g</td>
<td>1.2g</td>
<td>1.31g</td>
</tr>
<tr>
<td>5</td>
<td>Total Carbohydrates</td>
<td>4.4g</td>
<td>8.62g</td>
<td>23.99g</td>
</tr>
<tr>
<td>6</td>
<td>Nitrogen</td>
<td>0.95g</td>
<td>0.156g</td>
<td>0.332g</td>
</tr>
<tr>
<td>7</td>
<td>Ash</td>
<td>0.2g</td>
<td>0.6g</td>
<td>0.8g</td>
</tr>
<tr>
<td>8</td>
<td>Calcium</td>
<td>6.1mg</td>
<td>19.0mg</td>
<td>6.1mg</td>
</tr>
<tr>
<td>9</td>
<td>Phosphorous</td>
<td>15.0mg</td>
<td>36.0mg</td>
<td>34.3mg</td>
</tr>
<tr>
<td>10</td>
<td>Iron</td>
<td>0.29mg</td>
<td>2.08mg</td>
<td>0.54mg</td>
</tr>
<tr>
<td>11</td>
<td>Carotene</td>
<td>0.001mg</td>
<td>0.271mg</td>
<td>0.0mg</td>
</tr>
<tr>
<td>12</td>
<td>Thiamine</td>
<td>0.03mg</td>
<td>0.33mg</td>
<td>0.04mg</td>
</tr>
<tr>
<td>13</td>
<td>Riboflavin</td>
<td>0.03mg</td>
<td>0.37mg</td>
<td>0.05mg</td>
</tr>
<tr>
<td>14</td>
<td>Niacin</td>
<td>0.35mg</td>
<td>1.10mg</td>
<td>0.780mg</td>
</tr>
<tr>
<td>15</td>
<td>Ascorbic acid</td>
<td>11.5mg</td>
<td>29.0mg</td>
<td>17.50mg</td>
</tr>
<tr>
<td>16</td>
<td>Nicotinic acid</td>
<td>0.4mg</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>17</td>
<td>Calories</td>
<td>471per kg</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>18</td>
<td>Sodium</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>19</td>
<td>Potassium</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Also, it has been observed that flavonoid content has been declined significantly through the cooking processes [14, 31-33]. The flavonoid content was observed to be decreased as fresh (maximum amount of flavonoids) > steamed > blanched > baked > microwaved > roasted (minimum amount of flavonoids). Furthermore, the roasting and steaming methods of food processing remarkably lowered the amounts of total phenols to one-half. The amount of total carotenoids, proteins, fibres and Vitamins have been reduced through these methods. Hence, the method of cooking is crucial for retaining the nutritional composition of Chayotes. Due to the significant levels of different essential nutrient ingredients, the Chayotes possess important medicinal properties.

Bioactive Potential: The different parts of Chayote have been utilized in the folk medicine. Its tuberous roots have been utilised as potent diuretic, a quick remedy for pulmonary ailments in Cuba [15]. An emulsion of seeds is made and used to relieve intestinal inflammation. The leaf decoctions are taken by Yucatan several times a day to lower blood pressure as well as to dissolve urinary stones [9]. Leaf and fruit decoction are also useful in prevention of urinary tract related problems such as relieving burning sensation during urination, urine retention, dissolve calcifications and also in the treatment of hypertension as well as arteriosclerosis [15].
Sechium edule fluid extract have also been reported to have antibacterial, antifungal, antimicrobial and antimutagenic properties [18, 19, 35]. The extracts have been found to possess antimicrobial activity against various microorganisms such as Escherichia coli, Enterobacter cloacae, Klebsiella pneumonia, Serratia marcescens, Proteus mirabilis, Morganella morganii, Pseudomonas aeruginosa, Acinetobacter baumannii, Stenotrophomonas maltophilia, Aspergillus spp. and Candida spp [19].

Burgeoning evidences have revealed the antioxidant and α-glucosidase inhibitor activities of Chayote [14, 34]. The ethyl acetate extracts of Chayote revealed maximum 1,1-diphenyl-2-picrylhydrazyl (DPPH) free radical scavenging activity that was further found to be positively correlated with the contents of total phenols [34]. The gallic acid have been found to be present which had the highest antioxidant potential [4]. Another report on the study on leaves, pulp and peel of Chayote also revealed the antioxidant as well as carbohydrate-hydrolysing enzyme inhibitory activity against α- amylase and α-glucosidase [14]. The antioxidant activities of the extracts of S. edule was studied through reducing power assay, β-carotene, linoleate model and 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical-scavenging assay [35]. The ethanolic extracts of leaves and water extracts of seed revealed potential inhibitory activity through β-carotene. Also, it has been found that the extracts also showed hydrogen donating activity in the presence of DPPH stable radical. Therefore, it may be emphasised that the Leaf and seed extracts may be utilized as potential biopreservatives in food industry and also for health supplements.

The Ames assay utilising Salmonella typhimurium TA98 and TA 100 strains revealed that the fluid extract of S. edule possess antimicrobial, antibacterial, antioxidant and antymycotic properties. The anti hypertensive potential has also been reported in different extracts of Jamaican Cho-Cho [15]. Neeraja et al., [36] reported that the ethanolic extract of Chayote fruits possess cardioprotective activity which was determined through the administration of isoproterenol for two days. The studies on animal models further revealed that the animals treated with Chayote’s ethanolic extracts had less degenerative changes when compared to the isoproterenol-treated animals, suggesting cardioprotective roles of Chayote extracts.

The ethanol extract of S. edule fruits revealed significant antiepileptic and anticonvulsant effects when studies were carried on the central nervous system (CNS) depressant model in rats [17]. Furthermore, ethanolic extract of fruits were administrated to diabetic wistar rats fed with on alloxan to induce diabetes. The studies on lipid profile revealed that extracts significantly prevented the body weight loss and decreased the blood glucose level in diabetic rats [37]. The Sechium edule Perla Negra cultivar have also been reported to possess antiproliferative activity against the HeLa P-388 and L-929 cancer cell lines [2]. Therefore, Therefore, the biological effect revealed by the various extracts of Chayote remarkably suggest its potential use as an effect biomedical agent in nutraceutical or pharmaceutical industries.

Although it has been well-documented that Chayote possess high nutritional value and immense bioactive potential, yet a little attention has been given toward the commercial cultivation or utilization of Chayote. Hence, futuristic research and active implications of its by-products or extracts in food and medical industry might be more eco-friendly approach.

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EXPLORATION AND DIVERSITY EVALUATION OF SOME IMPORTANT MEDICINAL PLANTS FROM NORTH-WESTERN HIMALAYAS

VIKAS SHARMA, PITAMBER DUTT SHARMA, GULAZAR-Ul-HASSAN, SALEEM WANI, JASWANT SINGH, VIJAY SINGH, RAGHBIR CHAND GUPTA

Abstract: Indian Himalayan Region (IHR) harbors a great extent of medicinal plants diversity. Many of these medicinal plants are endemic and native to Himalayan regions. The populations of these medicinal genetic resources are declining under the influence of climate change and anthropogenic activities. Therefore, it is necessary to explore the diversity of these plants to find suitable accessions for further mass cultivation for commercial purpose, genetic improvement and conservation. In the current study, five species of three important medicinal plant genera namely, Trillium, Polygonatum and Roscoea were surveyed and explored from various north-western Himalayan regions. Of the surveyed species, Trillium govanianum was analysed for its genetic diversity using different DNA markers while genetic diversity analysis in other species is underway. Comprehensive analysis starting from cytotypes analysis through genetic diversity to phytochemical screening is needed to take the best possible advantages of these medicinal genetic resources and to preserve them for future.

Keywords: Indian Himalayan Region, Medicinal plants, DNA markers, Phytochemicals, Genetic diversity.

Introduction: Medicinal plants are being used as therapeutic agents since ancient times and these genetic resources are still extensively utilized in present day herbal medicine systems. Plenty use of herbal medicines has increased the demand of medicinal plants by 11.1% (Subrat 2002). The Indian Himalayan region (IHR) harbours approximately 1748 plant species which have medicinal value (Samant, 1998). Many of himalayan plant species are effective against wide spectrum of ailments and are used in many ayurvedic, Sidha and Unani medical formulations. With the increase in consumption of medicinal plant products their high demand is obvious. However, to fulfil this demand, the unscientific over extraction and uprooting of natural populations of these medicinal plant resources is in practice which has resulted in increased anthropogenic pressure on these species. As natural reserves of many medicinal plant species are declining, efforts for their conservation and mass cultivation should be made. In present study five medicinal plant species namely, Trillium govanianum, Polygonatum verticillatum, P. cirrhifolium, Roscoea alpina and R. procera, representing three genera were surveyed and explored from different north-western himalayan regions. An account of each genera is given below.

Trillium govanianum commonly called “Nagchhatri” is an important Himalayan plant species found distributed from 2400- 4000 m asl (Kubota et al., 2006: Vidyarthi et al., 2013). It is an herb species from family Melanthiaceae and grows best in shady moist soils with plenty of dead organic matter. The plant consists of an unbranched of up to 15-25cm height which bears three leaves on a central point. From this point of leaf origin, arise a single flower with reddish brown color. The plant perennates through rhizomes which are also utilized in remedies for various ailments, in tonics and sex hormones (Uniyal and Dutta, 2012). The over exploitation and of this herb from north-western Himalayan region has resulted in declining of its populations (Vidyarthi et al., 2013). Further, its germplasm largely remained uncharacterized at molecular level. Therefore, genetic characterization is needed to identify elite accessions. We conducted the survey to assess its availability and developed the microsatellite markers in this species for genetic diversity analyses (Sharma et al. 2017). Further, cytological and phytochemical investigations are in progress.

Polygonatum spp. Polygonatum verticillatum L., commonly known as Meda and P. cirrhifolium (Mahameda) are the members of ayurvedic formulation “Ashtavarga”, and belongs to family Liliaceae. These are found distributed in patches throughout temperate Indian Himalayan regions in an altitudinal range of 2000 -3000 m asl. These are highly important medicinal plant due to presence of lysine, serine, aspartic acid, threonine, diosgenin, β-sitosterol, sucrose, glucose and other active ingredients. Therefore, these are used in different traditional systems of medicines as a diuretic, aphrodisiac, tonic, antituberculant, and antidiabetic (Pandey et al. 2007; Samant et al. 2007; Bisht et al. 2011). Moreover, these species are also beneficial in asthma, Phthisis, weakness and hypertension. They are effective as an
insecticidal and antimicrobial agent. Due to excessive exploitation and habitat loss, their distribution and frequency of occurrence has decreased remarkably in north-western Himalayas and hence placed in endangered category. In this situation, paramount importance should be given for characterization of their existing germplasm at molecular level and conservation of their diverse germplasm. Further, molecular characterization should be carried at genetic and phytochemical level so that we can identify elite germplasm stocks having high contents of important secondary metabolites and genetically diverse accessions.

Roscoea spp. The genus Roscoea includes 22 species worldwide. It belongs to family Zinziberaceae. The most of the members of this family are located in tropical regions of the world. However, few species are temperate and are found in high mountainous regions. Roscoea alpina Royle and Roscoea procera Wall. Syn. R. purpurea Smith are among the temperate regions species and grows in different regions of Himalayas at an altitudinal range of 1800–3500 m above mean sea level. Both these species are endemic, vulnerable and of high medicinal value. These are used in treatment of different ailments by folks. Roscoea procera commonly known as ‘Kakoli’ is one of the eight herbs used in ayurvedic formulation named “Ashtavarga”, and also used as an ingredient in ‘Chyavanprash’. The medicinal properties of these species are attributed to the presence important compounds such as Kaempferol, ferulic acid, syringic acid, vanillic acid, gallic acid, catechin, p-coumaric acid, lysisine, diosgenin, and β-sitosterol. Rhizomes of both these species are used in different traditional systems of medicine. They are used in seminal debility, diabetes, hypertension, fever, leucorrhoea, diarrhoea, dysentery, malaria, phthisis and inflammation. In addition, these are used to treat wounds and cuts of cattle. However, Due to endemic nature, excessive exploitation and habitat disturbance, the populations of these Roscoea species have decreased remarkably in north-western Himalayas, which is the matter of great concern. Therefore, both Roscoea species of Himalayan regions require immediate attention for their conservation and sustainability. Conservation of these plant resources having small population sizes can provide important resources for future. Further, characterization of these genetic resources at various levels (Chromosomal, DNA and metabolites) is highly required to identify diverse and elite types. However, characterization efforts in these species are scarce, which are required to conserve these important plant genetic resources.

Materials and Methods:

Study Area and Survey: Our study area included various regions of northwestern Himalaya of IHR representing states of Jammu & Kashmir, Himachal Pradesh and Uttarakhand. Specifically, Sangla valley and Chitkul in Kinnaur, Shikari Devi Sanctuary in Mandi, Kamru Nag region, Parasher and Tunga Dhar in Mandi, Chauhar valley in Mandi. Solang Valley in Kullu, Jalori pass in Kullu, Sharan in Shimla district of Himachal Pradesh were surveyed for the species under investigation. Similarly, Sonmarg, Gulmarg, Khilanmarg and Fatehpura were surveyed in Kashmir valley, and Uttarkashi District of Uttarakhand was surveyed for the occurrence and distribution of these species. All the surveys were done between June – September 2015 to 2017.

Molecular Analysis: Leaf and plant samples of T. govanianum and P. verticillatum were collected during surveys and properly packed in paper envelopes containing silica gel. These samples were brought to lab and DNA isolation was done. The selected DNA samples and pooled samples of both these species were screened for DNA polymorphism using Simple Sequence Repeat (SSR) markers and Inter-Simple Sequence Repeat (ISSR) markers. SSR markers in T. govanianum were developed by our group previously (Sharma et al. 2017). The preliminary genetic diversity estimates were drawn in T. govanianum while initial works related to genetic diversity in P. verticillatum are in progress. In P. verticillatum SSR markers were not available therefore SSR markers of other related species (Trillium and Asparagus) were checked for cross-transferability so that polymorphic markers from these cross-transferred markers can be used to estimate genetic diversity. In T. govanianum we extended our analysis of previous work with SSR in which factorial analysis and structure analysis were added. Factorial analysis was done using DARwin and structure analysis was done with the help of STRUCTURE software. The work related to cytological variations and phytochemical diversity of selected accessions is also underway. A general scheme of the methodology is given in Figure 1.
**Results:** During our surveys in various north-western Himalayan regions of Himachal Pradesh we found that *P. verticillatum* was most frequently met species among the species under investigations. *R. procera* and *R. alpina* were the next two species. These were followed by *P. cirrhifolium* and the least encountered species was *T. govanianum*. Similar trends were observed in Uttarakhand Himalayan regions while in Jammu and Kashmir, *T. govanianum* showed a better frequency than both the other states. Figure 2 shows the photographs of these species captured during surveys. We have collected around 40 samples of *T. govanianum* and 190 samples of *P. verticillatum* and *P. cirrhifolium* during our survey and sample collection tours.

Molecular investigations in *P. verticillatum* and *T. govanianum* are in progress. We checked cross-transferability 34 SSR markers (20 of Asparagus species and 14 of *T. govanianum*) in *P. verticillatum*, of these 25 (11 of Asparagus species and 14 of *T. govanianum*) markers showed good amplification which are being utilized for genetic diversity studies (Figure 3). Preliminary genetic diversity analysis using 14 SSR markers in *T. govanianum* showed low level of genetic diversity. The factorial and structure analysis showed groupings of twenty accessions into four clusters as shown in Figure 4.
Figure 2. Photograph of studied plant. These photographs were captured during surveys at different locations of northwestern Himalayan reagions of Himachal Pradesh. a. *Polygonatum* species Photograph captured at Sarahan region in Shimla. b. *Polygonatum* species captured at Jalori pass top, Kullu. C. Patch of *Polygonatum* captured at Shikari Devi Sanctuary, Mandi. d. *Polygonatum* captured at Shikari Devi Sanctuary top. e. *Polygonatum* plant with flowers captured at Shikari Devi Sanctuary. f. Plants of *Roscoea* spp. Captured at Shikari Devi Sanctuary. h. A single plant of *Roscoea*.

Figure 3. A representative picture preliminary genetic diversity analysis in *T. govanianum* and *P. verticillatum*. a. Genotyping of nineteen accessions of *T. govanianum* with UBC-810 ISSR marker. L=50 bp DNA ladder. b. Cross-transferability of sixteen SSR markers of *Asparagus* species in pooled samples of *P. verticillatum*. 
Figure 4. Genetic diversity analysis in *T. govanianum* using SSR markers. a. Factorial analysis. b. Structure analysis- bar plot showing four clusters of twenty *T. govanianum* accessions.

**Discussion:** Himalayan region harbours the valuable wealth of medicinal plants which is vanishing day by day due to various reasons such as climate change, over extraction of natural populations and no provision of cultivation of these wild important plants. The appropriate measures for the exploration, documentation, characterization, proper utilization and conservation of these plant species are required at wider level. The present study is a preliminary and basic step towards the accurate documentation of surveyed and studied species i.e. *P. verticillatatum, P. cirrhifolium, T. govanianum, R. alpine* and *R. procera*. During our surveys we found that *Polygonatum* species showed a great extent of morphological diversity which points towards occurrence of more than two species in north-western Himalayan region. However, this aspect requires further investigations at phenotypic and molecular level. There was no such high phenotypic diversity in *T. govanianum*. Structure analysis in *T. govanianum* showed four clusters which means the populations of this species have probably different genetic stocks but negligence towards their conservation can result in their loss in near future. Samples of *Roscoea* species are being collected and processed for molecular studies. In all these species, cytomorphic, morphological, molecular and phytochemical analysis is in progress which will give the estimates of their past, present and future dynamics in north-western Himalayan regions. Such initiatives are also required in other important medicinal plant species of this area. The work and strategies discussed herein will help in future to maintain diverse germplasm having better chemotypes and propagation of these germplasm lines through technologically advanced methods for its conservation and management.

**Conclusion:** Genetic diversity studies provide the important data for conservation and management of elite genotypes which can be taken on priority basis for cultivation and insitu and exsitu conservation programmes. Further, this data can be used to associate different traits in future studies. The phytochemical analysis will provide information on elite chemotypes which can be utilized in pharmaceutical industries. Thus, the strategies discussed herein are required to be implemented in different species of Himalayan medicinal plants on priority basis which will safeguard their existence and proper utilization.

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SPATIAL EXTENT AND INVASION POTENTIAL OF SAPIUM SEBIFERUM, AN INVASIVE TREE SPECIES IN HIMACHAL PRADESH, WESTERN HIMALAYA.

VIKRANT JARYAN, SANJAY KUMAR UNIYAL

Abstract: Biological invasion is the second biggest cause of biodiversity loss after habitat destruction. There is a long history of introducing new species into areas beyond their native range. Due to the course of time many species have escaped into wild areas and become invasive in the region. Invasive species, today, constitute a serious threat to biodiversity, second only to habitat fragmentation. The prominent invasive species like Lantana camara, Ageratum sp, Parthenium hysterophorus, Ageratina adenophora etc have threatened the native flora and reduced biodiversity, besides these there is a new invasive species Sapium sebiferum, a tree species had established in the foothills of Himachal Pradesh and threatened the biodiversity further. It is now distributed along the altitudinal gradient ranges from 700-1300 m asl and present in 7 district namely Chamba, Hamirpur, Kangra, Kullu, Mandi, Sirmaur and Solan of Himachal Pradesh. Total extent of Occurrence (EOO) (distribution) of the species worked out to be 4,611 km². Maximum distribution of S. sebiferum was observed around human settlements (55%), followed by mesic (25%) and forest area (20%). The predicted spatial extent of S. sebiferum in western Himalaya is between 30°14’43” to 32°50’40” N and 74°52’25” to 79°23’28” E covering an area of 1920 km². Silently with the prominent invasive species, new invasive species are emerging and threatened the biodiversity of the Himalaya. There is an urgent need for planning the policies regarding the management of the invasive species in the Himalaya.

Keyword: Invasion, Sapium sebiferum, Extent of Occurrence (EOO), Ecological Niche Modeling (ENM).

Introduction: Biological invasion is very popular term used in the research publication all around the world nowadays. Major project such as DAISIE, Global Invasive Species Programme (GISP), Mountain Invasion Research Network (MIREN) and Assessing Large scale Risks for biodiversity with tested Methods (ALARM) were started in western world to address the growing problems and adverse effect of invasive species on both natural and managed ecosystems. The objective was to understand the invasive species behavior and come with a solution to manage and control these species for ecosystem sustainability [1]. India is also working in the field of biological invasion but with a very slow pace however, recently the number of publication regarding invasion had increased [2]. Checklist of invasive species based on the region was published in the Indian region [3], [4], [5], [6], [7]. While the prominent invasive species like Lantana camara, Ageratum sp, Parthenium hysterophorus, Ageratina adenophora etc. had adverse effect on biodiversity and people of the region, few prominent invasive species like Sapium sebiferum has also started to show its impact on the region. S. sebiferum one of the worst invasive tree species in the history of USA [8], [9], Australia [10]. Recently it had established itself in the Himalayan subtract successfully [11] and studied thoroughly for its invasiveness in the region. It is the native of China and introduced in the India in 1858 by the Britisher’s at Saharanpur garden in Uttar Pradesh. Later a large plantation of the species was established in Dehradun [12]. It was also planted in many tea gardens between the elevations ranges 1200-1600 m. S. sebiferum is a medium sized tree and rarely attain height of 18 m. The species belong to the family Euphorbiaceae and alike other members produces milky sap and often confused with Shisham (Dalbergia Sissoo) hence called Pahari Sisham or Wilayati Shisham (Figure 1). Although tree was reported from Kangra valley, Kullu and Solan [13] but its correct distribution was unknown in Himachal Pradesh. Being an invasive tree species, extensive field survey were conducted in the Himachal Pradesh to know the Extent of Occurrence (EOO) in the state and on the bases of ground truthing with the help of hand held GPS (Global Position System). Later with the ecological niche modelling its area of suitability was also predicted in the western Himalaya.

Material and Method: Himachal Pradesh, lying between 28° to 33° N and 75° to 79° E, is one of the larger states of the Indian Himalayan region. It covers an area of ca 55,673 km² and is bounded by Jammu and Kashmir in the north, Punjab in south-west, Haryana in south, Uttarakhhand in south-east, and shares international boundary with China on the east. Administratively, the state has been divided into 12 districts, namely, Bilaspur, Chamba, Hamirpur, Kangra, Kinnaur, Kullu, Lahaul Spiti, Mandi, Shimla,
Sirmaur, Solan and Una (Figure 2).

On the bases of literature and previous survey of the distribution of *S. sebiferum*, we limited our survey up to 2000 m in the state. We divided the map of Himachal Pradesh into two zones: the zone above 2000 m and the zone below 2000 m. It was completed by downloading the (Shuttle Radar Topography Mission) from the USGS (United States Geological Survey) site (http://www.usgs.gov/) and then overlaying it on the map of HP in the Geographic Information System (GIS) environment using the overlay function [14]. The zone below 2000 m was gridded into 10 x 10 km² grids in Arc GIS 9.3 version. Total 265 grids were visited for 3 years and GPS coordinates (latitude, longitude and altitude) was recorded bearing *S. sebiferum* location were located using a hand held Garmin etrex vista Global Positioning System (GPS) (Figure 2). Other information such as terrain, vegetation characteristics, slope and aspect were also recorded. The GPS coordinates then overlaid in the map of HP using Arc GIS 9.3 version. Extent of occurrence (EOO) represents the area that lies between the farthest points from where the species has been reported. It was calculated by joining the farthest GPS locations and the area of the polygon was calculated.

For Ecological Niche Modelling (ENM), we use inputs from the known distribution of a species and then based on these inputs identifies areas that can support the species on the bases of climate [15]. Maxent version 3.3.3, downloaded from the portal (www.cs.princeton.edu), was [15]. The co-ordinates of all the 177 sites, where *S. sebiferum* was observed growing during the field surveys, were recorded.

Results and Discussion:

**Extent of Occurrence (EOO):** Total 177 GPS of *S. sebiferum* occurrence were recorded in Kangra (98 sites) followed by Mandi (46), Solan (17), Kullu (8), Sirmaur (3), Chamba (3) and Hamirpur (2). This pattern appears to follow a rainfall gradient with district Kangra receiving the highest rainfall [16]. Interestingly, *S. sebiferum* prefers moist areas for establishment and then spreads to other areas [17], [8]. The species was observed in all kind of slopes from 0-75° and almost in all aspect south-west (29%), west (21%), east (14%), south-east (13%), south (7%) and north-east (6%) in the altitudinal ranges from 569 to 1632 m [18]. Its distribution was 78% in altitudinal range 700-1300 m, 11% between 500-700 m as well as 1300-1700 m asl range (Figure 3). In terms of aspect, maximum distribution of the species was recorded on south-west and west slopes, which is corresponding to relatively high rainfall in these aspects in Himalaya during monsoon [19]. The distribution of *S. sebiferum* was found in between the geographical coordinates 30° 5’ 58” to 32° 12’ 17” N and 76° 10’ 36” to 77° 11’ 16” E in Himachal Pradesh (Figure 2). After plotting the 177 *S. sebiferum* geographical coordinates, the farthest geographical coordinates were joined to calculate the Extent of Occurrence (EOO) (Figure 2). The total Extent of Occurrence (EOO) was worked out to be 4.61 km² which is the 8.28% geographical area of the state of HP. Mapping and potential distribution analysis of an alien species are important criterion for the management and control of that species. Maximum distribution of *S. sebiferum* was observed around human settlements (55%), followed by mesic (25%) and forest area (20%). In total 245 plant species found associated with *S. sebiferum* in which 93 plant species were common to all three habitats, 83 species were common to human settlements and forest, while 64 species were common to human settlements and mesic area. Mesic area and forest area shared 62 species in common. In all these species, 78 plant species were exotic [18].

**Potential area of *S. sebiferum* by Ecological Niche Modeling (ENM):** Ecological Niche Modeling was carried out using Maxent and the output is shown in figure 4. The predicted area of invasion potential of *S. sebiferum* is 1920 km² over an altitudinal range of 349 to 2390 m in western Himalayan region which includes three Himalayan states namely, Jammu and Kashmir (J&K), Himachal Pradesh (HP) and Uttarakhand (UK) [20]. Almost 3% area of western Himalaya has the predicted to invade by *S. sebiferum*. HP has the maximum invasive potential of *S. sebiferum* (9794 km²), followed by J&K (1233 km²) and UK (892 km²) (figure 3). This could be attributed to the fact that few localities in HP have comparatively higher annual rainfall than J&K and UK, and the affinity of *S. sebiferum* to mesic conditions has already been documented [17]. Despite of big state J&K, most of its area is under cold desert [21], this could be reason behind less predicted area in J&K. Our model predicted occurrence of *S. sebiferum* in Jammu and Kathua in J&K and Dehradun in UK which proves that model have statistical as well as field accuracy. The natural population of *S. sebiferum* was already reported from Jammu and Kathua area [22], [24] and
15% area is considered as high probability while 2881 km$^2$ is moderately and 7237 km$^2$ is considered of low probability of *S. sebiferum* spread in western Himalaya (Figure 3). There is high chances of spread of *S. sebiferum* in Chamba, Hamirpur, Kangra, Kullu, Solan, Shimla, and Sirmaur districts in HP, while Dehradun and Uttarkashi districts in UK. Whereas, districts Bilaspur, Mandi and Una in HP, Rudraprayag, Tehri, Pauri, Chamoli in UK, and Kathua, Jammu, and Udhampur in J&K have moderate probability of spreading of *S. sebiferum*. In HP, the total predicted area is 11920 km$^2$ which is 21% and thrice the area that is present under *S. sebiferum* in HP.

*S. sebiferum* had successfully established itself in human settlements, mesic and around forest periphery in Himalayan region over an altitudinal range from 569 to 1632 m. The potential of its invasion over an altitude 349 to 2390 m is a real threat in future for the native plant species. Models run elsewhere have also shown vulnerability of western Himalaya to invasion by *S. sebiferum* [25]. In USA with changing climatic condition and increase in summer precipitation, a further spread of the species has been projected [26], [27], [28]. According to IPCC the average annual mean temperature of Himalaya will increase by 3° C by 2050 and 5° C by 2080 with an associated change in rainfall patterns [29]. *S. sebiferum* is a fast growing species, high ecological amplitude, short juvenile period, high fecundity, vegetative mode of reproduction and long distance dispersal have all character of successful invader. The need of hour is to develop methods for its management and control, before it becomes the severe invasive species in the Himalayan region.

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Figure 1: S. Sebiferum Tree with Its Leaves, Inflorescence, Fruits and Seeds
Figure 2: Extent of Occurrence (EOO) of *S. sebiferum* in Himachal Pradesh

Figure 3: Distribution Pattern of *S. Sebiferum* Along Altitudinal Gradient
Figure 4: Predicted Distribution of *S. Sebiferum* Along Altitudinal Gradient in Western Himalaya Developed by Maxent. Here HP = Himachal Pradesh, UK = Uttarakhand, J&K = Jammu and Kashmir

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MICROBIAL SURFACE ACTIVE GLYCOLIPIDS IN THE SERVICE OF BEAUTY

SHWETA SINGH, SANDHYA MALHOTRA, RAJESH KUMAR, MONICA JASSI, ANIL KUMAR SINGH

Abstract: Surfactants are imperative part of cosmetic preparations. Chemically synthesized/petrochemical derived surfactants have adverse effects on environment and humans, particularly severe in long term exposure. However, their natural counterparts, biosurfactants are highly desirable for their biodegradability, low toxicity, ecological acceptability and skin compatibility. Of all the known biosurfactants, microbial surface active glycolipids namely rhamnolipids, sophorolipids, mannosylerythritol lipids, cellobiose lipids and trehalolipids have shown features that make them suitable for cosmetic application. This paper highlights these features and cosmetic products that utilize them for serving beauty. It also discusses means of overcoming economic challenges being faced by biosurfactant industries and future facet of glycolipids in cosmetic industries.

Keywords: Biosurfactant, Cosmetics, Glycolipids, Microemulsion.

Introduction: Classical Quote “Beauty lies in eyes of beholder” is undisputedly accepted by human society as a fact but still, their yearning to become beautiful and adorable has driven cosmetics since the dawn of the civilization. The word “cosmetics” comes from the Greek word kosmetikos meaning “skilled in adornment.” In general, the term cosmetics refer to substances used to enhance the appearance or odour of human body. The US food and Drug Administration (FDA) defines cosmetics as “intended to be applied to the human body for cleansing, beautifying, promoting attractiveness, or altering the appearance without affecting the body's structure or functions.”[1]. Cosmetics includes wide variety of products which ranges from skin care creams, lotions, gels, facial makeup, deodorants, nail polish, coloured contact lenses to baby products and many more.

The progression of cosmetics has changed over time and civilizations. From the ancient times till today pursue for beauty is recorded in our literature, music and art. In the present society several women and men assign considerable amount of time and money to decide on, and use the right combination of cosmetic products. This propels huge and continuously growing cosmetics industries [1]. The gloomy part of cosmetic empire is that their user does not have definite knowledge of the ingredients present in the products and its effect on the body as well as on the environment. By and large conventional cosmetic products are made with synthetic and chemical ingredients, with petro-chemical derived ingredients playing pivotal role. Synthetic surfactants are one of the key chemical ingredients used in several cosmetics and personal care products [2], [3]. Surfactants properties like surface tension /interfacial tension reducing ability, wetting, emulsifying, solubilising, foaming or defoaming, modifying flow, conditioning the surface, lubrication, glossing and reducing static nature is utilized by cosmetic industries for formulating an efficient product [2].

This review focuses on the application of microbial surfactant in cosmetic industries with major emphasis on glycolipids type biosurfactants. It also encompasses various aspects of surface active glycolipids in relationship to cosmetics formulations which make them environment friendly natural compound for replacing synthetic surfactants. Future potential of glycolipids in cosmetic formulations is also discussed.

Toxicity Associated with Cosmetics: Chemical compounds like Phthlates, Sodium Lauryl Sulphate (SLS)/ Ammonium Lauryl Sulphate (ALS), Petrolatum, Parabens, Hydroquinone, Lead Acetate, Triclosan, Xylene, Toluene, p-Phenylenediamine (PPD), Propylene Glycol (PG), Diethanolamine (DEA), Triethanolamine (TEA), Monoethanolamine (MEA) which are part of general cosmetic compositions have been long argued for their safety factors [4]. Surfactants like SLS, ALS, and Cocamidopropyl betaine (amphoteric surfactant) that are commonly used in the cosmetic products (particularly cosmetic rinse off or cleaning products) is also subject of concern. SLS and ALS are known to cause severe skin irritation. SLS and ALS are easily absorbed into the body, building up in the brain, heart, lungs and liver, leading to
potential long term health problems [5]. Synthetic surfactants used in cosmetics are generally associated with toxic contaminants like Nitrosamines, 3-Dimethylaminopropylamine, 1, 4-Dioxane, Ethylene oxide which are undeniably detrimental even at low concentrations [6], [7]. Carcinogen 1, 4-dioxane has been reported in cosmetics finished products as well as in ethoxylated raw materials [8]. The 3-Dimethylaminopropylamine used in the synthesis of some surfactants (like Cocamidopropyl betaine) has been experimentally shown to be associated with skin allergy [9].

Glycolipids: Environment Friendly Surfactants for Cosmetics: Advent of green chemistry in early 1990s has made the greener and environment friendly cosmetic products quite desirable worldwide. Beauty products with the natural and eco-friendly tags have become foremost precedence for cosmetic lovers. Cosmetics companies, in bids to excel in the market, are increasingly using the results of basic research in the biological and chemical sciences to create more refined eco-friendly products that suite the users.

The term glycolipids refers to any compound containing one or more sugar moieties (aglycon part) bounded by glycosidic linkage to lipid moieties (aglycon part). Linkage of hydrophilic sugar moieties to hydrophobic lipid moieties makes these molecules amphiphilic. Depending upon the length, type and number of fatty acids attached to sugar moieties, properties of glycolipids particularly hydrophilic-lipophilic balance of a surfactant can vary and consequently, influencing its potential application in cosmetic industries. Interest of cosmetics industries in glycolipids based formulation has increased in recent past owing to their advantages associated with performance, health of consumers and environmental compatibility compared to conventional products [10]-[12]. Sugar-based surfactants like alkyl polyglycosides, fatty acid N-methyl glucamides, sorbitan ester and sucrose esters have been appreciated in various cosmetics formulation [11]. Production of these surfactants from renewable sources (like sucrose from sugar beet or sugar cane, glucose from starches, and sorbitol derived as the hydrogenated glucose derivative) also adds advantage to production process [11].

Apart from chemical synthesis routes, glycolipids surfactants can also be biologically synthesized. In living being they originate from complex pathways involving the transfer of sugar residues to sterols, ceramides and diacylglycerols by glycosyltransferases [11]. Generally glycolipids remain membranes bounded, however some microorganism may secretes the synthesized glycolipids in to external environments as biosurfactants.

Source of Surface Active Glycolipids: Biosurfactants or microbial surface active compounds are amphiphilic compounds of biological origin. They contain hydrophobic and hydrophilic moieties that confer the ability to accumulate between fluid phases, thus reducing surface and interfacial tension at the surface and interface respectively. The biosurfactant producing microorganisms are ubiquitous, and their presence has been reported from every imaginable environment worldwide, including soil, marine environments, wastewater, human lungs tissue and plant surfaces [13]. The microorganism can produce biosurfactant on water soluble substrates or hydrophobic substrates or on both [13]. Biosurfactant produced by the microorganism can be released extracellular into surrounding environment or may be localized on the surface. The biosurfactant are secondary metabolites produced during late log phase and stationary phase.

