Karmveer Vitthal Ramji Shinde Shikshan Sanstha's

Shivraj College of Arts, Commerce & D. S. Kadam Science College, Gadhinglaj

Estd-1964, Affiliated To Shivaji University, Kolhapur

PROCEEDINGS

Two Day Multidisciplinary National Conference

Sponsored by

Shivaji University, Kolhapur

Computer Science & Information Technology

15th and 16th February, 2024

2024

ISBN - 978-81-967894-0-4

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Publisher
Shivraj Prakashan Vibhag
Vadarge Road, Gadhinglaj.
02327-222307

Type Setter & Printers
Shri. Rajendra Mane,
Prism Graphics, Kolhapur
Mobile - 9049160426

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ISBN - 978-81-967894-0-4

Editor Note

National Conference on Computer Science and Information Technology invites Teachers, Research Scholars and Industrial Representative involved in all aspects of computer science and technology to publish high quality and refereed papers. Papers reporting original research and innovative applications from all parts of the world are welcome. Papers for publication in the journal are selected through rigorous peer review, to ensure originality, timeliness, relevance, and readability. While the journal emphasizes the publication of previously unpublished materials, selected conference papers with exceptional merit that require wider exposure are, at the discretion of the editors, also published, provided they meet the journal's peer review standards. The journal also seeks clearly written survey and review articles from experts in the field, to promote insightful understanding of the state-of-the-art and technology trends.

All articles are aimed at a general computer science audience seeking a full and expert overview of the latest developments across computer science research. Articles from other fields are welcome, as long as their content is relevant to and has impact on the development of computer science. In particular, articles that review the application of well-known Computer Science methods to other areas are in scope only if these articles advance the fundamental understanding of those methods.

Ravindra B. Khot
Editor

Principal Note

It is a matter of great pride and satisfaction for Shivraj Arts, Commerce And D. S. Kadam Science College , Gadhinglaj to organise National Conference on Computer Science and Information Technology sponsored by Shivaji University, Kolhapur . The College has made tremendous progress in all areasacademic, non-academics, capacity building relevant to staff and students. The College has achieved another milestone in getting NAAC "A" Grade Accreditation.I am confident that this Conference will send a positive signal to the teachers, research scholars and industrial representative those who interested in the Technical education and Technology based activities.

Today, all problems, whether with social or industrial relevance call for interdisciplinary approach and team work. Technical competence alone is inadequate. Hence, the staff and students of the department should not leave any stone unturned to develop both technical and team competencies and attain excellence in their endeavour.

A superb alignment is seen among the goals of the Management, faculty, staff members and students o. Management has been very magnanimous to support all our endeavours to provide a wholesome personality to students, and equip them with skills at par with international standards. Anyway, I am sure that the students and staff of the department have made use of this opportunity to test and hone their intellectual skills to reach a wider readership. I congratulate the editorial team for having put their best to bring out this outstanding piece of work.

Prof. (Dr.) S. M. Kadam
Principal,
Shivraj College of Arts, Commerce &
D. S. Kadam Science College, Gadhinglaj

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Artificial Intelligence Based Cyber Crimes

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Abstract

The threat of AI-based cyber-crimes is growing rapidly alongside the recent developments in Artificial Intelligence (AI) technology. AI-based cyber-crimes use machine learning to analyze a vulner abilities and find techniques to attack an organization that are not equipped to detect them. These attacks can be highly targeted as hackers are increasingly using AI to launch such attacks. The accessibility of cloud environments has made it effortless for them to explore AI techniques and construct sophisticated learning models to launch cyber-attacks like Fraud GPT and Worm GPT. The AI-based cyber-crimes occur through such AI-based cyber-attacks that are difficult to detect and can bypass traditional cyber security solutions. Advancements in machine learning and artificial intelligence (AI) have greatly influenced the hackers to the field of cyber-crimes. Presently, cyber-security professional are facing the tremendous challenge of going through vast amounts of AI-based suspicious activities. It is important for organizations to understand the risks and take steps to mitigate them by continuously monitoring and adapting the defense techniques to stay ahead of these evolving threats.

Key words : Artificial Intelligence, Cyber-crimes, Cyber-attacks, Cyber-security

1. Introduction

Artificial Intelligence involves various algorithms and technique to be used by the machines to analyze data for decision making. With this ability, artificial intelligence has made advancement in the field of computer science and information technology but emerged as a risk to cyber-security as well. In the information technology world, AI-driven cyber-crimes is the reality rather fiction as one might think. However, the reality is that AI cyber-crimes happen and are growing rapidly. The presence of AI algorithms in the cyber-crimes and their impact on the cyber security industry is significant. As hackers have posed a serious problem with the inception of an artificial intelligence, their reach and capacity to steal large amounts of data, have become increasingly challenging. Consequently, AI-based cyber-crimes have posed a security threats, not only for major government agencies but also for ordinaryindividuals. The risks of AI-based cyber-crimes are expected to increase rapidly as AI tools are becoming cheaper and more accessible. As per the experts comments attackers are using generative AI and large language models to launch AI-based cyber-attacks at an unseen level of speed and complexity.

2. Glimpses of AI-based Cyber-crimes

Word press has recently disclosed a series of extensive botnet cyber-attack s on self-hosted Word Press websites, resulting in over 20,000 infected sites. Hackers access personal information and credit card numbers of users through these botnet-style cyber-attacks. This has turned into a loss of faith in Word Press among users, including those utilizing its hosting services.

The popular social media platform Instagram experienced two AI-based cyber-attacks in 2019 where a number of Instagram users found their account information accessed by hackers and preventing them from accessing their social profiles. In another incident, a bug in Instagram's code exposed to a data breach that made users' passwords visible in the URL of their browsers, posing a serious security risk.

A serious trend is emerging where hackers are using AI-generated You Tube videos to deceive viewers into downloading hidden malware. In one of its exclusive report by Cloud SEK, a prominent IT security intelligence firm, there has been a considerable growth in YouTube videos with descriptions containing harmful malware. These videos are showcasing a tutorial for obtaining pirated versions of software such as AutoCAD, Autodesk 3dsMax, Photoshop and Premiere Pro especially to

licensed users.

Though these videos are mostly on YouTube but also spread across popular social media platforms, including Twitter, Instagram, and Face-book. Viewers who are downloading such free software put in the video description, consequently linked to a data-stealing malware. After installation, it starts stealing and transmitting the user's data including sensitive financial information to the hackers making their personal and confidential data absolutely vulnerable. It is critical to understand the mechanics of this scam and adopt measures to safeguard viewer's personal information from being compromised.

As artificial intelligence and machine learning technologies are becoming more and more advanced, cyber criminals could use these tools to launch more sophisticated and auto mated attacks in future, making the more difficult o detect and protect from.

3. Conclusion

Overall, it is clear that AI-based cyber-crimes are initially based on botnet attacks and the propagation of general malware. Eventually a minor security breach now has the potential to be disastrous through AI-based cyber-attacks. Even the fundamentals of cyber security, including fire walls, anti-mal ware up-to hiring an experienced cyber-security team, are unable to surpass the cyber-criminal equipped with the AI-based techniques to capitalize on existing vulnerabilities. Organizations can mitigate the risks and stay a step ahead of cyber criminals by implementing AI-powered cyber security solutions such as regular security audits, employee training, developing an incident response and disaster recovery plan in collaboration with cyber security experts. But majority of the responsibility is of cyber security experts to understand these AI-based cyber-crimes and develop customized solutions to protect against them.

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Enhancing User Experience: Applications and Challenges of AI at College Libraries in India

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Abstract

This research paper investigates the multifaceted landscape of Artificial Intelligence (AI) technology in the context of Indian libraries, focusing on both its applications and the challenges encountered in its integration. Through an in-depth analysis, the study explores how AI is transforming traditional library services, such as cataloging, user engagement, and resource management. The paper also underscores the ethical considerations, data privacy concerns, workforce adaptation, and financial constraints that accompany the adoption of AI in libraries. It advocates for a balanced approach to ensure responsible and sustainable implementation, emphasizing the need for capacity building and collaborative efforts among stakeholders.

Keywords : Artificial Intelligence, Library Science, Digitization, Indian Libraries.

1. Introduction

In today's information technology era, traditional library services are facing many challenges. With the increasing flow of information, it is becoming difficult for students to find and analyze the information they need. Also, as the use of technology in education is increasing, students need to adapt to new learning methods and technologies. Artificial intelligence (AI) is a new technology with the potential to overcome many challenges in traditional library services. AI-based systems can provide personalized services to students based on their needs, help them search and analyze information, and help them adapt to new learning methods and technologies.

This research paper discusses the potential as well as challenges in adopting artificial intelligence technologies in Indian college libraries. It looks at how AI can improve student experiences, facilitate resource management and change the way libraries work. This analysis is done keeping in mind the Indian context and limitations in particular.A brief summary of the objectives of the paper:

- To understand the benefits and potential applications of using AI in college libraries in India.
- Identify and analyze key challenges and barriers related to AI use.
- Formulate recommendations and strategies to enhance the use of AI in the Indian context.
  This research paper is useful for students, professors, librarians and others interested in the field of technology. This paper will provide a new perspective on the needs of students and the role of libraries in the Indian higher education sector.

2. Benefits and Applications of AI in Indian College Libraries

The use of artificial intelligence (AI) technology is increasing in college libraries around the world. AI gives students the potential to improve library services by providing personalized learning, improved information discovery, increased efficiency, and services available 24/7.

Some of the key benefits of AI and its applications in Indian college libraries are as follows:

1. Personalized Learning:

- AI can recommend learning materials and resources based on students' learning needs and learning styles.
- AI-based tutorials and educational games can help students learn at their own pace and learn according to their abilities.

- AI can help teachers monitor students' progress and provide them with the support they need.

2. Improved Information Search:
- AI can help learners find more accurate and relevant information using Natural Language Processing (NLP) and Machine Learning (ML) technologies.
- AI-based chatbots and virtual assistants can provide information and assistance to students 24/7.

3. Efficiency Enhancement:
- AI can help automate library tasks, such as lending and returning books, data entry and classification.
- AI can help library staff become more efficient and productive.

4. 24/7 Availability:
- AI can make library services and information available to students 24/7, even when the library is closed.

5. Linguistic Inclusion:
- Since India is a multilingual country, AI can provide bilingual or multilingual information discovery and recommendation systems.
- AI can increase information accessibility by translating and collecting information in local languages.

6. Financial Savings:
- AI can reduce costs by automating some library tasks and increasing efficiency.
- AI can reduce costs by finding less expensive alternatives and using local resources.

These benefits can help Indian college libraries better meet the needs of students, make information and services more accessible, and reduce costs by increasing efficiency. However, challenges must be overcome before AI can be used to reap these benefits.

3. Challenges and barriers to AI use

There are many challenges and barriers to using AI technology in Indian college libraries. Some of the important ones are as follows:

I. Financial Limitation:
- AI technology and equipment can be expensive to buy and maintain.
- Libraries lack the capacity to invest in the technology and infrastructure required for AI.
- Many college libraries do not have sufficient budget to purchase AI-based systems and equipment.
- Libraries located in rural areas lack the high-speed Internet connectivity and computer hardware required for AI.

II. Digital divide:
- Internet and technology access in India is uneven, leaving out students in rural and tribal areas from the benefits of AI.
- Many students in rural areas do not have smartphones or computers, making them unable to use AI-based library services.
- Many rural libraries do not have internet connectivity required for AI.

III. Data Privacy and Security:
- AI systems use large amounts of data, which raises data privacy and security concerns.
- Strong data privacy and security policies are required to prevent misuse of students' personal data.
- AI systems must be secured against hacking and data breaches.

IV. Technology and Skill Gap:

- Library staff may not have the necessary training and skills to use AI technologies and tools.
- Many library staff do not know how to use and manage AI systems.
- Inadequate resources to train library staff to learn the technologies and skills required for AI.

V. Social and Cultural Challenges:

- Some communities may have a negative perception of AI technology.
- Some people fear that AI technology will take over human jobs.
- Some people believe that privacy and security can be compromised by using AI technology.

VI. Linguistic Diversity:

- Many languages are spoken in India, making it difficult to develop and deploy AI systems that can work in all languages.
- Many AI systems are available in the English language, making it difficult for students who speak other languages to use them.

4. Indian context

A) Characteristics of the Indian Higher Education System and Implications for AI Use:

The Indian higher education system is characterized by the following characteristics:

- Large and diverse student population
- Limited resources and infrastructure
- Increasing use of technology in education

These characteristics have a significant impact on the use of AI. AI-based systems are in high demand due to the large student population. Libraries face financial challenges to deploy AI technology due to limited resources. The growing use of technology in education creates an environment conducive to the use of AI.

B) Relevant Government Initiatives and Ability to Support AI:

The Government of India has implemented several initiatives that can support the use of AI in libraries. It includes the following:

- Digital India programme
- National Education Policy 2020
- Skill India Mission

Through these initiatives, the government provides financial support, training and infrastructure to libraries to implement AI technology.

C. Challenges and Addresses Specific to India:

India faces a number of specific challenges in its use of AI, including:

- Infrastructure deficit
- Linguistic diversity
- Digital Literacy

To overcome these challenges, the government needs to focus on:

- Developing the necessary infrastructure for AI technology in libraries
- Developing AI-based systems in various Indian languages
- Implementing digital literacy programs

AI technology has transformative potential for Indian college libraries. With the right policies and implementation, India can lead the world in the use of AI and provide better learning opportunities for all students.

5. Case studies

Below are some examples of successful implementation of AI in Indian college libraries:

i. University of Delhi: University of Delhi has launched an initiative called "AI for Libraries" to use AI technology in library services. Under this initiative, the library has implemented an AI-

based system for tasks such as book numbering, cataloging and circulation. This has increased the efficiency and productivity of the library staff.

ii. IIT Khadagpur: IIT Khadagpur has developed an "AI-based search and recommendation system" to help students find and analyze information according to their needs. The system provides personalized recommendations based on students' search behavior. This has helped students find the information they need quickly and easily.

iii. Indian Institute of Science, Bangalore: Indian Institute of Science, Bangalore has developed an "AI-Based Education and Training System" to help students adapt to new learning methods and technologies. The system provides students with a personalized learning experience and helps them progress in their education.

These case studies show that the following factors are critical to the successful implementation of AI:

- Strong leadership and support: Implementation of AI requires strong leadership and support from the library administration.
- Clear goals and strategies: Implementation of AI must have clear goals and strategies.
- Appropriate technology and infrastructure: Implementation of AI requires appropriate technology and infrastructure.
- Training and Capacity Building: Training and capacity building of library staff is required to use AI systems.
- Data privacy and security: AI systems must incorporate data privacy and security standards.

6. Future directions and recommendations

A. New AI Trends:

AI technology is evolving rapidly and offers many new opportunities for libraries. Some relevant new AI trends include:

- Big data: AI systems require large amounts of data, and libraries have large amounts of data about students' learning behaviors and needs.
- Machine learning: AI enables systems to learn from data and improve themselves.
- Natural language processing: AI enables systems to understand and process human language.
- Robotics: AI enables systems to perform tasks in the physical world.

These trends open up many new opportunities for libraries, such as:

- Personalized learning: AI-based systems can provide a personalized learning experience based on each student's needs and learning style.
- Improved search and information retrieval: AI-based systems can help students find and analyze information according to their needs.
- Automated library functions: AI-based systems can automate many library functions, such as book numbering, cataloging and circulation.
- Augmented Reality and Virtual Reality: AI-based systems can use AR and VR technologies to provide engaging and interactive learning experiences for students.

B. Recommendations to Increase AI Use in India:

The following specific recommendations are suggested to promote the use of AI in India and overcome the challenges:

- Develop policy guidelines: Develop a national policy for the use of AI and establish guidelines for the use of AI in libraries.
- Increase funding: Providing financial support for implementing AI technology and training library staff.
- Conduct capacity building programs: Conduct training programs for library staff on AI technology and its use.

- Develop Infrastructure: Developing the infrastructure required to implement AI technologies.
- Increase awareness and education: Creating awareness among students, faculty and library staff about AI technology and its benefits.
- Encourage Research and Development: To encourage research and development on the use of AI in libraries.

C. Policy, Financing and Capacity Building:

Promoting the successful use of AI in libraries in India requires a coordinated and integrated approach of the three elements of policy, financing and capacity building. A more detailed discussion of how each of these factors can be focused is discussed below

1. Policy:

- National Policy: A national policy needs to be formulated that will promote and guide the use of AI in libraries. This policy can provide clear guidance on important issues such as data privacy, security and intellectual property rights.
- State and local policies: Complementary policies should be developed at the state and local levels to implement the national policy. The policy adapts to local needs and contexts.

2. Financial Supply:

- Government funding: Central and state governments should provide financial support to libraries for implementing AI technology. This includes hardware, software, training and infrastructure costs.
- Public-Private Partnership (PPP): It is possible to mobilize financial resources by partnering with the private sector. This can accelerate the development and implementation of AI technology.
- Donations and Donations: It is possible to mobilize financial resources by collecting donations and donations. To do this, there is a need to raise awareness among students, teachers and society about the benefits of AI.

3. Capacity Building:

- Training for library staff: Training programs should be organized to develop library staff with the necessary skills to use and manage AI technology.
- Training for teachers: Teachers should be trained on how to use AI technology in education. This will enable them to provide better learning experiences to students.
- Awareness programs for students: Students should be made aware of AI technology and how it can benefit their education.

All these solutions implemented together can boost the use of AI in Indian college libraries. Making the most of AI's potential requires coordination and engagement of policy, financing and capacity building.Libraries in India have great potential for use of AI. With the right policy, funding and capacity building measures implemented, AI can provide better learning experiences for students and make libraries more efficient and effective.

7. Conclusion

There has been an exploratory discussion on increasing the use of artificial intelligence (AI) in Indian college libraries. It covers AI's benefits, challenges and solutions to overcome them. It appears that AI can provide students with personalized learning, improved information retrieval, increased efficiency, and 24/7 available services. However, challenges such as financial constraints, digital divide, data privacy and security, technology skills, social and cultural concerns and linguistic diversity need to be overcome.

Although these challenges are difficult, they can be overcome. This can be achieved by emphasizing government support, collaborative communities, technology tailored to local needs, data privacy and security policies, social sensitivity and linguistic inclusiveness.

In the future, AI technology will further develop and its use will increase. Therefore, there is a

need for research on developing AI systems tailored to local needs, developing AI-based devices that provide personalized learning experiences, automating library operations, and creating strategies for responsible use of AI.AI is a big opportunity for Indian college libraries. If properly planned and implemented, AI can serve students better and revolutionize the education sector.

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Teaching Biology In The Digital Age : The Impact Of Ict On Student Learning Outcomes

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ABSTRACT

The landscape of education, particularly in the realm of science learning, is undergoing a significant transformation driven by the burgeoning presence of Information and Communication Technologies (ICT). Biology, a subject inherently linked to the exploration of life's intricate processes and diverse forms, stands poised to reap the benefits of this digital revolution. This paper delves into the dynamic relationship between ICT and biology education, exploring its impact on student learning outcomes in the digital age. Today's students are digital natives, accustomed to interacting with information through multimedia experiences and immersive environments. This paper examines how ICT tools, from interactive simulations and virtual labs to online databases and collaborative platforms can cater to this learning style and enhance the acquisition and retention of biological knowledge. This research investigates the impact of ICT integration on various facets of student learning.

Key Words:

Biology teaching, Learning strategy, Technology.

INTRODUCTION

Information and technology has a major role to play in forming the new worldwide economy to deliver fast changes in the society. Within the previous decade, ICT has advanced and changed at such a speed, that developing countries have not been able to catch up with the revolution and have been left behind and thus lag in their communication with the developed countries. ICT acts as the foundation stone of the contemporary world; thus, understanding this technology and its fundamental concepts is considered as part of the core of education (UNESCO, 2002). Technology has the potential to renovate the ways of instruction, where and how learning occurs and the roles of students and educators in the instructional process (UNESCO, 2002a).

Digital tools can significantly facilitate critical thinking, problem-solving, and data analysis skills in the context of biology in several ways

Critical Thinking

Interactive simulations and models: These tools allow students to manipulate variables, observe outcomes, and analyze data in a safe and controlled environment. This process encourages them to question assumptions, consider different explanations, and draw their own conclusions.

Virtual labs and experiments

By engaging with virtual versions of real-world experiments, students can analyze data without the constraints of time, resources, or safety protocols. This allows them to explore multiple scenarios, analyze discrepancies, and think critically about experimental design.

Online debates and discussions

Platforms for collaborative learning enable students to engage in constructive discussions about biological topics, explore diverse perspectives, and challenge their own beliefs. This fosters critical evaluation of information, evidence-based reasoning, and thoughtful argumentation.

Problem-Solving

Data analysis tools and software: These tools assist students in organizing, visualizing, and interpreting large datasets relevant to biological phenomena. This empowers them to identify patterns,

test hypotheses, and develop solutions to complex problems.

Bioinformatics resources and databases

Access to vast biological databases allows students to explore real-world datasets, formulate research questions, and design strategies to solve them. This encourages them to think creatively, adapt to new information, and apply their knowledge to solve authentic problems (Koehler, 2005).

Gamified learning platforms

Educational games incorporating biological concepts can challenge students to solve puzzles, overcome obstacles, and make strategic decisions. This promotes critical thinking, problem-solving skills under pressure, and adapting to changing situations.

DATA ANALYSIS

Interactive visualizations and info graphics

These tools present complex biological data in engaging and accessible formats, allowing students to identify trends, relationships, and outliers. This fosters visual literacy, data interpretation skills, and the ability to draw meaningful conclusions from complex information.

Collaborative data analysis projects

Working in teams to analyze real-world biological data sets encourages students to communicate effectively, share insights, and refine their interpretations. This process improves teamwork skills, data communication, and collaborative problem-solving.

Open-source coding and data analysis platforms

Learning basic coding skills empowers students to manipulate and analyze biological data directly. This enhances their analytical thinking, computational skills, and ability to work with large datasets independently.

Technology can absolutely spark curiosity and ignite a passion for exploring the wonders of life in young minds, and here's how

1. Interactive and Immersive Experiences

Virtual Reality and Augmented Reality: Exploring rainforests from your living room, dissecting a frog in VR, or seeing the universe through a telescope app - these immersive experiences can bring abstract concepts to life, sparking curiosity and a sense of wonder.

- Interactive Simulations: Running experiments, observing animal behavior, or building model organisms can all be done virtually, allowing students to actively engage with biological phenomena and ask "what if" questions.
- Gamification: Educational games can make learning biology fun and engaging, incorporating challenges, rewards, and storytelling to keep students motivated and curious about the natural world (Yapici, 2017).

2. Accessibility and Exploration

- Access to Information: Just a click away, young minds can explore vast databases of images, videos, and articles about any biological topic, leading them down rabbit holes of discovery and fueling their curiosity.
- Connecting with Experts: Online platforms and social media can connect students with scientists, researchers, and other enthusiasts, allowing them to ask questions, learn from experts, and participate in discussions about their interests.
- Citizen Science Projects: Participating in online or local projects like birdwatching, insect monitoring, or data analysis allows young minds to contribute to real-world research, feeling a sense of purpose and connection to the wonders of life.

3. Visualization and Storytelling

- Interactive Info graphics and Animations: Complex biological processes can be visualized in engaging and dynamic ways, making them easier to understand and remember, igniting curiosity

about the mechanisms behind life.

- Educational Documentaries and Videos: High-quality media can showcase the beauty and diversity of life on Earth, inspiring awe and a desire to learn more about the natural world.
- Science Communication through Social Media: Platforms like YouTube and Instagram allow scientists and educators to share their knowledge in creative and engaging ways, captivating young audiences and sparking their interest in science.

4. Personalization and Empowerment

- Apps and Tools Tailored to Interests: Personalized learning platforms can recommend topics based on individual interests, encouraging exploration of specific areas of biology that spark curiosity.
- DIY Experiments and Projects: With readily available online resources and kits, young minds can conduct their own experiments at home, fostering a sense of ownership and inquiry about the world around them.
- Connecting Biology to Daily Life: Educational apps and games can help young minds understand how biology relates to their daily lives, making the subject relevant and sparking curiosity about the science behind everyday phenomena.

However, it's important to remember

Technology is a tool, not a replacement for real-world experiences. Hands-on activities and interaction with nature remain crucial for fostering a deep connection with the wonders of life. Mindful screen time and responsible use are essential. Technology should complement, not replace, other forms of learning and exploration. Equity and access to technology must be addressed. Not all young minds have equal access to technology, and educators and parents must work to bridge the digital divide. The digital divide, which refers to the gap in access to technology and the internet, often creates disadvantages for students who lack sufficient resources.

However, ICT has the potential to bridge this gap and ensure inclusive learning opportunities for all students in several ways:

- Increasing Access: Low-cost Devices and Programs: Providing subsidized or free devices like tablets or laptops enables students to participate in digital learning activities. Initiatives like Google Chrome books or low-cost Raspberry Pi computers offer affordable options.
- Expanding Internet Access: Expanding Wi-Fi access in schools, libraries, and public spaces allows students to connect even outside their homes. Partnerships with telecom providers and community initiatives can be explored.
- Open Educational Resources (OERs): Utilizing openly available learning materials, textbooks, and educational tools reduces dependence on expensive proprietary resources and ensures equal access to quality content.
- Universal Design for Learning (UDL): Developing digital learning materials and platforms following UDL principles ensures they are accessible for students with diverse abilities, learning styles, and needs. This could involve incorporating multiple text formats, voice narration, closed captions, and alternative input methods.
- Assistive Technology (AT): Providing access to AT tools like screen readers, text-to-speech software, and magnification software empowers students with disabilities to engage effectively with digital learning environments (Zined et al., 2011).
- Multilingual Resources: Incorporating content in multiple languages caters to diverse student populations and ensures all learners can understand and participate in digital learning activities (Singh 2013).
- Supporting Teachers and Educators: Professional Development: Equipping teachers with the skills and knowledge to effectively integrate ICT and address inclusive practices in their classrooms is crucial. Training programs should cover pedagogy, accessibility best practices,

and utilizing assistive technologies (Webb 2005).

- Collaborative Platforms: Creating online communities and forums where teachers can share best practices, resources, and experiences related to inclusive digital learning fosters collaboration and mutual support.
- Technical Support: Providing ongoing technical support for teachers and students ensures smooth functioning of technology and addresses any barriers related to its use.

Additional Strategies

- Community Engagement: Partnering with parents, community organizations, and NGOs can create programs and initiatives to address the digital divide and promote inclusive access to technology.
- Privacy and Security: Implementing robust data privacy and security measures ensures all students can participate in digital learning environments safely and ethically.
- Sustainable Solutions: Focusing on long-term solutions through infrastructure development, capacity building, and resource allocation ensures the sustainability of efforts to bridge the digital divide.

By implementing these strategies and harnessing the potential of ICT, we can move towards a future where all students, regardless of their background or circumstances, have access to quality and inclusive learning opportunities.

CONCLUSION

The integration of Information and Communication Technologies (ICT) into biology education has painted a vibrant picture of potential, offering a dynamic and engaging learning environment for students in the digital age. This research has explored the impact of ICT on various facets of student learning, examining its influence on cognitive development, engagement, knowledge acquisition and accessibility.

The findings paint a promising landscape. Interactive simulations, virtual labs, and collaborative platforms have been shown to foster critical thinking, problem-solving, and data analysis skills, allowing students to delve deeper into complex biological concepts. Additionally, these technologies have the potential to spark curiosity and ignite a passion for biology, leading to improved engagement and motivation.

However, the journey of ICT integration is not without its challenges. Ensuring equitable access to technology and resources remains crucial, and addressing the potential for digital distractions requires careful planning and implementation. Furthermore, striking a balance between traditional and digital learning methods is essential to optimize the learning experience.

Moving forward, educators, curriculum developers, and policymakers must work collaboratively to harness the full potential of ICT while mitigating its challenges. Investing in teacher training, developing high-quality digital resources and fostering a supportive learning environment are key steps in this journey.

Ultimately, the impact of ICT on biology education lies not just in its technological advancements, but in its ability to transform the learning process. By fostering critical thinking, igniting curiosity and promoting deeper understanding, ICT can empower a new generation of biologists to explore life's wonders and contribute meaningfully to the world.

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Artificial Intelligenceimpacting On Today's Education

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ABSTRACT:

Recently Artificial Intelligence(AI) has become a game-changer in education. It is not just making things more convenient in education but also about transforming the entire learning landscape. AI helps in creating personalized learning experiences, adapting to individual student needs and styles. It's like having a digital tutor available 24/7. The present study mainly focuses on how AI impacting on today's education as well as on students. AI facilitates distance learning, providing access to education for those who might otherwise struggle with geographical or financial constraints. The use of AI-driven educational tools, virtual classrooms, and interactive content has made learning more engaging and accessible. There are challenges that nobody knows how AI will shape the future education system. such as the need for ethical AI practices, addressing potential biases, and ensuring that technology doesn't replace the human touch in education. Striking the right balance is key to harnessing the full potential of AI in today's education.AI in education does come with its set of challenges. One major concern is the potential for reinforcing existing inequalities. If AI is not implemented carefully, it might end up favouring students with better access to technology and resources, widening the educational gap instead of narrowing it.

Keywords: Artificial Intelligence, Today's Education, Students, Teaching-learning.

INTRODUCTION

AI is short form of Artificial Intelligence, refers to the simulation of human intelligence in machines that are programmed to think, learn, and perform tasks that traditionally require human intelligence. It involves the development of algorithms and systems that enable computers to analyse data, recognize patterns, and make decisions. AI can be categorized into two main types: Narrow AI (or Weak AI) and General AI (or Strong AI). Narrow AI is designed for a specific task, such as image recognition or language translation, while General AI aims to possess the ability to understand, learn, and apply intelligence across a wide range of tasks, similar to human intelligence.The ultimate objective of AI is to create machines that can adapt, reason, and problem-solve in diverse situations, making them valuable tools across various industries and applications.

It has applications across various industries, including healthcare, finance, education, and more. AI systems can analyse vast amounts of data, identify patterns, and make predictions, leading to improved efficiency and innovative solutions. It helps hospitals to ascertain the best path for patient care, it assists automotive companies in creating safer cars for our roads, and aids banks in rapidly detecting fraudulent activity. It even helped to education systems to create magazines and most of the articles were originally written by AI and then re-written, factchecked, and edited by actual humans.

AI has made more impact on today's education! It is like having a super-smart study buddy that never gets tired. AI helps personalize learning experiences, tailoring lessons to individual needs and pacing. It can also assist teachers by automating administrative tasks, allowing them to focus more on actual teaching. AI is also help to students in accessing a wealth of resources and interactive tools and makes learning more engaging. It doesn't mean to replacing teachers but enhancing the overall educational experience. With that AI can analyse the data in large to identify learning patterns and provide insights to improve teaching methods.