Biosurfactants finds application in diverse industrial fields (like agriculture, nanotechnology, bio-processing, biomedical, cosmetics, environmental, food and petroleum industries) owing to it diverse properties and environmental compatibility [13]. The microbial surfactants score much higher when compared to their synthetic counterpart as they are biodegradable, less toxic, have specific mode of action and can be produced from inexpensive substrates. Use of cheap substrates like agro- and industrial waste in biosurfactant production not only reduces the cost of production but also trim down saddle of waste disposal by industries [13].

Structurally the microbial surface active compounds are diverse, though all of them share one common property i.e. they have a hydrophobic and a hydrophilic moiety. Diversity present in the chemical composition of biosurfactants is primarily related to the microorganism, growth and process conditions
Depending on their chemical composition, classified biosurfactant into four groups namely glycolipids, phospholipids, lipoproteins/lipopeptides and polymeric biosurfactants [12].

Among all known groups of microbial surface active compounds, glycolipids are extensively investigated surfactants with beginning more than 60 year back. Surface lowering ability, emulsification, antimicrobial, anti-oxidants, moisturizing, wetting, foaming and skin compatibility are some properties that make surface active glycolipids very much desirable for cosmetic applications. Glycolipids type biosurfactants have been extensively analyzed in the cosmetic industry due to exceptional skin compatibility [12].

Glycolipids exhibits better emulsification ability, relatively to other known low molecular mass biosurfactants. Thus, demonstrate ability to serve cosmetic industries as emulsifying agents, as emulsions are the most common type of delivery system used in cosmetics. They enable a wide variety of ingredients to be quickly and conveniently delivered to hair and skin. The general criteria for choosing an emulsifier is known as the Hydrophilic-Lipophilic Balance (HLB) system which uses a scale of 0 to 20 based on their affinity for oil and water [2]. The HLB of a surfactant describes the extent to which it is hydrophilic and lipophilic. Emulsifiers with low HLB-values are more lipophilic, while higher HLB compounds are hydrophilic. In general, emulsifiers with HLB values of 3 – 8 forms water in oil emulsions, whereas those with values above 9 are readily water-soluble, thus forming oil in water emulsions [3].

Glycolipids type biosurfactant consist of long chain aliphatc acids or hyroxylaliphatic acids linked to carbohydrates by means of either ether or an ester group. Glycolipids are well represented by rhamnolipids, trehalolipids, sophorolipids, mannosylerythritol and cellobiose lipids [14]. Patent search in context to biosurfactants reveals that glycolipids mainly sophorolipids followed by rhamnolipids have contributed to cosmetic industry significantly [12, 14].

**Glycolipids Based Nano-Formulation in Cosmetics:** Many present day cosmetic products are exploiting benefits of nanomaterials or nanotechnology for enhancing the product performance [15]. Currently, several sunscreens contain titanium dioxide or zinc oxide nanoparticles, which can efficiently scatter ultraviolet ray is available in market [16]. With reports of biosurfactant mediated nanomaterials synthesis and stabilization it is believed that surface active glycolipids has potential to play important role in nanotechnology. It is being highlighted as environment friendly green chemistry procedure [17]. Surface active glycolipids like rhamnolipids and sophorolipids have been used to synthesize nano-material using oil-water-surfactant microemulsion technique [18]. Recently, glycolipids from *Brevibacterium casei* MSA19 has been shown to stabilize silver nano-particles [18]. Thus, it would not be an exaggeration to expect that in future surface active glycolipids can also contribute to cosmetic industry via nanotparticles synthesis route.

**Overcoming Economic Barrier:** Successful commercialization of any product depends largely on its cost of production. Like any other biotechnological product, biosurfactants too have high production cost thus, hampering their extensive commercialization and use in cosmetic applications. Some authors are of the view that in the cosmetic or pharmaceutical sectors, higher price dimensions are standard, and therefore, biosurfactants can easily compete. Cosmetic products with high price tag would have limited access and hence, restricted to higher class users. Success of any science is counted only when it can serve common mass directly or indirectly. Thus, reduction in the cost of biosurfactant production is needed in order to have their extensive cosmetic applications. Nowadays, it is realized that a broader strategic approach is needed to remove economic barrier undermining extensive application of biosurfactants. To make biosurfactants commercially viable, the use of cheaper substrates, optimizing production conditions coupled with novel and efficient multistep downstream processing methods and the use of hyper producing microbial strains (recombinant/mutant) has engrossed the attention of several investigators. Improvement in production technology of biosurfactant has already enabled 10-20 fold increase in productivity although further significant improvements are required [19].

**Conclusion:** Increase in the awareness about harmful effects of synthetic ingredients used in the cosmetics or personal care products, along with concern for Mother Nature has made environment friendly beauty products popular among users. As a consequence, biotechnology-derived ingredients are
becoming important part of cosmetics and personal care products. Microbial surface active glycolipids have shown properties that make them better substitute for synthetic surfactants. Supplementary bioactive properties like skin compatibility, antimicrobial activity, macrophage activator, reduction of subcutaneous fat, hardening wound healing, and many more add up to benefits of using them in cosmetic/personal care products. However, this has been appreciated mainly in laboratory scale studies. Commercially very few glycolipid containing cosmetic products (like Sapholine containing sophorolipids from Candida sp.) are available in market. Inappropriate marketing and advertisement of these products also contribute to their restrictive commercialization. Major obstacle preventing commercialization of cosmetics with surface active glycolipids is the cost of production. Recent advances in biosurfactant research have reduced cost but more work has to be done so as to make biosurfactant containing products affordable to common people. Biochemical basis of several Cosmeceuticals activities of glycolipids is poorly understood and thus, major research is needed in this line.

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STUDY ON HEALTH STATUS OF SLUM CHILDREN IN DELHI

KUMARI MANISHA, RUBY GROVER

Abstract: More than one-third of under five year olds living in the Indian capital's slums are malnourished, a survey conducted by a child rights group said on Thursday, adding that this showed government child health schemes were not reaching the poor. More than 50 percent of the malnourished children did not have access to clean drinking water and defecated in the open, leading to frequent bouts of water-borne diseases such as diarrhea, the survey found. Half of the children in the slums of the national capital are underweight, according to a study conducted by volunteers of CRY- Child Rights and You for children between the ages of 1 to 6 years. The children do not fare any better with respect to the other indicators of malnutrition, with 43 percent found to be wasted. The percentage of children found to be suffering from stunting stands at 45 percent, even though it has shown a marginal improvement from the NFHS figure of 51 percent in 2005-06. Nutrition and immunization are the most critical for a child's survival in the first six years of his or her life. A gender imbalance is seen here with only 25 percent of the girls receiving at least one dose, as compared to 39 percent of the boys.

Keywords: Malnutrition, Nutrition, Underweight, Slums, Population.

Introduction: The slums in India have been described as unsystematically developed and generally neglected. It is overcrowded, with coexistence of weak buildings, insufficient communications, and civic amenities. The existence of slums is an indication of poverty and the population dwelling in slums is termed as 'urban poor'. According to a 2001 census\(^1\) (India), the number of cities and towns, which accounted for the total slum population is 40 605 418, comprising 22.76% of the urban population. It is estimated that, on an average, the slum areas of a city that contain about 20% of its population will have about 50% of all its diseases.\(^2\) Slums are generally dirty and unclean, and have shortage of water supply, inadequate lighting and sanitation facilities. The United Nations has been more concerned with the slums of developing countries.\(^3\) The health hazards of the urban slum dwellers are directly related to poverty and a polluted and stressful environment. They are more prone to communicable diseases and malnutrition and at the same time exposed to greater risk of accidents at work.\(^4\)

In the last two decades, India’s population has increased by 2.25%, but the urban population has increased by 3.8%.\(^5\) An estimated 30% of the population in 12 major cities of India lives in slums and the proportion of slum dwellers and squatters have been continuously increasing. Therefore, the sanitary conditions and housing conditions of slum dwellers are deteriorating day-by-day. This calls for an urgent need for evolving a rational policy on urban resettlement.\(^6\) Since independence, Government of India accorded high priority to rural development and rural health system. Subsequently, health facilities have expanded in the rural areas. However, the urban areas have relatively remained unattended. Urban health care services, especially in slums, have not received adequate attention. The growing urbanization unfortunately resulted in the mushrooming of slums. No comprehensive survey has been carried out either at national or state level to review the problems of slum health.\(^7\) India has achieved a considerable reduction in the prevalence of morbidity and mortality rates and some of the communicable diseases have also been eradicated. The National Health Policy 2002 states, “The bulk of the increase is likely to take place through migration resulting in slums without any infrastructure support. Even the meager public health services, which are available, do not percolate to such unplanned habitations”.

Status of Slum Children:

New Delhi: Half of the children residing in slums in New Delhi are underweight, a study released by NGO Child Rights and You (CRY) showed on today. According to the survey on the status of health, nutrition and education of children below the age of six years in slums here, 25.6 per cent of the 50.2 per cent underweight children are severely underweight.\(^8\) Only 31 per cent of the children under the age of three in the capital received at least one vaccination, while 45 per cent were stunted, the survey called ‘Are Children Getting A Healthy Start’ said. It also highlighted the issue of gender imbalance as 25 per cent girls received at least one dose of vaccination compared to 39 per cent boys. The study was conducted in
The study highlighted that 62.2 per cent of the children in slums in Chennai were underweight, while Kolkata and Mumbai slums have 49 and 41 per cent underweight children respectively. In Bengaluru, 33 percent children were found to be underweight.

CRY’s regional director (north) Soha Moitra said: "Early childhood, spanning from birth to the age of six years, is the crucial period when the foundation of cognitive, physical and socio-emotional development, language and personality are laid."

On the northern fringes of Delhi, if you get off the last stop of the yellow metro line at Jahangirpuri, and ride for half an hour on one buttock in a packed auto with two dozen people, you will see what first appears to be a giant mountain. As your auto wobbles and people start to get off, you will notice birds hovering above it and get a whiff of its ripe stench. It’s not until you get closer that you realise you are staring at a mammoth landfill, 22 meters high, growing at 2,200 tonnes each day, which provides a backdrop for the entire Bhalswa resettlement area.

Malnourished Children Suffer Various Diseases: An emerging body of scientific research suggests that many among India’s 162 million malnourished children under the age of five are suffering less from a lack of food and more on account of poor sanitation. Research has shown a direct correlation between poor sanitation and the prevalence of stunting, a form of malnutrition which constrains a child’s natural height.

"These children’s bodies divert energy and nutrients away from growth and brain development to prioritise infection-fighting survival. When this happens during the first two years of life, children become stunted," Jean Humphrey, a professor of human nutrition at Johns Hopkins Bloomberg School of Public Health, told the New York Times last November. "What’s particularly disturbing is that the lost height and intelligence are permanent."

Prolonged exposure to unhygienic conditions causes the child’s intestinal gut wall to become inflamed and permeable, allowing microbes to enter, thereby reducing nutrient absorption and leading to a chronic failure of the immune system.

Finding The Cure: Bhalswa has five toilet complexes, or one complex per 4,000 people. It isn’t the only slum in Delhi where people defecate in the open. According to a survey done by the non-profit CRY in 2014, 52% of Delhi’s slum kids defecate in the open.

In South Delhi, near the Okhla landfill, in the slum area of Indira Kalyan Vihar, the non-profit Save the Children has built a large public toilet complex. On a drizzly March morning, when I visited the toilet complex, a few enthusiastic community members greeted me and showed me the sophisticated waste treatment system which treats waste water before reusing it as flush water in the toilets. A bio-digester treats solid wastes before releasing them in the sewer drains.

Save The Children Program: The toilets were sparkling clean, without a trace of any foul odour. But in the half hour I spent there, not a single person walked in to use them. People in the slum said the facility was clean and nice but they only use it to go for “number 2” and not to urinate. While the fees to use the facility looks reasonable – Rs 2 for using the toilet and bath and Rs 5 for washing clothes – quick maths shows a family of five members that depends on the facility could end up spending nearly Rs 1,000 rupees a month.

Provision of Water: In Bhalswa, the ugliest fights are not over toilets but water. The slum does not have piped drinking water. "In the summers, the ground water gets so polluted because of the landfill and children suffer skin rashes and their eyes itch. People get desperate," said Pushpa who founded the Bhalaswa Lok Shakti Manch to fight for the basic rights of the residents since they were first resettled.

It takes several rounds of complaints for the local municipal tankers to arrive. The residents go battling their way through the crowd with their plastic containers. The water is never enough and patience runs
dry. The residents recall one time when a man pulled out a knife ready to kill another over a pail of water.

**Poor Sanitation in Living Areas:** “Living conditions – which include poor sanitation, unclean drinking water and not having a basic minimum amount of living space per person – play a huge role in causing urban malnutrition,” said Rakesh of Pardarshita, a non-profit working in Naiy Seemapuri in East Delhi. A study they did last year showed 41% of 1,000 children living in two slum clusters were malnourished(14).

Shahida, 21, lives with her two children Wahid and Sarah in the darkness of a corner house that has no ventilation. Little Wahid is wailing when I walk in. He refuses to let his mother stand up, clinging to her sari. Shahida has brought him food from the neighbouring government-run anganwadi. The day’s menu is lemon rice. The grains appear dried, hardly suitable for a baby.

Wahid is two-and-a-half years old but weighs 5 kilos, just a kilo more than his 45-day-old baby sister Sarah. His mother complains that he has stopped putting on weight or growing taller for over a year. He still cannot stand without support, cannot walk or talk when a normal child his age would be storming through the house.

For a year and half, he was only fed milk. "Much of malnutrition occurs because mothers don’t transition their children from liquid to semi-solid to solid food at the correct stage," points out Dr Laxmikant Palo, a nutritionist with Save the Children.

"The compulsion to work makes mothers just give a bottle of milk in the hands of the children simply because that takes the least effort on their part," said Santosh, a dietician at Guru Gobind Singh Hospital. "On top of it, these bottles are never properly sterilised and the children catch severe stomach infections(15). Wahid’s condition could be attributed to poor sanitation, bad water, improper eating practices or a combination of all. Sarah is just 45 days old and still breastfeeding. But in some months her mother will have to leave her home and go look for work. "How can we make ends meet with one salary?” she asked. Sarah, like her brother, is a victim of the city life and everything it takes away from you. Each healthy child in Delhi’s slums is an untold miracle of the hundred odds it had to fight to turn out "normal".

Shahida better believe in miracles. The study forms a part of the Healthy Start initiative by CRY, which is focused on the importance of ensuring children in the age group of 0-6 receive essential care, nutrition and education.

Half of the children in the slums of the national capital are underweight, according to a study conducted by volunteers of CRY—Child Rights and You for children between the ages of 1 to 6 years. The children do not fare any better with respect to the other indicators of malnutrition, with 43 percent found to be wasted. The percentage of children found to be suffering from stunting stands at 45 percent, even though it has shown a marginal improvement from the NFHS figure of 51 percent in 2005-06(16).

**Survival by immunization:** Nutrition and immunization are the most critical for a child’s survival in the first six years of his or her life. Shockingly, even the immunization coverage in the slums in Delhi is much worse than expected. Less than one third of the children (about 31 percent), under the age of three years, have received at least one dose of recommended vaccination. A gender imbalance is seen here with only 25 percent of the girls receiving at least one dose, as compared to 39 percent of the boys.

**Key Findings in Delhi**

- 50% of children in slums are underweight.
- 45% children suffer from stunting.
- Only 47% children in Delhi slums are enrolled in Aanganwadis.
- 60% of parents were not informed by the Aanganwadi that their child is malnourished.
- More than 40% of the parents surveyed in Delhi said that the Aanganwadi worker does not do regular growth-monitoring.
- Half the children do not receive Iron/Folic Acid (IFA) and Vit A doses.
- One third of the children are not de-wormed.
These children dwelling in the most underprivileged sections of the city, most of them belonging to migrant families bear the maximum impact of urban poverty; especially in the absence of caregivers, who are mostly engaged in informal economic roles.

This household survey on early childhood was conducted in slums across five major metropolitans in India namely Delhi, Mumbai, Chennai, Bangalore and Kolkata. The slums in the five metros do not show a positive trend with respect to child nutrition. Chennai has the most number of children battling malnutrition in its slums, with 62.2 percent being underweight; Kolkata and Mumbai slums have 49 and 41 percent underweight children, accordingly to this study. Bangalore fares slightly better, with 33 percent children found to be underweight. About 43 percent children across all the metros were not fully vaccinated (17).

Even as Aanganwadi Centres (AWCs) remain one of the most important institutions for ensuring nutrition, health and early education of children below 6 years, only 46 percent children dwelling in slums are enrolled. In the national capital, the enrollment in AWCs in slum children stood at a despondent figure of 47 percent. The ICDS scheme also provides for health services including de-worming, IFA (Iron and Folic Acid tablets) and Vitamin A dosage. More than a third of the children in the 5 cities surveyed had not been de-wormed. In Delhi, half the children did not receive the Vitamin A and IFA supplement and about a third had not been de-wormed.

The study points out that the service provision to children is more effective in Aanganwadis than in other institutions. This is reflected in the fact that children going to private pre schools and other institutions are not receiving essential services for their health and survival. For instance, 73 percent children enrolled in Aanganwadis receive the Vitamin A dose compared to only 52 percent in private preschools. However, while the Aanganwadi worker is providing the services within the institution, provisioning services through community outreach remains a challenge. An indicator that substantiates the gap between the service and the community is the fact that though growth monitoring was done for 70 percent of children only 48 percent of parents were informed. In Delhi, for instance, 60 percent of parents were not informed that their child is malnourished.

Soha Moitra, the Regional Director, North for CRY said, “Early childhood, spanning from birth to the age of six years, is the crucial period when the foundations of cognitive, physical and socio-emotional development, language and personality are laid. It is also the phase of maximum vulnerability as deprivation can seriously impact a child’s health and learning potential. Therefore we need to ensure that children in this age group get the best of nutrition, health and learning.”

She added, “CRY strongly recommends that health, nutrition and care to children should be provided as entitlements. Nutrition security of these children should be addressed with urgency. Alternate care arrangements like crèches for all children are a non negotiable in light of informal economy in urban slums where both parents are compelled to work for sustenance.”

**Conclusion:** The study forms a part of “Healthy Start” initiative by CRY, which is focused on the importance of ensuring children in the age group of 0-6 receive essential care, nutrition and education. Within the ambit of Healthy Start, CRY has launched ‘Get Healthy Give Healthy’ campaign which is about encouraging people to raise funds for a healthy start for young children, while working towards a personal health goal.

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TO STUDY THE EFFECT OF TEMPERATURE AND PH ON GROWTH OF THE Marssonina rosae

REETIKA, DR.SHALU RANI, DR.SHILPA KAUSHAL, DR.VIJAY SINGH

Abstract: Rose (Rosa sp.) belongs to family Rosaceae. Black spot, Diplocarpon rosae, is a fungal disease specific to roses. It is caused by a common fungus that thrives in wet, warm, and humid conditions. It is dominant and occurs worldwide and is the most severe disease of rose in almost all species and cultivars of Rose. In the present research, cultural studies of Marssonina rosae (asexual stage) were carried under in vitro conditions in order to find out the best optimum temperature and pH for the vegetative growth and sporulation of the test fungus. Among various temperature regimes the maximum radial growth (88.00 mm) was observed at temperature 25º C with sporulation count of 54.23 x spores/ml. Different pH ranging from 5.0 – 8.0 were tried to see their effect on vegetative growth of Marssonina rosae. The average mycelial weight (293.00 mg) with sporulation of 54.11 spores/ml was recorded highest at pH 6.5 and followed by 7.0. The minimum mycelial weight (83.25mg) however was recorded at pH 8.0 with least sporulation count of 8.86 x 104 spores/ml.

Keywords: Rose, Black spot, PH, Temperature.

Introduction: Rose (Rosa spp.) belongs to family Rosaceae and its genus Rosa, contains 200 species and more than 18,000 cultivars, most of which are woody perennial shrubs with a basic chromosome no. of seven and ploidy levels ranging from 2x to 8x (Wissmen, 2006). Rose cultivars are commercially important. Every year 8 billion flowering stems, 80 million potted plants and 220 million garden rose plants are sold world-wide (Roberts et al., 2003). Various fungal diseases often are found associated with the rose at all stages of its growth including black spot (Debener and Byrne, 2014). Black spot disease is dominant and occurs worldwide and is the most severe disease of rose in almost all species and cultivars of Rosa in the outdoor (Horst, 1995). It is incited by Diplocarpon rosae (anamorph Marssoninirorae), an ascomycete fungus (Horst and Cloyd, 2007). Though, it is a minor problem in greenhouse roses because humidity is regulated very carefully but is the most important disease of out door roses. The rose plant is used in gardens and landscaping for its aesthetic value, but the black spot infections make the roses unsightly due to the black spots on the leaves, yellowing and premature defoliation. Black spot disease manifests itself as circular black spots on plant foliage with an irregular margin on the upper surface of the leaf, which greatly reduce the beauty and performance of roses in the landscape. Black spot is easily distinguished from other diseases by the darker color and fringed borders of the spots that can occur on either side of the leaf. Spots often are surrounded by a yellow halo, and infected leaves fall prematurely. This disease may cause severe defoliation. As the lesions get increase in size, the leaves begin to yellow and abscise, compromising the health and appearance of the plant (Dobbs, 1984). The pathogen causes defoliation and reduced flower production and often results in weakening of the plants (Drewes-Alvarez, 2003). The premature defoliation leads to reduced vigour (Smith et al., 1988) and even death in very susceptible varieties (Black et al., 1994). Disease damage cannot be assessed only in terms of size of lesion but always includes the defoliation aspect. The intensity and severity of black spot is quite high and reported to be 56, 42.14 and 56.00 per cent in different parts of the world (Wolf, 1912). However, during dry and cool months, plants remained infected throughout the year approximately by giving 30 per cent disease severity (Srivastava 1961). The severity (S) and intensity (I) of Marssonina rosae in Tamil Nadu, Delhi, Solan (H.P.) and West Bengal were reported to be within a range of 14.1 to 30.0 per cent. Once established on plants, black spot is difficult to control despite a combination of practices that include sanitation measures and fungicide applications (Behe et al., 1993). Good cultural practices such as removing of disease leaves from the ground and pruning of canes with infected leaves to reduce the overwintering potential of the pathogen, avoiding of dense planting to allow good air circulation through the leaf canopy and avoidance of overhead irrigation since it favours infection are some of the primary measures to be taken carefully in managing the disease (Horst, 1983). However avoiding excessive watering during cloudy and humid weather is useful method to prevent the rose leaves wet for long hours, as this provides the water needed for the conidia to germinate. The conidia of the black spot pathogen germinate to form germ tubes on the host surface but further development of the fungus takes place below
the host cuticle and even within the host cells. The control of this type of pathogen requires the use of contact as well as systemic fungicides (Gauchomo, 2005).

Materials and Methods: The present research was conducted in Rose growing areas of two districts Solan and Sirmour of Himachal Pradesh were surveyed to record the black spot severity in rose during the year 2015-16. The areas surveyed include Nauni, Kandaghat, Mahog, Moganand, Sargaon, Matnali. At each location, thirty leaves selected from 4-5 plants were assessed randomly to record the disease severity on the basis of 0-6 scale as adopted by Colbaugh et al. (2001) with slight modifications. To observe the effect on mycelial growth and conidial production of the fungus *Marssonina rosae* different range of temperature (10, 15, 20, 25, 30, 35°C) each with four replications used. The observations on mean radial growth and sporulation of the fungus were recorded. In order to study the effect of different pH levels on mycelial growth and sporulation of the fungus *M. rosae*, six pH levels viz., 5.0, 5.5, 6.5, 7.0, 7.5 and 8.0 were used. Each level was adjusted with the help of 0.1 N NaOH or 0.1 N HCl. Adjusted medium at different pH levels was sterilized in autoclave at 15 lb p.s.i. at 121°C for 20 minutes. All the treatments were replicated four times.

Results and Discussion: Effect of Temperature: To determine the optimum temperature required for the vegetative growth and sporulation of the test fungus six different temperature regimes ranging from 10 to 35°C with 5°C of difference were studied. The data recorded in each case is presented in Table 1.

<table>
<thead>
<tr>
<th>Temperature (°C)</th>
<th>Mean radial growth (mm)</th>
<th>Spores (conidia /ml) x 10⁴</th>
<th>Degree of sporulation*</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>11.40</td>
<td>9.62</td>
<td>Poor</td>
</tr>
<tr>
<td>15</td>
<td>19.89</td>
<td>13.14</td>
<td>Poor</td>
</tr>
<tr>
<td>20</td>
<td>80.12</td>
<td>40.33</td>
<td>Good</td>
</tr>
<tr>
<td>25</td>
<td>88.00</td>
<td>54.23</td>
<td>Excellent</td>
</tr>
<tr>
<td>30</td>
<td>26.45</td>
<td>11.55</td>
<td>Poor</td>
</tr>
<tr>
<td>35</td>
<td>0.00</td>
<td>0</td>
<td>Absent</td>
</tr>
<tr>
<td>CD(0.05)</td>
<td></td>
<td>1.98</td>
<td></td>
</tr>
</tbody>
</table>

* Degree of sporulation

Absent = 0, poor = 1-20, good = 20-50, excellent = > 50

The data revealed that the fungus was capable of growing on a wide range of temperature ranging from 10 to 35°C. Although the maximum radial growth was observed at 25°C (88.00 mm) followed by 20°C (80.12mm) while at 30°C it was recorded to be (26.45mm). Minimum radial growth was observed at 10°C (11.40 mm), however no radial growth recorded at 35°C indicated thereby that higher temperature is not suitable for the growth of the fungus. The fungus optimized its growth between 20 - 25°C temperature with good to excellent degree of sporulation.

A poor sporulation was observed at three temperatures i.e. 15°C, 30°C and 10°C and a high temperature of 35°C did not yield any spore formation. Gauchomo (2005) also concluded that development of disease symptoms was much slower at 15°C than at 20°C and 25°C, and no disease symptoms developed at 10°C. This indicates that *M. rosae* was able to germinate and penetrate the host cuticle at 15°C, but it developed very slowly compared to the development at 20°C and 25°C. Same results were also recorded by Zhao et al. (2010). According to them optimum mycelial growth and conidial production occurred at 25°C. At 30°C, no mycelial growth occurred, but conidial production was observed. Horst (1983) had also reported that the pathogen tolerates a wide range of temperatures from 15-27°C. The pathogen then remains in the host until the temperatures are favourable for mycelia development. The optimum temperature for conidium germination is 18°C and it is lower than the optimal temperatures for mycelia and disease development, which are 21°C and 24°C, respectively.
Effect of Hydrogen Ion Concentration (pH): The data on dry mycelial weight and sporulation of fungus recorded at different pH levels are presented in the Table 2.

Table 2: Effect of Different pH levels on the Vegetative Growth and Sporulation of M. rosae

<table>
<thead>
<tr>
<th>Hydrogen ion concentration (pH)</th>
<th>Dry mycelial weight (mg)</th>
<th>Sporulation Spores x 10^4 (conidia/ml)</th>
<th>Degree of sporulation*</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.0</td>
<td>215.75</td>
<td>30.46</td>
<td>Poor</td>
</tr>
<tr>
<td>5.5</td>
<td>236.00</td>
<td>44.65</td>
<td>Good</td>
</tr>
<tr>
<td>6.5</td>
<td>239.00</td>
<td>56.34</td>
<td>Excellent</td>
</tr>
<tr>
<td>7.0</td>
<td>247.25</td>
<td>54.11</td>
<td>Excellent</td>
</tr>
<tr>
<td>7.5</td>
<td>146.25</td>
<td>14.76</td>
<td>Poor</td>
</tr>
<tr>
<td>8.0</td>
<td>83.25</td>
<td>8.86</td>
<td>Poor</td>
</tr>
<tr>
<td>CD(0.05)</td>
<td>4.27</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Degree of sporulation
  Absent = 0, poor = 1-20, good = 20-50, excellent = > 50

The perusal of data depicted that with the increase in the pH levels from 5.0 to 7.0, mycelial weight of the fungus also increased, thereafter maximum reduction in mycelia weight was recorded gradually. However, dry mycelial weight of the fungus was recorded maximum at 6.5 pH (293.00 mg). It was followed by pH 7.0 (247.25 mg), pH 5.5 (236.00 mg), pH 5.0 (215.75 mg), pH 7.5 (146.25 mg) and pH 8.0 (83.25 mg) in order of decrease in mycelial weight which were statistically different from each other.

Degree of sporulation was also observed excellent at two pH levels 6.5 and 7.0. However at pH 5.5 sporulation was good, but at pH 5.0, 7.5, and 8.0 sporulation was rated poor. Mycelial growth and conidial production responded similarly to changes in pH. In general, a neutral to weak acidic environment was suitable for mycelia growth, with optimum pH 5–7. The similar pH levels 5–8 were reported favorable for conidal production as by Zhao et al. (2010).

Appendix:

ANOVA 3: Effect of temperature regimes on vegetative growth of Marssonina rosae (Table 1)

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Sum of Squares</th>
<th>F-Calculated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>5</td>
<td>27,546.769</td>
<td>5,509.354</td>
<td>3,149.900</td>
</tr>
<tr>
<td>Error</td>
<td>18</td>
<td>31.483</td>
<td>1.749</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>23</td>
<td>27,578.252</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ANOVA 4: Effect of different pH levels on vegetative growth of Marssonina rosae ( Table 2)

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Sum of Squares</th>
<th>F-Calculated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>5</td>
<td>115,472.833</td>
<td>23,094.567</td>
<td>2,827.906</td>
</tr>
<tr>
<td>Error</td>
<td>18</td>
<td>147.000</td>
<td>8.167</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>23</td>
<td>115,619.833</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Acknowledgment: We gratefully thank the Sant Baba Bhag Singh University, Jalandhar for financial support.
References:


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IMPACT OF DIFFERENT INTERCROPPING SYSTEMS ON GROWTH PARAMETERS AND YIELD OF MAIZE UNDER ORGANIC CONDITIONS IN AN ACID ALFISOL.

DR. SHILPA KAUSHAL, DR. RAMESHWAR KUMAR, DR.VIJAY SINGH, DR. SHALU RANI

Abstract: A field experiment was conducted during Kharif 2011 at Holta Organic Farm, Department of Organic Agriculture, CSK HPKV, Palampur to study the performance of maize based intercropping system under organic conditions. The crop was fertilized with 10 t ha⁻¹ vermicompost and 2.5 t ha⁻¹ enriched compost. There were total nine treatments comprising of maize alone and all possible combinations of maize along with different intercrops i.e. soybean, cowpea, asparagus bean and rice bean in additive and paired series. The experiment was laid out in randomized block design, replicated three times. Growth, grain and stover yields of maize were more in case of sole stand which was statistically at par with maize + asparagus bean in paired series which in turn was followed by maize + soybean in paired series. Intercropping systems resulted in significantly higher grain maize equivalent yield as compared to sole stand under organic conditions.

Keywords: Balanced Fertilization, State Level Recommendations.

Introduction: Agriculturists have been focusing their attention upon the efficient and judicious utilization of available resources to increase the total productivity and profitability per unit area and to meet out the food and other demands of ever increasing population. Intercropping enables efficient utilization of space available for raising of crops and practically no portion of the field is left bare as the crops have varying root depth and they utilize the plant nutrients judiciously from different layers of soil. Cereal-legume intercropping plays an important role in subsistence food production in both developed and developing countries, especially in situations of limited water resources (Tsubo et al. 2005). Yields of intercropping are often higher than in sole cropping systems (Lithourgidis et al. 2006). In addition to consequent effects of intercropping, organic matter decomposition affects soil physical, chemical and biological properties, which are the key attributes of soil quality (Cannell and Hawes 1994). Therefore, maintenance of soil productivity requires an agriculture management system that improves soil organic matter content (Derpsch and Moriya 1998). Organic farming is certainly an answer to make safe food, clean eco-system and environment and to bring stability and sustainability of agriculture (Raj and Bhardwaj 1995, Shreck et al. 2006 and Thind 2009). The farmers in hilly regions have the opportunity to enter organic agriculture by default due to climatic conditions, topography, rainfall etc. According to Ghosh (2003), the rain-fed, tribal, North-east and hilly regions of the country where negligible chemicals put in use are practicing subsistent agriculture for a long period.

Material and Methods: A field experiment was conducted during Kharif 2011 at Holta Organic Farm, Department of Organic Agriculture, CSK HPKV, Palampur to study the performance of maize based intercropping system under organic conditions. The crop was fertilized with 10 t ha⁻¹ vermicompost and 2.5 t ha⁻¹ enriched compost. There were total nine treatments {T₁ : Maize alone, T₂ : Maize + Soybean, T₃ : Maize + Cowpea, , T₄ : Maize + Asparagus bean, , T₅ : Maize + Rice bean, T₆ : Maize + Soybean, T₇ : Maize + Cowpea, , T₈ : Maize + Asparagus bean, , T₉ : Maize + Rice bean ( From T₃ To T₅ is Additive series and from T₆ To T₉ is paired series)} comprising of maize alone and all possible combinations of maize along with different intercrops i.e. soybean, cowpea, asparagus bean and rice bean in additive and paired series. The experiment was laid out in randomized block design, replicated three times. The data collected with the standard methods.

Results and Discussions: Plant Height: A progressive increase in plant height of maize from knee high to maturity stage in all the treatments and this attribute was significantly influenced by different treatments at all the three stages of observation. At knee high stage, sole maize produced taller plants which were statistically at par with maize in maize + asparagus bean in paired series, whereas plant height of maize in maize + asparagus
bean, maize + soybean and maize + cowpea in paired series were also statistically at par with each other. Significantly shortest plants of maize were observed in maize + cowpea in additive series. At tasseling stage, plant height of maize was statistically at par in maize sole, maize + asparagus bean in paired series and maize + soybean in paired series whereas, shortest plants of maize were observed under maize + cowpea in additive series. On the other hand at harvesting stage, the tallest plants of maize were observed in sole stand of maize which were significantly superior to other treatments followed by maize + asparagus bean and maize + soybean in paired series. Significantly, the shortest plants of maize were

**Table 1:** Effect of Treatments on Plant Height (cm) of Grain Maize at Different Stages of Growth

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Knee high</th>
<th>Tasseling</th>
<th>Maturity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize sole</td>
<td>59.5</td>
<td>186.3</td>
<td>221.3</td>
</tr>
<tr>
<td>Maize+Soybean (additive)</td>
<td>48.6</td>
<td>169.7</td>
<td>197.0</td>
</tr>
<tr>
<td>Maize+Cowpea (additive)</td>
<td>42.6</td>
<td>129.0</td>
<td>164.4</td>
</tr>
<tr>
<td>Maize+Asparagus bean (additive)</td>
<td>49.4</td>
<td>171.7</td>
<td>200.2</td>
</tr>
<tr>
<td>Maize+Ricebean (additive)</td>
<td>43.1</td>
<td>162.6</td>
<td>191.9</td>
</tr>
<tr>
<td>Maize+Soybean (paired)</td>
<td>55.8</td>
<td>178.8</td>
<td>205.2</td>
</tr>
<tr>
<td>Maize+Cowpea (paired)</td>
<td>54.6</td>
<td>172.7</td>
<td>204.7</td>
</tr>
<tr>
<td>Maize+Asparagus bean (paired)</td>
<td>57.7</td>
<td>184.9</td>
<td>206.1</td>
</tr>
<tr>
<td>Maize+Ricebean (paired)</td>
<td>45.1</td>
<td>168.5</td>
<td>196.9</td>
</tr>
<tr>
<td>CD (P=0.05)</td>
<td>3.62</td>
<td>12.02</td>
<td>9.29</td>
</tr>
</tbody>
</table>

observed in maize + cowpea in additive series. In all the treatments sole crop stand had the tallest plants at different stages of growth. This may be due to the fact that in sole stand there was no competition from any other crop for different resources like light, water, space and nutrients which might have favored the growth of crop. Heizel (1974) also reported similar findings. Among other intercropping system maize + asparagus bean and maize + soybean in paired series followed sole stand of maize in production of the tallest plants due to relatively less interspecific competition as compared to rest of the treatments.