Research Problem

How AI impacting on today's Education?

Objectives of the study

The present study has been done towards achieving following objectives

- To understand the concept of Artificial Intelligence.
- To see the various impact of Artificial Intelligence on education.
- To provide information for future research works

Research Methodology

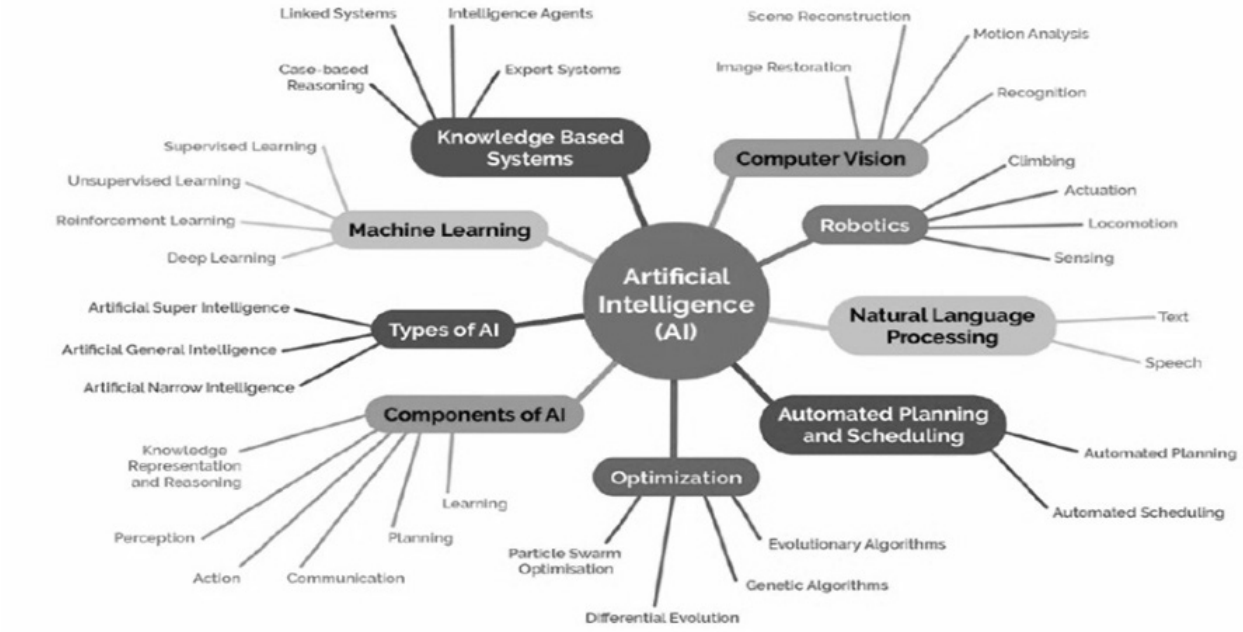
The present research paper based on secondary data and attempts the exploratory research. Secondary data is the data that has already been collected through primary sources and made readily available for researchers to use for their own research. It is a type of data that has already been collected in the past.The present paper has more consultations which carried out from the previous academic research, books, and journals that relate to the issue. Therefore, the study embraced the form of a new analysis based on the previous research on the subject.

WHAT IS AI

AI stands for artificial intelligence. It refers to the simulation of human intelligence processes by machines, especially computer systems. These processes include learning (the acquisition of information and rules for using the information), reasoning (using rules to reach approximate or definite conclusions), and self-correction. AI encompasses a wide range of technologies and applications, from simple algorithms to complex neural networks, all designed to enable machines to perform tasks that typically require human intelligence, such as visual perception, speech recognition, decision-making, and language translation.

AI is not one thing but an umbrella term for a growing set of modeling capabilities, as visualized in Figure 1.

Figure 1: Components, types, and subfields of AI based on Regona et al (2022).12



Source:https://www.google.com/url?sa=i&url=https%3A%2F%2Ftwitter.com%2FAhmadMikati11&psig=AOvVaw0bz3BZm3y9DnTdxEu9pKzE&ust=

1707483015428000&source=images&cd=vfe&opi=89978449&ved=0CBIQjRxqFwoTCIj1gI7km4 QDFQAAAAAdAAAAABBK

Important of AI in Education

Artificial Intelligence (AI) is increasingly being integrated into various aspects of education to enhance learning experiences, personalize instruction, streamline administrative tasks, and facilitate data-driven decision-making. Here are some key applications of AI in education:

Personalized Learning:

AI-powered adaptive learning platforms analyse students' learning patterns, preferences, and performance data to deliver customized learning experiences. These systems provide tailored content, pacing, and feedback to meet individual students' needs, promoting deeper understanding and engagement.

Intelligent Tutoring Systems (ITS):

ITS leverage AI algorithms to mimic the role of human tutors, offering personalized guidance and support to students. These systems assess learners' knowledge gaps, provide targeted instruction, and offer real-time feedback to improve learning outcomes.

Automated Grading and Feedback:

AI algorithms can automate the grading process for various types of assignments, including multiple-choice questions, essays, and programming assignments. By relieving teachers of routine grading tasks, AI enables them to focus on providing meaningful feedback and supporting student learning.

Virtual Assistants and Chatbots:

Educational institutions deploy AI-powered virtual assistants and chatbots to address students' queries, provide instant support, and offer guidance on various academic and administrative matters. These virtual assistants enhance accessibility and convenience for students, faculty, and staff members.

Predictive Analytics:

AI-based predictive analytics tools analyse vast amounts of data, including student performance, attendance, and demographic information, to identify patterns and predict future outcomes. Educators can use these insights to identify at-risk students, personalize interventions, and improve retention rates.

Natural Language Processing (NLP):

NLP technologies enable intelligent content analysis, semantic search, and language understanding capabilities. In education, NLP-powered applications can assist in language learning, automate text summarization, and support literacy development through interactive tools and resources.

Educational Content Creation:

AI algorithms can generate educational content, such as quizzes, study materials, and interactive simulations, based on specific learning objectives and curriculum standards. These AI-generated resources supplement traditional teaching materials and provide additional learning opportunities for students.

Learning Analytics and Insights:

AI-driven learning analytics platforms aggregate and analyse data from various sources, including learning management systems (LMS) and digital learning tools, to generate actionable insights for educators. By monitoring student progress, engagement levels, and learning behaviours, these platforms enable data-driven decision-making to improve teaching strategies and curriculum design.

Overall, AI has the potential to revolutionize education by personalizing learning experiences, optimizing administrative processes, and empowering educators with valuable insights to enhance student outcomes and foster lifelong learning. However, it's essential to address ethical considerations,

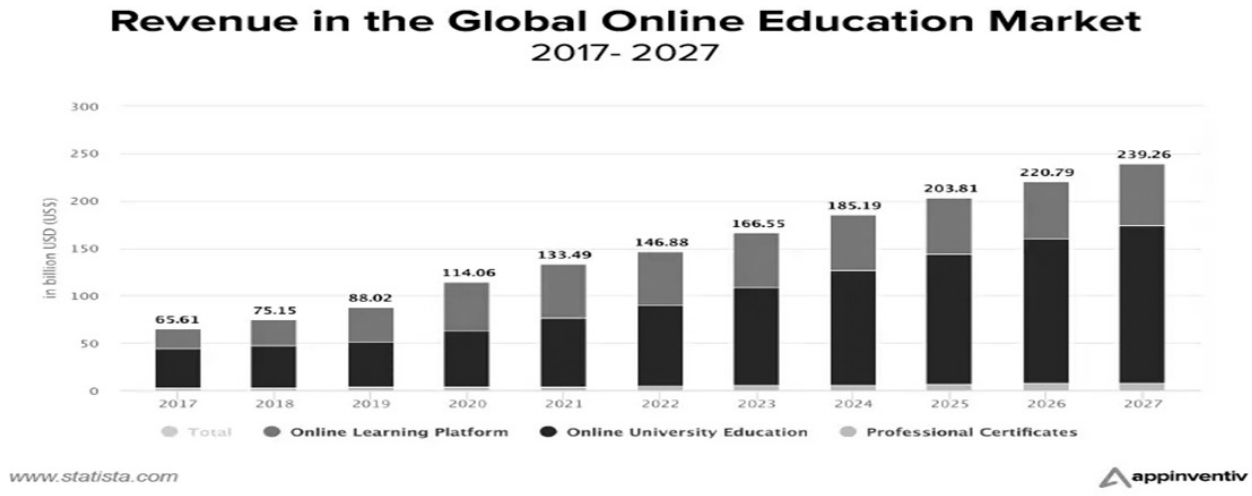
privacy concerns, and equity issues to ensure responsible and equitable deployment of AI technologies in education.

The global online education market had been experiencing significant growth, driven by factors such as increased internet penetration, advancements in technology, and the growing demand for flexible and accessible learning options. However, specific revenue figures can vary greatly depending on the source and the time frame considered.

According to various market research reports, the global online education market was estimated to be worth several hundred billion dollars annually, with projections for continued growth in the coming years. These estimates encompass revenue generated from various segments within online education, including online courses, tutoring services, corporate training, and e-learning platforms.

It's important to note that the online education market is dynamic and can be influenced by factors such as changes in technology, shifts in consumer behavior, and regulatory developments. Therefore, staying updated with the latest research and market trends is essential for obtaining the most accurate and current revenue figures.

Figure 2:



Source: https://appinventiv.com/wp-content/uploads/sites/1/2022/07/Revenue-in-the-Global-Online-Education-Market-2017-2027.webp

From the above diagram it was represented by how many more businesses collectively invested in AI applications from education app development, robotics, virtual assistance, and natural language to computer vision and machine learning in education.

Negative Effects of AI On Education

While AI can offer numerous benefits in education, it also comes with its own set of Negative Effects on Education-

1. Depersonalization: AI-driven education can depersonalize the learning experience, as it may lack the human touch and personalized attention that some students need to thrive.
2. Inequity: Access to AI-powered educational tools might not be uniform across all students or schools, exacerbating existing inequalities in education. Students from disadvantaged backgrounds may not have equal access to these resources, widening the gap between them and their peers.
3. Over-reliance on technology: Excessive reliance on AI in education could lead to a diminishing emphasis on critical thinking, creativity, and problem-solving skills, as students may become overly reliant on technology to provide answers and solutions.
4. Privacy concerns: AI systems in education often collect vast amounts of data on students, raising concerns about privacy and data security. Improper handling of this data could lead to breaches of privacy and misuse of personal information.

5. Job displacement: There are concerns that AI could potentially automate certain aspects of teaching, leading to job displacement among educators. While AI can assist teachers in various tasks, it cannot fully replace the nuanced skills and human interaction that teachers provide.
6. Bias and discrimination: AI algorithms can inherit biases present in the data they are trained on, which could perpetuate or even exacerbate existing biases in education. This could lead to unfair treatment or discrimination against certain groups of students.
7. Loss of traditional skills: Increased reliance on AI for tasks such as calculation and information retrieval could lead to a decline in traditional skills like mental math and memorization, which may still hold value in certain contexts.
8. Ethical dilemmas: AI in education raises complex ethical questions, such as who should have access to student data, how it should be used, and who is responsible for ensuring that AI systems are fair and unbiased.

Addressing these demerits requires careful consideration of how AI is implemented in education, along with ongoing monitoring and regulation to ensure that it benefits all students equitably.One drawback of AI in education is the potential for exacerbating inequality. While AI can personalize learning experiences and provide additional support to students, it may also deepen the divide between those who have access to advanced technology and those who do not. Additionally, there are concerns about AI reinforcing biases present in the data it's trained on, leading to unfair treatment or limited opportunities for certain groups of students. Moreover, overreliance on AI in education could diminish the role of teachers and human interaction, which are crucial for fostering creativity, critical thinking, and emotional intelligence in students.

CONCLUTION: ON EDUCATION AND THE FUTURE AI

In the present study the researcher mainly focuses on different classes of examples as a bases concerning the effects of AI. The analysis has mainly focussed on only today's education not for other trades. AI is affecting on each and every stage of living life but for the present study the researcher only focuses on today's education.Artificial Intelligence (AI) is slowly changing the basic level of education system across the world. AI ensures that technology and their benefits are available to everyone. AI technologies should be affordable to ensure that they are accessible to people across different income levels. This might involve reducing the cost of hardware, software, and services related to AI.Access to education and training programs is crucial to enable individuals to understand, use, and contribute to AI technologies. This includes providing resources for learning AI skills and promoting AI literacy.

Artificial intelligence (AI) has a bright future, but it also faces several difficulties. AI is predicted to grow increasingly pervasive as technology develops, revolutionising sectors including healthcare, banking, and transportation. Today's youngster whatever getting level of education is country's progress. Recently everywhere seeing that there are lot of courses accessible on AI. However, AI will changing overall schooling system in future. And also, in manufacturing sectors as well as in factories also no longer required skilled labour as AI is replacing them. Mostly labours will be replacing robots and AI technology. AI would provide opportunities for talented students to present their talent as well as better opportunity for those students who are hard workers. Othe other hand through AI proper education will get today's students by that strengthen the individuals as well as nation.

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PREDICTIVE ANALYTICS IN MEDICINE: A SURVEY OF MACHINE LEARNING APPROACHES

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Abstract:

In this paper, we take a comprehensive survey that explores the diverse landscape of machine learning (ML) approaches applied to predictive analytics in medicine, focusing on notable early-stage and potentially transformative research that addresses the complex and heterogeneous nature of healthcare data. We investigate each of these methodologies that range from traditional regression models that focus on parsimony and transparency to more modern and sophisticated deep learning architectures. We then consider predictive analytics tasks across various medical domains that include diagnosis, prognosis, and personalized treatment planning. We conclude with an eye towards both the strengths and limitations of recent ML models and outline an exciting opportunity to improve present clinical decision support systems.

Incorporating insights from the contributions of Indian scholars, the survey concludes by articulating the need for interpretability, the development of robust validation frameworks, and collaborations between ML experts and healthcare professionals as key directions moving forward. We hope this survey will serve as a valuable resource for researchers, practitioners, and policy makers trying to navigate the dynamic intersection of machine learning and predictive analytics in Indian healthcare.

Introduction:

The fusion of machine learning (ML) and healthcare has produced a bevy of intellectual capital to re-imagine and re-design predictive analytics. Indeed, unfolding developments in medical decision-making have pointed to a radical shift in the deployment of predictive analytics in medicine. Statistical techniques have been greased by the technology of the day, viz. deep learning, and a plenitude of predictive analytics methodology has enriched the medical diagnostics, prognostics and (personalized) treatment planning workflow. As we reach an inflexion point in the co-evolution of technology and medicine, it becomes necessary to take stock of the expanding universe of predictive analytics, and appreciate the craft that entails weaving ML algorithms (in short) into the clinical fabric.

Predictive analytics framework driven by machine learning models facilitates the extraction of valuable insights from voluminous medical data and propels the field toward precision medicine. The contributions of the Indian researchers to the global discourse have been noteworthy, “reflecting the broader spirit of global collaborative research.”[3, 4]. We intend to survey and synthesize the methodologies employed in predictive analytics in this paper, and emphasize the contributions of the Indian scholars to the field.

The diagnostic applications of predictive analytics have been especially evident in ML-driven advancements. The success of models such as CheXNet and Chexpert in automating the detection of pneumonia from chest X-rays attests to this [3, 4]. Another notable example is the predictive modeling of hospital readmission rates, which leverages electronic medical records to combine insights from medical informatics with those from the machine learning community [6].

The search for precision medicine is soon to be realized as research has deluged the field of predictive analytics over the most recent decade. Despite this promise, the deployment of predictive analytics in a real-world healthcare setting entails stringent requirements for widespread acceptance. The work of Indian researchers such as Varshney et al. (2018), underscores the role of a privacy-preserving

paradigm in delivering responsible AI for healthcare, with ethical considerations and stringent validation frameworks playing a critical role [9].

With the survey of machine learning approaches in predictive analytics for medicine, presented here, we believe that not only will a comprehensive review of the current state-of-the-art be provided, but that the challenges and promising future directions will be elucidated by both global and Indian scholars[10].

Background

The integration of machine learning (ML) with healthcare has enabled the use of cutting-edge technology to make a revolutionary connection in the medical research and practice. To understand the dynamics of predictive analytics in medicine, it is of utmost relevance to understand the historical evolution and the fundamental principles at the intersection of machine learning and healthcare.A snapshot is provided in this section, which essentially provides an overview of the historical context and foundational concepts that have contributed towards the application of machine learning approaches to predictive analytics in healthcare.

Historical Perspectives: The trajectory of machine learning in healthcare has reflected a timeless pursuit of improved methodologies in medical research. The contemporary surge in the availability of medical data, propelled by the enthusiasm for electronic health records (EHRs), has thrust machine learning and data-driven insights into the limelight [1, 2]. From the early attempt at rule-based expert systems to the current explosion of deep learning architectures, the narrative of machine learning has portrayed a constant hunt for improved precision in medical decision-making.

Foundational Concepts: Supervised learning, a key player in predictive analytics, plays a central role in healthcare. For example, in medical diagnosis and prognosis, supervised learning algorithms train on labeled data to predict outcomes, training from historical patient records where the outcome is known [3, 4]. Unsupervised learning techniques such as clustering and dimensionality reduction expose hidden patterns in healthcare data. Reinforcement learning, though less pervasive in healthcare, can optimize treatment strategies via learned interaction with the environment.

Historical Perspective and Introduction

Recent years have witnessed numerous breakthroughs in data-driven algorithms, transforming a multitude of domains in the process. In the arena of machine learning, predictive analytics on a variety of structured and unstructured data types — images (e.g. MRI and CT scans, pathology slides), time series data (e.g. electrocardiograms, continuous vital sign data), and other forms of clinical data (e.g. electronic health records) — is particularly in the spotlight due to the complexity of the domain and the promise of significant impact. The past eighteen months have seen spectacular successes, particularly in the domain of visual data processing, where deep learning models, such as convolutional neural networks, have beaten humans at diagnosing pulmonary tuberculosis, detecting diabetic retinopathy, diagnosing skin cancer, and following other diagnostic tasks, although such models have also been shown to be vulnerable to perturbation, confounding, and atypical cases, and despite the attention garnered by these few high profile examples, practical applications of machine learning in healthcare are still more promise than reality. However, two societies for medical imaging have recently organized high-profile competitions on chest pathology identification and classification in which the winners were deep learning systems or hybrids, which is suggestive of imminent practical applications. Society is rightfully mindful of many barriers to, and complications arising from, the integration of machine learning into clinical practice. At the forefront: ethical considerations created by the use of opaque models, the integration of these models into the workflow of complex teams of individuals, the challenge of interpretation of the decision process, robustness of the model in the wild, and robust validation frameworks [5, 6]. Independent controversial factors are essential to the appropriate deployment of predictive analytics in a medical setting, such as preventing model bias, which highlights a common misconception of machine learning as ultimately grounded in observation, rather than hypothesis

formulation and controlled experimentation.

This survey thus seeks to survey the diverse landscape of machine learning applications in predictive analytics for medicine in a manner that reviews historical evolution and foundational concepts, while acknowledging significant challenges and opportunities, to introduce basic concepts and set the stage for a more in-depth examination of the current state-of-the-art in a rapidly changing field.

Literature Review:

Machine learning (ML) in healthcare, especially predictive analytics, has recently thrived in research. In this regard, we provide a thorough review of the literature, investigating the state-of-the-art in machine learning approaches for predictive analytics in medicine, with particular emphasis on key research being conducted in India as well as other related work by global researchers.

Diagnostic applications: Predictive analytics in healthcare has markedly improved the diagnostic capabilities in interpreting medical images. These applications are clearly illustrated in the works by Rajpurkar et al. (2017) and Irvin et al. (2019), which demonstrated the implementation of deep learning models such as ones named CheXNet and Chexpert that can interpret chest radiographs and achieve performance comparable to practicing radiologists for pneumonia detection based on chest radiograph reports [3, 4]. These studies embody the possibility of machine learning to automate and advance traditional diagnostic processes.

Prognostic modeling: In prognostic modeling, an original article by Singh et al. (2019) on predictive modeling for hospital readmission rates using electronic medical record-wide machine learning was notable. Their work showed the potential of hospital readmissions predictive modeling by applying machine learning to predict rates of patient readmissions in real-time, and the authors provided an insightful discussion and conclusions to health services managers and researchers in this area[8].

The personalization of computed tomography imaging and positron emission tomography scan for radiation therapy (RT) planning presented by Zhou et al. (2018) [6] is also noteworthy. With machine learning and predictive analytics now well established, recent overviews and surveys have instead focused on the diversifying applications of each method. The review of Shukla et al. [7] for example, summed up data mining and big data in co-occurrence with heart disease prediction, informing of their roles throughout cardiovascular medicine. There was also the survey of Gopalakrishnan et al. [8], who spoke to the personalization of medicine in their indication of deep learning-based diabetic retinopathy diagnosis.

Ethical Considerations and Responsible AI: Wiens et al. (2019) critically discussed the ethical considerations in deploying machine learning models in healthcare. They present an extensive roadmap for responsible machine learning in healthcare, emphasizing on the importance of patient privacy and interpretability and ensuring that the algorithms do not cause harm in decision-making [5]. Varshney et al. (2018) further provided an Indian perspective, reflecting on the need for a privacy-preserving paradigm in responsible AI for healthcare [6].

Interdisciplinary Collaboration: Ravi et al. (2016) investigated the intersection between health informatics and machine learning, highlighting the interdisciplinary nature of research in this area [7]. Partnership between machine learning experts and healthcare professionals is critical in the development of applications which are both effective and meaningful as they can not only provide engineers with a detailed understanding of the clinical use case, but also an appreciation of the constraints and limitations under which the applications must operate in the contexts of real-world clinical workflows.

Emerging Trends and Future Directions: Anand et al. (2020) offer a glimpse into the future by reviewing the latest insights into explainable artificial intelligence and machine learning. The authors predict future trends in machine learning, suggesting that the new decade will be marked by efforts to increase the transparency and interpretability of machine learning models [10]. These emerging trends will serve as the bedrock upon which the future of predictive analytics in healthcare will be built.

This literature review has outlined a cross-sectional representation of machine learning applications

in predictive analytics for medicine, with contributions from the global researcher community alongside those from India. The ensuing sections of this survey paper will provide an in-depth treatment of the methodologies, challenges, and future directions in the fast-paced and everchanging field of study. Laksari et al. (2020) published by Global Science Journals.

Methodology:

A systematic literature search was conducted for relevant articles published within 10 year timeframe and meeting inclusion criteria. Criteria were focused on machine learning applications within healthcare generally and with regards to Indian contributions more specifically. The literature was then reviewed and full text case studies were organized by themes.

Discussion:

Diagnostic advancements have demonstrated predictive and prescriptive capabilities of machine learning with ethical considerations and transparency concerns documented as barriers. Prognostic case findings present new opportunities within the clinical space with traditional and trusted prognostic tools constantly challenged and the need to integrate machine learning models into clinical practices threatened. A population health case revealed the healthcare system may be shifting from the objective directive treatment plans to personalized learning treatment plans, which indicates a shift to patient-centric care. A privacy case conclusion illustrated how, “privacy and confidentiality issues are instrumental in preventing data sharing between different medical institutes for supervised learning using their combined database”. Lacking more diversity, machine learning applications can be more secure from hacking and tampering with an interdisciplinary collaboration case finding, while an overview of emerging trends in explainable AI makes a case for increased transparency when using machine learning applications to achieve more clinician buy-in.

Conclusion:

In the fast-paced world of healthcare, machine learning can help integrate predictive analytics. Improved diagnostics, better predictions, and personalized treatment plans are all in the works, while machine learning-based clinical decision support can boost precision and improve decision-making. But regulatory challenges and ethical concerns remain, and the health sector will need to demonstrate that machine learning models and predictive algorithms can be trusted. Integrating machine learning into predictive analytics shows unparalleled opportunity. Perspectives are diverse, as the authors contribute examples from both the United States and the European Union, and as computational epidemiologists weigh in on the horizon of complex predictive algorithms. Regulatory approaches are beginning to take shape, as evidenced by a case study of the United States. Nevertheless, any of these approaches will require hard-won combinations of ethical transparency, collaboration, and big data techniques if machine learning -arguably the most accurate way ever to distinguish signal from noise -- is to come to fruition in shaping the future of healthcare globally.

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Image Processing using Machine Learning

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Abstract :

This paper systematically focuses on the Use of Machine Learning for Image Processing. Machine Learning (ML) has become one of most widely used AI techniques for several companies, institutions and individuals who are in the business of automation. Today, when it comes to image data, ML algorithms can interpret images the same way our brains do. These are used almost everywhere, right from face recognition while capturing images on our

smartphones, automating tedious manual work, self-driving cars and everything in between. The paper basically describes the anomaly of demonstrating the mathematical methods and the algorithm required for their recognition. Several machine learning algorithms like Multilayer Perception, Support Vector Machines, Convolutional Neural Networks, and many more. The main purpose or objective is to recognize the effective and efficient method for recognition of the pattern. The paper shows different classification algorithms have their different accuracy. - Image processing is prominent in the area of science and technology, agriculture, biological image processing, face/iris/image recognition and many other fields. There are many fields and uses where, frameworks that analyze images could have much benefit. From high-tech uses to areas like agriculture, image recognition etc.

Keywords : Image Processing, Machine Learning, Deep Learning, pattern recognition, Classification, Segmentation, neural network, Machine Learning Algorithms, SVM, KNN, CNN

Introduction :

Image:

An image is represented by its dimensions (height and width) based on the number of pixels. For example, if the dimensions of an image are 500 x 400 (width x height), the total number of pixels in the image is 200000.

Types of an image :

• Binary Image:

only two pixel elements i.e. 0 & 1,where 0 refers to black and 1 refers to white and also known as Monochrome.

• Black And White Image:

It consist of only black and white colour 8 Bit Colour Format–

It has 256 different shades of colours in it and commonly known as Grayscale Image. In this format, 0 stands for Black, and 255 stands for white, and 127 stands for gray.

• 16 Bit colour Format:

It has 65,536 different colours in it. It is also known as High colour Format.

Image Processing :

Image processing is a method to perform some operations on an image, in order to get an enhanced image or to extract some useful information from it. In short we can say that an Image Processing is a method/technique or a process of manipulating digital images.

From centuries, there are various mode of communicating with others, handwriting is one of those

means we have. But nowadays due to advancement in technology, computers and the Internet are the compelling way of latest communication, turning the world upside down and recompressing into a small town. Deep learning has had a tremendous impact on various fields of technology in the last few years. One of the hottest topics buzzing in this industry is computer vision, the ability for computers to understand images and videos on their own. To make machines more interactive and smart the developers are taking into account various machine learning, deep learning concepts, just like a human learns to perform a respective tasks by practicing it again and again so that it can mastery the task. However recognition of handwritten digit recognition is still a concern. It generally consist of three steps. First, a sequence of input strokes is segmented into hypothetical symbols (symbol segmentation).Then hypothetical symbols are recognized by a symbol classifier (symbol recognition). Finally, structural relations among the recognized symbols are determined and the structure of the expression is analyzed by a parsing algorithm in order to provide the most likely interpretation of an input OHME (structural analysis). It takes into account different neural used as a tool for different kind of problems. The basic behind the pattern reorganization is to develop useful application and software through the use of digital image processing, over the years, a great work by the researchers in the machine learning and data mining concepts have been elaborated to achieve a coherent approach for approximation of the mathematical equation recognition. Now a days, pattern reorganization is widely used as a tool for communication and information related purpose for the individual. But every aspect has some problem related to it. With respect to pattern reorganization, the drawbacks in the variation and form of handwritten character set because different community has different styles of writing. Handwritten dataset are generally indefinite in nature because they may not be sharp and perfect reorganization is to remove the redundancy from the data.

The main approach that the developer have used is SVM based offline handwritten pattern reorganization system. The SVM model is being perform on NIST SD19 standard data set. The mathematical equation consists of different number or operators and symbols representing their own importance. The conversion of those mathematical equation to the testimonial and vice versa urges the developers to endorse different technology features like extraction and recognition. The problem becomes more intense when the handwritten pattern is provided as input to the computer. The quality of image, font and size of symbols, pattern and writing style of the writer further arouse the problem in identification of the elements of the mathematical equation. One of the main problem with the recognition of the mathematical equation is that they are not fully conveyed the way they are found in the survey by the authors. The construction of equation in digital format is inconvenient and clumsy and does not go hand in hand with the actual writing style.

Types of Image Processing :

- Visualization - Find objects that are not visible in the image
- Recognition - Distinguish or detect objects in the image
- Sharpening and restoration - Create an enhanced image from the original image
- Pattern recognition - Measure the various patterns around the objects in the image
- Retrieval - Browse and search images from a large database of digital images that are similar to the original image

Fundamental Image Processing Steps :

Image Acquisition :

Image acquisition is the first step in image processing. This step is also known as pre-processing in image processing. It involves retrieving the image from a source, usually a hardware-based source.

Image Enhancement :

Image enhancement is the process of bringing out and highlighting certain features of interest in an image that has been obscured. This can involve changing the brightness, contrast, etc.

Image Restoration :

Image restoration is the process of improving the appearance of an image. However, unlike image enhancement, image restoration is done using certain mathematical or probabilistic models.

colour Image Processing :

Colour image processing includes a number of colour modelling techniques in a digital domain. This step has gained prominence due to the significant use of digital images over the internet.

Wavelets and Multi-resolution Processing :

Wavelets are used to represent images in various degrees of resolution. The images are subdivided into wavelets or smaller regions for data compression and for pyramidal representation.

Compression :

Compression is a process used to reduce the storage required to save an image or the bandwidth required to transmit it. This is done particularly when the image is for use on the Internet.

Morphological Processing :

Morphological processing is a set of processing operations for morphing images based on their shapes.