**Fig. 1:** Effect of Treatments on Plant Height (cm) of Grain Maize at Different Stages of Growth Dry Matter Accumulation

The dry matter accumulation in maize at various growth stages was significantly affected by different treatments.

**Table 2:** Effect of Treatments on Dry Matter Accumulation and Leaf Area Index (LAI) of Maize at Different Stages
<table>
<thead>
<tr>
<th>Treatments</th>
<th>Dry matter accumulation (g/m²)</th>
<th>LAI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Knee high</td>
<td>Tasseling</td>
</tr>
<tr>
<td>Maize sole</td>
<td>96.24</td>
<td>229.75</td>
</tr>
<tr>
<td>Maize+Soybean (additive)</td>
<td>50.63</td>
<td>151.99</td>
</tr>
<tr>
<td>Maize+Cowpea (additive)</td>
<td>40.08</td>
<td>86.17</td>
</tr>
<tr>
<td>Maize+Asparagus bean (additive)</td>
<td>50.69</td>
<td>152.61</td>
</tr>
<tr>
<td>Maize + Ricebean (additive)</td>
<td>43.67</td>
<td>97.40</td>
</tr>
<tr>
<td>Maize+Soybean (paired)</td>
<td>88.96</td>
<td>166.33</td>
</tr>
<tr>
<td>Maize+Cowpea (paired)</td>
<td>54.82</td>
<td>159.54</td>
</tr>
<tr>
<td>Maize+Asparagus bean (paired)</td>
<td>93.07</td>
<td>195.29</td>
</tr>
<tr>
<td>Maize+Ricebean (paired)</td>
<td>50.46</td>
<td>151.23</td>
</tr>
<tr>
<td>CD (P=0.05)</td>
<td>3.95</td>
<td>8.26</td>
</tr>
</tbody>
</table>

At all the growth stages, dry matter accumulation in maize was significantly higher in maize alone however, at knee high stage, maize alone and maize + asparagus bean in paired series were statistically at par with each other and were significantly superior over other treatments. Similarly, at tasseling and maturity stage, maize alone was significantly superior over other treatments followed by maize + asparagus bean in paired series.

![Graph of dry matter accumulation and LAI](image)

**Fig. 2:** Effect of Treatments on Dry Matter Accumulation (g/m²) and Leaf Area Index (LAI) of Maize

The shortest plants of maize were observed in maize + cowpea in additive series followed by maize + ricebean in additive series at all the growth stages. This may be because of the larger photosynthetic area.
in terms of taller plants of maize which might have intercepted more solar radiation and have resulted in increased photosynthesis rate which was reflected in significant increase in dry matter accumulation of maize at all the growth stages. James and Obura (1983) and Jha et al. (2000) also reported that sole stand produced more dry matter than intercropped treatments.

**Leaf Area Index:** LAI was significantly affected by different treatments. Maximum leaf area index was recorded with the growing of maize alone, and was significantly superior over other treatments followed by maize + asparagus bean and maize + soybean in paired series whereas, minimum leaf area index was recorded with maize + cowpea in additive series. This reduction in leaf area index when intercropped with different intercrops was probably due to increase in the population of the companion legume and competition between the maize and the legume for environmental resources such as light. James and Obura (1983) also conducted an intercropping study with different crops i.e. cowpea and soybean and reported more leaf area index in sole crop of maize as compared to intercropping with other crops. Similar results were also reported by Jha et al. (2000).

**Developmental Studies:**

**Days Taken to 50 Per Cent Tasseling:** The treatments significantly affected the number of days taken to 50 per cent tasseling. The days taken for the attainment of 50 per cent tasseling were significantly less in sole maize as compared to the crop grown in intercropping followed by maize + asparagus bean in paired series. Among different intercropping treatments, 50 per cent tasseling in maize was significantly delayed in maize + cowpea in additive series which was statistically at par with maize + ricebean in additive series.

**Table 3:** Effect of Treatments on Number of Days Taken to 50 Per Cent Tasseling and Maturity Stages of Maize

<table>
<thead>
<tr>
<th>Treatments</th>
<th>50 per cent tasseling</th>
<th>Maturity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize sole</td>
<td>56.2</td>
<td>102.3</td>
</tr>
<tr>
<td>Maize+Soybean (additive)</td>
<td>62.3</td>
<td>108.6</td>
</tr>
<tr>
<td>Maize+Cowpea (additive)</td>
<td>68.6</td>
<td>110.5</td>
</tr>
<tr>
<td>Maize+Asparagus bean (additive)</td>
<td>61.6</td>
<td>108.3</td>
</tr>
<tr>
<td>Maize+Ricebean (additive)</td>
<td>67.3</td>
<td>110.6</td>
</tr>
<tr>
<td>Maize+Soybean (paired)</td>
<td>60.2</td>
<td>107.4</td>
</tr>
<tr>
<td>Maize+Cowpea (paired)</td>
<td>60.4</td>
<td>107.0</td>
</tr>
<tr>
<td>Maize+Asparagus bean (paired)</td>
<td>59.5</td>
<td>105.6</td>
</tr>
<tr>
<td>Maize+Ricebean (paired)</td>
<td>64.8</td>
<td>109.4</td>
</tr>
<tr>
<td>CD (P=0.05)</td>
<td>2.52</td>
<td>NS</td>
</tr>
</tbody>
</table>

The other treatments were statistically alike in attaining 50 per cent tasseling in maize.

**Yield:**

**Grain Yield:** An examination of data indicates that highest grain yield (25.7q/ha) was obtained in sole crop of maize which was statistically at par with maize + asparagus bean in paired series, whereas maize + soybean in paired series and maize + cowpea in paired series were statistically at par with maize + asparagus bean in paired series. Maize + asparagus bean in additive series, maize + soybean in additive series, maize + ricebean in paired series were statistically at par with maize + cowpea and maize + soybean in paired series. Significantly lowest maize yield was recorded in maize + cowpea in additive series. The yield of sole maize crop was 51.36 per cent more than that of the lowest yield treatment i.e. maize + cowpea in additive series.

**Stover Yield:** The significantly higher stover yield (58.6 q/ha) was produced when maize crop was grown alone and this treatment was significantly superior over other treatments which was followed by maize + asparagus bean in paired series whereas, the lowest stover yield (39.7 q/ha) was recorded in maize + cowpea in additive series which was 47.6 per cent lower than growing of maize crop alone.
Table 4: Effect of Treatments on Grain and Stover Yield and Harvest Index of Maize

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Grain yield (q/ha)</th>
<th>Stover yield (q/ha)</th>
<th>Harvest index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize sole</td>
<td>25.7</td>
<td>58.6</td>
<td>0.31</td>
</tr>
<tr>
<td>Maize+Soybean (additive)</td>
<td>18.1</td>
<td>50.1</td>
<td>0.27</td>
</tr>
<tr>
<td>Maize+Cowpea (additive)</td>
<td>12.5</td>
<td>39.7</td>
<td>0.24</td>
</tr>
<tr>
<td>Maize+Asparagus bean (additive)</td>
<td>18.2</td>
<td>50.5</td>
<td>0.26</td>
</tr>
<tr>
<td>Maize+Ricebean (additive)</td>
<td>12.9</td>
<td>40.1</td>
<td>0.24</td>
</tr>
<tr>
<td>Maize+Soybean (paired)</td>
<td>19.8</td>
<td>52.7</td>
<td>0.27</td>
</tr>
<tr>
<td>Maize+Cowpea (paired)</td>
<td>19.2</td>
<td>52.3</td>
<td>0.27</td>
</tr>
<tr>
<td>Maize+Asparagus bean (paired)</td>
<td>22.3</td>
<td>53.5</td>
<td>0.29</td>
</tr>
<tr>
<td>Maize+Ricebean (paired)</td>
<td>17.2</td>
<td>49.5</td>
<td>0.26</td>
</tr>
<tr>
<td>CD (P=0.05)</td>
<td>3.70</td>
<td>4.02</td>
<td>0.02</td>
</tr>
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</table>

Fig. 3: Effect of Treatments on Grain and Stover Yield and Harvest Index of Maize

The grain yield of maize is a function of number of plants per unit area and yield per plant and the yield is dependent on different yield attributes i.e. (final plant population, number of barren plants, and number of cobs per plant, number of grains per cob and test weight). Thus, any change in these characters directly or indirectly is bound to have its effect on the final product i.e. grain yield of crop. At the same time the yield of a crop is the net resultant of the interactions among physio-chemical environment of soil, plant, atmosphere and their genetic makeup, thus, the yields may evidently be increased, unaffected or decreased by given alteration in biotic and microclimatic parameters. Maize yield under all the intercropping patterns was significantly lower than sole stand. In sole maize the grain yield, straw yield and harvest index were more as compared to other treatments because of the reason that in sole stand there was less competition for light, nutrients, and water and the resources were also utilized in a proper manner for better growth and yield. In sole stand there was proper environment for the growth of the crop and there was no competition of the intercrop. Singh and Singh (2001) reported that the intercropping system brought reduction in maize yield over sole stand in maize and soybean intercropping. These results are also in conformity with those of Jha et al. (2000) and Khola et al. (1997). However, the magnitude of reduction varied among different intercropping patterns, maize + asparagus bean in paired series and maize + soybean in additive series being at par with each other recorded significantly higher maize yield, straw yield and harvest index than other planting patterns. Lesser
competition for space and nutrients might be the probable reason for higher maize yield under these treatments.

**Conclusion:** The result from the above study shows that growing of sole stand of maize followed by paired series under organic conditions resulted in better growth of the crop as well as yield.

**References:**

5. James RA and Obura RK. Yield of corn, cowpea and soybean under different intercropping systems. Agronomy Journal 75: 1983. 1005-1009
11. Singh VP and Singh VK. Productivity potential and economics of maize (Zea mays) and soybean (Glycine max) intercropping patterns under rainfed low hill or valley situation of Uttaranchal. *Indian Journal of Agronomy* 46(1): 2001. 27-31
CORRELATION STUDIES AMONG THE PHYSICAL, CHEMICAL AND BIOLOGICAL PROPERTIES OF SOIL WITH YIELD IN PEA-SESAMUM CROPPING SYSTEM IN AN ACID ALFISOL

DR. VIJAY SINGH, DR. SHILPA KAUSHAL, DR. SHALU RANI

Abstract: An experiment was conducted at the soil microbiology section of Department of Soil Science by taking pea and sesamum crop during rabi, 2008 and kharif, 2009. There were eight treatments with organic (T1 and T2) inorganic (T3) and integration of organic and inorganic sources of nutrients (T3, T4, T5 and T6). Design was randomized block design. The soil sample of both crops was taken after harvest and was analyzed for physical, chemical and microbiological properties. The soil was having texture silty clay loam, pH 5.2, cation exchange capacity 10.3 cmol (p+) kg⁻¹, organic carbon 9.5 g kg⁻¹, available N and P (267.1 kg ha⁻¹ and 10.2 kg ha⁻¹). The yield of pea was significantly and positively correlated with all physical, chemical and microbiological properties of soil in 0-0.15 m depth, but not significantly and positively correlated with field capacity and bacterial population in 0-0.15 and 0.15-0.30 m, whereas sesamum yield was significantly and positively correlated with all physical, chemical and microbiological properties of soil except pH in 0-0.15 m. In 0.15-0.30 m, sesamum yield was significantly and positively correlated with all physical, chemical and microbiological properties of soil except with field capacity and bacterial population.

Keywords: Balanced Fertilization, State Level Recommendations.

Introduction: Plant growth under field conditions is one of the most complex, interactive amongst physical, chemical and biological systems. Crop yield is a function of soil, crop, climate and management factors. Amongst these factors, soil has edge over all others. The major emphasis on soil health, investigation until recently has been carried out the use of physical and chemical attributes of soil to define soil quality soil health (Arshad and Coen 1992). The biological component of soil is responsible for humus formation, cycling of nutrient, soil tilth and structure and myriad of other functions (Tisdall 1991). These biological components have been largely ignored, though are an important aspect to manage sustainable agriculture, soil health and ecosystem. Thus, it is essential to maintain the physical, chemical and biological components of soil for sustainable agriculture. The maintenance of all these components together is essentially required with the use of organic inorganic and integration of organic, inorganic and biofertilizer together for restoration of declining soil productivity. Legumes-cereal cropping system is most common in our country because of the residual nitrogen from symbiosis benefit to the subsequent cereal crops (Tilak 1993). But the legume-oilseed cropping system is very uncommon. The yield and the area of legumes and oil seed crops are decreasing owing to their low yield and susceptibility towards insect pest and diseases. It is most important to study the relationship between physical, chemical and biological properties of the system which ultimately contributes to soil health.

Material and Methods: In order to achieve the objectives of the investigation a field study was conducted in pea and sesamum crop during rabi, 2008 and kharif, 2009 at the Soil Microbiology section of Department of Soil Science, College of Agriculture, CSK HPKV, Palampur. There were eight treatments which were replicated thrice in a randomized block design. The treatments were; (T1): 10 t FYM ha⁻¹ + NF (A) + PSB + CCR, (T2): 10 t FYM ha⁻¹ + NF (A) + PSB + CCR, (T3): 5 t FYM ha⁻¹ + NF (A) + P and K (RDF), (T4): 5 t FYM ha⁻¹ + NF (A) + PSB + Half N and P (RDF) + K (RDF), (T5): 5 t FYM ha⁻¹ + NF (B) + P and K (RDF), (T6): 5 t FYM ha⁻¹ + NF (B) + PSB + Half N and P (RDF) + K (RDF), (T7): N, P and K (RDF), (T8) Control. Recommended dose of fertilizer (RDF) rate corresponds to the state level recommendations for respective nutrients. FYM application was made @ 10 t ha⁻¹ on fresh weight basis for both crops, which corresponds to the practice being followed by the farmers of the region. The FYM applied contained 60 per cent moisture; and its average nutrient content during the period of experimentation on dry weight basis was 1.01, 0.26 and 0.40 per cent of N, P and K, respectively. The correlation between the physical, chemical and biological properties of soil was studied with the standard procedures.

Results and Discussions: Relationship among Physical, Chemical and Biological Properties of Soil and With Yield: The
green pod yield was found to be significantly and positively correlated with pH, organic carbon, cation exchange capacity, total NPK, bulk density, water holding capacity, field capacity, permanent wilting point, bacterial, fungal and actinomycetes population, microbial biomass carbon, dehydrogenase, phosphatase and urease activity in the surface soil (0-0.15 m) with the values of coefficient of correlation ranging from 0.495* to 0.886*. In the subsurface soil (0.15-0.30 m), the green pod yield was significantly and positively correlated with pH, organic carbon, cation exchange capacity, total NPK, water holding capacity, permanent wilting point, fungal and actinomycetes population, microbial biomass carbon, dehydrogenase, phosphatase and urease activity with the values ranging from 0.421* to 0.884* but not significantly correlated with bulk density (r = 0.392), field capacity (r = 0.337) and bacterial population (r = 0.328). The seed yield of sesamum was found to be significantly and positively correlated with all chemical, physical and microbiological parameters in surface soil (0-0.15 m) except soil pH and values ranging from 0.581* to 0.918*. In the subsurface soil (0.15-0.30 m) it was found to be significantly and positively correlated with all chemical, physical and microbiological parameters and values ranging from 0.455* to 0.907*.

Soil pH showed positive and significant correlation with cation exchange capacity (r = 0.515*), total N (r = 0.473*), bacterial population (r = 0.556*), dehydrogenase (r = 0.483*) and urease activity (r = 0.506*) in surface soil (0-0.15 m). In subsurface soil (0.15-0.30 m), it was found significantly and positively correlated with water holding capacity (r = 0.481*).

Cation exchange capacity showed significant and positive correlation with total N, P and K (r = 0.738*, r = 0.588* and r = 0.536*), bulk density (r = 0.514*), water holding capacity (r = 0.639*), field capacity (r = 0.455*), permanent wilting point (r = 0.521*), bacterial (r = 0.629*), fungal (r = 0.567*) and actinomycetes population (r = 0.554*), microbial biomass carbon (r = 0.562*), dehydrogenase (r = 0.626*), phosphatase (r = 0.735*) and urease activity (r = 0.652*) in the surface soil (0-0.15 m) and the values ranging between 0.514* to 0.738*. Similar, in the subsurface (0.15-0.30 m) it was found positively and significantly correlated with total N, P and K (r = 0.475*, r = 0.71*, and r = 0.648*), bulk density (r = 0.643*), water holding capacity (r = 0.608*), permanent wilting point (r = 0.720*), bacterial (r = 0.447*), fungal (r = 0.610*) and actinomycetes population (r = 0.443*), microbial biomass carbon (r = 0.698*), dehydrogenase (r = 0.628*), phosphatase (r = 0.553*) and urease activity (r = 0.669*) and values ranging from 0.443* to 0.720*.

Total N showed positive and significant correlation with, total P and K (r = 0.673* and r = 0.568*), bulk density (r = 0.514*), water holding capacity (r = 0.639*), field capacity (r = 0.432*), permanent wilting point (r = 0.607*), bacterial (r = 0.786*), fungal (r = 0.835*) and actinomycetes population (r = 0.853*), microbial biomass carbon (r = 0.688*), dehydrogenase (r = 0.737*), phosphatase (r = 0.916*) and urease
Table 1: Relationship among physical, chemical and biological properties of soil and with yield (0-15 cm)

<table>
<thead>
<tr>
<th></th>
<th>pH</th>
<th>OC</th>
<th>CEC</th>
<th>N</th>
<th>P</th>
<th>K</th>
<th>BD</th>
<th>WHC</th>
<th>FC</th>
<th>PWP</th>
<th>Bact.</th>
<th>Fungi</th>
<th>Actino.</th>
<th>MBC</th>
<th>DHA</th>
<th>PHA</th>
<th>UA</th>
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<tbody>
<tr>
<td>YIELD (Pea)</td>
<td>0.495*</td>
<td>0.814*</td>
<td>0.710*</td>
<td>0.876*</td>
<td>0.868*</td>
<td>0.785*</td>
<td>0.817*</td>
<td>0.633*</td>
<td>0.444*</td>
<td>0.574*</td>
<td>0.629*</td>
<td>0.792*</td>
<td>0.830*</td>
<td>0.814*</td>
<td>0.655*</td>
<td>0.886*</td>
<td>0.811*</td>
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<tr>
<td>Yield (Sesamum)</td>
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<td>0.806*</td>
<td>0.678*</td>
<td>0.755*</td>
<td>0.861*</td>
<td>0.821*</td>
<td>0.799*</td>
<td>0.736*</td>
<td>0.599*</td>
<td>0.705*</td>
<td>0.581*</td>
<td>0.589*</td>
<td>0.609*</td>
<td>0.609*</td>
<td>0.841*</td>
<td>0.918*</td>
<td>0.807*</td>
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<td>0.226</td>
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<td>0.180</td>
<td>0.556*</td>
<td>0.285</td>
<td>0.347</td>
<td>0.344</td>
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<td>0.639*</td>
<td>0.524*</td>
<td>0.611*</td>
<td>0.0691*</td>
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<td>0.786*</td>
<td>0.736*</td>
<td>0.780*</td>
<td>0.907*</td>
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<td>0.514*</td>
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<td>0.455*</td>
<td>0.521*</td>
<td>0.679*</td>
<td>0.567*</td>
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<td>0.562*</td>
<td>0.626*</td>
<td>0.735*</td>
<td>0.652*</td>
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<td>0.432*</td>
<td>0.607*</td>
<td>0.786*</td>
<td>0.835*</td>
<td>0.0853*</td>
<td>0.688*</td>
<td>0.737*</td>
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<td>0.740*</td>
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<td>0.537*</td>
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<td>0.827*</td>
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<td>0.904*</td>
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<td>0.370</td>
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<td>0.527*</td>
<td>0.590*</td>
<td>0.815*</td>
<td>0.735*</td>
<td>0.709*</td>
<td>0.766*</td>
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</tr>
<tr>
<td>FC</td>
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<td>0.284</td>
<td>0.815*</td>
<td>0.612*</td>
<td>0.504*</td>
<td>0.626*</td>
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<tr>
<td>PWP</td>
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<td>0.520*</td>
<td>0.535*</td>
<td>0.915*</td>
<td>0.769*</td>
<td>0.672*</td>
<td>0.889*</td>
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<tr>
<td>Bact</td>
<td>0.550*</td>
<td>0.642*</td>
<td>0.687*</td>
<td>0.589*</td>
<td>0.761*</td>
<td>0.490*</td>
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</tr>
<tr>
<td>Fungi</td>
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<td>0.560*</td>
<td>0.606*</td>
<td>0.753*</td>
<td>0.697*</td>
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<tr>
<td>Actino.</td>
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<td>0.630*</td>
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<td></td>
<td></td>
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<tr>
<td>MBC</td>
<td>0.833*</td>
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<tr>
<td>DHA</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>PHA</td>
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</tbody>
</table>

*Significant at 5 Per Cent Level

OC- Organic carbon, CEC- Cation exchange capacity, NT- Total nitrogen, TP- Total phosphorus, TK- Total potassium, BD- Bulk density, WHC- Water holding capacity, FC- Field capacity, PWP- Permanent wilting point, Bact.- Bacterial population, Actino.- Actinomycetes population- MBC- Microbial biomass carbon, DHA- Dehydrogenase activity, PHA- Phosphatase activity.
### Table 2: Relationship among Physical, Chemical and Biological Properties of Soil and with Yield (15-30 cm)

<table>
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<tbody>
<tr>
<td><strong>Yield (Pea)</strong></td>
<td>0.421*</td>
<td>0.766*</td>
<td>0.551*</td>
<td>0.841*</td>
<td>0.586*</td>
<td>0.519*</td>
<td>0.392*</td>
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<td>0.337</td>
<td>0.578*</td>
<td>0.328</td>
<td>0.549*</td>
<td>0.670*</td>
<td>0.715*</td>
<td>0.668*</td>
<td>0.884*</td>
<td>0.775*</td>
</tr>
<tr>
<td><strong>Yield (Sesamum)</strong></td>
<td>0.455*</td>
<td>0.793*</td>
<td>0.562*</td>
<td>0.825*</td>
<td>0.716*</td>
<td>0.907*</td>
<td>0.794*</td>
<td>0.701*</td>
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<td>0.682*</td>
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<tr>
<td>K</td>
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<td>0.643</td>
<td>0.614*</td>
<td>0.855*</td>
<td>0.535*</td>
<td>0.795*</td>
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<td>0.856*</td>
<td>0.810*</td>
<td>0.643*</td>
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<td>BD</td>
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<td>0.537*</td>
<td>0.740*</td>
<td>0.483*</td>
<td>0.693*</td>
<td>0.398</td>
<td>0.774*</td>
<td>0.755*</td>
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<td>0.777*</td>
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<td>0.421*</td>
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<td>0.804*</td>
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*Significant at 5 Per Cent Level

OC- Organic carbon, CEC- Cation exchange capacity, NT- Total nitrogen, TP- Total phosphorus, TK- Total potassium, BD- Bulk density, WHC- Water holding capacity, FC- Field capacity, PWP- Permanent wilting point, Bact.- Bacterial population, Actino.- Actinomycetes population- MBC- Microbial biomass carbon, DHA- Dehydrogenase activity, PHA- Phoshatase activity
activity \( (r = 0.795^*) \) in the surface soil \((0-0.15 \text{ m})\) and the values ranging between \(0.432^* \) to \(0.916^* \) and similar trend has been found in subsurface soil \((0.15-0.30 \text{ m})\) and values ranging from \(0.415^* \) to \(0.897^* \).

Total K showed positive and significant relationship between bulk density \( (r = 0.950^*) \), water holding capacity \( (r = 0.764^*) \), field capacity \( (r = 0.714^*) \), permanent wilting point \( (r = 0.848^*) \), bacterial \( (r = 0.480^*) \), fungal \( (r = 0.475^*) \) and actinomycetes population \( (r = 0.447^*) \), dehydrogenase \( (r = 0.881^*) \), phosphatase \( (r = 0.698^*) \) and urease activity \( (r = 0.799^*) \) in the surface soil \((0-0.15 \text{ m})\) and the values ranging between \(0.432^* \) to \(0.916^* \) and similar trend has been found in subsurface soil \((0.15-0.30 \text{ m})\) and values ranging from \(0.551^* \) to \(0.929^* \).

Bulk density has been found positively and significantly correlated with, water holding capacity \( (r = 0.726^*) \), field capacity \( (r = 0.657^*) \), permanent wilting point \( (r = 0.786^*) \), fungal population \( (r = 0.435^*) \), microbial biomass carbon \( (r = 0.801^*) \), dehydrogenase \( (r = 0.834^*) \), phosphatase \( (r = 0.631^*) \) and urease activity \( (r = 0.730^*) \) except bacterial and actinomycetes population in the surface soil \((0-0.15 \text{ m})\), but in subsurface soil \((0.15-0.30 \text{ m})\) bacterial population was found positively significant and same trend has been found with rest of parameters. The values has been found ranging from \(0.483^* \) to \(0.774^* \).

Water holding capacity showed positive and significant correlation with field capacity \( (r = 0.815^*) \), permanent wilting point \( (r = 0.766^*) \), bacterial \( (r = 0.645^*) \), fungal \( (r = 0.527^*) \) and actinomycetes population \( (r = 0.590^*) \), microbial biomass carbon \( (r = 0.815^*) \), dehydrogenase \( (r = 0.735^*) \), phosphatase \( (r = 0.709^*) \) and urease activity \( (r = 0.766^*) \) in the surface soil \((0-0.15 \text{ m})\) and values ranges from \(0.527^* \) to \(0.881^* \) but in the subsurface soil \((0.15-0.30 \text{ m})\) it showed positive and significant correlation with field capacity \( (r = 0.716^*) \), bacterial \( (r = 0.485^*) \), fungal \( (r = 0.438^*) \) and actinomycetes population \( (r = 0.587^*) \), microbial biomass carbon \( (r = 0.777^*) \), dehydrogenase \( (r = 0.716^*) \), phosphatase \( (r = 0.627^*) \) and urease activity \( (r = 0.748^*) \) in the surface soil \((0-0.15 \text{ m})\) and values ranges from \(0.438^* \) to \(0.777^* \) same trend has been found except permanent wilting point.

Field capacity showed positive and significant correlation with permanent wilting point \( (r = 0.704^*) \), bacterial \( (r = 0.420^*) \), microbial biomass carbon \( (r = 0.815^*) \), dehydrogenase \( (r = 0.612^*) \), phosphatase \( (r = 0.504^*) \) and urease activity \( (r = 0.626^*) \) in the surface soil \((0-0.15 \text{ m})\) and values ranges from \(0.420^* \) to \(0.815^* \), but in the subsurface soil \((0.15-0.30 \text{ m})\) permanent wilting point \( (r = 0.578^*) \), fungal \( (r = 0.534^*) \) and actinomycetes population \( (r = 0.488^*) \), microbial biomass carbon \( (r = 0.514^*) \), dehydrogenase \( (r = 0.523^*) \), phosphatase \( (r = 0.403^*) \) and urease activity \( (r = 0.518^*) \) in the surface soil \((0-0.15 \text{ m})\) and values ranges from \(0.488^* \) to \(0.578^* \).

Permanent wilting point has been found positively and significantly correlated bacterial \( (r = 0.609^*) \), fungal population \( (r = 0.520^*) \), actinomycetes population \( (r = 0.535^*) \), microbial biomass carbon \( (r = 0.915^*) \), dehydrogenase \( (r = 0.769^*) \), phosphatase \( (r = 0.672^*) \) and urease activity \( (r = 0.889^*) \) in the surface soil \((0-0.15 \text{ m})\), but in subsurface soil \((0.15-0.30 \text{ m})\) fungal population \( (r = 0.776^*) \) actinomycetes population \( (r = 0.714^*) \), microbial biomass carbon \( (r = 0.880^*) \), phosphatase \( (r = 0.518^*) \) and urease activity \( (r = 0.849^*) \) population was found positively significant and same trend has been found with rest of parameters.

Bacterial population has been found positively and significantly related with fungal \( (r = 0.550^*) \) and actinomycetes population \( (r = 0.642^*) \), microbial biomass carbon \( (r = 0.687^*) \), dehydrogenase \( (r = 0.589^*) \), phosphatase \( (r = 0.761^*) \) and urease activity \( (r = 0.490^*) \) in the surface soil \((0-0.15 \text{ m})\). Similarly in the subsurface soil \((0.15-0.30 \text{ m})\) also showed positive and significant relationship with fungal \( (r = 0.663^*) \) and actinomycetes population \( (r = 0.427^*) \), microbial biomass carbon \( (r = 0.493^*) \), dehydrogenase \( (r = 0.421^*) \), phosphatase \( (r = 0.480^*) \) and urease activity \( (r = 0.516^*) \).

Fungal population showed positive and significant relationship between actinomycetes population \( (0.855^*) \), microbial biomass carbon \( (r = 0.560^*) \), dehydrogenase \( (r = 0.606^*) \), phosphatase \( (r = 0.753^*) \) and urease activity \( (r = 0.697^*) \) in the surface soil \((0-0.15 \text{ m})\) and similarly in the subsurface soil \((0.15-0.30 \text{ m})\) positive and significant relationship with actinomycetes population \( (r = 0.714^*) \), microbial biomass carbon \( (r = 0.792^*) \), dehydrogenase \( (r = 0.733^*) \), phosphatase \( (r = 0.638^*) \) and urease activity \( (r = 0.804^*) \).
Actinomycetes population found to be positive and significant with, microbial biomass carbon \((r = 0.580^*)\), dehydrogenase \((r = 0.630^*)\), phosphatase \((r = 0.776^*)\) and urease activity \((r = 0.765^*)\) in the surface soil \((0-0.15 \text{ m})\) and similarly in the subsurface soil \((0.15-0.30 \text{ m})\) positive and significant relationship with microbial biomass carbon \((r = 0.537^*)\), dehydrogenase \((r = 0.560^*)\), phosphatase \((r = 0.736^*)\) and urease activity \((r = 0.651^*)\).

Microbial biomass carbon has been found positive and significant with dehydrogenase \((r = 0.833^*)\), phosphatase \((r = 0.788^*)\) and urease activity \((r = 0.931^*)\) in the surface soil \((0-0.15 \text{ m})\) and similarly in the subsurface soil \((0.15-0.30 \text{ m})\) positive and significant relationship with dehydrogenase \((r = 0.832^*)\), phosphatase \((r = 0.790^*)\) and urease activity \((r = 0.953^*)\).

Dehydrogenase activity showed positive and significant relationship with phosphatase \((r = 0.820^*)\) and urease activity \((r = 0.800^*)\) in the surface soil \((0-0.15 \text{ m})\) and similarly in the subsurface soil \((0.15-0.30 \text{ m})\) positive and significant relationship with phosphatase \((r = 0.673^*)\) and urease activity \((r = 0.868^*)\).

Phosphatase activity was found positively and significantly correlated with urease \((r = 0.847^*)\) activity in surface soils and also found positively and significantly correlated with urease activity \((r = 0.821^*)\) in subsurface soils.

Soil properties \textit{i.e.} physical, chemical and biological properties were estimated by following standard procedures and correlated with yield of pea and sesamum. Though, soil pH did not show any significant correlation with yield of pea and sesame on surface and sub surface soils and other soil properties except CEC, nitrogen, bacteria, dehydrogenase, phosphatase and urease activity similar results were observed by Stroo and Jenks (1992) where they observed that most of the microbial properties did not show a significant relationship with pH on surface and sub surface soil.

The yield of pea and sesame was found to be positively correlated with organic carbon. It might be due to the fact that increase in total carbon and maintain the proper C:N:C:P ratio for mineralization which increase physical chemical and biological properties of soil. Similar trend was also recorded with sub surface soil. (Tyagi \textit{et al.} 2003; Rather \textit{et al.} 2010; Attia 2001 and Habbasha \textit{et al.} 2007).

The yield of pea and sesame was found to be positively correlated with CEC. It might be due to the fact that during decomposition of organic matter some cations were released which cause to increase in nutrient availability of both crops (Singh \textit{et al.} 2006).

Total NPK was found to be positively and significantly correlated with yield of pea and sesame on surface and subsurface soils. It might be due to the fact that the requirements of these nutrients are considered as the macro nutrients for growth and yield of crops. Whereas the effective root zone of sesame and pea is up to 30 cm. the nutrients on sub surface is also equally important (Singh \textit{et al.} 2006).

Yield of pea and sesame are positively and significantly correlated with physical properties except bulk density on sub surface. The positive correlation of physical properties with yield of pea and sesame might be due to the fact that physical parameters are an essential component for nutrient availability and mechanical support of the crops. Ashfaq-Ahmad \textit{et al.} (2001)

Soil biological properties \textit{i.e.} microbial population, individual microbial population, microbial biomass carbon, dehydrogenase, phosphatase and urease are positively and significantly correlated with yield and sesame except the population of bacteria for both the crops. It might be due to the fact that the biological properties play an active role in the transformation of the nutrients by affecting C: N: P: S ratio up to effective root zone. Bacterial population on the surface did not show a significant correlation with yield of pea and sesame due to decrease in soil pH (Jaun \textit{et al.} 2008 and Bedi \textit{et al.} 2009).

\textbf{Conclusion:}
Addition of organics along with inorganics improves the physical, chemical and biological properties of soil and hence, improves the soil health, yield and soil quality. So, it may be inferred from this study that the application of organic and inorganics in combination is more beneficial for sustaining crop yield as well as soil health.

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PRELIMINARY EVALUATION OF EFFECT OF OXIDATION ON PHYSICOCHEMICAL PROPERTIES OF STERCULIA GUM.

NISHA SHARMA, VIKRANT SINGH RANA, GANESH KUMAR

Abstract: The polysaccharide gums are important industrial raw materials due to their sustainability, biodegradability and biosafety. Physicochemical properties of hydrocolloid gums are very crucial property responsible for their wide applicability especially in pharmaceutical and food industry as a stabilizer, binder, and emulsifier. Polysaccharide gums are one of the most useful natural polymers due to their diverse functionalities. Presence of ionic groups allows an easy modification of their chemical properties by the introduction of new functional groups. Sterculia gum is medicinally important hydrocolloid gum used in food, agriculture and biomedical applications. The main impetus behind wide applications of Sterculia gum is its unique physicochemical properties. Present study focus on an economical and ecofriendly dry method for the chemical modification of native gum through oxidation to study the effect of oxidation on its physicochemical properties. The parameters applied for present study includes pH, solubility, conductivity, viscosity, ash content and fluorescent analysis.

Keywords: Sterculia Gum, Polysaccharide, Oxidation, Physicochemical Properties, Fluorescent Analysis.

1. Introduction: Sterculia gum is acetylated acidic natural polysaccharide obtained from Sterculia urens (Family-Sterculiaceae). Galactose, rhamnose and galacturonic acid are the major fractions of the sterculia gum. There also present small fraction of glucuronic acid [1],[2],[3]. Sterculia gum is mainly used as stabilizer [2] and emulsifier [4]. In biomedical sector it is used in wound dressing [5], antidiarrheal drug delivery [6], as bulk laxative [7], in the removal of metal ions [8], removal of dyes and organic pollutants from water [9, 10]. Physico-chemical properties of Sterculia gum can be changed by chemical modification. Modification can be done by microwave induced diffusion method [11], graft polymerization [10] and heat treatment [4]. Thiolation of Sterculia gum was done by using thioglycolic acid which increases its mucoadhesiveness and sustained release properties [12]. With more emphasis on environmental friendly and economical methods, our present approach is to oxidize Sterculia gum by hydrogen peroxide which is economic, green and dry method [13]. The peroxide oxidation changes the physico-chemical properties of native Sterculia gum. Oxidized Sterculia gum has different pH, viscosity, conductivity, absorbance, ash content and moisture content when compared with native Sterculia gum.

2. Materials and Methods: Gum Karaya was purchased from the herbal store. Hydrogen peroxide, (H_2O_2), [Avantor Performance materials India Ltd], sodium hydroxide (NaOH) [Merck Specialities Pvt Ltd], acetic acid (CH_3COOH) [Qualigens Fine Chemicals], potassium chloride (KCl) [Avantor Performance materials India Ltd], boric acid (H_3BO_3) [Avantor Performance materials India Ltd]. All the chemicals were used as received. Double distilled water was used in the preparation of all solutions.

2.1 Oxidation of Sterculia gum: Sterculia gum oxidation was done by using a reported method [13],[14] with some modification. 30 % (w/v) solution of Sterculia gum was prepared using double distilled water. Then adjusted the pH of the solution to pH 4 using 0.1 M NaOH solutions and stirred the solution continuously at 60 °C for one hour. Temperature was maintained at 45 °C and hydrogen peroxide (30% of the weight of Sterculia gum) was added. Then the reaction mixture was continuously stirred for four hours. The oxidized Sterculia gum was dried in vacuum oven at 40 to 45 °C.

2.2 Moisture Content: Moisture content was determined according to reported method [15]. Porcelain dish was first heated in hot air oven for 30 minutes and then cooled in a desiccator and weighed it. Accurately weighed about 0.1g of the sample in a porcelain dish and heated it in a hot air oven at 105 °C for one hour. The porcelain dish was removed from the hot air oven and cooled to room temperature in the desiccator. Weighed the cooled porcelain dish and again placed it into the hot air oven and was heated at a temperature of 105 °C. This process was repeated until we get constant weight.

2.3 Ash Content: Ash content was determined according to reported method [15]. Silica crucible was first
heated to redness in the muffle furnace for 30 minutes and then cooled in a desiccator and weighed it. Accurately weighed about 0.1g of the sample in a silica crucible and ignited it in a muffle furnace at 600 °C for three hours. The silica crucible was removed from the muffle furnace and cooled to room temperature in the desiccator. Weighed the cooled silica crucible and again placed the silica crucible in the muffle furnace and was ignited at a temperature of 600 °C. This process was repeated until we get constant weight.

2.4 pH: pH of 0.1% Sterculia gum solution (w/v) and 0.1% oxidized Sterculia gum solution (w/v) prepared in distilled water were determined using Elico L120 pH meter.

2.5 Viscosity: Viscosity of 0.1% solution of Sterculia gum (w/v) prepared in 2% acetic acid and stirred for ten minutes was determined using Ostwald viscometer [1]. Viscosity of 0.1% solution of oxidized Sterculia gum (w/v) in double distilled water and that of 0.1% Sterculia gum (w/v) in double distilled water and its various compositions with oxidized Sterculia gum was also determined using Ostwald viscometer.

2.6 Conductivity: Conductivity of 0.1% Sterculia gum solution (w/v) and 0.1% oxidized Sterculia gum solution (w/v) prepared in double distilled water were determined using Elico CM 180 conductivity meter.

2.7 Absorbance: Absorbance of aqueous solutions Sterculia gum and oxidized Sterculia gum was determined at 250nm using T60 UV-Visible Spectrometer (PG Instruments). The effect of UV light on Sterculia gum and oxidized Sterculia gum powder was observed under UV light using Vigil- 02 UV light source.

Table: Comparative Physicochemical Properties of Sterculia gum and Oxidized Sterculia gum

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Sterculia gum</th>
<th>Oxidized Sterculia gum</th>
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<tbody>
<tr>
<td>pH (0.1% in water)</td>
<td>5.80</td>
<td>4.29</td>
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<tr>
<td>pH (after ageing for 24 hours)</td>
<td>3.10</td>
<td>4.72</td>
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<tr>
<td>Viscosity (0.1% in water)</td>
<td>1.272cPs (0.1% GK in 2% acetic acid)</td>
<td>1.024cPs (0.1% OGK in water)</td>
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<tr>
<td>Conductivity (0.1% in water)</td>
<td>280x10³S/cm</td>
<td>475x10⁻³</td>
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<tr>
<td>TDS</td>
<td>455</td>
<td>307</td>
</tr>
<tr>
<td>Ash Content</td>
<td>4.12%</td>
<td>3.60%</td>
</tr>
<tr>
<td>Moisture Content</td>
<td>5.11%</td>
<td>5.52%</td>
</tr>
<tr>
<td>Absorbance</td>
<td>Maximum absorbance of 0.982 was observed at 260nm for Sterculia gum solution in acetic acid (sample A) and 0.145 in case of Sterculia gum in water at 280nm (sample B)</td>
<td>Maximum absorbance of 1.775 was observed at 270nm for oxidized sterculia gum in water (sample C)</td>
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<tr>
<td>Colour under UV light</td>
<td>White Colour</td>
<td>Creamy Colour</td>
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</table>

3. Results and Discussion: Sterculia gum was oxidized by hydrogen peroxide. It being more acidic get decomposed in the presence of a base to give HOO⁻ (perhydroxylanion) which then react with another hydrogenperoxide molecule to form more reactive hydroxyl radical (OH). Glycosidic bonds in the Sterculia gum were attacked by hydroxyl radicals resulting in degradation of gum karaya. The oxidized Sterculia gum formed has more solubility and decreased molecular weight. The moisture content of oxidized Sterculia gum was 3.60% as compared to Sterculia gum which was 20%. The low moisture content of oxidized gum karaya as compared to gum karaya implies that it is less susceptible to attack of microorganisms. It also means that it can be stored for longer time. Ash content of oxidized gum karaya was 3.60% as compared to gum karaya which was 4.12%. The low value of ash content indicated low level of contamination in oxidized product as well as removal of all extraneous particles. The low ash content of oxidized gum karaya implies that it has good mineral content as compared to gum karaya. The 1% solution of gum karaya in water was about 4.5-4.7 indicating its acidic character. The 0.1% solution of gum karaya in water has a pH value of 5.80 which shows that the gum karaya was sparingly soluble in water. After ageing the solution of gum karaya for twenty four hours the pH get decreased to 3.10 indicating the
acidic character. In comparison to gum karaya the 0.1% solution of oxidized gum karaya in water has a pH value of 4.29 indicating that oxidized gum karaya was more soluble in water as compared to gum karaya. Its pH remains almost unchanged upon ageing. Dispersions of gum karaya in water have viscosity ranges from 120-400cPs for 0.5% to 10,000cPs for 3%. Viscosity of 0.1% solution of gum karaya (w/v) prepared in 2% acetic acid and stirred for ten minutes was determined using Ostwald viscometer and the calculated value of viscosity was 1.2872 cPs which indicates the solubility of gum karaya in organic acid (acetic acid). Viscosity of 0.1% solution of oxidized gum karaya (w/v) in double distilled water was 1.024cPs which implies that oxidized gum karaya has lower molecular weight as compared to gum karaya. Conductivity and TDS of 0.1% gum karaya solution (w/v) and 0.1% oxidized gum karaya solution (w/v) prepared in double distilled water were determined using Elico CM 180 conductivity meter. Conductivity and TDS of gum karaya was 280x10⁻³ siemen/cm and 455 while that of oxidized gum karaya was 475 x10⁻³ siemen/cm and 307 respectively. Maximum absorbance of 0.982 is observed at 260nm for gum karaya solution in acetic acid (sample A) and 0.145 in case of gum karaya in water at 280nm (sample B). Maximum absorbance of 1.775 is observed at 270nm for oxidized gum karaya in water (sample C). The gum karaya powder under UV light appeared whitish and oxidized gum karaya powder appeared creamish.

Figure 1: Plot of Absorbance Vs Wavelength (nm). Sample A: Gum Karaya in water, Sample B: Gum Karaya in acetic acid and Sample C: Oxidized Gum Karaya

4. Conclusion: Sterculia gum oxidation by hydrogen peroxide is economical and environmental friendly method of chemical modification. The modification has effect on the physico-chemical properties of Sterculia gum. The moisture content, ash content, viscosity, pH, conductivity, TDS, absorbance of oxidized sterculia gum is different from Sterculia gum. These changes increase the efficiency of Sterculia gum in the biomedical and environmental applications.

Acknowledgments: The authors are thankful to Sant Baba Bhag Singh University, Jalandhar, Punjab India and S.G.G.S Khalsa College, Mahilpur, District Hoshiarpur, Punjab, India for the laboratory facilities and the technical support.

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STIMULI RESPONSIVE POLYMERIC HYDROGELS: A REVIEW

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Abstract: Hydrogels are hydrophilic, three dimensional polymeric network with unique characteristics such as their biocompatibility, biodegradability, ability to respond to external physical/chemical/mechanical stimuli with a structural change (e.g. deformation, swelling, dissociation of functional groups). This ability is extensively exploited for the preparation of “intelligent” materials or smart hydrogels possessing certain self-control mechanisms. Present study summarizes basic characteristics and classifications of hydrogels. The main impetus behind this article is stimuli responsive characteristics especially pH, temperature, electric and magnetic stimuli based hydrogels which attractive materials for biopharmaceutical applications.

Keywords: Stimuli-Responsive, Hydrogels, Interpenetrating Networks, Deswelling/ Swelling, Biocompatibility.

Introduction: Hydrogels are hydrophilic, three dimensional polymeric network, consist of polymeric chains capable of swell on contact with water up to thermodynamic equilibrium without disintegrating [1]. Many materials, both naturally occurring and synthetic, fit the definition of hydrogels such as crosslinked dextrans, collagens and pectin as natural polymers that are modified via various methods to produce hydrogels and synthetic hydrogels include polyacrylic acid (PAAc), polyacrylamide (PAAm), polyvinylalcohol (PVA) [2].

Hydrogels exhibit unique characteristics such as high water absorption capacity (swellability), good mechanical strength, thixotropy, biocompatibility, biodegradability, mucoadhesiveness, elasticity similar to body tissues and rheological properties [3]. In literature, hydrogels have been exploited in in wide range of applications [4]. Swellability allows the hydrogels to be biocompatible due to which used as excellent biomaterials as soft contact lenses, wound dressing, in tissue engineering [5], as super-absorbents and as drug delivery systems [6]. Hydrogels find applications in food industry, electronic devices, environmental and agricultural science [7-9]. Applicability of polymeric materials depends upon the structure framework as well as composition of the material. It is important to give a brief account of classification of hydrogels.

1. Classification of Hydrogels: Hydrogels can be classified in different ways based on source, polymeric composition, configuration or physical appearance, according to network electric charge, type of crosslinkingand based upon response to stimuli [10].

1.1 Based upon source : On the basis of source, hydrogels are natural, synthetic and semi-synthetic [11]. Hydrogels made from natural polymers, such as cellulose, gelatin, chitosan, pectin and alginate, are of great interest due to their unique advantages such as abundance, nontoxicity, biocompatibility and biodegradability [12]. Synthetic Hydrogels are made from synthetic polymers, such as PVA, PNIPAAm and PAAc are networks of hydrophilic homopolymers or copolymers covalently or ionically crosslinked. Semi-synthetic Hydrogels are composed of chemically-modified natural polymers [13]. These hydrogel matrices provide precisely-controlled microenvironments with the bioactive features of natural materials and multi-tunable properties by varying the chemical parameters [14].

1.2 Classification Based Upon Polymeric Composition: On the basis of polymeric composition, hydrogels can be classified as: Homopolymeric, Copolymeric and Multipolymeric Interpenetrating Networks (IPNs). Homopolymeric networks are derived from a single species of monomer having crosslinked skeletal structure depending on the nature of the monomer and polymerization technique [15]. Copolymeric hydrogels are comprised of two or more different monomer species with at least one hydrophilic component [16]. Multipolymer IPNs, are made of two independent crosslinked synthetic and/or natural polymer component, contained in a network form. IPNs are the intimate combination of two polymers, at least one of which is synthesized or crosslinked in the immediate presence of the other. In semi-IPN hydrogel, one component is a crosslinked polymer and other component is a non-crosslinked
polymer [17].

1.3 Classification Based Upon Network Electrical Charge: On the basis of presence or absence of electrical charge, hydrogels are categorized as non ionic, ionic and amphoteric. Non-ionic hydrogels also known as neutral hydrogels do not bear any charged groups in their structure. They may be prepared from hydroxyalkyl methacrylates (HM), acrylamide derivatives, N-Vinyl pyrrolidinone [18]. Ionic hydrogels also known as polyelectrolytic hydrogels are prepared from monomer/s accompanying ionic charges. The charges could be positive or negative thus categorizing the hydrogels as cationic or anionic hydrogel respectively. Anionic hydrogel networks are usually composed of negatively charged acidic or anionic monomers such as acrylic acid derivatives. Cationic hydrogel networks are composed of cationic monomers such as aminoethyl methacrylate derivatives and 4-Vinyl pyridine [18]. Amphoteric/ Polyampholytic hydrogel networks also known as zwitterionic (polybetaines) are capable of possessing both positively and negatively charged moieties in the polymer network [19].

1.4 Classification Based Upon Response to Stimuli: Based upon type of stimuli, hydrogels are categorized as physical stimuli and chemical stimuli responsive hydrogels. Physical responsive hydrogels includes temperature sensitive hydrogels, electric field responsive, magnetic field responsive, Light-sensitive hydrogels, pressure-sensitive hydrogels and sound sensitive hydrogel. Chemical responsive hydrogels are pH sensitive hydrogels, ionic strength sensitive hydrogels, Solvent composition dependent hydrogels, Molecular species dependent hydrogels [20]. “Smart” or “stimuli responsive” hydrogels are those that respond to changes in their environment. Environmental stimuli that cause smart hydrogels undergo unique changes include physical (temperature, light, electricity, magnetic field, ultrasound, shear stress, and pressure), biological (antibody, enzyme, glucose), and chemical (pH, ion type, ionic strength, solvent, and hydrogen bonding) factors [21].

1.4.1 pH-Responsive Hydrogels: pH responsive hydrogels are capable of responding to perturbations in the environmental pH leading to deswelling/ swelling behaviour [22]. The pH-responsive hydrogels contains side functional groups such as acid (e.g., carboxylic and sulfonic acids) or basic (e.g., ammonium salts), which either accept or release protons in response to changes of external pH. They are of particular interest for biomedical applications due to substantial pH changes in various parts of body during either normal function or as part of a disease state. The most common monomers used to introduce pH-responsive behaviour include acrylic acid, acrylamide, dimethylaminoethyl methacrylate[23]. Natural polymers such as albumin, gelatin, alginate, and chitosan can also exhibit pH-responsive behaviour. pH-responsive hydrogel systems have been widely used for the controlled drug delivery of a variety of therapeutics[24,25]

1.4.2 Temperature-Sensitive Hydrogels: Temperature-sensitive hydrogels are those polymeric networks having both hydrophobic and hydrophilic groups which undergo volume changes (swelling/deswelling) in response to temperature change of medium. The most commonly used thermosensitive polymers include poly(N-isopropyl acrylamide) (PNIPAAm), poly(N,N-diethyl acrylamide), poly(N- vinyl alkylamide), poly(N-vinylcaprolactam), pluronic, polysaccharide derivatives, chitosan and triblock copolymer based poly(ethylene glycol)and hydrophobic copolymer poly(lactic acid-co-glycolic acid). PNIPAAm is commonly used as it exhibits a LCST close to body temperature and phase transition at 32°C in water. The expansion or collapse that correlates with the critical shift in aqueous solubility has been utilized as a mechanism for drug delivery [26], membranes, microfluidics, and sensors [27] and in situ gelling scaffolds for tissue regeneration [28].

1.4.3 Chemically /Photo-Responsive Hydrogels: Chemically responsive hydrogels may be glucose responsive hydrogels that respond to the presence of elevated levels of glucose and have uses in the treatment of diabetes or enzyme responsive that are degradable by the enzymes and thus are used for assisting in wound healing and tissue engineering [29].

1.4.4 Electrically-Responsive Hydrogels: Electrically-responsive hydrogels exhibits a potential gradient when placed between two electrodes with an applied voltage, the hydrogel will swell or contract depending on the charge of the hydrogel [30]. This responsive behaviour occurs through a combination
of coulombic, electrophoretic, piezoelectric, electroosmotic, and electrostatic interactions. Such hydrogels are used in photovoltaic devices, light-emitting diodes, electrochromic displays and biomedical devices [31].

1.1.4 Magnetic- Responsive Hydrogels: Magnetic- responsive hydrogels effectively traps the magnetic micro- and nanoparticles in the field at the target site in the presence of a magnetic field gradient. They can be prepared by the incorporation of preformed magnetic nanoparticles into the polysaccharide solution by mixing and subsequent in situ gelation or by the simultaneous formation of both hydrogel matrix and inorganic nanoparticles in the reaction system or by the fabrication of well-defined hybrid hydrogel beads[32]. They have wide applications in soft biomimetic actuators, sensors, cancer therapy agents, artificial muscles, switches, separation media, membranes, and drug delivery systems [33].

Future Prospective of Stimuli-Responsive Hydrogels: Polysaccharides are natural, renewable, nontoxic, biodegradable and ecologically-friendly products. Polysaccharides, such as hyaluronic, exudate gums, starch (amylose, amylpectin and their mixtures), maltodextrins and agarose are capable of forming gels [8, 11]. They are widely used in various industries such as agro-food, textile, biomedical and pharmaceutical because of their rheological characteristics. On the other hand, due to its good tissue compatibility, they have been widely used in the field of tissue engineering, in the treatment of exuding wounds and in enhancing the healing process, controlled drug delivery systems. Currently, the development of stimuli-responsive polysaccharides-based hydrogels have gained popularity due to their biocompatibility, excellent biodegradability, low or non-toxicity, hydrophilicity, similarity to biological environments. All these properties make them highly versatile material with extensive applications in biomedical and clinical fields. The degradation of natural polymers into physiological metabolites creates them tremendous candidates for a regenerative medicine [34]. In addition, the adaptability of their chemical network structures allows development of advanced functionalized materials which can meet a multiplicity of requirements.

Conclusion: Hydrogels exhibit unique characteristics such as high water absorption capacity thixotropy, biocompatibility, biodegradability, soft consistency, elasticity, mechanical and rheological properties responsible for their wide applicability. They are most attractive materials to be used as biomaterials as well as as controlled drug delivery systems. Applicability of polymeric materials depends upon the structure framework as well as composition of the material. Present review summarizes a brief account of classification and applications of stimuli-responsive hydrogel networks. Stimuli responsiveness can be induced in biopolymers so that a double potential smart material can be synthesized and find diverse applicability.

References:


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FORMULATION DEVELOPMENT AND STATISTICAL EVALUATION OF NANO-STRUCTURED LIPID CARRIERS OF ROPINIROLE HCL FOR INVASIVE TREATMENT OF PARKINSON’S DISEASE

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Abstract: Parkinson’s Disease is 2nd most a neuro-degenerative disorder of the central nervous system (CNS) effecting 7-10 million people of worldwide as the report of WHO 2014. It occurs due to the death of dopamine-generating cells in the substantia nigra, a region of the midbrain. It is characterized by tremor, rigidity, bradykinesia, dementia, depression and falls or emerges with the progression of the disease. Ropinirole HCl is a low molecular weight, highly water soluble drug. It is rapidly absorbed from the GI.T and mean peak plasma concentrations have been achieved within 1.5 h after oral doses. The oral bioavailability of Ropinirole HCl is 50% due to extensive first pass metabolism by the liver. Its mean plasma half-life is 5–6 h. The present study tries to enlighten the prior art related to Parkinson’s treatment and to prepare Ropinirole HCl loaded Nano-structured lipids carriers (NLC) that may overcome the problem of bioavailability and bypass the blood brain barrier by preparing the intra-nasal drug delivery targeted to the brain thereby decreasing the dosing frequency and increasing patient compliance. Ropinirole HCl was characterized using various techniques like melting point determination, FTIR, DSC and UV scan analysis. A total 8 formulations (RNH1–RNH8) were designed using half factorial design $2^3$ model by using two different lipids i.e Isopropyl myristate and Glyceryl monostearate and Pluronic F-68 as surfactant. Ropinirole HCl loaded NLCs were fabricated by hot homogenization method. The optimized NLC formulations were characterized for their % Entrapment efficiency, particle size, zeta potential, TEM, in-vitro drug release studies and different types of release kinetics models (First order, Zero order, Higuchi etc.) were applied. On the basis of evaluation parameters, formulation RNH6 was found to be better as compare to other. The promising results of optimized formulation suggested a practical approach for achieving better therapeutic efficacy by being able to target CNS.

Keywords: Parkinson’s Disease, Bioavailability, NLC, Nano-Technology.

1. Introductory Notes:

1.1 Parkinson’s Disease: Parkinson’s disease is a common neurodegenerative disorder of the central nervous system. It is named after James Parkinson the English doctor who published the first detailed description in “An Essay on the Shaking Palsy” (1817). Its symptoms resulting the death of dopamine generating cells of the midbrain. Shaking, rigidity, slowness of movement and difficulty in walking are equivalent in patients suffering from Parkinson’s disease. Symptoms also include sensory, sleep and emotional problems[1]. It occurs in 0.3% of the population and it is common in elderly people of 60 years of age or over by 1%. It is idiopathic and the cause is not known. Levodopa (L-dopa) and dopamine agonists are the main treatments used to control the signs and symptoms of Parkinson’s disease. Using these drugs for a long period may cause marked motor complications such as motor fluctuations and dyskinesia[2].

1.1.1 Symptoms: The major symptoms are classified into motor and non-motor types.

Motor Symptoms: PD is associated with resting tremor (initially unilateral), bradykinesia (slow movements), rigidity, shuffling gait, and postural instability. The onset is insidious where individuals may attribute the symptoms to aging processes. PD symptoms are progressive but rates of motor progression are highly variable. Also, subtypes of PD occur wherein tremor, rigidity, or postural instability dominate[3].

Non-Motor Symptoms: Non-motor symptoms of PD include cognitive changes, behavioral/ neuropsychiatric changes autonomic nervous system failure, sensory and sleep disturbances ( Jain S, 2011). Notably, a number of non-motor features can precede the motor symptoms of PD by years, even decades. However, it is known that almost 90% of PD patients experience non-motor symptoms during the course of the disease [4].
1.1.2 Risk Factors/Diagnosis: Age is the most potent risk for PD with an average age of onset of approximately 50 to 60 years. Two other risk factors have shown to be important: family history (a genetic link) and pesticide exposure. Additional risk factors have been identified though how they may differentially affect men vs. women is still unclear. Many other risk factors have been suggested though epidemiologic evidence is not as robust. These include: Use of well water, milk consumption, excess body weight, exposure to hydrocarbon solvents, living in rural areas, farming or agricultural work, living in urban areas or industrialized areas with exposure to copper, manganese and lead, high dietary intake of iron, history of anemia and higher levels of education[5].

1.1.3 Pathophysiology: The pathological definition of PD is loss or degeneration of the dopaminergic (dopamine-producing) neurons in the substantia nigra and development of Lewy Bodies (a pathologic hallmark) in dopaminergic neurons. Pathologic changes may precede obvious symptoms by two decades or more. This preferential loss of dopamine producing neurons results in marked impairment of motor control. Lewy Bodies, or abnormal intracellular aggregates, contain various proteins including alpha-synuclein and ubiquitin that impair optimal neuron functioning[6].

Recent publications suggest that environmental stress and aging itself may promote neuropathology. Specifically, exposure to environmental toxins (e.g pesticides), drugs of abuse, or the stress of the aging process promotes a chronic low-level inflammation in the brain (“Inflammaging”). This inflammatory process over time generates cellular senescence in brain neurons. From a pathologic perspective, the brain's substantia nigra pars compacta and the pontine locus ceruleus are affected by typical abnormalities of PD patients including depigmentation, neuronal loss and gliosis. By the time PD symptoms occur, about 60-70 percent of the neurons in the substantia nigra pars compacta are gone [7].

1.1.4 Drugs for treatment of Parkinson’s Disease:

Table 1.1: Traditional drugs and novel delivery system for the treatment of PD[9]

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Drug</th>
<th>Dose</th>
<th>Brand Name</th>
<th>Dosage Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Levodopa</td>
<td>0.1,0.25,0.5g</td>
<td>Dopar</td>
<td>Oral tablets</td>
</tr>
<tr>
<td>2</td>
<td>LD/Carbidopa</td>
<td>20mg/5mL</td>
<td>Duodopa</td>
<td>Suspension of micronised</td>
</tr>
<tr>
<td>3</td>
<td>LD/Benserazide</td>
<td>100/250mg or 200/50mg</td>
<td>Madopar</td>
<td>Oral capsules, Oral breakable tablets.</td>
</tr>
<tr>
<td>4</td>
<td>COMT Inhibitors</td>
<td>100/200mg</td>
<td>Tasmar</td>
<td>Oral film coated tablets.</td>
</tr>
<tr>
<td></td>
<td>Tolcapone</td>
<td>200mg</td>
<td>Comtan</td>
<td>Oral film coated tablets.</td>
</tr>
<tr>
<td></td>
<td>Entacapone</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5 MAO-B Inhibitors
  Selegiline
  Selegiline Resagiline
  Selegiline

5mg
1.25mg
0.5-1mg
Eldepryl
Zelapar
Azilect
Oral capsules.
Sublingual tablets.
Oral tablets.

6 Ergoline Dopamine Receptor Agonists
  Bromocriptine
  Pergolide
  Cabergoline
  Lisuride
  Lisuride
  Dihydroergocriptine
  Dihydroergocriptine

2.5 mg
5mg
0.05/0.25/1mg
1-2mg
0.2/0.5/1mg
2.5µg/h(10cm²)
5µg/h(20cm²)
5mg
10mg
Parlodel
Parodel
Permax
Cabaser
Dopergin
Nenad TDS
Daverium
Daverium
Oral snap tabs.
Oral capsules.
Oral tablets.
Oral tablets.
Oral tablets.
Transdermal patch.
Oral capsules.
Oral capsules.

7 Non-Ergotine Dopamine Receptor Agonists
  Pramipexole
  Ropinirole
  Ropinirole
  Rotigotine
  Apomorphine

0.125/0.25/0.5
1/1.5mg
0.25/0.5/1/2/3
/4/5mg
2/4/8mg
2mg/24hr
4mg/24hr
6mg/24hr
8mg/24hr
5mg/ml
10mg/ml
10mg/ml
5mg/ml
Mirapex
Requip
Requip XL
Neupro
Apo-go PFS
Apo-kyn
Apo-go Pen
Apo-go Amp.
Continuous infusion
Subcutaneous injection.
Subcutaneous injection.
Subcutaneous injection.

1.2. Nanostructured Lipid Carriers: In the present era not too many new chemical entities are coming in market primarily due to the fact that either they have poor solubility or incomplete absorption. Various methodologies have been explored to overcome this issue but none of them possess all the prerequisites. Hence this Nanostructured lipid carriers (NLCs) is being explored present a relatively new type of colloidal drug delivery system that consists of solid lipid and liquid lipid and offers the advantage of improved drug loading capacity and release properties. Nanostructured lipid carriers (NLCs) are systems that have been successfully used for topical, dermal, transdermal administration. These systems consist of aqueous dispersions of solid nanoparticles, composed of a mixture of solid and liquid lipids, and stabilized by one or two surfactants. NLCs are efficient systems to improve skin hydration, due to their physiological lipid composition and occlusive effect properties. Typically, NLC dispersions present a low viscosity, which is not advantageous for topical application, because it decreases the time of permeance at the application site. To avoid this, NLCs can be incorporated into traditional semisolid systems (e.g. hydrogels [HGs]), increasing the consistency of final formulations and also the long-term stability of the incorporated nanoparticles. NLCs have the usual particle diameter ranging 10–1000 nm. NLCs drug delivery system have many advantages like high biocompatibility, controlled drug release, high bioavailability, and the possibility of large industrial scale production[10].

1.2.1 Methods Employed in Fabrication of nlc's: There are several methods for the preparation of lipid
nanoparticulate DDS. In this type of DDS the drug especially depends on solubility and stability, the lipid matrix, route of administration, etc.

a) High pressure homogenization
b) Hot High pressure homogenization
c) Cold high pressure homogenization
d) Microemulsion technique
e) Solvent emulsification-evaporation technique
f) Solvent emulsification-diffusion technique
g) Phase inversion temperature (PIT) method
h) Melting dispersion method
i) Solvent injection (or solvent displacement) technique
j) Hot Homogenization Method

1.2.2 Applications of nlc's

a) Oral drug delivery
b) Drug delivery to brain
c) Pulmonary drug delivery
d) Intranasal drug delivery
e) Cosmetic Applications of NLC

Drug and Excipient Profile:

2.4.1 Drug profile of Ropinirole Hydrochloride:

Synonyms Ropinirole HCl

Description Selective D₂ receptor agonist.

Biological description Selective D₂-like receptor agonist. Displays high affinity for D₂ and D₃ but little for D₁ receptor.

Molecular Formula C₁₆H₂₄N₂O.HCL

Chemical structure

Molecular weight 296.84g/mol.

Chemical name 4-[2-(Dipropylamino)ethyl]-1,3-Dihydro-2H-indole-2-ol hydrochloride.

Appearance white to yellow powder.

Half life 6 hours.

Melting point 243-250°C

Water solubility 133mg/ml

Log P 2.70

Volume of distribution 7L/Kg

Protein binding 10-40%

Pka 9.5

Pharmacodynamics: Clinical experience with dopamine agonists, including ropinirole, suggests an association with impaired ability to regulate blood pressure with resulting orthostatic hypotension, especially during dose escalation. In some patients in clinical trials, blood pressure changes were associated with the emergence of orthostatic symptoms, bradycardia, and, in one case in a healthy volunteer, transient sinus arrest with syncope. The mechanism of orthostatic hypotension induced by ropinirole is presumed to be due to a D₂-mediated blunting of the noradrenergic response to standing
Mechanism of Action: Ropinirole is a non-ergoline dopamine agonist. The precise mechanism of action of ropinirole as a treatment for Parkinson's disease is unknown, although it is thought to be related to its ability to stimulate dopamine D2 receptors within the caudate-putamen in the brain. The precise mechanism of action of ropinirole as a treatment for Restless Legs Syndrome is unknown, although it is thought to be related to its ability to stimulate dopamine receptors[12].

3. Research Objective: The main objective of the formulation design is listed below:
   - To develop the Lipid nanoparticles of Ropinirole HCl by using simple and industrially feasible methods.
   - To maximize the drug release in the brain for better therapeutic or improved therapeutic performance.
   - To develop competent dosage form than the marketed dosage form.

4. Methodology
4.1. Materials: 4.1.1. Drug and Excipients

<table>
<thead>
<tr>
<th>S.n</th>
<th>Materials</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Ropinirole Hydrochloride</td>
<td>Ind-Swift, Mohali, Punjab (India)</td>
</tr>
<tr>
<td>2.</td>
<td>Isopropyl Myristate</td>
<td>CDH Central Drug House (P) Ltd., New Delhi</td>
</tr>
<tr>
<td>3.</td>
<td>Glyceryl Mono Stearate</td>
<td>Loba Chemie Pvt Ltd. Mumbai</td>
</tr>
<tr>
<td>4.</td>
<td>Pluronic F-68</td>
<td>Himedia Laboratories Pvt. Ltd., Mumbai</td>
</tr>
<tr>
<td>5.</td>
<td>Potassium di-hydrogen phosphate</td>
<td>Loba Chemie Pvt Ltd. Mumbai</td>
</tr>
<tr>
<td>6.</td>
<td>Sodium chloride</td>
<td>CDH Central Drug House (P) Ltd., New Delhi</td>
</tr>
<tr>
<td>7.</td>
<td>Potassium chloride</td>
<td>CDH Central Drug House (P) Ltd., New Delhi</td>
</tr>
<tr>
<td>8.</td>
<td>Potassium di-hydrogen orthophosphate</td>
<td>CDH Central Drug House (P) Ltd., New Delhi</td>
</tr>
<tr>
<td>9.</td>
<td>Sodium hydroxide</td>
<td>CDH Central Drug House (P) Ltd., New Delhi</td>
</tr>
<tr>
<td>10.</td>
<td>Calcium chloride</td>
<td>CDH Central Drug House (P) Ltd., New Delhi</td>
</tr>
<tr>
<td>11.</td>
<td>Orthophosphoric acid</td>
<td>CDH Central Drug House (P) Ltd., New Delhi</td>
</tr>
<tr>
<td>12.</td>
<td>Hydrochloric acid</td>
<td>CDH Central Drug House (P) Ltd., New Delhi</td>
</tr>
</tbody>
</table>

4.2. Methods:
4.2.1. Preformulation Studies: Preformulation studies are an investigation of physical and chemical properties of drug substance alone and when combined with excipients. It is first step in the rational development of any formulation.

API Characterization:
Melting Point: The melting point of the drug was determined using melting point apparatus. The sample was placed in apparatus and observed for the temperature at which the drug melts.

4.2.2. Analytical Studies:
Calibration Curve: Analytical method being a vital part of preformulation research and development obviates the need to develop reliable, effective, eco-friendly and cost-effective methodologies for routine analysis of active pharmaceutical ingredient. UV spectroscopy is one of the earliest yet of wide application in drug analysis in different formulation and quality control despite the availabilities of sophisticated chromatographic technique and other hyphenated technique current research attempts to develop simple, sensitive, accurate precise and economical UV spectrophotometric method for the routine analysis of Ropinirole HCl in bulk and pharmaceutical dosages from using simulated nasal fluid (SNF). The maximum absorbance was observed at 249.6 nm, beer’s law was obeyed in concentration 2, 4, 6, 8, 10, 12 μg/ml. [13].
• **Preparation of Simulated Nasal Fluid:** The Simulated Nasal Fluid (SNF) was prepared by accurately weighing the sodium chloride (NaCl) 8.77mg/ml, potassium chloride (KCl) 2.98mg/ml and calcium chloride (CaCl₂) 0.59mg/ml per litter in aqueous solution.

• **Preparation of 0.1N HCl Buffer:** The 0.1N HCl buffer was prepared by measured the 8.3ml of concentrated HCl and dissolve into litre distilled water. (IP, 2007).