Segmentation :

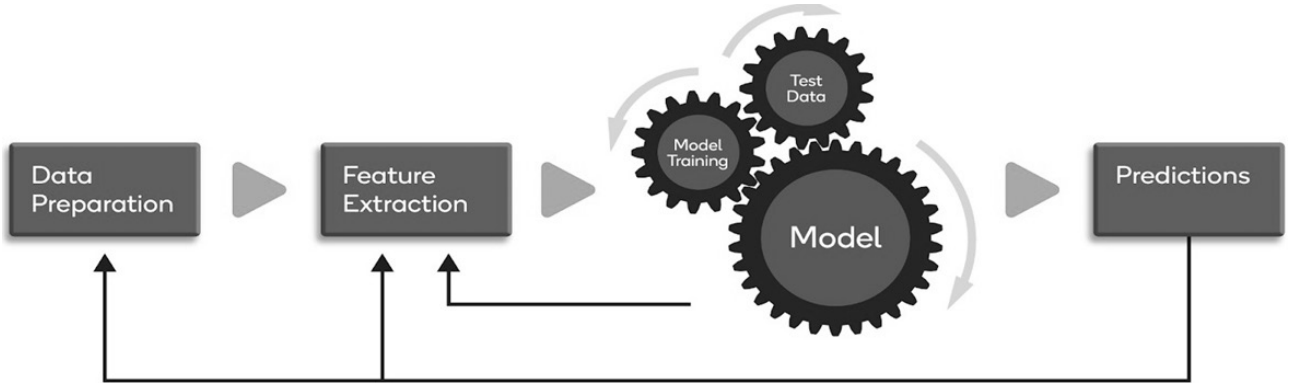
Segmentation is one of the most difficult steps of image processing. It involves partitioning an image into its constituent parts or objects.

Representation and Description :

After an image is segmented into regions in the segmentation process, each region is represented and described in a form suitable for further computer processing. Representation deals with the image's characteristics and regional properties. Description deals with extracting quantitative information that helps differentiate one class of objects from the other.

Recognition :

Recognition assigns a label to an object based on its description.



At present, there are more than 250 programming languages in existence. Out of these, Python is one of the most popular programming languages that's heavily used by developers/practitioners for Machine Learning. However, we can always switch to a language that suits the use case.

Libraries and Frameworks for Machine Learning Image Processing –

- OpenCV
- Tensorflow
- PyTorch
- Caffe
- Emgu CV
- MATLAB Toolbox
- WebGrazer
- Apache Marvin-AI
- MIScnn
- VXL

Image Processing using CNN :

The various deep learning methods use data to train neural network algorithms to do a variety of machine learning tasks, such as the classification of different classes of objects. Convolutional neural networks are deep learning algorithms that are very powerful for the analysis of images. CNN is a powerful algorithm for image processing. These algorithms are currently the best algorithms we have for the automated processing of images. Many companies use these algorithms to do things like identifying the objects in an image.

Images contain data of RGB combination. Matplotlib can be used to import an image into memory from a file. The computer doesn't see an image, all it sees is an array of numbers. Colour images are stored in 3-dimensional arrays. The first two dimensions correspond to the height and width of the image (the number of pixels). The last dimension corresponds to the red, green, and blue colours present in each pixel.

Convolutional Neural Networks specialized for applications in image & video recognition. CNN is mainly used in image analysis tasks like Image recognition, Object detection & Segmentation.

1) Convolutional Layer :

In a typical neural network each input neuron is connected to the next hidden layer. In CNN, only a small region of the input layer neurons connect to the neuron hidden layer.

2) Pooling Layer :

The pooling layer is used to reduce the dimensionality of the feature map. There will be multiple activation & pooling layers inside the hidden layer of the CNN.

3) Fully-Connected layer :

Fully Connected Layers form the last few layers in the network. The input to the fully connected layer is the output from the final Pooling or Convolutional Layer, which is flattened and then fed into the fully connected layer.

Image Classification with K Nearest Neighbours :

K-Nearest Neighbours (k-NN) is a supervised machine learning algorithm i.e. it learns from a labelled training set by taking in the training data X along with its labels y and learns to map the input X to its desired output y.

The k-NN algorithm is arguably the simplest of the machine learning algorithms. The model only consists of the training data, that is, the model simply learns the entire training set and for prediction gives the output as the class with the majority in the 'k' nearest neighbours calculated according to some distance metric.

The K-NN working can be explained on the basis of the below algorithm: Step-1: Select the number K of the neighbours

Step-2: Calculate the Euclidean distance of K number of neighbours

Step-3: Take the K nearest neighbours as per the calculated Euclidean distance.

Step-4: Among these k neighbours, count the number of the data points in each category.

Step-5: Assign the new data points to that category for which the number of the neighbour is maximum.

Step-6: Our model is ready.

SVM constructs a hyperplane in multidimensional space to separate different classes. SVM generates optimal hyperplane in an iterative manner, which is used to minimize an error. The

core idea of SVM is to find a maximum marginal hyperplane(MMH) that best divides the dataset into classes.

Image Classification with SVM :

SVM is a very good algorithm for doing classification. It's a supervised learning algorithm that is mainly used to classify data into different classes. SVM trains on a set of label data. The main

advantage of SVM is that it can be used for both classification and regression problems. SVM draws a decision boundary which is a hyperplane between any two classes in order to separate them or classify them. SVM also used in Object Detection and image classification.

Support Vectors :

Support vectors are the data points, which are closest to the hyperplane. These points will define the separating line better by calculating margins. These points are more relevant to the construction of the classifier.

Hyperplane :

A hyperplane is a decision plane that separates between a set of objects having different class memberships.

Margin :

A margin is a gap between the two lines on the closest class points. This is calculated as the perpendicular distance from the line to support vectors or closest points. If the margin is larger in between the classes, then it is considered a good margin, a smaller margin is a bad margin.

Support Vector Machine can also be used for multiclass classification problems.

Applications of Image Processing :

Medical Image Retrieval :

Image processing has been extensively used in medical research and has enabled more efficient and accurate treatment plans. For example, it can be used for the early detection of breast cancer using a sophisticated nodule detection algorithm in breast scans.

Image Reconstruction :

Image processing can be used to recover and fill in the missing or corrupt parts of an image. This involves using image processing systems that have been trained extensively with existing photo datasets to create newer versions of old and damaged photos.

Face Detection :

One of the most common applications of image processing that we use today is face detection. It follows deep learning algorithms where the machine is trained with the specific features of human faces, such as the shape of the face, the distance between the eyes, etc.

Pattern recognition :

It involves the study of image processing, it is also combined with artificial intelligence such that computer-aided diagnosis, handwriting recognition and images recognition can be easily implemented. Now a days, image processing is used for pattern recognition.

Video processing :

It is also one of the applications of digital image processing. A collection of frames or pictures are arranged in such a way that it makes the fast movement of pictures. It involves frame rate conversion, motion detection, reduction of noise and colour space conversion etc.

Image sharpening and restoration:

It refers to the process in which we can modify the look and feel of an image. It basically manipulates the images and achieves the desired output. It includes conversion, sharpening, blurring, detecting edges, retrieval, and recognition of images.

Conclusion :

The present paper depicts certain findings-

Major finding of this paper is that Image processing is prominent in the area of science and technology, agriculture, biological image processing, face/iris/image recognition and many other fields. The combination of image processing and machine learning opens up exciting possibilities

in various fields. By leveraging the power of machine learning algorithms, we can extract valuable information from visual data such as images, videos etc., automate image analysis tasks, and enhance decision-making processes.

As researchers continue to innovate and refine machine learning techniques in image processing, we can expect further advancements that will transform how we interact with and derive insights from visual data. It was found that, machine learning presented a new model that helped in processing images in a better way. It was implemented in image processing to overcome all problems that was faced earlier.

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Handwritten Character Recognition based on Artificial Neural Network

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Abstract

In current scenario, character recognition is the most important field of pattern recognition because of its application in numerous fields. Optical Character Recognition (OCR) and Handwritten Character Recognition (HCR) has specific domain to use. OCR system is most fitted for the applications like multi selection examinations, written communication address resolution etc. In returning days, character recognition system would possibly function a key issue to make paperless setting by digitizing and process existing paper documents. During this paper, I have planned the detail study on existing strategies for hand written character recognition based on ANN. This paper presents an in depth review within the field of handwritten Character Recognition.

Keywords : HCR, Features, classification, Optical Character Recognition.

I. INTRODUCTION :

The development of handwritten recognition system began in the 1950. The objective of hand written character recognition is to simulate the human reading capabilities so that the computer can edit and read the work as human do with documents. Handwriting recognition technique has been one of the most interesting and challenging research areas in field of the image processing and pattern recognition in the recent years. It contributes hugely to the innovation of automation process and improves the interface between man and machine in several applications. Devanagari is the most well liked script in Asian country and also the most well liked Indian language Marathi,Hindi is written in this script. Nepali, Indo-Aryan and Sanskritic languages are written in script. Moreover, Marathi is that the official language of Maharashtra and Marathi is the third most spoken language in India. The OCR actually is a converter which translates hand written text images to a machine based text. In general, hand written recognition is classified in two ways: offline and online. here, the writing is basically capture optically by scanner the completed writing text is scanned by a scanner in to digital format. That brings increase speed & precision to the entire recognition process. Handwritten recognition has been one of the most fascinating & challenging research areas in the field of image processing & pattern recognition in the recent year. OCR is a field of study than encompass many different solving methods. ANN (Sandhu & Leon, 2009), support vector machines & statistical classifies seem to be the preferred solutions to the problem due to their proven accuracy in classifying new data. Automatic character recognition of handwritten and printed information on documents like envelopes, cheques, application forms of various filed, and other manuscripts has a variety of practical and commercial applications in banks, post offices, libraries, and publishing houses

1. Off-line handwritten character recognition-Offline character recognition refers to the typed/ handwritten characters area unit scanned then regenerates into binary or grey scale image. The feature extraction and recognition method is carried over the binary image. Offline character recognition could be a tough and difficult task as there's no temporal order data concerning character strokes is offered. So offline character recognition is taken into account as a tougher task than its on-line counterpart.

2. On-line handwritten character recognition-On-line handwritten character recognition is additionally called real time recognition of character. During this case, writing and recognition

are done at the same time. User can write character on any sensory space wherever sensors can acquire the pen movements so on the premise of these pen movements characters are recognized. On-line character recognition is far easier than offline character recognition; as a result of temporal arrangement data is accessible there.

Marathi script employed within the Indian landmass is employed by over ninty million folks. The most application of Marathi Handwriting Recognition is automatic computer recognition of characters from optically scanned and digitized pages of written text. OCR is one of the foremost fascinating and challenging areas of pattern recognition with varied practical application potentials. It is well understood that the image recognition of written text could be a troublesome issue attributable to the writing style and therefore the form of the Characters hugely. Unconstrained Marathi writing style is more advanced than English cursive because of form of constituent strokes. This script (Marathi) has 13 vowels and 36 consonants.Marathi basic character can be written as unique letters, by using a mixture of diacritical marks such as line, curve and circles which are written below, before, after or above the consonant. Sometimes more than consonants and vowels can combine to take new shapes, these combined new shape are known as compound characters. All the characters have at upper top side horizontal line known as Shirorekha. In constant handwriting of Marathi character, from left to right direction. The headline of one character joins with another words headline of the next or previous of the same word. In this case, multiple modified shape and character in a word appear as a single linked component joined through the common headline or Shirorekha. Also in Marathi character there are consonants, component characters and vowel modifiers, numerals, there are many similar fashioned characters.All these variations make the handwritten Marathi character recognition, more a challenging problem.

Following figures1 and 2 are glimpse of vowels and their corresponding modifiers, and consonants in Marathi script.

Vowels:	अ	आ	इ	ई	उ	ऊ	ऋ	ए	ऐ	ओ	औ
Modifiers:		ा	ि	ी	ु	ू	ृ	े	ै	ो	ौ

Figure 1: Vowels and Corresponding Modifiers

क	ख	ग	घ	ङ	च	छ	ज	झ	ञ	ट
ठ	ड	ढ	ण	त	थ	द	ध	न	प	फ
ब	भ	म	य	र	ल	व	श	ष	स	ह

Figure 2: Consonants

क	ख	ग	घ		च		ज	झ	ञ	
			ण	त	थ		ध	न	प	फ
ब	भ	म	र		ल	व	श	ष	स	

Figure 3: Half Form of Consonants with Vertical Bar

क क्क	क ल क्ल	घ न घ्न	च ञ च्ञ	अ च च्च	त न त्न	प त प्त	प ल प्ल
व व ब्ब	भ न भ्न	म ल म्ल	ल ल ल्ल	श न श्न	श व श्व	श ल श्ल	स न स्न

Figure 4: Some Special Combination of Half-Consonant and Consonant

क़	ख़	ग़	ज़	फ़	ड़	ढ़	ॅ	॰	:	।	ऽ	ॅ

Figure 6: Special Symbols

Optical Character Recognition is a powerful field of analysis in Pattern Recognition. The matter of character recognition is classified according to two criteria. One is predicated on the sort of the text that is written or hand written. The opposite is predicated on the acquisition method which may be on-line or off-line. It's typically thought-about that the on-line technique of recognizing written text has achieved better results than its off-line counterpart. This might be attributed to the actual fact that the number of data is also captured within the on-line case cherish the direction, speed and therefore the order of strokes of the handwriting. On the opposite hand machine-printed character recognition can do excellent results on good quality documents. Just in case of on-line character recognition, there's real time recognition of characters. On-line systems have higher data for doing recognition since they need temporal arrangement data and might avoid the initial search step of locating the character as within the case of their off-line counterpart. On-line systems get the position of the pen or written character as perform of your time directly from the interface. Offline recognition of characters is understood as a difficult downside owing to the complicated character shapes and nice variation of character symbols written in different modes. Character recognition is Associate in nursing art of sleuthing segmenting and distinguishing characters from image. Different number of exact Character recognition is method of sleuthing and recognizing characters from input image and converts it into computer code or different equivalent machine editable kind. It contributes vastly to the advancement of automation method and raising the interface between man and machine in several applications. Character recognition is one in every of the foremost fascinating and interesting areas of pattern recognition and computing . Character recognition is obtaining a lot of attention since last decade because of its big selection of application. Conversion of written characters vital is very important for creating many important documents involving our history, cherish manuscripts, into machine editable kind so it is simply accessed and preserved.. Different methods and techniques are used to ensure that computer systems can read characters from Handwriting images and documents . Among the existing techniques that are used to model, and train Handwriting character recognition include neural network, Hidden Markov Model (HMM), Machine Learning, and Support Vector Machine, to mention a few. This paper focuses on artificial intelligence networks, machine learning, Hidden Markov Model, and the Support Vector Machine :

A. Artificial Intelligence :

The idea of reading Handwriting characters, digits, and words by computer systems can be argued to be an imitation of a human being. In other words, such a system can be argued that they use artificial intelligence to read handwriting from images or any Handwriting source. Artificial intelligence refers to intelligence that is demonstrated by machines. The term is used to describe computer or machines that can mimic "cognitive" functions that are associated with the human mind. Artificial intelligence allows the machine to learn from experience, adjust to new data (inputs), and perform tasks that can be performed by humans. Branches of artificial intelligence include machine learning, neuron network, and deep learning.

B. Machine Learning :

Machine learning technology is inspired by psychology and biology that focus on learning from a set of data. The central assumption is that machines can learn to perform given tasks by learning from data. A machine learning model is provided with training data that is specific to the given problem domain and the solution to each instance of the problem. That way, the model learns how to solve certain problems based on learning. Fig. 1 shows a simple demonstration of the machine learning model used in the handwriting recognition system. The model takes an image that has a Handwriting digit and determines the specific digit based on the learning data.

C.Artificial Neural Network (ANN) :

Artificial Neural Network (ANN) refers to information processing paradigm or computing systems that are inspired by biological neural networks that constitute the human brain. The systems are not

identical to the biological neural systems, but they are designed to process information the same way the human brain and animal brain process information. The networks are composed of many interconnected neurons working in unison to achieve specific goals. Just like the human brain, ANN learns from example. Hence, an ANN can be configured for an application, such as data classification or character recognition through the learning process. The learning process involves adjusting the system to a connection. The artificial neural network comprises a network of multiple simple processors, each with a small amount of local memory. The processors (units) are linked together by unidirectional communication channels and operates only on local data and input their get through their links.