• **Determination of Wavelength:** Ropinirole HCl 100mg was accurately weighed and transferred to 100 ml volumetric flask. It was then dissolved and diluted up to 100 ml with SNF. The above made solution was further diluted to obtain concentration of 20μg/ml. The resulting solution was scanned from 200-400 nm and the spectrum was recorded to obtain the value of maximum wavelength. The λ max was found to be 249.6 nm. The spectrum graph presented in the figure no.5.1

a) **Standard Calibration curve for Ropinirole HCL in SNF:** The drug Ropinirole HCl 100mg was weighed and transferred into 100ml volumetric flask. It was dissolved and diluted to volume with SNF to give stock volume containing 1000μg/ml. From the above solution 5ml was taken and transferred into 500ml volumetric flask and volume made upto 500ml with SNF. It was containing the 10μg/ml concentration. This standard stock solution was then serially diluted with SNF to get 2,4,6,8,10,12μg/ml and the absorbance of the solution was measured against SNF as the blank at 249.6nm using with UV spectrophotometer.

b) **Standard Calibration curve for Ropinirole HCL in 0.1N HCl:** The drug Ropinirole HCl 100mg was weighed and transferred into 100ml volumetric flask. It was dissolved and diluted to volume with 0.1N HCl to give stock volume containing 1000μg/ml. From the above solution 5ml was taken and transferred into 500ml volumetric flask and volume made upto 500ml with 0.1N HCl. It was containing the 10μg/ml concentration. This standard stock solution was then serially diluted with SNF to get 2,4,6,8,10 μg/ml and the absorbance of the solution was measured against SNF as the blank at 249.6nm using with UV spectrophotometer.

4.2.3. **Drug Excipient Compatibility Studies:**

a) **Fourier Transformed Infrared (FTIR) Spectroscopy Analysis:** The drug polymer interactions were analyzed by FTIR spectrophotometer (Perken-Elmer- spectrum-100 Japan). Two percent w/w of the sample, with respect to potassium bromide (KBr-SD Fine Chem. Ltd, Mumbai, India) was mixed with dry KBr. The mixture was ground into a fine powder using an agate mortar and then compressed into a KBr disc in a hydraulic press at a pressure of 10000 Psi. Each KBr disc was scanned 16 times at 2μm/size at a resolution of 4cm⁻¹ using Carson apodization. The characteristic peaks were recorded. Isopropyl Myristate, Glyceryl monostearate, and Pluronic F68 were conjugated with Ropinirole HCl. Due to this conjugation there may be chances of adsorption of some functional groups to the newly formed conjugate Lipid Nanoparticles. Hence, FTIR analysis was done to study the chemical properties of lipid nanoparticles conjugated Ropinirole HCl and after knowing the functional groups its bonding nature with NLC was also characterized[14].

b) **Differential Scanning Calorimetry (DSC):** DSC thermograms of pure drug Ropinirole HCl, drug loaded optimized formulation and physical mixture were recorded on a DSC equipment (NETZSCH DSC 200), in order to determine the physical nature of the drug and the polymers/carriers in the formulation. The 4–5 mg of each of the samples were weighed in aluminum pansand then crimped. The samples were scanned in the temperature range of 25-500ºC at a heat flow rate of 10ºC/min. The sample cell was continuously purged with nitrogen at a flow rate of 100 ml/min. [15]

4.2.4. **Formulation Methods:**

**Method of Preparation of Ropinirole HCl Nanoparticles:**

<table>
<thead>
<tr>
<th>Trial 1</th>
<th>Drug (mg)</th>
<th>IPM (%w/v)</th>
<th>GMS (%w/v)</th>
<th>Pluronic F-68 (%w/v)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composition</td>
<td>20</td>
<td>0.5</td>
<td>0.625</td>
<td>0.875</td>
</tr>
</tbody>
</table>

**Summary:** white milky emulsion was formed and stable.
Master sizer of prepared trial 1 has been shown in figure no. 4.1.

**Trial 2:**

<table>
<thead>
<tr>
<th>Composition</th>
<th>Drug (mg)</th>
<th>IPM (%w/v)</th>
<th>GMS (%w/v)</th>
<th>Pluronic F-68 (%w/v)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20</td>
<td>0.625</td>
<td>0.5</td>
<td>1</td>
</tr>
</tbody>
</table>

**Summary:** white emulsion was formed and stable.

Master sizer of prepared trial 2 has been shown in figure no. 4.2.

**Trial 3:**

<table>
<thead>
<tr>
<th>Composition</th>
<th>Drug (mg)</th>
<th>IPM (%w/v)</th>
<th>GMS (%w/v)</th>
<th>Pluronic F-68 (%w/v)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20</td>
<td>0.5</td>
<td>0.625</td>
<td>1</td>
</tr>
</tbody>
</table>

**Summary:** white milky emulsion was formed and stable.

Master sizer image of prepared trial 3 has been shown in figure no. 4.3.

**Plan of Action:** The trials results demonstrated that the concentration of drug and excipients were suitable for nanoemulsions based on that various concentrations may developed to select a best concentration for the nanoemulsions.

**4.2.5. Final Optimized Formula:**

**RNH1:**

Table N.o.4.3: Final Optimized Formula for RNH1

<table>
<thead>
<tr>
<th>S.No</th>
<th>Ingredients</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Drug (mg)</td>
<td>20</td>
</tr>
<tr>
<td>2.</td>
<td>Isopropyl Myristate (%w/v)</td>
<td>0.5</td>
</tr>
<tr>
<td>3.</td>
<td>Glyceryl monostearate(%w/v)</td>
<td>0.5</td>
</tr>
<tr>
<td>4.</td>
<td>Pluronic F-68 (%w/v)</td>
<td>0.875</td>
</tr>
</tbody>
</table>

NLC’s were prepared by using hot homogenization method.

**Summary:** white milky emulsion was formed. Quite stable product formed.

**RNH2:**

Table No.4.4: Final Optimized Formula for RNH2

<table>
<thead>
<tr>
<th>S.No</th>
<th>Ingredients</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Drug (mg)</td>
<td>20</td>
</tr>
<tr>
<td>2.</td>
<td>Isopropyl Myristate (%w/v)</td>
<td>0.5</td>
</tr>
<tr>
<td>3.</td>
<td>Glyceryl monostearate(%w/v)</td>
<td>0.625</td>
</tr>
<tr>
<td>4.</td>
<td>Pluronic F-68 (%w/v)</td>
<td>0.875</td>
</tr>
</tbody>
</table>

NLC’s were prepared by using hot homogenization method.

**Summary:** White emulsion was formed. Quite stable product formed.

**RNH3:**

Table No.4.5: Final Optimized Formula for RNH3

<table>
<thead>
<tr>
<th>S.No</th>
<th>Ingredients</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Drug (mg)</td>
<td>20</td>
</tr>
<tr>
<td>2.</td>
<td>Isopropyl Myristate (%w/v)</td>
<td>0.625</td>
</tr>
<tr>
<td>3.</td>
<td>Glyceryl monostearate(%w/v)</td>
<td>0.5</td>
</tr>
<tr>
<td>4.</td>
<td>Pluronic F-68 (%w/v)</td>
<td>0.875</td>
</tr>
</tbody>
</table>

NLC’s were prepared by using hot homogenization method.
**Summary:** White milky emulsion was formed. Quite stable product formed.

**RNH4:**

<table>
<thead>
<tr>
<th>S.No</th>
<th>Ingredients</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Drug (mg)</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>Isopropyl Myristate (%w/v)</td>
<td>0.625</td>
</tr>
<tr>
<td>3</td>
<td>Glyceryl monostearate (%w/v)</td>
<td>0.625</td>
</tr>
<tr>
<td>4</td>
<td>Pluronic F-68 (%w/v)</td>
<td>0.875</td>
</tr>
</tbody>
</table>

NLC's were prepared by using hot homogenization method.  
**Summary:** White milky emulsion was formed. Quite stable product formed.

**RNH5:**

<table>
<thead>
<tr>
<th>S.No</th>
<th>Ingredients</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Drug (mg)</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>Isopropyl Myristate (%w/v)</td>
<td>0.5</td>
</tr>
<tr>
<td>3</td>
<td>Glyceryl monostearate (%w/v)</td>
<td>0.5</td>
</tr>
<tr>
<td>4</td>
<td>Pluronic F-68 (%w/v)</td>
<td>1</td>
</tr>
</tbody>
</table>

NLC’s were prepared by using hot homogenization method.  
**Summary:** White Milky emulsion was formed. Quite stable product formed.

**RNH6:**

<table>
<thead>
<tr>
<th>S.No</th>
<th>Ingredients</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Drug (mg)</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>Isopropyl Myristate (%w/v)</td>
<td>0.625</td>
</tr>
<tr>
<td>3</td>
<td>Glyceryl monostearate (%w/v)</td>
<td>0.5</td>
</tr>
<tr>
<td>4</td>
<td>Pluronic F-68 (%w/v)</td>
<td>0.875</td>
</tr>
</tbody>
</table>

NLC’s were prepared by using hot homogenization method.  
**Summary:** White emulsion was formed. Quite stable product formed.

**RNH7:**

<table>
<thead>
<tr>
<th>S.No</th>
<th>Ingredients</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Drug (mg)</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>Isopropyl Myristate (%w/v)</td>
<td>0.625</td>
</tr>
<tr>
<td>3</td>
<td>Glyceryl monostearate (%w/v)</td>
<td>0.5</td>
</tr>
<tr>
<td>4</td>
<td>Pluronic F-68 (%w/v)</td>
<td>1</td>
</tr>
</tbody>
</table>

NLC’s were prepared by using hot homogenization method.  
**Summary:** White emulsion was formed. Quite stable product formed.

**RNH8:**

<table>
<thead>
<tr>
<th>S.No</th>
<th>Ingredients</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Drug (mg)</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>Isopropyl Myristate (IPM) (%w/v)</td>
<td>0.625</td>
</tr>
<tr>
<td>3</td>
<td>Glyceryl monostearate (GMS) (%w/v)</td>
<td>0.625</td>
</tr>
<tr>
<td>4</td>
<td>Pluronic F-68 (PF-68) (%w/v)</td>
<td>1</td>
</tr>
</tbody>
</table>
NLC’s were prepared by using hot homogenization method.

**Summary:** White milky emulsion was formed. Quite stable product formed.

### 4.2.6 Characterization and Evaluation of Ropinirole HCL Nanostructured Lipid Carriers.

**Table No. 4.11:** Final Optimized Formulas of Ropinirole HCL for Preparation of NLC’s [RNH1-RNH8]

<table>
<thead>
<tr>
<th>S.NO.</th>
<th>RNH1</th>
<th>RNH2</th>
<th>RNH3</th>
<th>RNH4</th>
<th>RNH5</th>
<th>RNH6</th>
<th>RNH7</th>
<th>RNH8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drug (mg)</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>IPM (%w/v)</td>
<td>0.5</td>
<td>0.5</td>
<td>0.625</td>
<td>0.625</td>
<td>0.5</td>
<td>0.5</td>
<td>0.625</td>
<td>0.625</td>
</tr>
<tr>
<td>GMS (%w/v)</td>
<td>0.5</td>
<td>0.625</td>
<td>0.5</td>
<td>0.625</td>
<td>0.5</td>
<td>0.625</td>
<td>0.5</td>
<td>0.625</td>
</tr>
<tr>
<td>P F-68 (%w/v)</td>
<td>0.875</td>
<td>0.875</td>
<td>0.875</td>
<td>0.875</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

5. Results and Discussion

5.1 Experimental Results:

5.1.1. Pre-Formulation Studies

**API Characterization:**

**Table No. 5.1. API Characterization Summary**

<table>
<thead>
<tr>
<th>S. No</th>
<th>API Characterization</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Description</td>
<td>White in color, amorphous in nature</td>
</tr>
<tr>
<td>2.</td>
<td>Water solubility</td>
<td>0.188mg/ml at 37ºC</td>
</tr>
<tr>
<td>3.</td>
<td>Melting point</td>
<td>245ºC - 250ºC</td>
</tr>
<tr>
<td>4.</td>
<td>PKa</td>
<td>10.28</td>
</tr>
<tr>
<td>5.</td>
<td>Polarisibility</td>
<td>31.32Å²</td>
</tr>
</tbody>
</table>

5.1.2. Analytical Studies:

**UV Analysis of Ropinirole HCL:** Scan of drug at concentration 20µg/ml had been shown in Figure No. 5.1

**Table No. 5.2. Calibration Curve of Ropinirole HCL in 0.1N HCL**

<table>
<thead>
<tr>
<th>Concentration (µg/ml)</th>
<th>Absorbance (nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>0.159</td>
</tr>
<tr>
<td>4</td>
<td>0.270</td>
</tr>
<tr>
<td>6</td>
<td>0.384</td>
</tr>
<tr>
<td>8</td>
<td>0.509</td>
</tr>
<tr>
<td>10</td>
<td>0.623</td>
</tr>
<tr>
<td>12</td>
<td>0.738</td>
</tr>
<tr>
<td>14</td>
<td>0.871</td>
</tr>
</tbody>
</table>
5.1.3. Drug –Excipient Compatibility Study:

Table No. 5.4: FTIR Drug Excipient Interaction Study Summary

<table>
<thead>
<tr>
<th></th>
<th>O-H Streching</th>
<th>C-N Streching</th>
<th>C-H Streching</th>
<th>C=O Streching</th>
<th>C-H Bending</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pure drug RNH(^a)</td>
<td>3651.9</td>
<td>1241.46</td>
<td>3303.2</td>
<td>1733.8</td>
<td>1445.28</td>
</tr>
<tr>
<td>RNH+GMS(^b)</td>
<td>3314.23</td>
<td>1243.24</td>
<td>2977.8</td>
<td>1729.13</td>
<td>1468.17</td>
</tr>
<tr>
<td>RNH+P.F68(^c)</td>
<td>3494.46</td>
<td>1243.12</td>
<td>2969.14</td>
<td>1740.2</td>
<td>1467.10</td>
</tr>
<tr>
<td>RNH+IPM(^d)</td>
<td>3450.58</td>
<td>1249.14</td>
<td>2977.1</td>
<td>1734.5</td>
<td>1465.14</td>
</tr>
<tr>
<td>RNH- NLC’s</td>
<td>3432.6</td>
<td>1250.72</td>
<td>2922.4</td>
<td>1735.5</td>
<td>1467.71</td>
</tr>
</tbody>
</table>

RNH\(^a\) (Ropinirole HCL), GMS\(^b\) (Glyceryl mono stearate), P.F68\(^c\) (Pluronic F-68), IPM\(^d\) (Isopropyl Myristate), RNH- NLC’s(Chemical mixture)
Evaluation of prepared RNH-NLCs:

**Table No. 5.5:** Particle Size Analysis of NLC’s by Master Sizer

<table>
<thead>
<tr>
<th>Code</th>
<th>Code Distribution Width (nm)</th>
<th>MPS*</th>
<th>SA(m²/g)</th>
<th>Span</th>
<th>Uniformity</th>
</tr>
</thead>
<tbody>
<tr>
<td>RNH1</td>
<td>0.7 6.65 260.64</td>
<td>89.33</td>
<td>41.1</td>
<td>14.634</td>
<td>15.7</td>
</tr>
<tr>
<td>RNH2</td>
<td>0.91 13.75 2700.18</td>
<td>904.95</td>
<td>27.8</td>
<td>108.871</td>
<td>28.4</td>
</tr>
<tr>
<td>RNH3</td>
<td>0.79 10.1 959.4</td>
<td>323.43</td>
<td>36.6</td>
<td>52.344</td>
<td>17.6</td>
</tr>
<tr>
<td>RNH4</td>
<td>0.85 12.35 2576.7</td>
<td>863.03</td>
<td>31.3</td>
<td>115.69</td>
<td>28.6</td>
</tr>
<tr>
<td>RNH5</td>
<td>0.72 8.05 274.86</td>
<td>94.54</td>
<td>43.4</td>
<td>18.567</td>
<td>12.7</td>
</tr>
<tr>
<td>RNH6</td>
<td>0.75 8.75 65.16</td>
<td>24.88</td>
<td>45.7</td>
<td>3.702</td>
<td>3.88</td>
</tr>
<tr>
<td>RNH7</td>
<td>1.1 147.3 1588.2</td>
<td>578.2</td>
<td>20.4</td>
<td>5.953</td>
<td>2.34</td>
</tr>
<tr>
<td>RNH8</td>
<td>0.69 7.5 225.45</td>
<td>77.88</td>
<td>45.2</td>
<td>16.224</td>
<td>13.1</td>
</tr>
</tbody>
</table>

*Mean particle size

**Table No 5.6:** Particle size determination of NLC’s of Ropinirole HCL by Malvern Zetasizer™ nano S90 [RNH1, RNH6, RNH8]

<table>
<thead>
<tr>
<th>Code</th>
<th>Code Distribution width (nm)</th>
<th>Z- average (d.nm)</th>
<th>P D I</th>
</tr>
</thead>
<tbody>
<tr>
<td>RNH1</td>
<td>109 256.5 670.5</td>
<td>238</td>
<td>0.263</td>
</tr>
<tr>
<td>RNH6</td>
<td>76.3 147.5 297.5</td>
<td>138</td>
<td>0.195</td>
</tr>
<tr>
<td>RNH8</td>
<td>112.1 208.7 403.5</td>
<td>206.3</td>
<td>0.223</td>
</tr>
</tbody>
</table>

**Table No 5.7:** Zeta Potential Analysis by Delsa nano™ Common

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Formulation code</th>
<th>Zeta potential (mV)</th>
<th>Mobility</th>
<th>Conductivity(Ms/cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RNH1</td>
<td>3.56</td>
<td>2.758e-004</td>
<td>0.1773</td>
</tr>
<tr>
<td>2</td>
<td>RNH6</td>
<td>-20.15</td>
<td>-1.565e-004</td>
<td>0.2599</td>
</tr>
<tr>
<td>3</td>
<td>RNH8</td>
<td>-13.17</td>
<td>-1.027e-004</td>
<td>0.2227</td>
</tr>
</tbody>
</table>

**Table No 5.8:** Drug Entrapment Efficiency of Formulations [RNH1-RNH8]

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Formulation</th>
<th>%Entrapment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RNH1</td>
<td>68.8±0.75</td>
</tr>
<tr>
<td>2</td>
<td>RNH2</td>
<td>59.1±0.34</td>
</tr>
<tr>
<td>3</td>
<td>RNH3</td>
<td>65.1±1.85</td>
</tr>
<tr>
<td>4</td>
<td>RNH4</td>
<td>62.0±0.76</td>
</tr>
<tr>
<td>5</td>
<td>RNH5</td>
<td>60.5±1.67</td>
</tr>
<tr>
<td>6</td>
<td>RNH6</td>
<td>82.8±0.75</td>
</tr>
<tr>
<td>7</td>
<td>RNH7</td>
<td>65.1±1.84</td>
</tr>
<tr>
<td>8</td>
<td>RNH8</td>
<td>79.2±0.94</td>
</tr>
</tbody>
</table>
Table No. 5.9: In-vitro Cumulative Percentage Drug Release of Formulations (RNH1 - RNH8)

<table>
<thead>
<tr>
<th>Time(hr)</th>
<th>RNH1</th>
<th>RNH2</th>
<th>RNH3</th>
<th>RNH4</th>
<th>RNH5</th>
<th>RNH6</th>
<th>RNH7</th>
<th>RNH8</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>16.8±0.49</td>
<td>14.17±0.36</td>
<td>10.94±0.25</td>
<td>12.03±0.20</td>
<td>12.46±0.23</td>
<td>13.17±0.32</td>
<td>12.43±0.30</td>
<td>12.22±0.25</td>
</tr>
<tr>
<td>1</td>
<td>18.46±0.25</td>
<td>16.27±0.30</td>
<td>13.56±0.26</td>
<td>15.73±0.25</td>
<td>19.04±0.29</td>
<td>16.11±0.36</td>
<td>19.01±0.29</td>
<td>18.06±0.32</td>
</tr>
<tr>
<td>2</td>
<td>22.47±0.33</td>
<td>18.64±0.55</td>
<td>16.96±0.36</td>
<td>16.61±0.22</td>
<td>20.12±0.24</td>
<td>17.94±0.25</td>
<td>21.92±0.36</td>
<td>18.06±0.41</td>
</tr>
<tr>
<td>3</td>
<td>24.43±0.44</td>
<td>24.81±0.39</td>
<td>18.20±0.35</td>
<td>17.89±0.23</td>
<td>20.77±0.27</td>
<td>18.11±0.26</td>
<td>24.99±0.45</td>
<td>23.72±0.21</td>
</tr>
<tr>
<td>4</td>
<td>26.47±0.27</td>
<td>29.68±0.66</td>
<td>25.76±0.45</td>
<td>20.77±0.14</td>
<td>21.73±0.21</td>
<td>20.18±0.16</td>
<td>24.98±0.20</td>
<td>41.36±0.30</td>
</tr>
<tr>
<td>5</td>
<td>42.14±0.71</td>
<td>34.64±0.43</td>
<td>27.64±0.41</td>
<td>25.43±0.21</td>
<td>22.03±0.20</td>
<td>26.41±0.30</td>
<td>25.98±0.45</td>
<td>45.26±0.63</td>
</tr>
<tr>
<td>6</td>
<td>48.14±0.94</td>
<td>41.74±0.12</td>
<td>33.03±0.28</td>
<td>38.64±0.44</td>
<td>30.78±0.23</td>
<td>42.42±0.31</td>
<td>37.0±0.4</td>
<td>46.9±0.56</td>
</tr>
<tr>
<td>7</td>
<td>51.94±0.45</td>
<td>46.88±0.56</td>
<td>38.77±0.85</td>
<td>42.63±0.45</td>
<td>33.17±0.23</td>
<td>44.32±0.38</td>
<td>47.71±0.29</td>
<td>52.67±0.75</td>
</tr>
<tr>
<td>8</td>
<td>57.19±0.53</td>
<td>51.80±0.98</td>
<td>41.18±0.29</td>
<td>48.72±0.46</td>
<td>38.71±0.44</td>
<td>47.79±0.20</td>
<td>51.46±0.48</td>
<td>57.89±0.45</td>
</tr>
<tr>
<td>10</td>
<td>62.22±0.98</td>
<td>56.22±0.46</td>
<td>45.49±0.21</td>
<td>53.12±0.12</td>
<td>46.09±0.29</td>
<td>46.76±0.36</td>
<td>55.04±0.46</td>
<td>60.75±0.49</td>
</tr>
<tr>
<td>12</td>
<td>65.41±0.45</td>
<td>60.99±0.45</td>
<td>52.20±0.29</td>
<td>58.96±0.15</td>
<td>51.18±0.42</td>
<td>53.37±0.42</td>
<td>56.68±0.74</td>
<td>68.41±0.45</td>
</tr>
<tr>
<td>16</td>
<td>68.81±0.02</td>
<td>65.74±0.21</td>
<td>56.96±0.89</td>
<td>65.02±0.25</td>
<td>59.17±0.45</td>
<td>62.04±0.75</td>
<td>64.31±0.75</td>
<td>72.29±0.45</td>
</tr>
<tr>
<td>20</td>
<td>74.1±0.34</td>
<td>70.23±0.36</td>
<td>63.88±0.14</td>
<td>70.15±0.37</td>
<td>66.55±0.36</td>
<td>73.66±0.96</td>
<td>72.86±0.12</td>
<td>78.42±0.13</td>
</tr>
<tr>
<td>24</td>
<td>79.47±0.96</td>
<td>73.85±0.23</td>
<td>68.99±0.37</td>
<td>72.65±0.65</td>
<td>76.64±0.46</td>
<td>85.51±0.99</td>
<td>78.1±1.3</td>
<td>82.73±0.45</td>
</tr>
</tbody>
</table>

Table No.5.10: Drug Release Kinetics of Best Formulation (RNH6)

<table>
<thead>
<tr>
<th>Formulation code</th>
<th>Zero order</th>
<th>First order</th>
<th>Higuchi</th>
<th>Korsmeyer peppas</th>
<th>Hixon Crowell</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R²</td>
<td>K₀</td>
<td>R²</td>
<td>Kᵣ</td>
<td>R²</td>
</tr>
<tr>
<td>RNH6</td>
<td>0.947</td>
<td>3.090</td>
<td>0.954</td>
<td>0.030</td>
<td>0.970</td>
</tr>
</tbody>
</table>

Table No.5.11: Stability Study of RNH6

<table>
<thead>
<tr>
<th>Time of storage</th>
<th>Colour</th>
<th>Drug release</th>
<th>%EE</th>
<th>Colour</th>
<th>Drug release</th>
<th>%EE</th>
</tr>
</thead>
<tbody>
<tr>
<td>4°C</td>
<td></td>
<td></td>
<td></td>
<td>27°C±75%RH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 day</td>
<td>No change</td>
<td>71.38±1.34</td>
<td>68.42±1.23</td>
<td>No change</td>
<td>75.34±1.20</td>
<td>70.55±1.22</td>
</tr>
<tr>
<td>1 day</td>
<td>No change</td>
<td>79.59±1.34</td>
<td>65.1±1.84</td>
<td>No change</td>
<td>80.25±1.22</td>
<td>68.23±0.11</td>
</tr>
<tr>
<td>1 week</td>
<td>No change</td>
<td>82.89±1.45</td>
<td>80.8±0.75</td>
<td>No change</td>
<td>84.25±1.41</td>
<td>81.5±0.96</td>
</tr>
<tr>
<td>1 month</td>
<td>No change</td>
<td>85.45±1.54</td>
<td>63.1±0.34</td>
<td>No change</td>
<td>89.75±1.32</td>
<td>69.23±0.55</td>
</tr>
</tbody>
</table>

6. Summary and Conclusion: Based on our laboratory studies the following conclusions can be drawn. Ropinirole HCl NLC’s were successfully prepared using Isopropyl myristate, Glycerol monostearate, Pluronic F 68 for the effective therapeutic action.
The drug excipient compatibility studies ruled out any possibility of interaction between drug and excipients by FTIR.

The formulation developed was subjected to various analysis and results were found to be satisfactory. As the formulation is size specific the size of the formulations were confirmed by Master sizer technique in preliminary level which is later confirmed by sophisticated instruments like Delsa Nano™ C and Transmission Electron Microscopy (TEM).

It was found that most of the formulations developed were within the nano range. The results were presented in the respected tables for references.

The best formulations were subjected to Transmission electron microscopy (TEM) analysis for the study of morphology and size and the results confirmed that the particles were in spherical shape and the drug was encapsulated in it. The drug release kinetics studies demonstrated that the best formulation RNH-6 follow Higuchi release kinetics. The mechanism of drug release was found to be non-fickian anomalous diffusion. Also confirmed that particle size is within the nano range.

In-vitro drug release studies revealed that controlled release pattern was followed in SNF.

The best formulation from RNH-1 to RNH-8 was RNH-6 with the following parameters.

- Mean particle size: 138 nm
- PDI: 0.195
- Zeta potential value: -20.15 mV
- % Entrapment efficiency: 82.8±0.75
- In vitro drug release: 85.6±2.99% in 24 h

The study confirmed that the NLCs can be prepared by using the drug and the excipients such as IPM, Glyceryl mono stearate and Pluronic F-68. The prepared formulations were found to be stable based on the report of short term stability studies but the long term stability studies were also recommended. Further it is advised that the same work should be confirmed for its therapeutic efficacy with the animal/human clinical trials.

Acknowledgement: The authors are highly thankful to all staff members of University Institute of Sciences, Sant Baba Bhag Singh University, Jalandhar, Punjab, INDIA and Rayat-Bahra Institute of Pharmacy, Education City, Hoshiarpur, Punjab, India for their constant encouragement and support for preparing this article. The authors hereby declare no conflict of Interest.

References:


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THE STATE OF THE ART IN VISUALIZATION OF CLIMATE AND CLIMATE CHANGE DATA

DR. J. INDUMATHI

Abstract: Visualization of climate, social and ecological data is a conspicuous topic of research over the last epoch. The key technology of Visualization is used for analyzing and presenting climate simulations and observations to decision makers and to the general public in an easily-understandable way. The climate and climate change visualization techniques have progressed to deal with complex multidimensional data sets, including temporal, relational and geospatial aspects. They range from the basic pie and bar charts to extensive visual analytics systems involving novel representations. This paper presents an overview of the state-of-the-art in climate Visualization, integrating standard visualization techniques, tools and systems as well as other approaches from visualization literature. Moreover, particular aspects such as the basic usage of complex visualization systems, climate model and data quality and the amalgamation of statistics and visualization is explained. This survey will also be a guide for the visualization researchers. In conclusion, we discuss insights and opportunities for further research in climate and climate change visualization techniques.

Keywords: Visualization, Climate, Climate Change, and Statistics.

1. Introduction: Climate change refers to variations in modern climate, including the rise in average surface temperature. The climate modelers need techniques to handle the generated large simulation data sets. Moreover, the improvisation of observation techniques further lead to the increase in climate related data. To analyze these data for patterns and statistical relations between the variables, we need techniques to overcome the bottleneck and exhibit the conclusions arrived from simulation data.

The challenges faced in design of intuitive and meaningful visual representations in climate context are:

- The climate data is heterogeneous (spatial, temporal, multi-variate; gridded, region-based, station-based; ...) and it needs a variety of standard visualizations (e.g. 2d-maps, 3D-globes), time charts and scatterplots). We also require intuitive visualization techniques to analyze large time-dependent 3D or long time series data multi-varietally and interactively.
- The user groups to whom the data should visualize are heterogeneous like users with diverse skills, qualification grades, interests, and from dissimilar disciplines, who are defied with copious tasks.
- The application of visualization to scientific data is not direct, because of the diversity of obtainable tools, techniques and parameters. Sophisticated tools (graphical user interfaces, visualization design, ...) are indispensable.

2. History of Data Visualization: A picture is worth a thousand words goes a famous saying. The concept of using pictures to easily and quickly convey the data in hand has been around for centuries. The have been ranging from maps and graphs in the 17th century to the creation of the pie chart in the early 1800s. The statistical graphics developed by Charles Minard showed the Napoleon’s invasion of Russia is a very good example of data visualization. The Charles Minard map portrayed the size of the army, path of Napoleon’s retreat from Moscow. The genesis of computing power truly lit the fire of data visualization at lightning-fast speeds. Today, data visualization has become a quickly progressing blend of science and art that is certain to change the ecological landscape of future climate and climate change over the next few years.

3. Visualisation and Data Visualization: The process of creating images by filtering, mapping and rendering of data is called as Visualization. Different people have given different definitions. But all convey the same meaning of a pictorial depiction (as in table 1). Data Visualization is defined as any effort to help anyone comprehend the significance of data by placing it in a visual context. In order, to expose the patterns, trends and correlations that are undetected in text-based data is exposed and recognized easily with data visualization software.
Table 1: Definitions of Visualization:

<table>
<thead>
<tr>
<th>DEFINITION FOR VISUALIZATION</th>
<th>AUTHOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Transformation of the symbolic into the geometric”</td>
<td>[McCormick et al. 1987]</td>
</tr>
<tr>
<td>“... finding the artificial memory that best supports our natural means of perception.”</td>
<td>[Bertin 1967]</td>
</tr>
<tr>
<td>“The use of computer-generated, interactive, visual representations of data to amplify cognition.”</td>
<td>[Card, Mackinlay, &amp; Shneiderman 1999]</td>
</tr>
</tbody>
</table>

4. Why Create Visualizations?: Visualizations are created to:
- Answer questions (or discover them)
- Ascertain areas that need attention or improvement.
- Elucidate which factors influence customer behavior.
- Expand memory
- Find patterns
- Forecast sales volumes
- Help you comprehend which products to place where.
- Inspire
- Make decisions
- Present argument or tell a story
- See data in context
- Support graphical calculation

5. Classification of Data Visualization Techniques: The most established visualization techniques are categorized in geometric, icon-based, pixel-oriented, hierarchical, graph-based, or hybrid class.
- **Graph-Based** - Basic Graph (Straight-Line, Polyline, Curved-Line) [Battista G. D., et al.,(1994)]
- **Hybrid** - Arbitrary combination from above

6. Literature Survey: Visualization techniques are available for different data classes, e.g. flow, volume and multivariate visualizations (for overviews see Brodlie & Wood (2001), Laramee et al. (2004), Bürger & Hauser (2007)). The current decade has witnessed, new developments in establishing visualization as a flexible, easy-to-use data exploration tool (e.g. Shneiderman, 1996), relating right with the image and linking several views to the data. The Visual Analytics is a novel approach combining human perception abilities with automatic computational methods, permitting new insights into huge amounts of data sets (e.g. Thomas (2007)).

Visualization has a long folklore for meteorology and climatology (e.g. Galton (1863)). The current computer based climate visualizations are subdivided into two major approaches: climate and climate impact researchers applying standard visualization tools and visualization researchers applying techniques / tools under development for visualizing weather and climate data. Treinish (1999) classifies visualization techniques (for meteorological data) into four classes due to their dimensionality and interactivity.
Furthermore, there is a variety of implicit conventions and guidelines for the visualization of meteorological and climate data, including colour mapping, iconic wind vector mapping, axes labelling and geographic projections (American Meteorological Society (1993), Treinish (1994), Baker & Bushell (1995), Treinish (1999), Kottek & Rubel (2003)).

Most frequently, climate data is visualized in their temporal reference to identify temporal trends directly using time charts. For the representation of aggregated data values, interpolated stacked bar charts are frequently used for multi-variate trend analysis (e.g. Nocke et al. 2004). An alternative approach is 2-tone colour mapping (Saito et al., 2003) which compactly represents longer climate time series. Other temporal visualization techniques such as pixel-oriented visualizations are rarely used.

![Figure 2: A Chart for Selecting The Proper Data Visualization Technique For A Given Situation](https://towardsdatascience.com/5-quick-and-easy-data-visualizations-in-python-with-code-a2284bae952f)

Being of similar importance, meteorological and climate data are represented in their spatial reference, with animation to display the time axis. Table 1 summarizes work done in spatial visualization due to the spatial data dimensionality, the data grid and the data type. In many cases, the multi-variate properties of climate data are of interest, typically in combination with spatial and/or temporal reference of the data. Beside static representations of scatterplots (Stier et al., 2005), scatterplots are used to interactively select certain features and analyse their spatial and temporal behaviour (Macedo et al. (2000), Doleisch et al. (2004)). Other techniques representing high dimensional climate data, such as scatterplot matrices, parallel coordinates, graphical tables or using multi-dimensional scaling are less frequently used (e.g. Nocke et al. (2007), Jänicke et al. (2008a)).
7. What Makes A Visualization “Good”? A visualization is very good when it is able to satisfy the following:

- **Expressiveness** – all and only the facts in the data should be expresses by the visual language.
- **Effectiveness – the information** A visualization is more effective than another visualization if the information conveyed by one visualization is more readily perceived than the information in the other visualization.
- **Congruence** - The structure and content of the external representation should correspond to the desired structure and content of the internal representation.
- **Apprehension** - The structure and content of the external representation should be readily and accurately perceived and comprehended.

8. Conclusion: Visualization is used as a tool in climate and climate impact research. This tool is used to communicate results between all the climate stakeholders. The visualization techniques, tools and systems can be anything ranging from common purpose office systems, mathematical packages and GIS to distinct purpose climate visualization tools. Recently, the interactive visualization is catching up using alternative visual metaphors. There is a pressing need for the research community to devise and use sophisticated visualization approaches, which will support and assimilate the substitute visualization techniques into the users’ ongoing research processes.