B. Biological Neuron and ANN

As indicated earlier, artificial neural networks are inspired by the biological neural system. Hence, learning how biological neurons works can help to understand the artificial neural network. The human body's neural system consists of three stages: neural network, receptors, and effectors as shown in Fig. 2. The first phase is the receptor which receives stimuli from the external or internal environment and then passes the information to neurons. The second phase involves the processing of information by the neural network to make a proper decision of output. The third and final stage involves translation of the electrical impulses into responses to the external environment.

Fig. 1. Machine Learning Handwriting Model.

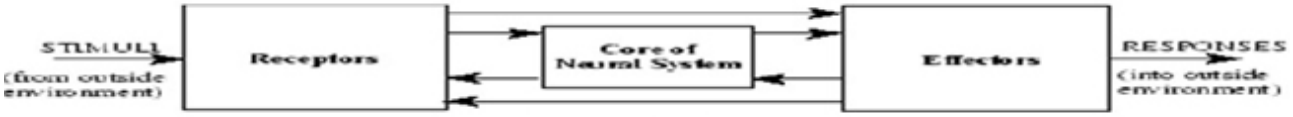


Fig. 2. Biological Neuron Model.

An artificial neural network can be argued to be a simplified imitation of the central nervous system. The structural constituents of human brains known as neurons perform computations such as logical inference, cognition, and pattern recognition, to mention The neuron models are shown in Fig. 3 and 4; however, does not do anything different that cannot be done by conventional computers. In other words, it is just a simple representation of a neural network system that does not do much different from what a traditional computer can do. The Fig. 5 presents a more complicated model (McCulloch and Pitts Model) which is different from the previous model since it has inputs that are "weighted". That means each input has a different effect on decision making. The weight of an input can be described as the number which when multiplied with the input, it results in weighted input. The results are then added together, and if they exceed the certain predetermined threshold value, the neuron fires, else, the neuron does not fire.

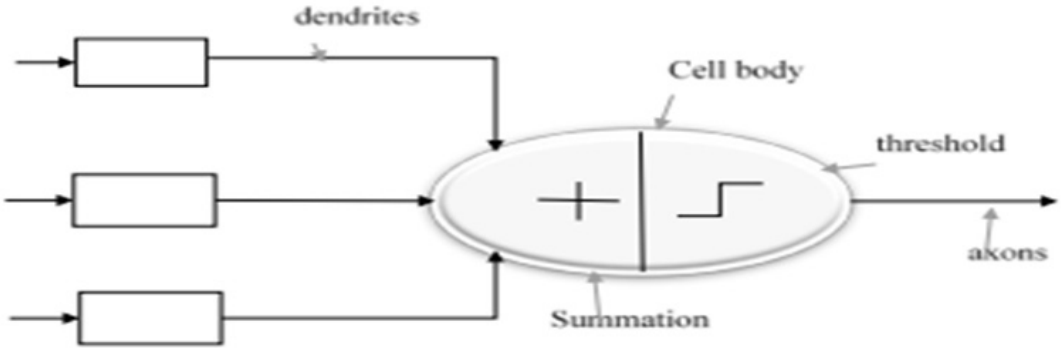


Fig. 3. Neuron Model.

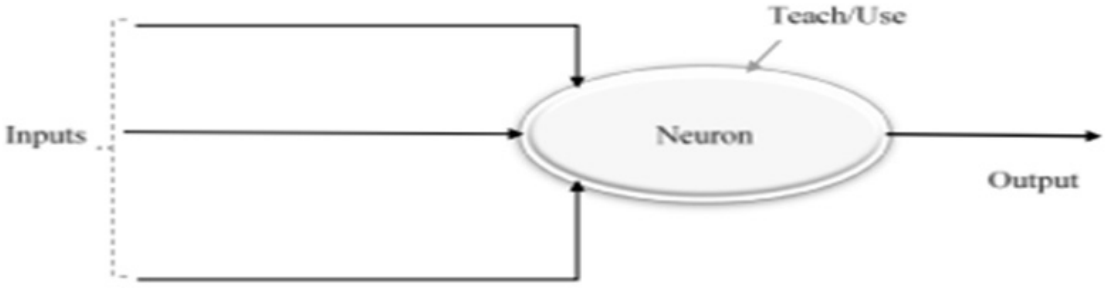


Fig. 4. Artificial Neuron Model.

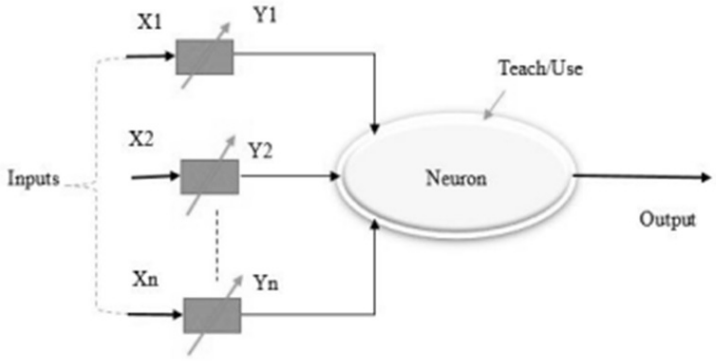


Fig. 5. Complicated Neuron Model.

Mathematically, neuron fires if and only if: X1Y1+ X2Y2+…>Threshold. The McCulloch and Pitts Model (MCP) neuron can adapt to different situations by changing its weights and/or threshold. Various algorithms can be used to make neurons to "adapt," with Delta rule and the back-error propagation being the most used algorithms

E. Deep Neural Network :

The neural network has layers of units where each layer takes some value from the previous layer. That way, systems that are based on neural networks can compute inputs to get the needed output. The same way neurons pass signals around the brain, and values are passed from one unit in an artificial neural network to another to perform the required computation and get new value as

output. The united are layers, forming a system that starts from the layers used for imputing to layer that is used to provide the output. The layers that are found between the input and output layers are called the hidden layer. The hidden layers refer to a deep neural network that is used for computation of the values inputted in the input layer. The term “deep” is used to refer to the hidden layers of the neural network. In Handwriting character recognition systems, the deep neural network is involved in learning the characters to be recognized from Handwriting images. With enough training data, the deep neural network can be able to perform any function that a neural network is supposed to do. It is only possible if the neural network has enough hidden layers, although the smaller deep neural network is more computationally efficient than a more extensive deep neural network.

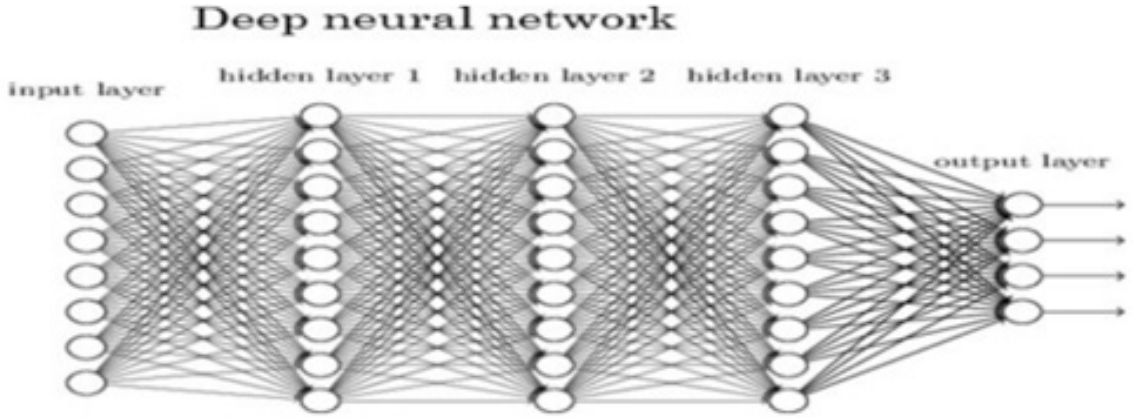


Fig. 6. Deep Neural Network.

F. Hidden Markov Models (HMM)

Hidden Markov Model (HMM) has been used in many handwriting recognition systems as a primary modeling component. It is essential to examine the theoretical background of this model to have a clear understanding of how handwriting recognition systems work . HMM is a statistical Markov model that is used in a system that is supposed to assume the Markov process . It can be considered as the most straightforward dynamic Bayesian network. Hidden Markov Models are class pf probabilistic graphical models used for predicting a sequence of hidden variables from a set of observed variables . For instance, these types of models can be used to predict the weather based on the types of people’s clothing. The weather, in this case, is the hidden variable while the people’s clothes are what has been observed (known) . In the same way, HMMs have successfully been implemented in the speech recognition, and character recognition since the models can help systems to predict unknown from the observed . The fact that handwriting can be a statistical model is the main reason HMM can be argued to be one of the most preferred models in the development of Handwriting character recognition systems. G. Support Vector Machine Handwriting recognition can be considered as a problem of supervised learning and classification from a discriminative classifier point of view, with this assumption, Support Vector Machine which a discriminative classifier is considered as one of the models that can be effective in developing handwriting recognition systems . Like a neural network, a support vector machine is a subset of machine learning . The support vector machine refers to a supervised learning model that is dependent on learning algorithms for classification and regression analysis. A support vector machine can be considered as a computational algorithm that finds out a hyperplane or a line in a multidimensional space that separate classes. The separation between two or more linear classes can be achieved by any hyperplane . This method is known as linear classification. However, several hyperplanes can be used to classify the same set of data, as shown in Fig. 7. A support vector machine is an approach where the main aim is to find the best separation hyperplane. The comparison of all approaches is shown in Table I below.

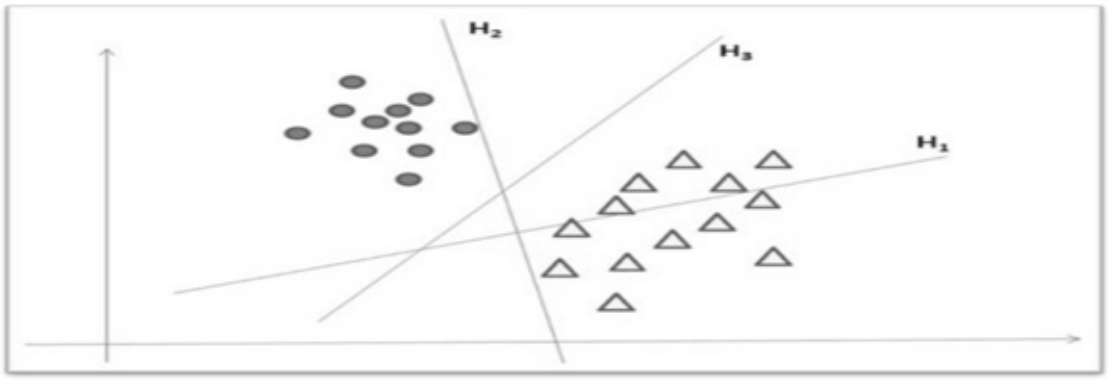


Fig. 7. Support Vector Machine Hyperplane.

TABLE I. COMPARISON OF APPROACHES

Approaches	Description	Advantages	Disadvantages
Hidden Markov Models (HMM)	HMM is a statistical Markov model which is used in a system that is supposed to assume the Markov process	-Strong statistical foundation [31]. -It allows a flexible generalization of sequence profiles [40]	-Have many unstructured parameters. -Algorithms are expensive in terms of computational time and memory [15] -Training requires repeated iterations, and this can be time-consuming [19]
Machine Learning	Machine learning-powered systems rely on patterns and inference instead of explicit instruction to read text and characters [21]	-No human intervention needed [27]. -Allows continuous improvement [19]	-Requires massive data to train [21] -Expensive in terms of time and resources [27] -High-error susceptibility [31]
Neural Network	A neural network can be considered as a large parallel computing system comprising of many interconnected nodes.	-Can learn complex non-linear input relationships [35]. -Has self-organizing capability [16]. -Ability to work with incomplete knowledge -Parallel processing capability -Ability to make machine learning	Different training may damage the capability of the system Overreliance on hardware [22]
Support Vector Machines (SVM)	Classifies the data using a hyperplane	Unlike neural networks, SVM approach relies on learning examples and structural behavior [23]. Has better generalization due to structural risk minimization	It is difficult to select a "good" kernel function Difficult to understand and interpret It is hard to visualize the impact of SVM models.

IV. DESIGN AND ARCHITECTURE

This section discusses the design and architecture of the proposed handwritten character recognition system that will be using the neural network approach. The proposed system comprises input pre-processing, CNN, and output sections as shown in Fig. 8.

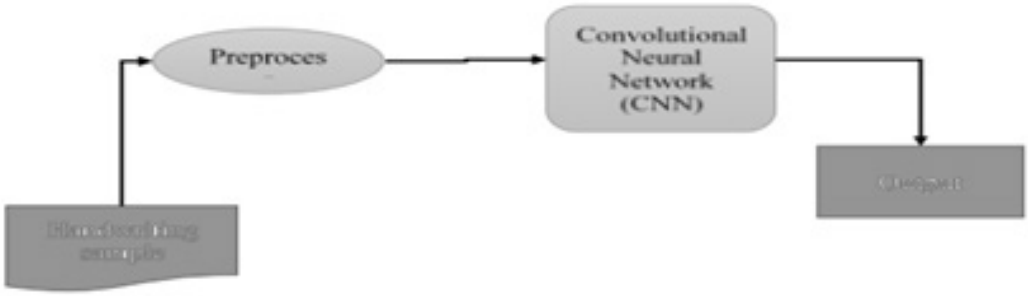


Fig. 8. Handwriting Recognition System (HRS) Design.

The explanation of the architecture is provided below: A. Neural Network Arthictecture As indicated earlier, the HRS systems are most efficient when they are based on neural networks. Hence, there is a need to understand the neural network architecture. The neural network architecture refers to the elements that are connected to make a network that is used for handwriting recognition. The human brain works loosely to inspire neural networks. It is based on the idea of how neurons pass signals around the human brain to process input into an output . Several units are layers to form a network and arrange from the ones that are responsible for receiving input to the layer that is responsible for output

values. Between the output and input level layers, there is a hidden layer that is involved in much of processing. Different neural network architectures can be used to provide different results from the input images of handwriting. It is because architectures are based on different parameters, data, and duration of training. Fig. 9 shows a clear visualized of architecture used to recognize handwriting from images. The “X” shows the input while “Y” represents the output. The size of a deep neural network layer is dependent on the work that the system is supposed to do. However, in most cases, more computational efficient smaller hidden layers can be developed to achieve the same task as one that can be achieved with an exponentially large deep neural network . The deep neural network is supposed to memorize the training data to be able to recognize handwriting. Hence, deep neural networks are commonly used in optical character recognition systems.