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18. Jánicke, H., Böttinger, M., & Scheuermann, G. (2008a), Brushing of Attribute Clouds for the Visualization of Multivariate Data, accepted at IEEE Visualization'08


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Social &
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EXAMINING THE IMPACT OF TRAUMA AND DELINQUENT BEHAVIOR AMONG FEMALE AFRICAN AMERICAN TEENAGERS

DR. ANITA BLEDSOE-GARDNER, MARY HOLIMAN

Many criminologists, racial, and ethnic social justice activists are raising concerns that African-American girls are the fastest growing population in the juvenile justice system, despite an overall decline in juvenile arrests (Crenshaw, Ocen, & Nanda, 2015). However, research regarding juvenile justice and delinquency typically centers around the white, male population. The psychological theory of crime, coined by Sigmund Freud, states that as painful internal conflict develops between the id and the ego, problematic defense mechanisms that often manifest into delinquent behavior are developed to cope with the conflict. Therefore, if it can be said that females are more likely to experience interpersonal victimization and trauma than males, this poses the question “Does exposure to trauma increase the risk of delinquency in teenage, black girls in urban areas?” The project will use primary data and two (2) survey instruments: 1) Negative Life Events Index and 2) General Strains and Delinquency Questionnaire to examine the correlation between the effects of trauma and female delinquency.

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AFUA COOPER AND POETICS OF MEMORY

PROF. HANNAH PADMA

Abstract: Jamaican-born Dr. Afua Cooper is a celebrated and award-winning poet, author, historian, curator, performer, cultural worker, recording artist, Poet –Laureate of Halifax, and Associate Professor of Sociology and Anthropology at Dalhousie University, Canada. Her poems have been anthologized in national and international publications, and translated in several languages, and she has published five books of poetry, including the award-winning Memories Have Tongue. Her newest book of poetry, Copper Woman, is a work in which she attempts to bring together the personal and the political, the exoteric and the esoteric. Cooper believes that poetry brings people together. In her poetry, Cooper offers homage to her ancestors, some of them Yorubas and addresses women in different cycles of life. A close examination of Cooper’s “Memories Have Tongue” reveals the value and importance of memories through a conversation between a grandchild and a grandmother. The grandmother in this poem repeatedly says she has a bad memory. This conversation enables the poet to have a quarrel with the social structures of Jamaica and Toronto. She moves back and forth between rhetoric and a loosely structured poetry of lamentation and celebration. Cooper’s poetry contradicts those critics who regarded the texts of performance poetry (Dub Poetry) as trivial and conventional. Most of her poems are written in the authentic Jamaican “vernacular.” As a Dub artist, Cooper uses “code-switching” to invade official language by inserting terms from her repertoire and lays claim to a form of cultural power- a power to own but not be owned by the dominant language. An attempt is made in this paper to analyze the “Poetics of Memory” in the poems of Afua Cooper.

Keywords: Jamaican Diaspora, Memory, Dub Poetry, Standard English, Canadian Poetry.

***

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THE EXTEND OF GENDER AMONG NEW GENERATION ADOLESCENT GIRLS – A STUDY BASED ON BAHRAIN AMONG 12TH GRADE FEMALE STUDENTS

SHEMILY.P.JOHN, DR.K.R.MURUGAN

Abstract: Gender is the basic foundation of discrimination among girls and boys existing in all the cultures and communities around the world, varying in different proportions and forms. The existence of being a girl or a boy, how it is to be learnt determined by societies, families and educational systems itself. Gender stereotypes and models have been the curse of centuries and there is a massive realization and revolutionary transformation happened during the past years around the world. Women are found to be the integral part of a nation’s infrastructure as well as the pillar of development. Globally there has been substantial attempts and initiatives to wipe out every single stain of discrimination in the nook and corner of the world.

This study, is an investigation, to identify the changes evolved due to the slogan of total equality, if the concept of gender persisting still among the female students and what is the extent of it if gender has still a threatening existence. This study would enlighten some important measures to be initiated with in the educational system so that in the future, ‘gender discrimination will never affect development and growth of any individual female to her fullest’

The survey will be conducted among Indian students those who are in the 12th grades among various CBSE schools. The schools are international standards and are equipped with high quality atmosphere and faculty. The data will be collected from among 12th grade girls in order to investigate the genuine and authentic responses towards the various aspects of gender if they are aware of and how do they manage these obstacles or how it’s affecting them This study may lit light to the areas to be restored, the common issues which can be easily dealt with from among family members, the challenges which has to be eliminated as societies and as a nation.

Keywords: Gender, Discrimination, Challenges, Awareness.

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SOCIAL TRANSFORMATION THROUGH WOMEN EMPOWERMENT
(A CASE STUDY IN INDIA -ASIA AND ETHIOPIA -AFRICA -CONTEXT)

DR. KARANAM VISWA BHUSHAN, DR.AJAY PRASHER

Abstract: The women's empowerment is getting global attention with priority agenda in promoting gender equality and women's rights. It is a precondition for women development and pro-poor growth and is essential to reduce poverty and promotes gender equality and women empowerment in order to enhance productivity, improve development outcomes for the next generation and make institutionalized. Empowerment of women which liberates from a life of poverty in turn it is a great contribution to the country's economic growth. It is well known that one significant factor inhibiting poverty reduction and economic growth across the developing world is the failure of identifying and valuing the worth women's work. It is undeniable fact that the achievement of economic growth is liable upon the full use of the skills and capacities of women.

It is clearly emphasized that to create a just and sustainable world it is important to enhance women's roles in sustaining their families and communities, achieving gender equality is vital (UN Women, 2014). Social transformation which is one component of development and it is unthinkable without the active involvement and social empowerment of women. It is important to achieve social economic, political, cultural transformation and thereby attain social transformation by improving all the socially restricted customs and wrong perceptions towards women in the society so empowerment is essential from the family level. Ethiopia is one of the countries in Africa where there exists a high rate of maternal mortality and child mortality despite strong efforts being made by the government through intervention measures (Solomon and Memar, 2014). The participation of women in local political, administrative and development leadership and decision-making process is totally negligible in Ethiopia (Ministry of women and Children, 2016).

The researchers focused at the various development and welfare activities for women in India as well as in Ethiopia, related case studies are conducted, focusing at the process of empowerment of women. It is noted that majority of women are illiterate and live in poverty thereby not aware of the developmental programmes which are for their empowerment. The research paper helps to develop the understanding on the position of women and process of empowerment. It also reveals success stories so both the countries can exchange the experiences for the better future of the women and for their progress in all aspects.

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COVERAGE OF DEVELOPMENT ISSUES IN THREE MAJOR KANNADA DAILIES; A COMPARATIVE STUDY

P. ANJU

Abstract: A Morning would be considered definitely Good, if a tea/coffee is accompanied by a newspaper. Ofcourse, to gain basic knowledge even in the present era, newspapers play a very important role in an individual's life, as because of time constraints we the people cant afford to watch television to get minute to minute updates, or either hold a phone in a work place constantly, or during other daily course. But, how far do we assess the content of the newspaper...?? and thats a big question mark. Is the newspaper worth a read or atleast a glance. While a whole lot of reasearch's speak about the advertisements in newspapers, and how commercialization has affected the print journalism, and how editorials and other stories are influenced by various factors, The researcher here is trying to understand if there is still some worthy content which can be read in newspapers, And has chosen developmental stories as an example for worthy content. Hence, the analysis of how many developmental stories appear within a month in three major kannada dailies of india is conducted with the help of Quantitative content analysis. The scope of the study is relevant and the review of literature shows comparatively less research done in this area.

Keywords: Newspaper, Development, Coverage, Three Major Kannada Dailies, Issues.

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FEMALE SUBJUGATION AND A SEARCH FOR AUTONOMOUS SELFHOOD IN HENRIK IBSEN’S PLAY A DOLL’S HOUSE

SANA PERWEEN

Abstract: Henrik Johan Ibsen was a major 19th century Norwegian playwright, theatre director and a poet. He is considered one of the greatest modern playwrights and his writings has given him the title of Father of Realism. He also founded Modernism in theatre. This paper throws the light on the role of women and their oppression in Henrik Ibsen’s play A Doll’s House(1879). Ibsen, being a feminist and a humanist depicts the status of women in society through his protagonist Nora in this play. Simone de Beauvoire gave the term woman as “the Other”. This concept has been broadly highlighted by portraying the stereotypical system of marriage and the adverse impacts of patriarchy on women. Nora, wife of Torvald and a mother of two is behaving like a doll or a puppet as she is constantly controlled by the invisible hands of the male dominant society. Throughout the play Nora has been given pet names by her husband like “my little squirrel”, “my little lark” or “spendthrift” and speaks down about her and also he has a thought in his mind the she is dumb and can not think on her own. His dominant nature runs throughout his nerves which protects him to think that she too is a human being who loves to feel free about herself and her thoughts. This paper will also focus on the dauntless choice made by Nora in the final act of the play where she chooses to be herself rather than being a puppet and giving the strings of her life to be handled by someone else. Her vanity makes way for her to enjoy her selfhood, individuality and womanhood eventually.

Keywords: Modernism, Patriarchy, Womanhood, Individuality.

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THE USE OF SYMBOLISM IN THE SRI AUROBINDO GHOSH

ASHWANI KUMARI, DR. DINESH SHARMA

Abstract: As regards symbolism it is through symbols that we express more than one meaning. Symbols sharpen the language, broaden the view and brighten the image and thereby enrich the language. They are the best vehicle to convey the concepts[1]. Thus, they convey ‘pure sensations’ or the poet understands of the mystery of the world.

Introduction: Symbolism thus is the use of symbols to signify ideas and qualities, by giving them symbolic meanings that are different from their literal sense. It deals with the totality and the absoluteness, and gives “dumb things voices and bodiless things bodies”. To put it differently through symbols, thus, a writer can express much more than by the use of ordinary worlds. Ideas and emotions which are otherwise intricate and inexpressible become articulate and meaningful through the use of the symbols.

Apart from their surface meaning, they evoke before the reader’s mental vision a host of associations connected with them, and are also rich in emotional significance. To take an example, the world lily’ simply means a ‘flower’, but it also calls up images of beauty and innocence, and carries with it the emotional overtone of pity resulting from suffering. Thus symbolism can take different forms. Symbolism is a way of expressing things indirectly, the symbolic art become subtle, complex and obscure[2]. Generally, it is an object representing another, to give an entirely different meaning that is much deeper and more significant. Sometimes, however, an action, an event or a word spoken by someone may have a symbolic value. Symbols may be of two kinds:

1) Traditional
2) Personal

Traditional symbols are the stock symbols which are in vogue and commonly used. For instance, the word ‘rose is a common symbol of beauty and it has been in use from the earliest times. Personal symbols, on the other hand, are the creation of the poet himself. For instance, “smile” is a symbol of friendship[3]. Similarly, the action of someone smiling at you may stand as a symbol of the feeling of affection which that person has for you.

Symbols do shift their meanings depending on the context they are used in. “A chain,” for example, may stand for “union” as well as “imprisonment”[4]. Thus, symbolic meaning of an object or an action is understood by when, where, and how it is used. It also depends on who reads the work.

In our daily life, we can easily identify objects that can be taken as examples of symbolism, such as the following:

• The dove is a symbol of peace.
• A red rose, or the color red, stands for love or romance.
• Black is a symbol that represents evil or death.
• A ladder may stand as a symbol for a connection between heaven and earth.
• A broken mirror may symbolize separation.
• To develop symbolism in his work, a writer utilizes other figures of speech, like metaphors, similes, and allegory, as tools[5]. Some symbolism examples in literature are listed below with brief analysis:

• The famous monologue in Shakespeare’s play As you Like It contains a great symbolic value:
  “All the world’s a stage,
  And all the men and women merely players;
  they have their exits and their entrances;
  And one man in his time plays many parts,”

• These lines are symbolic of the fact that men and women, in the course of their lives, perform different roles. “A stage” here symbolizes the world, and “players” is a symbol of human beings[6].
• William Blake goes symbolic in his poem Ah Sunflower. He says:
“Ah Sunflower, weary of time,
Who countest the steps of the sun;
Seeking after that sweet golden clime
Where the traveler’s journey is done;”

Blake uses a sunflower as a symbol for human beings, and “the sun” symbolizes life. Therefore, these lines symbolically refer to their life cycle and their yearning for a never-ending life.

Finally, it can be concluded that symbolism gives a writer’s freedom to add double levels of meanings to his work: a literal one that is self-evident, and the symbolic one whose meaning is far more profound than the literal. Symbolism, therefore, gives universality to the characters and the themes of a piece of literature. Symbolism in literature evokes interest in readers as they find an opportunity to get an insight into the writer’s mind on how he views the world, and how he thinks of common objects and actions, having broader implications.

**Characteristics of Symbolism:** The English word ‘Symbol’ owes its origin to the Greek word, ‘Symbolon’ meaning ‘a sign’ by which one knows or infers a thing. Swami Swahananda, in one of his articles states that, “a symbol, typifies, represents or recalls something by possession of analogous qualities or by association in the fact or thought”. Human beings use symbols so much so that it has become an innate tendency in them.

In due course, symbols began to be used to interpret more and more abstract things, thoughts, human virtues, beliefs, and faiths and so on. Naturally, artists, poets and writers took to symbols as fish take to water. While artists including painters and sculptors used symbols to depict variety of moods and thoughts in their colouring schemes and models respectively, poets with their rich imagination weaved tapestries of scenarios in words with rhymes and rhythms, which came to be called as poems, sonnets etc.

**Significance of Symbolism:** The *modus operandi* is simple. The phenomenon is transformed into a concept, or an idea by the symbol, the idea, in turn, is depicted into an image and the image captures the thinking faculty of the seeker and stays permanently there. Henceforth, every time he seeks the phenomenon, he has only to recall the symbol. Whether he attains the ultimate goal or not is another question.”

Let us now see now how Sri Aurobindo views symbols.

For him, symbol is a form on one plane that represents a truth on the other. The following are a few kinds of symbols as enumerated in his *Letters on Yoga*.

There are conventional symbols handled by ancient rishis taken from the objects around them. Cows represented prized possessions which had to be guarded against theft. Vedic Sanskrit attributes more meaning like ray or light to the word ‘go’. Therefore, they symbolised cows as images of spiritual light. Likewise horses were symbols of power and energy.

There are also life-symbols which are not chosen deliberately but which come naturally and are seen in the day-to-day life. They are closer to nature such as mountains and rivers. There are mental symbols like numbers, letters, words and geometric forms. When activated they too become useful tools. In other words, for Sri Aurobindo a symbol depicts the inward vision or experience of things and is one that is too subtle to be brought on to the intellectual level.

The study of symbols in the Sanatana Dharma could be done in the same order as Sri Aurobindo has done. He being the torch bearer for the revival of Vedic Age, more so in its ancient and eternal spirit which is cast into new forms suitable for modern times, has extensively dwelt in the interpretation of Vedic scriptures and the true meaning of the verses. In his analysis of the evolution of human society, he found that in the early stages there existed a strong symbolic mentality that governed or at least pervaded its thoughts, customs and institutions. The early
stages of the society were more religious also. This was because, as Sri Aurobindo points out, “symbolism and a widespread imaginative or intuitive religious feeling have a natural kinship and especially in earlier or primitive formations they have always gone together.” Therefore everything was symbolic.

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COMPARISON BETWEEN FOOTBALL AND TUG OF WAR MEN PLAYER ON EMOTIONAL STABILITY

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Abstract: For the purpose of the study, 36 subjects (18 football men player and 18 Tug of war men player) were selected randomly from Sant Baba Bhag Singh University. The age level of the subjects ranged from 18 to 25 years. The Emotional Stability Inventory developed by A San Gupta has been applied in the present study. The maximum possible score of this test is 15. In Emotional Stability Test for Children, each item of the test is scored as either +1 or 0. There are two types of items in this test, that is, positive and negative. All positive items are endorsed by the subjects as 'Yes' and the negative items (items No. 9 and 10) and endorsed by the subjects as 'No' is given score of +1. A Score of zero is given for all other answers. This high score on the test indicates low emotional stability or control and whereas low score on the test indicates high emotional stability or control. The collected data were put to statistical treatment applying t-test to find out the differences, if any between football and Tug of war men players. The level of significance was set at 0.05. The results thus coming out showcase a significant difference of Emotional Stability between football and Tug of war men players.

Keywords: Emotional Stability, Boys, Football, Tug of War.

Introduction: Emotional stability is not only one of the effective determinants of the personality patterns, but it also helps to control the growth of adolescent development. The concept of stable emotional behavior at any level is that which reflects the fruits of the normal emotional development. An individual who is able to keep his emotions stable and under control even in extreme situations, might still be emotionally stunned or be childish in his behavior sometimes. Therefore, emotional stability is considered as one of the important aspect of human life. Pupil must be able to control his/her emotions adequately and also expressed them appropriately. Scott (1968) opined that emotional stability as one of the seven important indicators of superior mental health. It also affects the learning of the pupils. Emotional control may impair performances in situations which require flexibility and adaptability on the part of the person or pupil. If the pupil has very little emotion control, it may lead to anxiety, inferiority feeling and guilt. (Fandsen, 1961). It has also been found that if the people want to be mentally healthy, these unhealthy feelings must be replaced by the feeling of self-respect, security and confidence which can be achieved only after a good sense of emotional stability emerges. Emotional stability overcomes the fear generated by past errors; it also allows us to pursue our superior ideals and be of service to others whenever we wish to do so. It neutralizes environmental instability and helps us to face pressures or facilities with equal poise, refraining from excess and extravagance. When aware of our mission on earth, we should set ourselves a goal and strive to attain it. We should neither stop nor run, but walk on firmly and steadily, never disturbing others. Our faith in the truth of everlasting life should help us to act serenely. We should ask our self what we expect from life, how we plan to achieve it and why we want it. Emotional stability refers to a person’s ability to remain calm or even keel when faced with pressure or stress. Someone who is emotionally unstable is more volatile, which means the person faces an increased risk of reacting with violent or harmful behaviors when provoked.

Statement: The statement of problem is “Comparison between football and tug of war men player on emotional stability”.

Objective: The purpose of the study is to compare Emotional Stability between football and tug of war men player.

Hypothesis: There is no significant difference of Emotional Stability between football and tug of war men player.

Limitation: 1. No special motivational technique was used during the test.
2. The investigator was unable to control their daily routine, training and competition schedules.

**Delimitations:**
1. The study was delimited to 18-25 years age group.
2. The study was delimited to football and tug of war men player of Sant Baba Bhag Singh University.

**Methodology:** For the purpose of the study 36 subjects (18 football men player and 18 Tug of war men player) were selected randomly from Sant Baba Bhag singh university The age level of the subjects ranged from 18 to 25 years All the samples were selected on random basis. To solve above mentioned problem. For assessing Emotional Stability of students, Emotional Stability Inventory is developed by A San Gupta was used & this inventory is highly reliable & valid.

**Tools and Scoring:** The Emotional Stability Inventory developed by A San Gupta has been applied in the present study. The maximum possible score of this test is 15. In Emotional Stability Test for Children, each items of the test in scored as either +1 or 0. There are two types of items in this test, that is, positive and negative. All positive items which are endorsed by the subjects as ‘Yes’ and the negative items, items No. 9 and 10. Which are endorsed by the subjects as ‘No’ are given score of +1. A Score of zero is given to all other answers. This high score on the test indicates low emotional stability or control and whereas low score on the test indicates high emotional stability or control.

**Statistical Procedure:** The data was analyzed and compared with the help of statistical procedure in which arithmetic mean; standard error mean, standard deviation and ‘t’ test was used to compare the data.

**Results:**

**Table 1:** Comparison between football and tug of war on Emotional Stability

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>MD</th>
<th>'t' Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>football</td>
<td>18</td>
<td>7.33</td>
<td>0.78</td>
<td>1.30</td>
<td>5.88</td>
</tr>
<tr>
<td>Tug of war</td>
<td>18</td>
<td>6.03</td>
<td>0.44</td>
<td>1.30</td>
<td></td>
</tr>
</tbody>
</table>

From table no.1 the result found that tug of war has low emotional stability (M= 6.03, SD= 0.44) as compared to football (M=7.33, SD= 0.78). The ‘t’ value is 5.88 which is more than tabulated value, show that there is a significant difference at .05 level.

**Conclusion:** Recognizing the limitations of these studies and on the basis of statistical findings the following conclusions may be drawn that tug of war players have low emotional stability as compared football players and there was significant difference among the football and tug of war players. Whatever is the situation the differences are bound to be there depending upon the conditions.
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NARRATIVE VOICES IN THE WORK OF ALAN SILLITOE
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Abstract: This paper will scrutinize passages from a range of Alan Sillitoe’s prose fiction, Saturday Night and Sunday Morning (1958) and short stories from the collection “The Loneliness of the Long-Distance Runner” (1958), via a relative exploration of the texts’ representations of Midlands English demotic. The narrative discourse traces a connection between the experience of the Midlands English working classes represented and the demotic verbal communication they speak; the narrators have voices malodorous of registers rooted in 1950s English working-class life. The texts also include different methods of representing their characters’ consciousness through the demotic idiolects that they speak.

Keywords: Dialect, Narrative Technique, Alan Sillitoe, Narratology, Characters.

Introduction: Sillitoe's account talk can be contended as situating itself contrary to the 'focal point of energy' which, without a doubt, numerous manifestations of dialect in writing appear to compose against, either stealthily or noticeably: the southeast of is relatively connected with it. Be that as it may, for the motivations behind this paper its most proper investigations are to be found in Rabelais and His World (1984), and therefore in Problems of Dostoevsky's Poetics (1984b). Bakhtin emphasizes the practice of popular, folk humour in the monstrous aspects of the writings of Rabelais which he traces to a 'folk spirit', a dissident, anti-authoritarian and subversive strand of medieval and resurgence culture which found its expression in events like May Day celebrations, modern carnival, Bacchanalian excess and working-class riots.

In Saussurean terms, jubilee is both a signifier and a meant. It can be the question of portrayal (Sillitoe's work, the saturated night in the bar, the unlawful sex, the battling), yet in addition, vitally, the methods for portrayal – for our motivations, the content and its account strategy; for Sillitoe, the demotic – precluded – rhythms of dialect Nottingham English ran against its standard, southern, dialogic adversary.

The connection between these two parts of fair – the inalienably insubordinate parts of mainstream culture and the traditions of style and account procedure – could be characterized as takes after: supposed established authenticity and its methods of portrayal came to be related with what Vice alludes to as the ‘specular’ (1997: 182) or straightforward, seeking to a type of objectivity and narratorial secretiveness, and, by surmising, with talks of expert: the authority of the Standard English, third-individual, past tense story voice which articulates 'This Is What Happened. This Is How It Was'. We see through the windowpane of the heterodiegetic account voice, straight into the anecdotal world which lies past. Simpson (1993) and Fowler (1986) describe the apotheosis of this sort of story intercession as outside kind C, ‘saw of instinctively as goal, impartial and indifferent’ (Simpson, 1993). The jubilee, in its penetration of both the protest and the method of portrayal, endeavors to demonstrate this supposition about how account fiction attempts to be false. It contaminates the pseudo-specular, Standard English account talk with the demotic dialect of the two its articles and its subjects or body electorate: characters and perusers. The straightforward window of traditional authenticity is appeared to be anything other than; it is mutilated, or even broken, by the irrepressible festival soul of the spoke to subaltern, exemplified by her or his demotic voice. A lot of Sillitoe's composition encapsulates this inclination, at that point, and through its organization of the demotic capacities as an immediate test to traditional suppositions about the idea of abstract dialect and how it intervenes the world.

The Constrained Confinement of the Long-Distance Runner: The primary explanation behind including investigation of stories from Sillitoe's gathering The Loneliness of the Long-Distance Runner is to go about as a state of correlation with the novel to be talked about in this manner. Without a doubt, in the first place the title story, there is nothing especially freak about its account strategy, which makes utilization of a homodiegetic storyteller:
So there I am, standing in the doorway in shimmy and shorts, not even a dry crust in my guts, looking out at frosty flowers on the ground. I suppose you think this is enough to make me cry? Not likely. Just because
I feel like the first bloke in the world wouldn’t make me bawl. It makes me feel fifty times better than when I’m cooped up in that dormitory with three hundred others. No, it’s sometimes when I stand there feeling like the last man in the world that I don’t feel so good. I feel like the last man in the world because I think that all those three hundred sleepers behind me are dead. They sleep so well that I think that every scruffy head’s kicked the bucket in the night and I’m the only one left, and when I look out into the bushes and frozen ponds I have the feeling that it’s going to get colder and colder until everything I can see, meaning my red arms as well, is going to be covered with a thousand miles of ice, all the earth, right up to the sky and over every bit of land and sea. So I try to kick this feeling out and act like I’m the first man on earth. And that makes me feel good, so as soon as I’m steamed up enough to get this feeling in me, I take a flying leap out of the doorway, and off I trot. (Sillitoe, 1958: 9).

The oral enroll of this account voice ought to be evident promptly. The first sentence begins ‘So there I am’, mimicking common features of oral storytelling (Fludernik, 2013), and it is directed at a presumed narratee (in this case, the implied reader), signalled through the deictic second-person pronoun ‘you’. Note also the use of the present simple tense, commonly signifying oral rather than written narration, and, as Stanzel terms it (1986: 141), the presence of a teller- rather than a reflector-character. The distinction is significant in its emphasis on the idea of telling, of narration as an activity rooted in oral discourse, and thus in the demotic.

Skaz is a type of portrayal taking the attributes of oral discourse. Accordingly, it grasps demotic and argumentative highlights as per usual: ‘... much of the time skaz is presented decisively for another person’s voice, a voice socially particular, conveying with it unequivocally those perspectives and assessments important to the creator’ (Bakhtin, 1984b: 191). Essentially, at that point, skaz is a gadget utilized by the creator for the voice of another person – a character – and the voice is ‘socially particular’, i.e. it is an endeavor to involve and possess an elective perspective. It is type A-ve, yet affected by the character’s unmistakable idiolect. Put just, Sillitoe embraces the voice and point of view of his storyteller. Notwithstanding, note additionally that there are metaphorical minutes in the talk as well, which appear to be lovely in expectation: the alliterative expression ‘chilly blooms’, alongside the analogy wellspring of the ice a thousand miles high covering the land. Fludernik (2013) sees this inclination toward the non-literal as a potential mimetic imperfection of skaz:

[Skaz] at times undermines the mimetic quality of the represented discourse by having a naïve peasant narrator resort to inappropriately elevated diction, e.g. the register of the legal or administrative elite. It must be noted that the evocation of orality in literary texts is just that: an evocation or stylization produced by highlighting the most striking features of oral language. What counts for narrative purposes is not a faithful copy of the ‘original’ utterance in all its linguistic detail, but the effect of deviation from the norm through quaintness, informality, intimacy, lack of education, cultural difference, class ascription. The simplifications and exaggerations of the linguistic features of orality and/or register therefore serve the purpose of facilitating identification, stereotyping, ‘local color,’ or effet de reel

Therefore, while there are surely demotic highlights in this account voice, we additionally discover all the more ordinarily writerly register. This ‘deformity’ will be come back to in the second 50% of this paper. In any case, the immediate talk of the short story, intervened thusly by the homodiegetic voice, is all the more clearly demotic; now and again, for sure, it endeavors to speak to the sound of a non-standard enlist through degenerate orthography.

‘How d’you know, you loony sod?’
‘Ain’t it off Alfreton Road?’
‘P’raps not, but I was looking at it...’

This orthographic deviation seems just in coordinate talk, at that point, and not as a component of the homodiegetic story voice. This partition is critical, and will likewise be come back to in the second 50% of this paper. A moment story from a similar accumulation, ‘Saturday Afternoon’, shows the very same account includes (A-ve):
All things considered, that is the place whatever is left of us get our dark looks from. It makes sense we'd have them with a father who carries on like that, isn't that right? Dark looks keep running in the family. A few families have them and some don't. Our family has them sufficiently right, and that is sure, so when we're tired we're truly tired. No one knows why we get as exhausted as we do or why it gives us those dark looks when we are. A few people get exhausted and don't take a gander by any means: they appear to be cheerful in an amusing kind of route, as though they've recently been sans set from ring subsequent to being in there for something they didn't do, or turn out the photos in the wake of sitting stopped for eight hours at a terrible film, or simply missed a transport they ran a large portion of a mile for and seen it was the wrong one soon after they'd quit running – however in our family it's murder for the others on the off chance that one of us is tired. I've solicited myself parcels from times what it is, however I can never find any kind of solution regardless of whether I sit and think for quite a long time, which I should concede I don't do, however it looks great when I say I do. Be that as it may, I sit and think for a considerable length of time, until the point when mam says to me, at seeing me scrunched up finished the fire like father: 'What are yo' looking so dark for?' So I've quite recently got the chance to quit contemplating it on the off chance that I get extremely dark and tired and go an indistinguishable path from father, tipping up a tableful of pots what not.

Mostly I suppose there's nothing to look black for: though it's nobody's fault and you can't blame anyone for looking black because I'm sure it's summat in the blood. But on this Saturday afternoon I was looking so black that when dad came in from the bookie's he said to me: 'What's up wi' yo'?'.

Epistemic methodology is foregrounded indeed ('they appear to be glad', 'I assume', 'I'm certain'), in addition to near structures: 'as though they've quite recently been sans set'. The enroll is likewise oral, motioned by the demotic inquiry tag 'don't it?', the utilization of slang terms, for example, 'clunk' and the persuasive 'summat'. Note likewise the incantatory and strong impact of the redundancy of 'dark', 'dark looks' and 'exhausted'. At long last, orthographic reenactment of the sound of lingo discourse is again bound to coordinate talk: 'What's up wi' yo'?'.

**Saturday Night and Sunday Morning** : In this his most renowned novel, Sillitoe draws on his experience as a laborer at the Raleigh processing plant in Nottingham to create a reasonable portrayal of common laborers life in the English Midlands amid the 1950s. In contrast with separates from the short stories talked about in segment, the portrayal this time is heterodiegetic, and along these lines can't be dealt with as skaz. This is huge, in light of the fact that it demonstrates that responsibility for story voice has gone from a character to a storyteller. In Fowler's (1986), Simpson's (1993) and Uspensky's (1973) terms, it is inclined predominantly towards internal type B (Simpson, 1993): 'an omniscient narrator who claims knowledge of what is going on in characters' minds'. This demonstrates the account talk of this novel is more authorial, slanted far from the mimetic desires of skaz towards a diegetic work. In any case, as will be seen, the impact of Sillitoe's method in this content is more nuanced and complex than that, and frequently consolidates type B with long swathes of direct idea introduction Given its topic, the enlist of the account talk is properly succinct; its economy and succinctness is foregrounded, yet intensely distinct:

He stuffed a packet of sandwiches and flask of tea into his pocket, and waited while his father struggled into a jacket. Once out of doors they were more aware of the factory rumbling a hundred yards away over the high wall. Generators whined all night, and during the day giant milling-machines working away on cranks and pedals in the turnery gave to the terrace a sensation of living within breathing distance of some monstrous being that suffered from a disease of the stomach. Disinfectant-suds, grease, and newly-cut steel permeated the air over the suburb of four-roomed houses built around the factory, streets and terraces hanging on to its belly and flanks like calves sucking the udders of some great mother. (Sillitoe, 1964)

It was Benefit Night for the White Horse Club, and the pub had burst its contribution box and spread a riot through its rooms and between its four walls. Floors shook and windows rattled, and leaves of aspidistras wilted in the fumes of beer and smoke. Notts County had beaten the visiting team, and the members of the White Horse supporters club were quartered upstairs to receive a flow of victory.
This is standard N (Short, 2007), seeking to target portrayal of a scene. In Simpson’s (1993) terms, it is B(N)+ve: the storyteller is in narratorial (N) as opposed to reflector mode, occasions are described from outside the awareness of any of the characters and spatial deixis is utilized (‘between its four dividers’, ‘were quartered upstairs’) to make a bird’s-eye see or ‘omniscient’ point of view. Like the primary portion, this one incorporates analogy: the Notts County supporters move toward becoming warriors, quartered upstairs anticipating the stream of triumph. In reality, ‘supporters are warriors’ is an incessant reasonable figurative model in prevalent brandishing culture. The style soon starts to modify, however:

For it was Saturday night, the best and bingiest glad-time of the week, one of the fifty-two holidays in the slow-turning Big Wheel of the year, a violent preamble to a prostrate Sabbath.

Here, the novel’s title is resounded in entirely non-literal, allegorical terms. The analogy likewise summons festival, both in the picture of the Big Wheel and in the Saturday night Bacchanalia compared against approaching recumbent religiosity. This short passage additionally contains similar sounding word usage (best and bingiest) and expressive neologism, in the last expression of the past case and in happy time. The deontic and boulomaic methodology symptomatic of B(N) type accounts, recognizable in the utilization of evaluative descriptors (Van Linden, 2012), is additionally present: ‘the best’ and ‘moderate turning’. In any case, now they demonstrate recognizable proof with character and a subjective, narratorially clear point of view. Thus, this talk relates to B(R)+ve: the story is intervened through the awareness of a reflector (R). This impression ends up more grounded along these lines, as will be shown in the following passage. Further, the style of this account talk is all the more expectedly ‘writerly’ when contrasted with the before short story; it shows semantic highlights (similitude, similar sounding word usage, plain portrayal) which are related with imaginative utilization of dialect. To condense, the heterodiegetic storyteller is here lined up with the point of view of character, however does not attribute to the mimetic desire of skaz. Notwithstanding, the tone moves quietly again in this way:

You followed the motto of ‘be drunk and be happy’, kept your craft arms around female waists, and felt the beer going beneficially down into the elastic capacity of your guts.

Robboe kept his job because he was clever at giving you the right answers, and took backchat with a wry smile and a good face as long as you did it with a brutal couldn’t-care-less attitude and didn’t seem frightened of him.

Second-individual fiction annihilates the simple suspicion of the conventional dichotomous structures which the standard narratological models have proposed, particularly the qualification amongst homo- and heterodiegetic portrayal (Genette) or that of the personality or non-character of the domain of presence amongst storyteller and characters (Stanzel).

Conclusions: Sillitoe’s is a novelistic talk which declines to notice the standards of great authenticity, distinguished in exceptionally broad terms with the impact of outer sort C portrayal (Simpson, 1993; Uspensky, 1973). Constantly, there is an animating dialogic strain between the talk of the two organizations of character and storyteller, as can be found in the cases examined. This dialogism has two viewpoints. On one hand, it has an intrinsic and notable stylish quality and capacity. The ‘authenticity’ of the content, its procedure of mimesis, is successful exactly on the grounds that its account enroll is established so immovably in the milieu which it looks to speak to. Its talk is frequently (despite the fact that, as has been appeared, not generally) ‘earthed’ by the 1950s Nottingham demotic of its base style, and accordingly is particularly attached to its topic.

To categorize Sillitoe’s work as ‘common laborers fiction’ is to submit a crucial misprision since it secludes the content pointlessly from its more extensive sociological setting. It is additionally a frequently accidental endeavor to debilitate, or, in Bakhtin’s terms, to monologise, that which is by its exceptionally nature dialogic. It classifies the better to disengage, expelling the work from the basic setting (different talks, or heteroglossia) from which it produces its polemical results.

The novel was born at the same time as modern science, and shares its sober, secular, hardheaded, investigative spirit, along with its suspicion of classical authority. But this means that, lacking authority outside itself, it must find it in itself. Having shed all traditional sources of authority, it must become self-authorizing. Authority now means not conforming yourself to an origin, but becoming the origin yourself.
References:


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Abstract: The author of fifteen books, A.K. Ramanujan was an eminent poet and a well-read scholar whose poetry is idiosyncratic in many ways. He was born in Mysore (India) in 1929 and had come to the U.S. in 1959, where he remained until his death in Chicago on July 13, 1993. Not only a transnational figure, but he was also a transdisciplinary scholar, who worked as a poet, translator, linguist, and folklorist. Although he wrote mainly in English, he was fluent in both Kannada, the common public language of Mysore, and Tamil, the language of his family, as well.

Keywords: A.K. Ramanujan, Idiosyncratic, Imagery, Tone, Rhyme, Sounds, Indian Sensibility, Modernity, Body, Soul, Puns, Paradoxes, Irony, Objectivity, complexity.

Introduction: Attipate Krishnaswami Ramanujan shows an idiosyncratic pattern and trend as far as his poetry is concerned. His poetry has in it a wide range and complexity of thoughts and feelings. He was a well-read scholar who had born in Mysore (India) in 1929 and had come to the U.S. in 1959, where he remained until his death in Chicago on July 13, 1993. Not only was Ramanujan transnational figure, but he was also a transdisciplinary scholar, working as a poet, translator, linguist, and folklorist. Although he wrote primarily in English, he was fluent in both Kannada, the common public language of Mysore, and Tamil, the language of his family, as well. His poetry is steeped in allusions from unusual sources of knowledge, ranging from philosophy, psychology, science and linguistics etc.

Ramanujan received his BA and MA in English language and literature from the University of Mysore. He then spent some time teaching at several universities in South India before getting a graduate diploma in theoretical linguistics from Deccan University in Poona in 1958. The following year, he went to Indiana University where he received a PhD in linguistics in 1963.

In 1962, he became an assistant professor at the University of Chicago, where he was affiliated throughout the rest of his career. However, he did teach at several other U.S. universities, including Harvard, University of Wisconsin, University of Michigan, University of California at Berkeley, and Carlton College. At the University of Chicago, Ramanujan was instrumental in shaping the South Asian Studies program. He worked in the departments of South Asian Languages and Civilizations and Linguistics and with the Committee on Social Thought. In 1976, the government of India awarded him the honorific title “Padma Sri,” and in 1983, he received a MacArthur Fellowship.

His poetry is steeped in allusions from unusual sources of knowledge, ranging from philosophy, psychology, science and linguistics etc. The Striders is a good example of it where he reveals a scientific precision in the watery surface of the steam. Here we notice the echoes of Indian mythology beneath the apparent surface simplicity and also allusion to the modern philosophy of life. As a matter of fact, his poetry lumps together details which sound incompatible—serious as well as comic, solemn as well as playful, grand as well as mundane. Many of his poems reveal his tendency of skepticism towards grandeur attached to tradition, death, history, ritual and ceremony. Issues such as hybridity and transculturation figure prominently in such collections as The Striders (1966), Selected Poems (1976), and Second Sight (1986) and The Collected Poems of A.K. Ramanujan (1995).

The noteworthy feature of his earlier poems is his blessedness with etymological expressions. “The Striders”, for instance, presents as well as represents this class of poetry. Here, the rhythmic movement aids felicity with which the water-bug perches on the surface of a stream:

And search
for certain thin-
stemmed, bubbled-eyed water bugs.
See them perch
on dry capillary legs
weightless
on the ripple skin
of a stream

The movement in this poem is made smooth and rhythmic by the usage of the ample, half-rhyme and assonance. The rhymes of “search-perch”, “bugs-legs” is noticeable. Every line has an unconscious use of ‘s’ sound. Furthermore, the first line of the poem starts with “And” and it can be considered as the stylistic feature. Bruce King views that the commencement of the poem on a conjunction advocates an equivalent to the metaphysical subject of life being a stream, a series of ‘ands’. The recurrence of the ‘s’ sound adds a musical eminence to the entire structure. “The Striders” is an uprightness instance of his early, skilfulness and dexterity.

Ramanujan is not only adroit and flawless in the use of certain sounds and conjunctions but he is also pertinent in the use of certain customary established poetic forms. He follows very occasionally formal poetic forms like sonnet but generally, he follows his own weird bravura and configuration. In most of his poems, being an avant-garde, he disrupts the rules, forges his own panache, which is occasionally exact symposium.

He attains success because he employs a free-flow rhythm which differs with the movement in thought. Additionally, he is proficient in using puns and paradoxes. There is a play on words in a very expert and scholarly mode, which is straight forwardly palpable in “The Striders”:

No, not only prophets
walk on water. This bug sits
on a landside of lights
and drowns eye-deep
into its tiny strip
of sky.

So these lines illustrate paradoxical happening as well as pun on the words “the eye” and “the sky”.

It is through paradoxes that he is efficacious in communicating his message of universal moment of self-recognition. The exclusivity of the self is refuted by the notion of permanency. Likewise, it is observed how things are lumped together like chlorinated water with Ganges; the naked Chicago bulb with the Vedic sun, the poet’s grandfather and father with his own self and son. “Second Sight” also divulges the poet’s groping in the dark, even without the customary prospect. “A Hindoo to His Body has also paradoxical testimonial when soul requests the body to take it along with as it moves to the trees.

To rise in the sap of trees
Let me go with you and feel the weight
Of honey-hives in my branching
And the burlap weaves-birds
in my hair.

Ramanujan is a conscious craftsman and this statement goes unobstructed. He is an imperfect artist who discerns thriving the close liaison between form and content. He may be called a highbrow bard who uses language, surgeon-like, with meticulousness and buoyancy. The outward uncomplicatedness is basically illusory like that of metaphysical poets who used to have abrupt and dramatic openings. See the opening of “Extended Family”

Yet like grandfather
I bathe before village crow
And search,
For certain thin,
stemmed bubble-eyed water-bugs.
Again in his poem, *A Hindoo to His Body*, he begins with
Dear pursuing presence,
dear body: you brought me
curled in womb and memory.

Actually, here, his stratagem is to tie the past and the present and even the imagined future in an
deavour to venture the inklings of continuousness in irony tone.
“History” begins in a verse terse way:
History,
Which usually
changes slowly,
changes sometimes
during a single conversation:

So, it has been observed that the both preciseness and snappiness of the language matches the thought-
pattern fully well.

Ramanujan has always been relying on effective use of imagistic and ironic modes. His poetry is image-
oriented and the image is at the staple of his poem, the sensuousness of his images works in a
magnificent tactic. Most chromatic, these images have instantaneous entreaty.

Paul Verghese comments that what is amazing about the use of imagery in Ramanujan is the technique it
clamps the poem unruffled. The images in *A River* are alike evocative and indicative. In a stunning image,
the poet likens shining wet stones lying on the river bed to “sleepy crocodiles” and the dry ones to “shaven
water-buffaloes” basking in the sun. Both the images have prodigious pictorial charm. See the lines:
the wet stones glistening like sleepy
crocodiles, the dry ones
shaven water-buffaloes lounging in the sun

Another idiosyncratic feature of Ramanujan’s imagery is that they subsidise to the determining of the
structure of a poem. “Snakes” is such a poem which the ‘s’ sounds of snakes hissing plays very imperative
role in the structure of the poem:
The twirls of their hisses
rise like the tiny dust-cones on slow-noon roads
winding through the farmers’ feet

His poems are steeped in irony to imbue intricacy. For example, “*Prayers to Lord Murugan*” is this sort of
poem. Irony is used here to devalue any religiosity involved in speaker’s prayers; and not other poets who
incline to use irony to depress and de glamorise the past. Extreme usage of irony is his endeavour for over-
all detachment and impersonality but in some cases, it backfires. Nevertheless, the global hollow of his
poetry is that it is thriving apprehended and well comprehended.

Another outstanding excellence of his poetry is an all-embracing objectivity. For instance, the poem, *A River*
epoches much of his method and technique. He portrays a common know-how of Indian life—the
mayhem rooted by river in flood, but he encompasses in it a lot of things. There is convolution in his
handling of the matter. On surface level, he mocks the old as well as the new Tamil poets who
romanticised floods, overlooking the sorrow and misery of the societies, while on the underneath level,
he proves it by citing an example how poetry can betruthful through effective imagery:
a river dries to a trickle
In the sand,
baring the sand ribs,
straw and woman’s hair
clogging the watergates
at the rusty bars
The furthersubstantial feature of his poetry is his exploration for self in all its complexities, in all its enigmas, in its elusiveness and in all its confusion well. In Indian culture, the individual self is intransigentlybonded with the higher self that begets and consumes. Ramanujanrecognizes and establishes a connectionamidhuman beings and nature. So in hisvisualisation, past, present and future are interdependent and interlinked.

In the end, it can be said that Ramanujan’s poetry intermingles in blatantly aup-to-date as well as the out-of-date Indian sensibility. There are evidentconfines, yet the poetry of Ramanujan cannot be brushed aside as an intellectual exercise in futility.

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Abstract: As a poet of seclusion and solitariness Emily Dickinson desired to remain enclosed in her own world with her particular preferences. Although 1800 poems were authored by her yet most of them remained unpublished during her lifetime. The theme of death and time are two most discussed issues in Dickinson’s poetry both with intense interest and her Interest still remains in critical world for her selection of words, thematic movement of the poem and expression of innermost feelings in simple language. Her poems on death and time not only attract the general readers but also they have become issues of critical research throughout the world. The poems of Dickinson are an expression of her own world, lived within the space of her own. The echoes of great poets like Shakespeare and Metaphysical poets in her depiction of the themes of time and death is easily perceptible almost everywhere in her poetry.

Keywords: Death, Time, Obsession, Seclusion, Confessional, Melancholy.

Introduction: Remained almost the whole span of her life unknown and unrecognized as a poet Emily Dickinson is acknowledged as one of our greatest poets, and according to some, one of the greatest lyric poets of all times. Indeed, the last fifty years or so have witnessed an outpouring of books and essays that attempt to explain her poetry and her life. Written as the expression of some repressed feelings of her heart, Dickinson’s poetry is confessional and attracts the critical attention like the poetry of Metaphysical poets or Shakespearean sonnets. The theme of time and death always holds a special place in the realm of literature throughout the world.

The Deep Delving into Death: Though not a new theme yet her treatment of death was novel enough to evince ample interest.

No longer an ordinary theme of Dickinson’s poetry, death occupied her lifelong attention. Death has been mentioned frequently in her poems together with frustration, suffering, pain, sorrow, grief and loneliness. Critics have pointed out that nearly one third of her poetry is concerned with the theme of death. This preoccupation with death made Dickinson a poet of darkness. Death is portrayed by her from every possible aspect – as the courtly lover, the dreadful assassin, the physical corruptor and also as a free agent in nature. She was obsessed with the problem of death and subsequent life after death. She died all her life; she experienced death daily in her life. Death with its horrible uncertainties, doubts about immortality – all these things have produced the sharp and intellectual works of Dickinson.

A reason for Dickinson’s preoccupation with death may be her involvement with religiosity. Her notions about God, Eternity, Time, Immortality, Infinity etc. are responsible for her growing interest in death. Immortality to her was a problem to be faced as death indeed was, but it was not an extension or a retreat. She accepts death as a physical fact and as a material truth. Her immediate interest in the death poems is to dramatize the event of death, to bring out the tension or conflict that such a particular event will have on the minds of human beings. Dickinson’s obsession with death may also be traced to her Puritan surroundings. For the Puritan, death is the climax of living, and it must be accepted in a solemn way. Her rebellion against the doctrine of Puritanism taught her that death could not be a compensation for this life. Though she was a poet obsessed with death thought, she never became a champion of death. Glorification of death was far from her motives.

In her poems on death, Miss Dickinson gives us a variety of experience on the subject. She closely examines the sensations of the dying, the response of the onlookers, the terrible struggle of the body of her life, the adjustments in a house after death, the arranging of the body for the funeral, the church services and even the thoughts of the dead person. She had a strange fascination for death and imagined herself dead with mourners walking past her or lying in order to punish different friends. Dickinson’s death poems deal with an intellectual point of view. She sees death as a culmination of human experience. She
wrote a series of death poems in which death is the thing that separates people from their beloveds. In the poem *I Died for Beauty*, the poet searches for the beauty all her life and dies in the search. Here she familiarizes the experiences of death as a sort of extension of experiences of this world. The idea is quite macabre and grotesque, but presented so naturally! She tries to understand this experience as another form of human experience.

In some of her poems Emily Dickinson has contrasted the expectations of death with its realistic occurrence. *I Heard A Fly Buzz When I Died* is such an example. With a strong sense of scepticism she questions the medieval fundamental beliefs of society. The poem is an ironic reversal of the conventional attitudes towards the moments of death. Here she says:

*The Eyes around – had wrung them dry –
And Breaths were gathering firm
For that last Onset – when the King
Be witnessed – in the Room –*

The king remains an open question – is it God or Death itself? The ending of the poem, however, does not suggest that it is God.

The dramatic sensation and experience during the soul’s departure from the body is described through the lyric. Here Dickinson is giving us no hint of living hereafter. Rather, we have a clear idea that instead of having a glimpse of heavenly light, the dying person only feels the familiar world around her fading away and slipping. She is not speaking about death as a positive moment, a gateway to a richer, fuller life – experience, death is a loss. The poem satirizes the traditional view of death as a peaceful release from life’s pressures and glorious entry into immortality. Life is a small New England town in Dickinson’s time contained a high mortality rate. Subsequently, she received the shock of death of her intimate associates. Leonard Humphrey died in 1830, Benjamin Newtown in 1853, her father, Edward Dickinson in 1874, her mother, Emily in 1882 which was shortly followed by the death of young Gilbert, Dickinson - was a terrible blow to her. That is why her former approach changed when she realized that death also meant separation. She narrates the events after death minutely – the stillness of the room; the visitors came to pay regard and even the dying man’s actions.

The last stanza of the poem depicts the dying man’s ultimate effort to live on this earth. But he could not “see to see”, his eyesight fails him, a curtain or barrier comes in front of his wish to continue living. This desperation on the part of the human being and their ultimate but inevitable surrender to the death of life is presented in this poem at its best.

Infact, a number of poems by Miss. Dickinson have the funeral ceremony as their theme. *Because I could not stop for Death* is her finest poem in that category. On the surface, this poem seems like just another version of a procession to the grave, but here it is also a metaphor that can be of a different sort. In the poem, death is viewed and presented from various perspectives. It brings a welcome relief from life’s tensions. It is a force that heightens a person’s satisfaction with life. Death and immortality may be viewed in two different ways in the poem. Death may be looked at as the gallant lover and immortality as a protector. Then dying represents a benefit. Death may also be viewed as a seducer and Immortality as his partner in the crime. In between these two alternatives, Dickinson leaves open and unresolved, the question of which set is really the more applicable to the poem. The irresolution comes about because she cannot honestly make up her mind about her feelings and attitudes are towards her own death. The poet records the passage from life whose everything is tangible to the ‘otherness’ of death, a realm in which shapes necessarily become ambiguous and baffling. Regardless of the varieties of interpretation of the poem, the journey itself arrests attention. With the expedition of death, the poet leaves her life; the life disappears behind her like a receding landscape. The sun imagery in the poem indicates light in the poem. The children and the fields of gazing grain suggest warmth and vitality. In the latter part of the poem, ‘darkness’ is emphasized by the expression “the sun is gone”; ‘cold’ by “the dews drew quivering and chill”. The tone of the poem gradually changes towards vagueness.

The poem has a narrative structure and involves characters, scenes, setting and an all – compassing theme. The entire poem yields to the description of the appearance of ‘Death’ and ‘Immortality’ and their
intention to carry the narrator away with them. The reference to Eternity in the last line can be explained as an attempt to carry the relationship between the suitors and the narrator till the farthest possible end. In the poem *Safe in their Alabaster Chamber* she speaks with her tongue in her cheek. She writes:

Untouched by morning And touched by noon,
Sleep the meek members of the resurrection-

**The Visualization of Time:** A poet with an obsession for death and consciousness of immortality and mutability, Dickinson also had a special attraction for time. Though the popular attitude teaches to look into time as a healer, she was far from such thoughts. She was living in a world that was fast changing. She accepted such motion, but desired stability. She was really afraid of change and therefore chose seclusion as a remedy.

Time was quite opposite to immortality to her. When immortality and eternity are changeless, time is a constant flux. Time brings all the evils which man encounters in this universe. She questions this temporary existence of human being and its relevance. When eternity is the only bliss, this existence is nothing but an interruption by time:

On this wondrous sea,
Sailing silently,
Knowest thou the
shore Ho! Pilot, ho!

But, she does not run away from time because she knows that an escape from time is impossible. She senses the presence of God behind time.

Dickinson blames time with the charge that it creates a distance between man and nature. The communion between man and nature is destroyed by time. It does not allow man to comprehend the world around him. As Dickinson is opposed to change and time is nothing but an agent of change, it is criticized by her. Time does not allow her to feel at home in this universe and she remains an eternal outsider.

She found no coherence of system in life except the autonomy of time and change. They were disturbing factors to her that put a barrier in human life. She found herself surrounded by motion, which she dislikes. She finds no traces of God’s majesty in this world. Naturally, there was the conflict between the divine constancy and earthly temporaries. To find a solution of this problem she elevates her poems dealing with the theme of time to the height of metaphysical poetry. Her search ends with the finding that eternity is the only place where one can experience glimmerings of a settled time.

Dickinson’s poem *There's a Certain Slant of Light* focuses on the theme of time. ‘Winter Afternoon’ is nothing but the closing years of life which is her most attended period of life in her poems. Both the ‘Winter’ and the ‘Afternoon’ are closing of season and day. They are naturally associated with the end of life. The words like hurt, despair, affliction, death, oppress and hefts are used to suggest the oppressiveness of death and the helplessness of human being:

When it comes, the Landscape listens – Shadows – hold their breath –
When it goes, ’tis like the Distance On the look of Death –

Here the underlying process of decay in nature parallels man’s psychological and emotional pain. The poem illustrates a good man’s inability to control nature and the desperation with which he fights for survival. The poet succeeds in creating a kind of oneness with nature in this poem. Though the ray of light is generally associated with cheerfulness, the poet here uses it to denote a profound sorrow. This light makes the poet feel the force of an eternal power that is irresistible.

Though some transcendental overtones run throughout the poem, the optimism of the transcendentalists is absent here. Rather the poet sounds like Melville’s Ishmael, who feeling winter in his soul, begins to know the meaning of the word ‘despair’.

Separation is a bitter and tragic experience in life and that is all we know of heaven or hell. The third event
in the poet’s life may be a huge one as she feels hugeness descending upon her.

It is said that the first two events may relate to the deaths of Newton and Wadsworth. She had a tender feeling towards both these young men. In many of her poetry, death comes as an inevitable end and a man becomes helpless before it. This poem also relates to the same theme by referring to the incidents of her life. Extreme time consciousness runs throughout the poem.

**Conclusion:** Dickinson started her poetic writing without the purpose of making it public. Her portrayal of time’s haunting image and inevitability of death in human life brings her close to many other legendary poets of English literature. In her choice of words and self imposed seclusion, she stands apart from the whole writing community. She is a unique voice of American poetry who echoes the solitary voice of loneliness and angst in literature. Though she does not attempt to philosophize the notion of death and also does not put burden of words into poetry; she successfully catches the attention of readers and critics working in the field of time and death.

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EXTRA-CURRICULAR ACTIVITIES FOR SUSTAINABLE DEVELOPMENT

PARAMJIT KAUR

Abstract: Sustainable development is a development that meets the needs of the present society without compromising the ability of future generations to meet their own needs. Sustainability is a paradigm for thinking about a future in which environmental, social and economic considerations are balanced in the pursuit of development and an improved quality of life. Sustainability is often thought of as a long-term goal while sustainable development refers to the many processes or pathways to achieve it (e.g. sustainable agriculture and forestry, sustainable production and consumption, good government, research and technology transfer, education and training). Extra-curricular activities can focus on sustainability, addressing environmental, social and economic concerns of the community. This study described variety of extra-curricular activities with sustainability themes which includes school gardens, community monitoring, pupil peer counseling, special events, community service, arts drama, earth day celebration, buy nothing day celebration, clean up the world day celebration, world animal day celebration, interactive ecosystem quiz etc.

Sustainable Development: The concept of sustainable development was described by the Bruntland Commission Report (1987) as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” Sustainability is a paradigm for thinking about a future in which environmental, social and economic considerations are balanced in the pursuit of development and an improved quality of life. These three spheres – society, environment and economy – are intertwined[1]. For example, a prosperous society relies on a healthy environment to provide food and resources, safe drinking water, and clean air for its citizens. The sustainability paradigm is a major change from the previous paradigm of economic development with its damaging social and environmental consequences. Until recently these consequences have been seen as inevitable and acceptable. However, we now realize that major damage or serious threats to the well-being of humans and the environment in pursuit of economic development have no place within the sustainability paradigm. We might then ask, what is the difference between sustainable development and sustainability? Sustainability is often thought of as a long-term goal (i.e. a more sustainable world), while sustainable development refers to the many processes and pathways to achieve it (e.g. sustainable agriculture and forestry, sustainable production and consumption, good government, research and technology transfer, education and training, etc.).

Principles of Sustainable Development: All sustainable development programmes must consider the three spheres of sustainability i.e. environment, society and economy as well as an underlying dimension of culture. Since sustainable development addresses the local contexts of these three spheres, it will take many forms around the world[2]. The ideals and principles that underlie sustainability include broad concepts such as:

- Equity among generations,
- Gender equity,
- Peace,
- Tolerance,
- Poverty reduction,
- Environmental preservation and restoration,
- Natural resource conservation,
- Social justice

The Rio Declaration contains principles, including: People are entitled to a healthy and productive life in harmony with nature; The right to development must be fulfilled so as to meet developmental and environmental needs of present and future generations in an equitable way; Eradicating poverty and reducing disparities in living standards in different parts of the world are essential to sustainable development; Environmental protection is an integral part of the development process and cannot be considered in isolation from it; International actions in the fields of environment and development should also address the interests and needs of all countries; To achieve sustainable development and a higher
quality of life for all people, countries should reduce and eliminate unsustainable patterns of production and consumption and promote appropriate demographic policies; Women play a vital role in environmental management and development. Their full participation is therefore essential to achieving sustainable development; Warfare is inherently destructive to sustainable development[3]. Peace, development and environmental protection are interdependent and indivisible. These principles can guide our efforts to define sustainability goals and create programmes to help achieve those goals. Perspectives on sustainability are commonly statements that expand upon the principles of sustainable development found in Agenda 21. Principles include, but are not limited to:

- Environmental protection and human-centred development are considered together, not separately.
- There must be a balance and integration of environment, society, and economy.
- States have a right to development, but must respect geographic boundaries.
- Partnerships can achieve more than solitary action.
- Social and environmental problems change through time and have both a history and a future.
- Contemporary global environmental issues are linked and interrelated.
- Systems thinking or a whole-systems approach should be used in problem solving rather than looking at problems in isolation.
- Humans have universal attributes.
- The family is the foundational social unit.
- Local issues must be understood in a global context and we should realize that solutions to local problems can have global consequences.
- Individual consumer decisions and other actions affect and give rise to resource extraction and manufacturing in distant places.
- Differing views should be considered before reaching a decision or judgement.
- Economic values, religious values, and societal values compete for importance as people with different interests and backgrounds interact.

**Values of Sustainable Development:** Understanding values (e.g. one's own values, the values of the society one lives in, and the values of others around the world) is an essential part of understanding one's own and other people's viewpoints. Values from the Earth Charter include:

- Respect the Earth and life in all its diversity.
- Care for the community of life with understanding, compassion, and love.
- Build democratic societies that are just, participatory, sustainable, and peaceful.
- Secure the Earth's bounty and beauty for present and future generations.
- Eradicate poverty as an ethical, social, and environmental imperative.
- Affirm gender equality and equity.
- Uphold the right of all, without discrimination.
- Treat all living beings with respect and consideration.
- Promote a culture of tolerance, nonviolence, and peace.

Donnella Meadows outlined these general guidelines for restructuring world systems towards sustainability:

- Minimize the use of non-renewable resources.
- Prevent erosion of renewable resources.
- Use all resources with maximum efficiency.
- Slow and eventually stop the exponential growth of population and physical capital.
- Monitor the condition of resources, the natural environment, and the welfare of humans.
- Improve response time for environmental stress.

**Extra-Curricular Activities for Sustainable Development[4]:** Some schools provide activities for pupils outside regular school hours, for example: thematic clubs and music, or athletic practices and events. Extra-curricular activities for pupils are usually voluntary rather than mandatory and often have social, philanthropic, artistic, athletic, or other goals instead of academic ones. Pupils often organize and direct these activities under teacher sponsorship or supervision, although pupil-led initiatives are also
In general, extra-curricular activities allow pupils to develop talents, skills, and abilities that the mandated primary and secondary curriculums do not address. As a matter of social equity, all pupils should have a chance to demonstrate their personal strengths, including non-academic ones, at school. These additional activities often allow pupils who do not excel in traditional classroom activities and behaviour (e.g. reading, reciting, and sitting still), to develop and demonstrate abilities which are not routinely used in the classroom. Providing all pupils with the opportunity to show their best work is a form of equity, which is at the heart of sustainable development and ESD.

Extra-curricular activities can focus on sustainability, addressing environmental, social and economic concerns of the community. The purpose of this section is to describe a variety of extra-curricular activities with sustainability themes.

**School Gardens:** Although school gardens are often used as living illustrations of the life science curriculum, they can also teach sustainability. School gardens can be used to increase pupil nutrition (e.g. school gardens provide produce for school meal programmes). School gardens also increase food security (the availability of and access to food) as well as teach agricultural skills for self-reliance or for use in a future career.

**Community Monitoring:** Pupils, assisted by teachers and community members, work together to monitor and critically evaluate the problems and conflicts facing their local community (e.g. beach erosion, water quality, traffic, or litter) and then design and implement activities and projects to address some of those problems. *Sand watch,* an each monitoring programme, is popular with teachers and pupils.

**Pupil Peer Counselling:** Adolescents often have issues they do not want to discuss with parents or teachers, but for which they need information and assistance in order to make decisions that may affect their well-being for years to come. Schools have established peer help desks and counseling to promote health, social responsibility, behaviour change, and decision-making. They have also established chat forums in which pupils can seek advice and guidance as well as openly express issues that concern them. Topics include physical and mental abuse, alcoholism, drug abuse, premarital sex, and HIV and AIDS. Such programmes help pupils become more knowledgeable about many of the serious health risks and social risks facing them and thus make more informed life decisions.

**Special Events:** Special events (e.g. environmental fairs, music and art festivals) at schools are memorable for pupils and community members who participate in them. Special events give pupils an opportunity to use skills and talents that are not often used in the classroom. Such opportunities address issues of equity, giving less academically oriented pupils a chance to employ and demonstrate their abilities. Pupils can sing, cook, perform sketches and make presentations, among other activities. Special events can focus on sustainability themes, giving pupils an opportunity to work cooperatively to gather information about different aspects of sustainability or unsustainable activities in the community.

**Community Service:** Pupils observe inequities in their community between “the haves and the have-nots.” They know that some community members lack the means to provide for their own needs, which is a social and economic sustainability issue. Some pupils express a desire to help. Community outreach comes in many forms (e.g. working in kitchens or food pantries to feed the hungry, visiting the elderly in nursing homes, assisting in nursery schools, and replanting environmentally degraded areas). Participation can be: (1) direct, involving face-to-face interactions with the recipients of the service, (2) indirect, with pupils working in supportive roles through a group or agency, or (3) via advocacy campaigns and raising awareness of a community problem. Such community service benefits pupils by increasing their sense of civic efficacy and their personal development.

**Arts Drama, Music, and Dance:** Drama, music, poetry, and dance can call upon talents and skills that are not part of the mandated curriculum and also have a sustainability focus. For example, pupils can write and act in sketches that reflect sustainable and unsustainable practices in the community or write...
lyrics to songs that remind others about good daily practices (e.g. water conservation). These pupils can perform for others so that the sustainability messages are conveyed across the school and into the community.

**Earth Day Celebration**[5]: Earth Day is a global holiday to celebrate the wonder of life on our planet. It was first celebrated in San Francisco in the United States on April 22nd, 1970. In its first year, more than 20 million people demonstrated to demand that the US government make environmental issues a priority and thousands of schools and local communities also participated. It has now become a special day to teach everyone about the things that need changing in our local and global environment. In 1990, 200 million people in 141 nations around the world held Earth Walks, Festivals, Eco-Book Fairs, Beach and River Clean-ups, Tree Planting events and Environmental exhibitions and seminars. Now, over 500 million people in over 180 countries hold Earth Day events and projects to address local environmental issues.

**Buy Nothing Day Celebration**: Buy Nothing Day was started in 1992 by the Media Foundation, a group based in Vancouver, Canada. The purpose of Buy Nothing Day is to ask people to not shop for a day and instead to spend time with family and friends. It is celebrated on the last weekend in November when the Christmas shopping period begins. It was started as a means of challenging over-consumption and the waste that consumption produces by asking people to consider if they really need all the things they are buying and to consider the personal, social and environmental effects of our shopping addiction. Now, Buy Nothing Day is celebrated in more than 62 countries and more than one million people participate in events. These include street theatre outside major department stores, meditating in Santa Claus costumes, cutting-up-credit-card events and free food parties.

**Clean up the World Day Celebration**: Clean up the World Day is held during the third weekend in September and began in 1993. The idea was started by one man, Ian Kiernan, an Australian yachtsman who was horrified by how much ocean pollution he saw during a solo around-the-world yacht race in 1989. He organized a ‘Clean Up Sydney Harbour Day’ with 40,000 volunteers and in 1990, 300,000 volunteers joined in a ‘Clean Up Australia Day’. The goal of Clean Up the World Day is to protect and conserve the environment for our children and the future by cleaning up local waterways, streets and parks, planting trees and holding environmental education activities. Now, over 35 million volunteers from 121 countries participate, bringing together businesses, community groups, schools, governments and individuals in cleaning up, fixing up and conserving their local environments.

**World Animal Day Celebration**[6]: World Animal Day was started in 1931 at a convention of ecologists in Florence, Italy to call attention to endangered species. It is held on October 4th and is now celebrated in over 20 countries by tens of thousands of people. Its mission is to celebrate animal life and humankind’s relationship with the animal kingdom by recognizing the many roles animals play in our lives such as providing us with food, being our companions and helpers and bringing us a sense of wonder. On World Animal Day, animal welfare groups, animal sanctuaries, schools and individuals hold special events to increase peoples’ awareness about animal issues such as animal testing, endangered species, habitat destruction, abandoned pets and factory farming. Many events take place such as Animal Adoption Festivals, Animal Charity Sponsored Runs and Walks and Farm and Animal Shelter visits.

**Interactive Ecosystem Quiz**: How much do you know about Earth’s ecosystems? The scientists in Earth on Edge say that humans are failing to wisely manage the ecosystems on which our lives depend. And, as the marine ecologist in the program, Carl Safina, reminds us, “Our everyday choices those we make shopping, eating, building, and commuting can make the difference between a passing grade or future failure.”

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EMPOWERING WOMEN TO “THINK EQUAL, BUILD SMART, INNOVATE FOR CHANGE” USING SENTIMENT ANALYSIS

DR. J. INDUMATHI

Abstract: Although, Innovation and technology offer exceptional opportunities, there is a cleft and the gender digital divide is growing at rapid speed. Women are less-represented in many fields like science, technology, engineering, mathematics and design. Because of this there is a hindrance in the progression of gender-responsive innovations, which can help us to attain transformative gains for the society. In order to shape our future societies it is vital that women’s ideas and proficiencies equally impact the design and implementation of the innovations. This paper attempts to unearth and support state-of-the-art solutions to guarantee women and girls to fully partake and flourish in the workforce and the economy. The solutions have to advance connectivity and technology access, upsurge the women’s financial inclusion (like access to digital payments, savings, investment, and insurance), and escalate prospects for honorable income generation in nontraditional sectors and through admission to new supply chains and new markets and iron out the bias and heuristics, in the workplace and home. Last but foremost, we need to empower women and girls of all socioeconomic backgrounds to use technology so that they can fully participate and prosper in the economy of the world.

Keywords: Innovation, Technology, Gender, Digital Divide, Empowerment.

1. Introduction: Women’s empowerment is the process in which women elaborate and reconstruct what it is that they can be, do, and accomplish in a circumstance that they previously were denied [Kabeer, Naila(2005), Mosedale, Sarah(2005)]. The objectives of women’s empowerment is to achieve the following:
   - Build awareness of occupational innovations that accelerate women’s empowerment, so as to impact the quality of life for women, men, families and communities;
   - Detect key activities to address the financing gap for women’s empowerment;
   - Drive change and commit to scaled-up partnerships for achieving women’s economic empowerment.

The 2019 year theme for International Women’s Day 2019, which will take place on 8th March, is “Think equal, build smart, and innovate for change”. The theme aims to concentrate on innovative ways to advance gender equality and empower women, mainly in the areas of social protection systems, access to public services and viable infrastructure.

In order to achieve the Sustainable Development Goals (SDGs) and Planet 50-50 by 2030, we need to perform transformative shifts, integrated approaches and devise new solutions, mainly when it comes to evolving gender equality and the empowerment of all women and girls. To eradicate the structural barriers we need to use Innovative approaches that disrupt “business as usual” and ensure that no woman and no girl is left behind.

2. Sentiment Analysis: Sentiment analysis is a form of social listening by actually monitoring the social media posts and discussions, then reckoning out how participants are reacting to an event. Sentiment analysis process started getting traction in 2010 and is now flourishing to such an extent that it has been exalted as a field of study.

3. How to Measure the Social Media Sentiment?
The sentiment analysis is a social media analytics tool that encompasses checking how many negative and positive keywords are existent in a mass of conversation. If you find more positive keywords than negative, it is reflected as positive content. If you find more negative keywords, it is called negative content. In-depth analysis encompasses judging opinions in social media content and mining the sentiment they contain. A view is made up of a target, also called a topic, and a sentiment on the topic.
4. **Accuracy of The Sentiment Analysis:** The accuracy of automated tools is based upon the algorithm used to analyze. For less number of active followers, manually a person can read, analyze and, make a judgment call and respond. If there are more people, then you need to automate the process as much as possible as a practical measure. Automation makes it cost effective.

5. **Use of Sentiment Analysis:** Sentiment analysis aids to make sound decisions about any topic like products and advertising. People gather in social media to discuss your products. Listening to customer feedback is important to corporations to stay in business and expand their customer base.
   - Respond quickly to a crisis. Using sentiment analysis, you get alerted to negative reviews as soon as they happen.
   - Based on the way it is trending you can guide the conversation and make it positive.
   - Achieve the trust and loyalty of customers by instantly responding to them.
   - Measure the success of a specific ad or campaign soon after it appears.
   - Is an important resource for market research.
   - Get an idea of where and how you stand with your competitor, which, aids in product development as well as marketing.
   - Track your virtual popularity to track on an ongoing basis.

6. **Gender Based Global Movements:** As a sample we have taken Twitter and scrutinized the buzzing topics around women's empowerment and gender equality currently. Twitter is seen as one powerful tool for sparking global discourse about important social issues.

Building on the impetus of global movements and grassroots campaigns such as '#MeToo', "#TimesUp", "#BalanceTonPorc", "#NiUnaMenos", "#MeTooIndia" and "HollaBack!", "#GirlsVoices", "#NoCeilings & #NotThere", "#It'sTime" and "#Work4Women" the UN theme for this year’s 16 Days of Activism against Gender-Based Violence (25 November – 10 December) under the UNiTE to End Violence against Women campaign is, Orange the World: #HearMeToo.

#HearMeToo carries to the forefront the voices of women and girls who have survived violence, who are defending women’s rights every day, who are taking action—many of them very far away from the limelight or media headlines. These are the faces we may not have seen on newspapers and stories we may not have heard on social media.