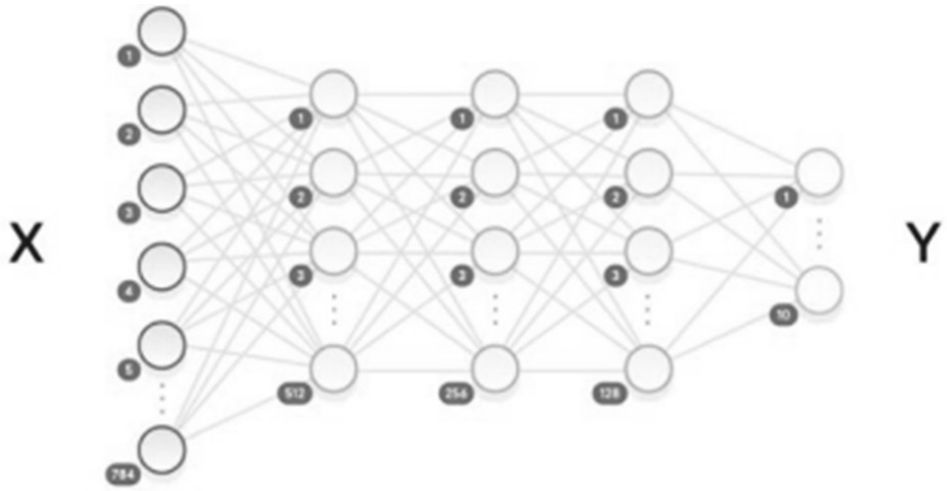


Fig. 9. Neural Network Architecture.

C. Convolutional Neural Network:

The system will use the convolutional neural network (CNN), which class of deep neural networks that are used for character recognition from images. Fig. 10 shows an underlying architecture of CNN that will be used in the OCR system. The architecture shows different types of layers, with the first layer being the input layer and the last layer being the output layer. The second later is called the convolutional layer and is followed by pooling layers and convolutional layers. The description of the CNN architecture is as follows:

1) Input layer: The input layer is used to feed the system with the image with the handwriting. The layer can be colored image (RGB values) or grayscale. It can have dimension W*H*W, depending on the input image. The W*H refers to the width and height of the image, while D refers to the depth of the image.

2) Convolution layer: The convolution layer is the building block of the whole network. Most of the computational work that is required to recognize characters from the input is done in this layer (Aggarwal, 2018). The layer consists of a set of learnable filters known as parameters of the convolution layer.

3) Pooling layer: The pooling layers are found between the convolutional layers in the CNN architecture. They are responsible for progressively reduce the spatial size of computational work in the network. They help to streamline the underlying computation. They do so by reducing the dimension of the input data by combing the outputs of the neuron clusters. They operate independently. That way, the system can achieve the intended outputs.

4) Fully connected layer: Neurons in a fully connected layer are fully connected to all activations in the prevision layer. Hence, this layer, activations, can be computed with matrix multiplication. Based

on the architecture, a system can have multiple fully connected layers. In summary, CNN can be used to achieve a solution to every pattern recognition issue. The architecture demonstrated above shows how OCR systems using neural networks can read handwriting. The convolutional networks work in the hierarchy and can be used to solve complex structures found in handwriting inputs. Humans inspire the whole idea can recognize writing objects and process what they see in their brains.

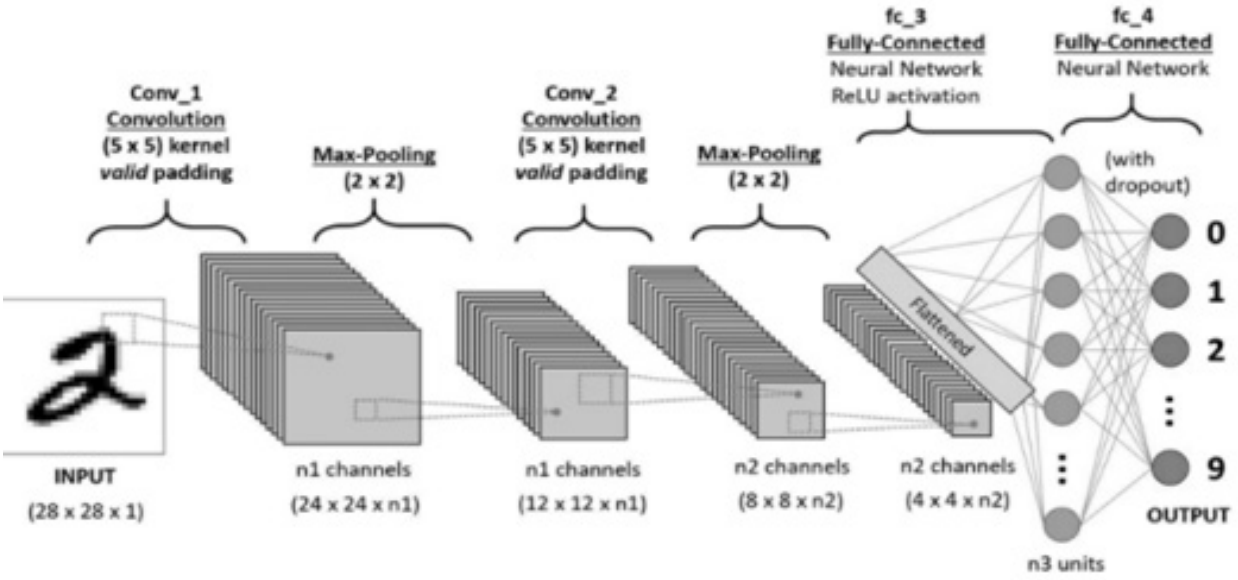
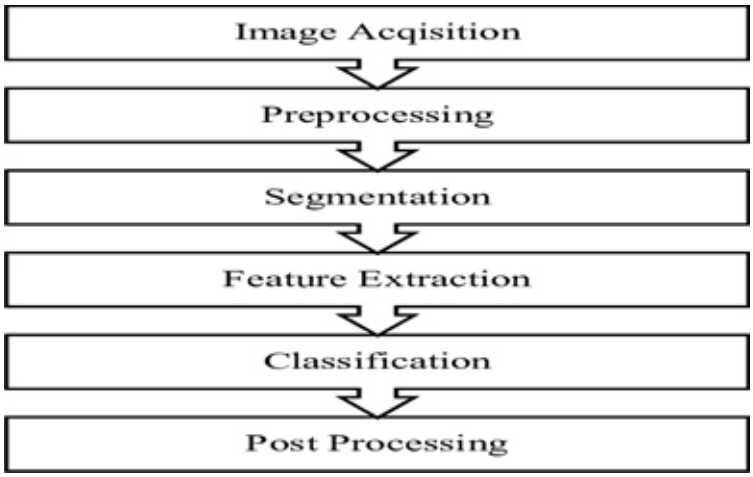


Fig. 10. Convolutional Neural Network Architecture.

Phases Of Recognition

Normally handwritten recognition is divided into six phases which are image acquisition, pre-processing, segmentation, feature extraction, classification and post processing. The block diagram of the basic character recognition is shown in figure3.



• Image Acquisition

Digitized/Digital Image is at the start taken as input. The foremost common of those devices is that the electronic medication or digitizer. These devices use a pen that's digital in nature. Input pictures for written characters can even be taken by exploitation different ways like scanners, images or by directly writing within the pc by employing a stylus.

• Preprocessing

Pre-processing is the basic part of character recognition at crucial permanent recognition rate. The most objective steps of pre-processing are to normalize strokes and take away variations that might otherwise complicate recognition and scale back the popularity rate. These variations or distortions embody the irregular size of text, missing points throughout pen movement collections, noise gift in text, left or right bend in handwriting and uneven distances of points from neighboring positions. Pre-processing includes five common steps, namely size normalization and centering, interpolating missing points, smoothing, slant correction and resampling of points.

• Segmentation

Segmentation is done by separation of the individual characters of an image. Generally document is processed in a hierarchical way. At first level lines are segmented using row histogram. From each row, words are extracted using column histogram and finally characters are extracted from words

• Feature Extraction

The main aim of feature extraction section is to extract that pattern that is most pertinent for classification. Feature extraction techniques like Principle Component Analysis (PCA), Linear Discriminant Analysis (LDA), Chain Code (CC), Scale Invariant Feature Extraction (SIFT), zoning, gradient based mostly options, bar chart could be applied to extract the options of individual characters. These options area unit are used to train the system.

• Classification

When input image is presented to HCR system, its features are extracted and given as an input to the trained classifier like artificial neural network or support vector machine. Classifiers compare the input feature with stored pattern and find out the best matching class for input

• Post Processing

Post-processing refers to the procedure of correcting misclassified results by applying linguistic knowledge. Postprocessing is processing of the output from shape recognition. Language information can increase the accuracy obtained by pure shape recognition. For handwriting input, some shape recognizers yield a single string of characters, while others yield a number of alternatives for each character, often with a measure of confidence for each alternative

IV. DISCUSSION & CONCLUSION

The paper discusses in detail all advances in the area of handwritten character recognition. The most accurate solution provided in this area directly or indirectly depends upon the quality as well as the nature of the material to be read

Varied techniques are precisely during this paper for character recognition in handwriting recognition system. From the study done to date, it's analysed that the choice of the classification similarity because the feature extraction techniques must be correct so as to achieve sensible rate in recognizing the character. A study within the paper reveals that there's still scope of enhancing the algorithms similarly as enhancing the speed of recognition of characters.

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Advancements in Image Sentiment Analysis: Techniques, Challenges, and Future Directions

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Abstract

In the digital era, understanding the sentiments conveyed through images has become increasingly crucial, given the prevalence of visual content across online platforms. Image sentiment analysis, a subset of sentiment analysis, aims to decode emotional cues portrayed in visual media such as photographs and videos. This paper presents an in-depth exploration of image sentiment analysis, highlighting its challenges, applications, and future directions.

The research delves into the significance of image sentiment analysis across various domains, including marketing, healthcare, and social media monitoring. Leveraging machine learning and deep learning techniques, the study addresses the complexities of emotional interpretation in visual content, encompassing facial expressions, body language, and contextual understanding.

Machine learning techniques play a pivotal role in image sentiment analysis, ranging from traditional approaches like Support Vector Machines to advanced deep learning paradigms such as Convolutional Neural Networks (CNNs) and recurrent neural networks (RNNs). The paper discusses the evolution of these techniques and their applications in deciphering emotional nuances in visual media.

Moreover, the research identifies challenges in image sentiment analysis, including the complexity of emotional expression and the need for contextual understanding. Ethical considerations, such as bias mitigation and transparency, are also addressed. By outlining research objectives and project scope, the paper sets the stage for further exploration in refining sentiment analysis models and advancing the field. in conclusion, this paper offers a comprehensive overview of image sentiment analysis, underscoring its importance in understanding human emotions portrayed through visual content. By addressing challenges and charting future research directions, the study aims to unlock the full potential of image sentiment analysis for diverse applications and societal impact.

1. Introduction to Image Sentiment Analysis

In the digital age, where visual content dominates online communication and social media platforms, understanding the sentiment conveyed through images has become increasingly important. Image sentiment analysis, a branch of sentiment analysis, focuses on extracting emotional cues and understanding the underlying sentiments expressed in visual media such as photographs, memes, and videos. Unlike traditional text-based sentiment analysis, image sentiment analysis presents unique challenges and opportunities, requiring advanced computational techniques to interpret the complex visual information presented in images.

At its core, image sentiment analysis seeks to automatically analyse and interpret the emotional content depicted in images, categorizing them into various emotional categories such as happiness, sadness, anger, or surprise. This process involves leveraging machine learning and deep learning algorithms to extract meaningful features from images and infer the emotional states of individuals or groups depicted in the visual content. By automating the analysis of visual emotions, image sentiment analysis enables businesses, researchers, and organizations to gain valuable insights into public

sentiment, consumer preferences, and societal trends.

The applications of image sentiment analysis are diverse and far-reaching. In marketing and advertising, image sentiment analysis helps businesses gauge consumer reactions to products, advertisements, and branding materials, allowing them to optimize their marketing strategies and enhance brand engagement. In healthcare, image sentiment analysis can assist in emotion recognition and mental health monitoring, providing valuable insights into patients' emotional well-being and enabling personalized interventions and support. Moreover, image sentiment analysis finds applications in fields such as social media monitoring, market research, and multimedia content analysis, offering valuable insights into the emotional impact of visual content shared online.

Despite its promise, image sentiment analysis presents several challenges, including the complexity of visual information, variability in emotional expressions, and the need for large-scale annotated datasets. However, recent advancements in machine learning and computer vision techniques, particularly deep learning approaches such as Convolutional Neural Networks (CNNs), have shown promising results in addressing these challenges and advancing the field of image sentiment analysis. As the volume and complexity of visual data continue to grow, image sentiment analysis holds immense potential for unlocking valuable insights into human emotions and enhancing various applications across domains [1-6].

2. Machine Learning Techniques for Image Sentiment Analysis

Machine learning techniques play a pivotal role in image sentiment analysis, offering powerful tools to interpret and analyse the emotional content portrayed in visual media. Within this domain, several key machine learning approaches have been employed to extract meaningful features and infer emotional states from images and videos. One prominent technique is Convolutional Neural Networks (CNNs), which excel at learning hierarchical representations of visual data. CNNs have been widely adopted for feature extraction in image sentiment analysis, enabling the detection of facial expressions, body language, and other visual cues indicative of emotional states.

In addition to CNNs, traditional machine learning approaches such as Support Vector Machines (SVMs), Random Forests, and k-Nearest Neighbors (k-NN) have also been utilized for image sentiment analysis. These techniques leverage handcrafted features and statistical models to classify images based on their emotional content. While CNNs offer superior performance in feature learning and representation, traditional machine learning approaches provide interpretability and flexibility, making them valuable tools in certain contexts, especially with limited data availability.

Furthermore, deep learning paradigms beyond CNNs have emerged as promising techniques for image sentiment analysis. Recurrent Neural Networks (RNNs), particularly Long Short-Term Memory networks (LSTMs), have shown effectiveness in capturing temporal dependencies and sequential patterns in visual data. This enables the modelling of dynamic emotional expressions over time, such as changes in facial expressions or body language, enhancing the accuracy and depth of sentiment analysis in videos.

Moreover, hybrid models that integrate spatial and temporal information have gained traction in image sentiment analysis. These models combine techniques from both traditional machine learning and deep learning paradigms to capture the static features of individual frames (spatial information) and the temporal dynamics across frames (temporal information). By leveraging the strengths of both approaches, hybrid models achieve superior performance in understanding and interpreting emotional content in visual media. Overall, machine learning techniques offer a diverse toolkit for image sentiment analysis, providing researchers with powerful methods to extract insights into human emotions from visual content across various domains and applications [7-9].

2.1 Traditional Machine Learning Approaches

Traditional machine learning approaches lay the foundation for image sentiment analysis, leveraging a diverse range of techniques to classify and interpret emotions depicted in visual content.

Support Vector Machines (SVMs), Decision Trees, and Ensemble Methods are among the prominent representatives of this category.

SVMs excel in creating decision boundaries that separate different emotional classes within images, while decision trees offer a hierarchical structure for feature evaluation. Ensemble methods, such as Random Forests, amalgamate multiple models to enhance overall prediction accuracy. While effective to some extent, traditional approaches often face challenges in adapting to the inherent complexity and variability of visual emotional expressions.

2.2 Deep Learning Paradigms in Image Sentiment Analysis

The advent of deep learning has catalysed a paradigm shift in image sentiment analysis, empowering models to autonomously learn intricate patterns and representations from visual data. Convolutional Neural Networks (CNNs) stand at the forefront of this revolution, designed to mimic the human visual system and excel at learning hierarchical features from raw pixel data.CNNs have demonstrated remarkable proficiency in discerning spatial patterns within images, enabling accurate interpretation of visual emotions. Transfer learning, a technique within deep learning, facilitates the fine-tuning of pre-trained models on large datasets to specific sentiment analysis tasks. This amalgamation of convolutional layers and transfer learning has significantly enhanced the accuracy and adaptability of image sentiment analysis models.