7. **#HearMeToo - Echoing Curently:** The "Me Too" was coined by Tarana Burke, an African-American civil rights activist in the year 2006 at New York. It became popular when American actress- Alyssa Milano in 2017, tweeted on Twitter. She tweeted,"If you’ve been sexually harassed or assaulted write 'me too' as a reply to this tweet." The #MeToo movement is a movement against sexual harassment and sexual assault, particularly at the workplace. It is very become popular in different languages all across the world. The hashtag got trended in at least 85 countries, and triggered a series of debates about whether or not cultural norms should be altered to eliminate sexual harassment at the workplace.

In India, #MeToo campaign gained steam around 7 October when actor Tanushree Dutta made serious accusations against Nana Patekar and narrated her experiences during the shoot of the film, Horn OK Please, 10 years ago. It was trailed by accusation of a Minister, by six women journalists for sexually annoying them when he worked as a newspaper editor.

8. **Conclusion:** The 2019 year theme for International Women's Day 2019, which will take place on 8th March, is “Think equal, build smart, and innovate for change”. In order to achieve the theme, we need to achieve the objectives of women's empowerment by constructing awareness of occupational innovations that accelerate women's empowerment, Identify key activities to address the financial gap for women's empowerment, Drive change and commit to scaled-up partnerships for achieving women's economic empowerment. If we are able to achieve the Sustainable Development Goals (SDGs) and Planet 50-50 by 2030, by implementing transformative shifts, integrated approaches and devise new solutions, definitely we can eradicate the structural barriers and ensure that no woman and no girl is left behind. Then
definitely we can attain the Planet 50-50 by 2030.

References:


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DO YOU KNOW ABOUT HIV AND AIDS? 
RESEARCH FOR GENERAL AWARENESS

DR. AMIT PHILLORA, RASHMI PHILLORA, SIMRAN KAUR

Abstract: A Research was done to find out whether people across globe knows what HIV and AIDs is and are they aware of it or have myths and misconceptions about the disease. HIV knowledge Questionnaire designed by Carey, MP and Schroder and Schroder K.E.E in 2002. It is also known as HIV-KQ-18 Questionnaire was used to find out the results. The questionnaire was sent to India, Pakistan, Canada and United States of America. Both medical and non-medical professional and house wives participated in this survey. We could manage to gather data from 60 people. Descriptive research method was used for finding out about the awareness of the sample population. We used ANOVA method to find out whether there is awareness among people or not and to find out whether they have same level of awareness or not.

Keywords: HIV, AIDs, HIV-KQ-18 Questionnaire and ANOVA.

Introduction: The first case of AIDS was diagnosed in the year 1981. Some physicians in California and New York came across unusual opportunistic infections among homosexual men. These infections didn’t respond medication. Therefore, the patients couldn’t live longer and eventually died. These patients didn’t show usual conditions of illness known to Medical Science at that time. Thus, it became evident that we had new illness to be treated. The new disease was named as Acquired Immuno-Deficiency Syndrome (AIDS).

The San Francisco AIDS Foundation had explained the acronym AIDS as:
A = Acquired – Not Born with
I = Immune – Body’s Defense System
D = Deficiency – Not Working properly
S = Syndrome – A group of Sign and Symptoms.
AIDS is not a single disease. It is a set of disease that result from the destruction of the body’s defense system. The destruction is done by Human Immunodeficiency Virus (HIV).

Human Immunodeficiency Virus (HIV): HIV is a very small and fragile virus. It is an RNA virus. It cannot survive outside the human body. Therefore, AIDS is not a contentious disease. It is cannot passed from one person to another person easily like a common cold or flu virus, nor can it be passed through ordinary social contacts.

HIV virus is a member of a group of viruses called retroviruses. Retroviruses are simple microscopic organism’s dependent on host for reproduction. They lack independent metabolism. Therefore, they cannot grow without energy and nutrients supplied by a host cell.

HIV was first described in 1983 in Paris. It has had several names during its short history of less than two decades. But HIV has now been accepted internationally. Some people also called it “AIDS Virus”. Once it infects some, the virus enters in the T Cells of Immune System. In the cell, it destroys genetic material. The damage caused is permanent. All body fluid contains Helper T Cells. The concentration of HIV therefore, is high in blood, semen and vaginal secretion.

An HIV infected person may continue to live a perfectly normal life without showing any physical symptoms. Such a situation is called HIV non-Symptomatic. Once the disease progress, the person will begin to have different illness. H/she may also show certain physical symptoms. The situation is called HIV symptomatic. The term “AIDS” is sued when the disease has progressed the person develops one or more serious infections or conditions.

Literature of Review: The questionnaire HIV KQ 18 was designed by Michael P. Carey, & Kerstin E. E. Schroder. Primary use / Purpose: The HIV Knowledge Questionnaire (18-item version) is a brief self-
administered measure of the individual’s HIV-related knowledge. This instrument contains 18 forced-choice statements (‘true’, ‘false’, ‘don’t know’) related to knowledge related to sexual transmission. A single summary score is yielded overall, with higher scores significant of greater HIV-related knowledge. The HIV Knowledge Questionnaire (HIV-KQ-18) was designed to provide a more concise and well-established measure of HIV-related knowledge in street outreach, fieldwork, and intervention settings. The scale aims to tap into other related constructs, for which the original HIV-KQ 45-item scale did not address.

IGNOU Study material books BFE-101 Basics of HIV/AIDS have explained concepts of HIV/AIDS. The Subject explains well about History and origin of the disease.

Mary Miller in her eBook “HIV and AIDS: Tests and Treatment” tried to explain what HIV is and how it can be tested. She also tried to explain the early symptoms and treatment which can be used for the patient who is suffering from HIV. She also wrote about AIDS and tried to explain what leads an HIV positive to become AIDS patient.

**Problem Statement:** It was found that there are many myths and misconceptions among the Medical, Non-Medical and common people of global population. We need to find those and find do we need more education camps for creating awareness for HIV and AIDS or not.

**Objectives:**
(a) Find out the misconceptions and existing myths among the general world population.
(b) Find out the extent of awareness about HIV/AIDS among the respondents.
(c) To study the methods used for creating awareness about HIV/AIDS among the respondents.

**Research Methodology:**
(a) Descriptive Research Method and Survey Method.
(b) Random Sampling.
(c) Targeted countries: India, Pakistan, Canada, Singapore and USA.
(d) Type of People targeted: Doctors, Nurses, Academicians, Corporate, Students and Housewives
(e) Number of people responded: 60
(f) Tool for Analysis: Microsoft Excel 2016
(g) **Type of test used:** ANOVA Single Factor Analysis.

**Tabulation for Score Results:**

<table>
<thead>
<tr>
<th>Sn</th>
<th>Doctors</th>
<th>Nurse</th>
<th>Academicians</th>
<th>Corporate</th>
<th>Students</th>
<th>House Wife</th>
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Data Study: Complete Population:

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<th>Sum</th>
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ANOVA

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<th>df</th>
<th>MS</th>
<th>F</th>
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<td>5.321723</td>
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<tr>
<td>Within Groups</td>
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<td>13.1238</td>
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<td>1070.984</td>
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</table>

Results Finding and Conclusions:

(a) Doctors have complete knowledge about the disease. It was found that the variance level is very low which is just 0.55 which negligible and which is why doctors don’t need any educational plans on HIV and AIDS and this is obvious to happen.

(b) Research also tell us that Nurses who are part of medical profession don’t have complete knowledge about HIV and AIDS and have many myths and misconceptions. The various calculated for them was 11.5 which is very high. Which means that they need training programs to remove their myths on sexual diseases.

(c) Research also tells that most educated section of global population that is the academicians like professors, teachers and researchers have many misconceptions about the disease and it was found that their calculated variance was 12 which is also very high. So, they also need education on HIV & AIDS so that they can generate general awareness for common people and can educate their own students about this disease.

(d) Common people like house wives, student and people who work in corporate firms or industries have relatively low awareness and they needed to be educated on AIDS and HIV program.

Myths and Misconceptions Identified:

1) **How HIV is not transmitted?**
   a) HIV is a fragile virus outside the body. Heat, ordinary soap and water, household bleach, lysol and chlorine (bleaching powder) can kill it. Surgical instruments can be sterilized.
   b) HIV doesn’t spread like cold and is therefore relatively difficult to catch. Not one case has been reported of HIV being transmitted contact with air, water, tears, sweat, shaking hands, hugging, coughing, sneezing, toilets seats, sharing towels, bed linens, utensils, being bitten by mosquitoes or other form of animals or any other form of everyday contacts.
   c) Saliva, uncontaminated by blood, has not been implicated as mechanism of transmission.
   d) It’s practically impossible to contract HIV while giving medical/nursing care to HIV patient. Thus, medical staff and family members of HIV positive person have nothing to fear, although a few universal or routine precautions must be observed.
   e) Consequently, it’s unscientific and unethical to quarantine HIV positive person as was done in Goa in 1989; or to refuse hospital admission to HIV positive infected patients as was ordered by several hospitals in Delhi in February 1990 for several months; or dismiss an HIV positive person from his/her job as was done in Goa in 1989.

2) **Myths and Misconceptions Related to Transmission of HIV/AIDS/STDs**
   1. Shaking hands (Handshaking);
   1.1. Sharing a toilet/bathroom;
   1.2. Sharing a toothbrush (Contact with Saliva);
1.3. Is HIV is present in Sweat?
1.4. Kissing Embracing;
1.5. Are Contact Sports being safe?
1.6. Swimming Pool/Ponds are Safe;
1.7. Circumcision (To Cut off foreskin of penis in males or clitoris in females as a custom/tradition in some societies.
1.8. Can one get HIV on being Raped?
1.9. Can one get HIV by Giving Blood?
1.10. Can one get HIV by Receiving Blood?
1.11. Safer Sex
1.12. Breast Milk
1.13. How safe it’s to go to a Dentist?
1.14. Risk to Doctors and Nurses
1.15. Mosquitoes
1.16. What is the Risk from a Single Episode of Unprotected Sex?
1.17. Can somebody get HIV from a Discarded Condom?
1.18. Tattoos and Ear/Nose Piercing
1.19. Acupuncture/Wax Treatment and Electrolysis
1.20. Living Together.

**Conclusion:** Except Doctors all other segment of professional and non-professional people needs educational awareness on HIV/AIDS and other STDs. This proofs our alternative hypothesis that the world population needs more awareness programs on HIV and AIDS. There should be more campaigns on HIV and AIDS in Schools, colleges, Corporate, Hospitals, NGOs, Public places etc.

**References:**

2. http://www.midss.org/content/hiv-knowledge-questionnaire-hiv-kq-18

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IMPLEMENTATION OF COST REDUCTION TECHNIQUES IN SMALL SCALE GARMENT INDUSTRIES IN INDIA - A SWOT ANALYSIS

DR. J. FELICITA, SMITHA ANDREWS

Abstract: Garment Industry plays a vital role in the Indian economy. India is the second largest manufacturer of garments after China. The textile industry endures to be the second largest employment generating sector in India. It offers direct employment to over 45 million in the country. India is known for its high quality garments for men. Most of the garment manufacturers in India are in the small and medium scale industries. Due to liberalization and removal of garment sector from the reservation list, Small scale garments are facing threats from the large scale and multinational companies. One of the major threats to Small scale garment Industries is the high cost of production. In Garment Industry major elements of cost are direct material cost, direct labour cost, direct expenses, Indirect material cost, Indirect labour cost, factory overheads, administration overheads, selling and distribution overheads and other miscellaneous expenses. This study helps in identifying the areas in which cost can be reduced in small scale garment industry. Some of the areas of cost reduction in Small Scale Garment Industries identified here are Material cost control -organised procurement, inventory management, transport cost reduction, Labour cost control, overhead cost control, organise work flow by rearranging production layout, minimising wastage, standardized working hours. Small scale garment industries can undertake their business in a successful manner by identifying the areas of cost reduction and implementing suitable techniques of cost reduction. This article analyses the areas of cost reduction and implementation of suitable techniques of cost reduction in garment industries in the Small Scale sectors.

 Keywords: Cost Reduction, Garment Industry, Small Scale Garment Industry, Material Cost Control, Labour Cost Control, SWOT Analysis.

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A STUDY OF WORKPLACE PRESSURE IN PUBLIC AND PRIVATE BANKS IN PUNJAB, INDIA

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Abstract: Stress is routinely initiated as a helpful term or a mental marvel because of its potential results in rotting the prosperity condition of a man and the shock that triggers the fight or flight response exclusively. Current time is simply the time of uneasiness and stress which itself will be affected by number of stressors (Beehr, 1998) [2]. Word related worry in the work space can make people fear walking around the work environment every morning and a while later makes them worry over their occupations around night time. It has ended up being more globalized and will in general impact all experts paying little heed to the occupation profile or class, the primary differentiation being the power levels. Antoniou, Davidson and Cooper (2003) [1] described worry as a situation which drives a man to go off to some faraway place from its typical working in light of advancement in mental or physiological condition. Right when staff is hopeless, they are less profitable, not so much ground-breaking but instead progressively inclined to squander work hours or finally quit. Stress impacts not just soul, yet rather an association's primary concern. The essential domain of this survey is word related pressure realized to a person in perspective of the corporate culture in the present shot. As enrapturing and beguiling it may show up, this package goes with specific cons for most of the overall public. Juggling between their work and life to strike that alter, dealing with the dimensions of notoriety of the market, surrendering to the resistance at workplace to show their esteem et al. With this and various more fights which the corporate culture offers consequently to what it offers, makes it hard to achieve the target for a couple.

1. Introduction: Word related pressure has been of remarkable worry to the organization, delegates, and distinctive accomplices of affiliations. Word related pressure researchers agree that pressure is a troublesome issue in various affiliations (Katherine et al, 2008). The expense of word related pressure is high in various affiliations. At an individual dimension, word related pressure may provoke to extended dismalness and mortality.

Word related pressure is described as the impression of a mistake between environmental solicitations (stressors) and individual capacities to fulfill these solicitations (Ben-Bakr, Al-Shammari and Jefri, 1995). Chang and Lu (2007) implied that the explanations behind word related pressure join saw loss of business, and security, sitting for drawn out stretches of time or genuinely troublesome work, nonappearance of prosperity, multifaceted design of bluntness and nonattendance of self-rule in the occupation. Likewise, word related pressure is achieved by nonattendance of benefits and equipment; work schedules, (for instance, working late moves or additional minutes) and definitive climate are considered as supporters to agents push. Word related pressure much of the time shows high frustration among the delegates, work flexibility, burnout, poor work execution and less effective relational relations at work. Topper (2007) additionally battled that mediations like recognizing or choosing the signs of pressure, perceiving the possible explanations behind the signs and making possible proposed answers for every sign are required. These measures allow individuals to build adapting capacities and make strategies to make individualized pressure organization masterminds that consolidate taking out the wellsprings of stress. What’s more, extending solitary adapting capacities is another intercession which will be used by the organization to confine pressure.

Word related pressure is an overall issue in current life. It tends to be described that as unsavory or negative comprehension and it insinuated work pressure and occupation stretch. In this way, various affiliations are extending stress on specialist push. Thusly, work pressure is one of the rule issues in the word related security prosperity and legitimate welfare.

As an individual felt themselves experiences the work pressure, it will make them slight physiologically, behaviourally and mentally (Topper, 2007). In this manner, push driving sound issues, for instance, despair and burnout, musculoskeletal messes, cardiovascular contaminations, and gastrointestinal are the fundamental issues (Minter, 1999). Nevertheless, some pressure may be sure to individuals regard to test
and motivation and may be hostile mental impact felt pressure or trouble a basic dimension of unpleasant impacts individuals after some time. In this way, this examination will attempt to discover the reasons for word related pressure, indications of stress and mediations that can be connected by the board and workers of private and open banks in Punjab, India so as to oversee pressure adequately.

1.1 Aims and Objectives: The point of this exploration is to distinguish the dimension of recurrence of the activity stressors for bank workers and follow out the upsetting component that influences generally representatives.

All the more explicitly, the goals of this exploration are:
- To measure the dimensions of ‘Word related worry among the workers of open and private segment banks in India.
- To recognize the variables existing in the current hierarchical atmosphere that impacts the workers’ recognition in regards to ‘Word related Stress’.
- To break down the degree of relationship of ‘Word related Stress’.
- To recommend the measures to diminish the word related worry’s among the workers.

2. Literature Review:
2.1 Occupational Stress: As per Raitano and Kleiner (2004), word related pressure may be communicated as the perilous enthusiastic and physical reactions that happen when the authority can’t qualify the essentials. Fairbrother and Warn (2003) depicted worry as when not ready to adjust to the solicitations of one s condition, and affirmation stress to the individual, both are connected a negative responses. Erkutlu and Chafr (2006) conceptualized that the significance of stress practically identical with Bland (1999) which is the response of individual to demands compelled them, which is singular disregard to adjust the solicitations of the earth.

2.2 Sources of Occupational Stress: Stress, which started from causes negative mental, social and physical outcomes on an individual, and causes with nonappearance of execution, late coming, nonattendance, growing work control trade, work feebleness, and workplace accidents (Antoniou et al., 2003, Sharpley et al., 1996; Brown et al., 1986)

In the perspective of Fakhimi (2002), there are 5 important purposes behind word related pressure which is characteristic calling things, parts of individual in the affiliation, employment headway, in-working associations and hierarchical structure and atmosphere.

2.3 Impacts of Occupational Stress: Stress impacts the delegates in an affiliation in all probability in light of the way that inadequacy of time, significant remaining task at hand, working condition, occupation and associations between individuals (Olovi, 1993).

Mansor, Fontaine and Chong (2003) conceptualized that pressure impacts the individual s change which is their execution and the gainfulness.

Smith (2000) expressed that whole deal introduction to stress and illness, including coronary illness, hypertension, and a couple of sorts of malignant growth, anguish, anxiety, stomach and strokes.

2.4 Role of Managers and Employers in helping Employees to Deal with Job Stress: Supervisors and managers expect act a key part in shaping the inevitable destiny of workers as they are the support sections who can speak to the critical point in time any condition for them. It should be to their most prominent preferred standpoint to keep feelings of anxiety in the working environment to a base dimension. They are now and again the genuine case for a laborer’s lead in explicit conditions, as they may act like their chief in that given state. There are some definitive changes that administrators and managers can endeavor to reduce worry at working environment related to the occupation close by as that is the reason for begin for pressure.

2.4.1 Improve Correspondence with Representatives: As indicated by Sundar (2013), workers
frequently endeavor to be in the incredible books of their supervisors and for that they endeavor to make an expert similarity with their directors. It should be the commitment of the director to strike a talk every once in a while with the representatives which should be all around arranged and compelling and not hostile to produce a comfort level at the work environment. Sharing information related to them or little information now and again in a conventional soul can be valuable from time to time.

2.4.2 Employee Cooperation:
- Seek and engage bolster from the representatives in issues related to their occupation, this will extend their devotion and collect their self respect which will explicitly reduce any kind of worry as they feel essential.
- Managers must guarantee that the remaining burden is sensible to workers as per their abilities and advantages for keep up a key separation from any kind of inconceivable due dates. Just to finish the work approach isn’t feasible on various events Show that they are huge similar to their chance to finish the things.
- Social support and joint effort among representatives ought to be organized again and again as partners are the work environment mates who decrease pressure most of the conditions.
- Not having enough work at business can be a stressor for a couple, as a void identity is fallen heavenly attendant’s workshop.

3. Research Methodology: Research Methodology Research technique is a methodical procedure managing articulation of distinguishing an exploration issue, gathering of realities or information, dissecting these information and coming to on a specific resolution either in type of arrangements towards the issue concerned or certain speculations for some hypothetical plan. It additionally contains various elective methodologies and interrelated and oftentimes corresponding strategies and practices. Since, there were numerous parts of research procedure; the line of activity must be looked over an assortment of choices. The choice of an appropriate technique can be landed at through the evaluation of destinations and correlation of different choices.

3.1 Research Design: Research plan of the present investigation is exploratory cum clear in nature as the examination went for accomplishing new bits of knowledge into a wonders and to pick up commonality with the different perspectives and measurements of QWL and word related worry in managing an account industry and dissecting the reactions of workers in regards to these two factors.

3.2 Sampling Method:
- The examining size for this examination is of 50 respondents.
- Five Public Sector and Five Private segment banks in Punjab, India are picked for the exploration.
- The systems utilized are unmistakable and purposive research.
- The zone of research has been the working experts in the corporate division who have encountered or are encountering business related worry in their occupations.

3.3 Tools:
- The overview has been done by setting up a poll covering the applicable elements identified with weight on an online review stage.
- The study interface was the transferred to some interpersonal interaction destinations, explore stages and furthermore disseminated to known associate

3.4 Data Collection: Essential information: Mainly through poll reactions comprising of straight out responsive inquiries and few recurrence scale responsive inquiries (regularly, in some cases and seldom). Optional information: Journals, distributed papers, articles, handbooks were alluded to increase further understanding relating to the point.

4. Discussion: Amid the investigation we accompanied the result that Out of 50 respondents, 79% of respondents were male and 21% respondents were female. The respondents were between the age gathering of 20-50. 43% were hitched and 57% were unmarried. A few representatives were experiencing
word related worry due to job related components like, diverse requests by various work gatherings, unachievable due dates, new innovation, over-burden at work put once in a while on account of poor stream of data, exploitative work practices and work assignments, independence issue, undertaking weight, weariness and dreary work, no new learning, troublesome errand and no ultimate result. While, a portion of the workers were making the most of their position and getting a charge out of difficult assignments. Because of occupation related factors a portion of the workers were not ready to take adequate breaks, they were disregarding different errands, they needed to finish their undertaking quick and prompt, they were feeling discouraged about employment and felt adversely about occupation and thus felt focused. Dominant part of private banks' and private insurance agencies' representatives have experienced word related pressure due to different variables like, work related components, relationship at work, vocation advancement and development related issues, authoritative atmosphere and hierarchical structure related issues. Lion's share of respondents were disappointed with execution examination approach, less advancement opportunity, less compensation increase strategy while, larger parts of them were not fulfilled on account of over heap of work, focuses in occupation, leave get to issues, inclination and governmental issues. Respondents had physical and mental effect because of stress and therefore they have confronted wellbeing related issues. Chosen associations were not making any compelling strides for word related pressure and its aversion and correspondingly huge numbers of the respondents were additionally not finding a way to oversee and avoid weight without anyone else. The two workers and chose associations should take care about word related pressure and both should endeavor to oversee it before it makes enormous issues for representatives.

5. Conclusion: This examination has recognized the dimension of recurrence of the activity stressors for bank workers and follows out the troubling element that influences generally representatives. As such, supervisors in various banks must consider distinctive mediations to regulate word related pressure. The standard methodology of coordinating representatives is lacking to supervise pressure. Thusly, there is a prerequisite for viewpoint change in regulating word related worry with an explicit ultimate objective to restrain its impact on the representatives’ lives.

The discoveries showed that word related pressure is overwhelmingly made by the extension of remaining task at hand, precariousness about the future, poor correspondence in banks, lacking resources and conflicts. The discoveries furthermore revealed that representatives in banks felt worried with business related issues which evidently diagrams the representatives who are focused on account of work and who feel focused on as a result of individual issues. The discoveries in like manner reveal that the outcomes related with the word related pressure unfairly impact the affiliation, especially in diminishing viability in affiliation tasks, growing representative turnover, and the utilization of prosperity costs of workers, low motivation and accident. The survey discoveries in like manner certified that word related pressure costs are high and its impact on workers can’t be slighted. Various leveled powerlessness to regulate word related pressure may disintegrate the definitive efficiency through case, grimness and mortality. In any case, chiefs in various banks stay to get in case they can perceive the signs of word related worry among the workers at their start orchestrate. This will help in checking the worry before its impacts make issues on an individual worker. The banks can use the organizations of specialists like teachers to perceive the symptoms of worry in workers well early. The intercessions, which are frequently used as a piece of numerous banks, have been delegated essential, helper and tertiary. Essential intercessions are the best in directing word related worry at the start compose. In case these essential intercessions are viewed as imperative to an explicit degree, worry in banks will be diminished.

References:


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EXPEDITION OF FACT-BASED DECISIONS MAKING USING THE CONVERGENCE OF INDUSTRIAL INTERNET OF THINGS (IIoT) AND LEAN SIX SIGMA

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Abstract: The Industrial Internet of Things (IIoT) expedites fact-based decisions, by giving data and analytics, to improve the efficacy of Lean Six Sigma programs and Kaizen teams. The emergence of the IIoT, has given industrial organizations a leverage cutting-edge digital technologies in manufacturing operations; and has rewarded them of better speed, flexibility, and precision in decision-making. For higher sigma levels, the IIoT platforms offer a broad set of analytics, to determine the true source of the problem relatively than a parallel effect (causation vs. correlation). The improve phase has to reduce defects, which is limited by the team’s imagination and process knowledge. Whereas, the IIoT offers a means to unceasingly monitor and generate an alert the process, when it deteriorates.

Keywords: Industrial Internet of Things (IIoT), Kaizen, Six Sigma.

1. Introduction: The real world the data is created, collected is limited, slow, and stale. IoT generates an exponential stream of reasonable real-time data, to focus on the continuous improvements of the organizations internal systems, saves time and money while increasing productivity and consistency. Connected devices like IoT, bring visibility of the operating conditions, giving the instantaneous vision into the flow, status, and state of key items in the process. This augments the understanding of desired improvements, and it scales operations with active quality and measure built into the process.

2. Lean Six Sigma: Motorola is the forerunner to familiarize utilization of six sigma during the 1980’s. Six sigma is can be stated in many ways, namely,
   - Six sigma is data driven, problem solving methodology of DMAIC
   - Six sigma’s quality level of 3.4 defects per million opportunities
   - Six sigma’s rate of improvement of 70% or better
   - Six sigma’s is used to create bottom line breakthrough change by the industry

2.1. What Is Six Sigma?:
Six Sigma is a well-defined and well-organized business methodology. It is aimed to escalate customer gratification, deliver business excellence, increasing profits and cost-effectiveness by rationalization of operations, and by vividly improving every process (financial, operational or production) in an enterprise; improving quality and eradicating defects in every organization-wide process.

2.2. History of Six Sigma: When Motorola (1980) was in loss of the market share, the need for increase in quality was felt. Motorola Engineer Bill Smith presented a new quality control system named Six Sigma, which was successfully implemented. The six key principles of which six sigma are summarized below.
   - Critical to Quality: Customer is the starting point and the needs of the customer is to be identified.
   - Defect: arises when the delivery is not meeting the customer wants.
   - Process Capability: processes that is able to deliver what the customer wants.
   - Variation: By way of the customer’s experience.
   - Stable Operations: The objective is to secure consistent, robust processes that increases the customer’s experience.
   - Design for Six Sigma: Design must meet all the customer requests and the capability of the process.

2.3. Purpose of Six Sigma: Six sigma is seen as: a vision; a philosophy; a symbol; a metric; a goal; a methodology.(figure)}
2.4. **Six Sigma Benefits**: Six Sigma method was developed in 1986 by Motorola. **Six Sigma is useful as**:

- **Business Strategy**: The plan of action, revenue increase, cost reduction and process improvements can be strategized in a business.
- **Benchmark**: aids in refining process metrics. When process metrics becomes stabilized it can be used to improve the newly stabilized process metrics.
- **Goal**: Using Six Sigma methodology, organizations can keep a stringent goal for themselves and work towards achieving them during the course of the year. Right use of the methodology often leads these organizations to achieve these goals.
- **Robust Methodology**: a documented methodology for problem solving.
- **Statistical Measure**: being a data driven methodology, it indicates the root-causes of the problem.
- **Vision**: aids the Senior Management craft a vision which will offer defect free, positive environment to the business.

2.5. **Methodologies of Six Sigma**: Six Sigma has the following methodologies:

- **DMAIC** – DMAIC is a data-driven quality strategy for improving an existing business processes.
- **DMADV** – DMADV is a data-driven quality strategy for designing products & processes. It is useful for creating new product designs or process designs in such a way that it results in a more probable, mature and defect free performance.
- **DFSS** – Design For Six Sigma (DFSS) is a data-driven quality strategy useful for designing or redesigning a product or service from the ground up.

3. **Why IIoT is Obligatory?**:

IIoT is a means to overcome the following impediments, namely,

- Gather data for the measure phase is not proper.
- Using unsuitable analytics for the problem at hand like statistical analysis supposing a normal distribution curve when it isn’t normal.
- A conventional approach of doing things leads to a weak control phase.

3.1. **Analysis Goes Beyond Normal Distribution Curve**: For higher sigma levels, the analysis has to move beyond the normal distribution curve. IIoT platforms offer a broad set of analytics, to determine the true source of the problem relatively than a parallel effect (causation vs. correlation).

The improve phase has to reduce defects, which is limited by the team’s imagination and process knowledge. Whereas, the IIoT offers a means to unceasingly monitor and generate an alert the process, when it deteriorates. Alerts managed by ad hoc communications with people is used to fix the problem in
the case of predictive maintenance, the suggested automated business process sends the alerts directly to the maintenance planner.

4. Industrial Internet of Things (IIoT): IIoT actually enables the acquisition and availability of far bigger amounts of data, at far superior speeds.

4.1. What IS IIoT And How It Has Shaken Manufacturing?
The IIoT is part and parcel of a larger concept known as the Internet of Things (IoT). The network of intelligent computers, devices, and objects are called IoT and they collect and share huge amounts of data. The data is garnered in a central Cloud-based service and shared with end users to increase automation in all the walks of life. The application of the IoT to the manufacturing industry is called the IIoT (or Industrial Internet or Industry 4.0). The IIoT revolutionizes not only the manufacturing industry but is also steering the software industry, by enabling the procurement and availability of far greater amounts of data, at rapid speed.

4.2. Benefits of IIoT: The IIoT significantly increases connectivity, effectiveness, scalability, time savings, and cost savings for all the industrial organizations. The cost savings is made possible due to the prophetic maintenance, enhanced safety, and other operational efficiencies. IIoT networks of intelligent devices is used to connect all of the stakeholders, data, and processes from the factory floor to the executive offices and to make better decisions.

4.3. IIoT Protocols: There are a number of dissimilar communication protocols presently in use, such as OPC-UA, the Message Queueing Telemetry Transport (MQTT) transfer protocol is rapidly evolving as the standard for IIoT, due to its lightweight overhead, publish/subscribe model, and bidirectional capabilities.

4.4. Challenges of the IIoT: The two major challenges for the implementation of IIoT are Interoperability and security.

5. Conclusion: By means of IIoT, the data from billions of intelligent devices create massive volumes of data, at a rapid pace, the digitalization assures lower costs, better production quality, flexibility, efficiency, shorter response time to market demands, and also opens up new business opportunities.

6. The Future of The IIoT: The IIoT is major trends disturbing industrial businesses today and in the future. Industries are swept off their feets to modernize systems and equipment to encounter new regulations, to keep up with snowballing market speed and volatility, and to deal with disruptive technologies. Industries using IIoT have seen major enhancements to safety, efficiency, and profitability. The IIoT solution significantly advances connectivity, efficiency, scalability, time savings, and cost savings for engineering organizations. It binds the people across all the levels permitting the enterprises to get the most value from their system without being controlled by technological and economic restrictions.

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About the University: Sant Baba Bhag Singh University, Khiala, Jalandhar, Punjab, India came into existence vide Sant Baba Bhag Singh University Act, 2014 (Punjab Government Act No. 6 of 2015) and is recognized by University Grants Commission (UGC) under Section 2(f) of UGC Act 1956. The University has been granted the Membership of Association of Indian Universities (AIU).

The university has been established in the name of Sant Baba Bhag Singh Ji, who carried forward the mission of ‘NIRMALA PANTH’ initiated by Sri Guru Gobind Singh Ji, the Tenth Guru of Sikhs, to spread education for all round development of the society. Sant Baba Bhag Singh Ji visualized that education and self-help are the transforming forces for upliftment of the common man. To achieve this, Revered Sant Baba Malkit Singh Ji adopted flash rivulet devastated rural area of Jabbar/Manko (Jalandhar, India) and marched on to educate people to identify their problems and then solve them by self-help. In this direction, a programme of ‘Girl Education’ was initiated in 1954 with a view that girl education was a step forwarded towards empowerment of the family. Carrying forward the legacy, Sant Baba Malkit Singh Ji established Sant Baba Bhag Singh Memorial Charitable Society (SBBSMCS) in the year 2000, facilitating education from Nursery to Postgraduate Degree level, to make Quality Education accessible to rural youth in technical and professional streams in the Doaba region of Punjab, India.

SBBSU boasts of lush green campus spread over an area of more than 220 acres. The University is committed to the creation, achievement and dissemination of knowledge post 12th standard and graduation levels with unique model of degree with skill in all Engineering branches, Computer Application, Commerce and Management Studies, Hotel Management, Airline Tourism, Pure Applied Sciences, Agricultural Sciences, Life Sciences, Para-Medical Courses, Education, Physical Education, Medical and Law.

The courses are designed in a way that one gets not only degree but skill certification too. Equipped with outstanding faculty and infrastructure, SBBSU facilitates skill development embedded courses to achieve its mission of imparting knowledge and strengthening students with the skills to contribute in their professional as well as personal lives and thus enabling them to go 'Beyond Mundane Learning'. The University is committed to ensure bright future of the learners in the contemporary era by putting seamless striving to work in accordance with the lurking needs in the theory ridden present education system.

The University has the following constituent Institutes:
1. University Institute of Engineering & Technology (UIET)
   Courses offered: B. Tech. (CSE, ME, CE, EE & ECE), M. Tech & Ph.D.
2. University Institute of Sciences & Humanities (UISH)

3. University Institute of Commerce & Management (UICM)
   Courses offered: B. B. A., M. B. A., B. Com. (Regular & Hons), M. Com., B. Sc. (Hotel Management & Catering Technology), B. Sc. (ATHM), M.Phil. & Ph.D.

4. University Institute of Computer Applications & Information Sciences (UICA & IS)
   Courses offered: B. C. A., B. Sc. (IT, Animation & Multimedia), M. C. A., M. Sc. (IT), PGDCA, M. Phil. & Ph.D.

5. University Institute of Education (UIE)
   Courses offered: B. Ed., M. Ed., B. P. Ed., B. P. E. S., M. P. E. S., M. Phil. & Ph.D.

6. University Institute of Law (UIL)
   Courses offered: B. A. L.L.B., L.L.B., L.L.M. & Ph.D.

The institutions above have lent significant contributions in the field of education that is reflected through remarkable results and placement records. With state-of-the-art infrastructure catering to the needs of students, a pollution and drug free campus, focus on excellence in teaching, active involvement of students & faculty in co-curricular and extracurricular activities, including NCC & NSS, industrial visits and a remarkable presence in the field of sports amongst educational institutions, along with a culture of imbibing ethical values, SBBSU is an ideal place to be in to embrace quality education.

The University emphasis on the Research & Development activities and the 50% of the faculty of SBBSU is doctorate in their respective areas. SBBSU has also submitted various projects to the funding agencies like CSIR, DST, SERB, and TERA for the grant of funds. The signing of MoUs with IIT, Delhi for the Virtual Labs Nodal Centre; MERIT, Delhi for research on Big Data, Shodhganga for digital submission of theses and dissertations; and Internshala, a platform for internship and training of students are also the added feathers in the cap of the University.

SBBSU has been awarded with prestigious 'Excellence in Community Services 2017' and ‘Best Infrastructure Facility Award 2017’ by Confederation of Education Excellence (ECC).

Mission: To achieve the best possible academic standards by exposing every student to a holistic educational experience in an active and dynamic environment. To develop self-expression, self-reliance, self-confidence, self-esteem and eventually endorse self-directed learning befitting the life in the rapidly changing world of the new millennium.

Vision: "To encourage learners to be educated, acquire knowledge and wisdom so as to live a happy, successful and meaningful life".

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