2.3 Hybrid Models: Integrating Spatial and Temporal Information

Hybrid models represent the cutting edge of image sentiment analysis, merging spatial information extracted by CNNs with temporal dependencies captured by recurrent neural networks (RNNs) or Long Short-Term Memory networks (LSTMs). While CNNs excel at discerning spatial patterns within individual images, RNNs and LSTMs are adept at capturing temporal dependencies in sequences of images or videos.

This hybrid approach is particularly beneficial in scenarios where emotional expressions evolve over time, such as in video-based sentiment analysis. The synergistic integration of spatial and temporal information enables these models to grasp the dynamic nature of emotional expressions, offering a more nuanced understanding of visual sentiment.

2.4 Challenges and Future Directions*

Despite the strides made in applying machine learning to image sentiment analysis, several challenges persist. Overfitting to specific datasets, biases in training data, and the interpretability of deep learning models pose ongoing challenges. Future research directions aim to mitigate these issues through the development of explainable AI, unbiased datasets, and novel architectures that balance complexity with interpretability.

As image sentiment analysis continues to evolve, the fusion of traditional and deep learning approaches, coupled with advancements in model interpretability and dataset diversity, holds promise for a more comprehensive understanding of visual sentiment. The subsequent chapters will delve deeper into the theoretical framework, research methodology, data analysis, and findings, offering a comprehensive exploration of image sentiment analysis within the broader context of facial recognition technology [2-9].

3. Significance of Research Problem in image sentiment analysis

The significance of the research problem in image sentiment analysis lies in its potential to revolutionize various industries and domains by providing insights into human emotions and attitudes conveyed through visual content. Understanding the significance of this research problem is essential for recognizing its broader implications and potential impact. Below are some key points highlighting the significance of the research problem in image sentiment analysis:

1. Enhanced Understanding of Human Emotions: Image sentiment analysis enables researchers to delve deeper into the complexities of human emotions portrayed in visual content. By deciphering the

emotional cues embedded in images, researchers can gain valuable insights into human behaviour, preferences, and attitudes, contributing to our understanding of the human psyche.

2. Improved Decision Making in Business and Marketing: In the business and marketing domain, image sentiment analysis provides valuable insights into consumer sentiments, preferences, and perceptions. By analysing the emotional response to products, advertisements, and branding materials, businesses can make informed decisions to optimize marketing strategies, enhance brand engagement, and improve customer satisfaction.

3. Social Media Monitoring and Public Opinion Analysis: With the proliferation of social media platforms, understanding public sentiment and opinion has become increasingly important. Image sentiment analysis enables organizations to monitor and analyse social media conversations, brand mentions, and user-generated content, providing insights into public sentiment, emerging trends, and societal issues [18].

4. Healthcare and Mental Health Monitoring: Image sentiment analysis holds promise for applications in healthcare, particularly in mental health monitoring and diagnosis. By analysing facial expressions, body language, and other visual cues, image sentiment analysis can assist in emotion recognition, mood tracking, and early detection of mental health disorders, enabling timely interventions and support for individuals in need.

5. Educational and Learning Technologies: In the field of education, image sentiment analysis can enhance learning experiences and educational technologies. By analysing students' emotional responses to learning materials and activities, educators can personalize learning content, provide targeted interventions, and create supportive learning environments conducive to student engagement and academic success.

6. Cultural and Societal Impact: Understanding the emotional content of visual media is essential for appreciating cultural nuances and societal dynamics. Image sentiment analysis can shed light on cultural differences in emotional expression, societal trends, and collective sentiments, fostering cross-cultural understanding and dialogue.

7. Ethical and Responsible AI Development: As with any AI technology, ensuring ethical and responsible development of image sentiment analysis systems is paramount. Addressing issues such as bias, fairness, privacy, and transparency in sentiment analysis models is crucial for building trust, fostering user acceptance, and promoting ethical AI practices [10-11].

4. Research Problem in image sentiment analysis

The research problem in image sentiment analysis encompasses a multifaceted exploration aimed at developing sophisticated computational techniques capable of accurately deciphering the emotional nuances portrayed in visual media. At its core, this problem delves into the challenge of recognizing and categorizing emotions expressed through facial expressions, body language, and other visual cues within images and videos. Achieving robust emotion recognition entails not only detecting the presence of emotions but also understanding the subtleties and complexities inherent in human emotional expression.

Furthermore, contextual understanding plays a pivotal role in advancing image sentiment analysis. Researchers endeavour to develop algorithms capable of interpreting the context surrounding emotional expressions in visual content, including scene content, social interactions, and cultural norms. This contextualization is essential for discerning the true intent and meaning behind the displayed emotions, enhancing the accuracy and reliability of sentiment analysis models [1].

In addition to recognizing emotions in isolation, researchers aim to integrate information from multiple modalities to provide a holistic understanding of emotional content. By incorporating visual, textual, and auditory cues, multimodal analysis enables a more comprehensive interpretation of emotions expressed in visual media, enriching the depth and breadth of sentiment analysis.

Ethical considerations are also paramount in addressing the research problem in image sentiment

analysis. Ensuring fairness, transparency, and accountability in sentiment analysis models is essential to uphold ethical standards and protect user privacy and rights. Researchers strive to develop algorithms that mitigate biases, respect diversity, and promote ethical AI practices, fostering trust and confidence in sentiment analysis systems [5].

5. Problem Statement

The problem statement in image sentiment analysis encapsulates a multifaceted challenge at the intersection of computer vision, artificial intelligence, and psychology. At its core, this research problem aims to develop algorithms capable of understanding and interpreting the emotional nuances portrayed in visual media, such as images and videos. This entails recognizing facial expressions, body language, and other visual cues indicative of various emotional states, including happiness, sadness, anger, and surprise.

One of the primary challenges within this problem statement is the need for contextual understanding. Emotions expressed in visual content are often influenced by the surrounding context, including scene content, social interactions, and cultural norms. Researchers seek to develop techniques that can effectively interpret these contextual cues to provide a more nuanced and accurate analysis of emotional content.

Furthermore, the problem statement involves addressing the complexity of emotional expression. Emotions are inherently multifaceted, and individuals may express them in diverse ways. Developing algorithms capable of capturing the subtle nuances and variations in emotional expression is essential for accurate sentiment analysis in visual media.

Ethical considerations also play a significant role in the problem statement. As with any AI-based technology, ensuring fairness, transparency, and accountability in sentiment analysis models is paramount. Researchers aim to develop algorithms that mitigate biases, respect diversity, and uphold ethical standards to foster trust and confidence in sentiment analysis systems[5].

6. Research Objectives in Image Sentiment Analysis

In the realm of image sentiment analysis, the research objectives converge to tackle multifaceted challenges and unlock the potential of computational techniques in deciphering emotional content portrayed in visual media. The primary objective centres on the development of robust algorithms capable of accurately recognizing and categorizing emotions depicted in images and videos. This entails leveraging advancements in computer vision to detect facial expressions, body language, and other visual cues indicative of various emotional states, facilitating a deeper understanding of human emotions through visual content.

Furthermore, the research aims to enhance contextual understanding within sentiment analysis models. By interpreting contextual cues embedded in visual content, such as scene context, social interactions, and cultural norms, the objective is to refine the analysis of emotional expressions. This contextualization provides a nuanced perspective, enabling sentiment analysis algorithms to capture the intricacies of emotional content more effectively and produce more accurate insights.

Another pivotal research objective is the integration of multimodal information to enrich sentiment analysis. By incorporating data from diverse modalities, including visual, textual, and auditory cues, the objective is to achieve a comprehensive understanding of emotional content in visual media. This holistic approach enhances the depth and accuracy of sentiment analysis, allowing algorithms to capture the multifaceted nature of human emotions expressed through various channels.

Finally, addressing ethical considerations is paramount in the research objectives of image sentiment analysis. Ensuring fairness, transparency, and accountability in sentiment analysis models is essential for upholding ethical standards and safeguarding user privacy and rights. By developing algorithms that mitigate biases, promote fairness, and foster trust, researchers aim to create sentiment analysis systems that adhere to ethical principles and contribute positively to societal well-being [10-15].

7. Project Scope for Further Research

Expanding the boundaries of image sentiment analysis calls for a comprehensive exploration within a defined project scope. To embark on further research, the project's scope can encompass various dimensions, starting with the refinement and innovation of computational models. Within this scope, researchers can delve into the development of novel neural network architectures specifically tailored for image sentiment analysis. This includes exploring advanced CNN architectures, recurrent neural networks (RNNs), and attention mechanisms to effectively capture and interpret emotional cues embedded in visual media.

Moreover, the project scope extends to fine-grained emotion recognition, aiming to discern subtle emotional nuances and complex states accurately. Researchers can focus on refining existing algorithms to distinguish between a broader range of emotions, quantifying emotional intensity, and accounting for variability in emotional expressions across different individuals and cultural contexts. This fine-grained approach enhances the granularity and accuracy of sentiment analysis, enabling a more nuanced understanding of human emotions [20].

In parallel, the project scope encompasses the enhancement of contextual understanding within sentiment analysis models. By integrating semantic and contextual information, researchers can develop techniques to interpret emotional expressions within their broader context. This involves leveraging contextual cues such as scene context, object interactions, and temporal dynamics to refine the interpretation of emotional content in images and videos, ultimately improving the contextual relevance of sentiment analysis results.

Additionally, the project scope extends to the exploration of multimodal fusion techniques to integrate information from multiple modalities effectively. By combining visual, textual, and auditory cues, researchers can enrich sentiment analysis models with complementary information from diverse sources. This involves investigating fusion mechanisms such as late fusion, early fusion, and attention

based fusion to leverage the synergies between different modalities and enhance the depth and accuracy of sentiment analysis.

Furthermore, ethical considerations and real-world applicability are integral components of the project scope. Researchers must address ethical concerns, mitigate biases, and ensure transparency and accountability in sentiment analysis models. Additionally, validating the effectiveness of sentiment analysis techniques in real-world applications across various domains, including business, healthcare, education, and social media, is essential. By aligning research efforts with these objectives, researchers can advance the field of image sentiment analysis, paving the way for more accurate, robust, and ethic [15-20]

Conclusion:

the exploration of image sentiment analysis presented in this paper underscores its critical role in deciphering the emotional content depicted in visual media. As digital communication increasingly relies on images and videos, understanding the sentiments conveyed through these mediums becomes paramount. Through the integration of machine learning and deep learning techniques, researchers have made significant strides in extracting meaningful insights from visual content, ranging from facial expressions to contextual cues. the significance of image sentiment analysis spans across diverse domains, including marketing, healthcare, social media monitoring, and beyond. By automating the analysis of visual emotions, businesses can optimize their marketing strategies, while healthcare professionals can monitor patients' emotional well-being more effectively. Furthermore, image sentiment analysis facilitates social media monitoring and public opinion analysis, providing valuable insights into societal trends and public sentiment. machine learning techniques, including traditional approaches and advanced deep learning paradigms, offer a versatile toolkit for image sentiment analysis. From Support Vector Machines to Convolutional Neural Networks and recurrent neural networks, these techniques enable the extraction of emotional nuances from visual content with

increasing accuracy and granularity.Despite the progress made, challenges such as the complexity of emotional expression and ethical considerations persist. Addressing these challenges requires ongoing research efforts focused on refining sentiment analysis models.

Looking ahead, the research objectives and project scope outlined in this paper provide a roadmap for further exploration in image sentiment analysis. By developing robust algorithms, integrating multimodal information, and ensuring ethical considerations, researchers can unlock the full potential of image sentiment analysis for diverse applications and societal impact. in essence, image sentiment analysis holds immense promise for understanding human emotions portrayed through visual media. Through continued research and innovation, this field will continue to evolve, offering valuable insights into the complexities of human emotions and enhancing our understanding of the digital landscape.

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Secure and efficient e-KYC by Blockchain Technology

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Abstract:

Blockchain technology is disrupting technology which is changing many sectors such as healthcare, supply chain, education and management etc. Banking is one of the sectors which also looking toward adopting blockchain solution in near future. One of the blockchain use cases is KYC (Know Your Customer). Every financial institution has to follow KYC (Know Your Customer) process to identity customers. The current KYC is manual and very time-consuming process. Customer have to follow the KYC process for every financial institute this leads to data duplication over every FIs. The proposed design in this paper will provide efficient KYC storing mechanism with high level of security.

Introduction:

This section gives the brief introduction about what is the blockchain, how it works and smart contracts.

Blockchain:

Blockchain technology is used to store data in a secure form. Blockchain technology provides trust in a decentralized environment through the use of consensus mechanisms and encryption technology. A block is nothing but a piece of data, stored in encrypted form. Besides the data,the hash of the previous block is also stored in a block, in this way,a chain of blocks is formed, that's why it is termed a blockchain. A Hash of a block is nothing but the hash of data or transactions in the block or encrypted code of data or transactions. This hash is used as a signature or fingerprint of the block. The architecture of the blockchain is shown in Figure1. Here another term nonce is used. Nonce is the number associated with the previous hash. If the data in two or more blocks is the same it creates the same hash value, to tackle this problem nonce is used. The nonce is the abbreviation of the number used once. The nonce is also responsible for making blockchain tamper-proof.

Tx1 Tx2 Tx3 ……. represent the transaction or data. Whenever new transactions are done it creates a new block for that transaction, it stores the block number and hash of the previous block and the nonce. The node which solves the mining difficulty first will get the right to add a new block in the blockchain. Mining difficulty means the number of preceding zeros in the hash of the block and guessing the number of zeros is nothing but solving (mining) the difficulty.

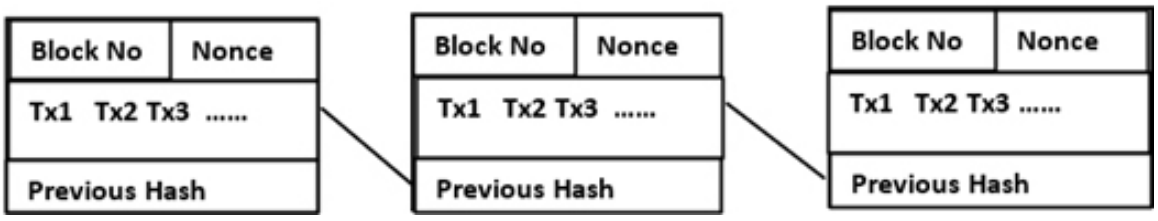


Figure 1Architecture of Blockchain

How Blockchain Works?

As blockchain is distributed ledger technology, every node in a network is connected with other nodes as shown in Figure 2.

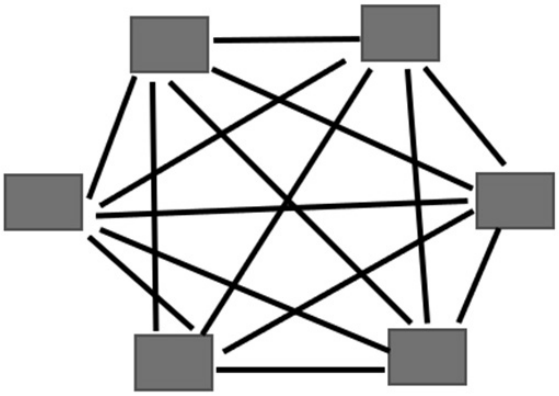


Figure 2 Distributed Blockchain network

The same data is replicated over every node in the blockchain network as shown in Figure.3. Every node in a network has its copy of the record.

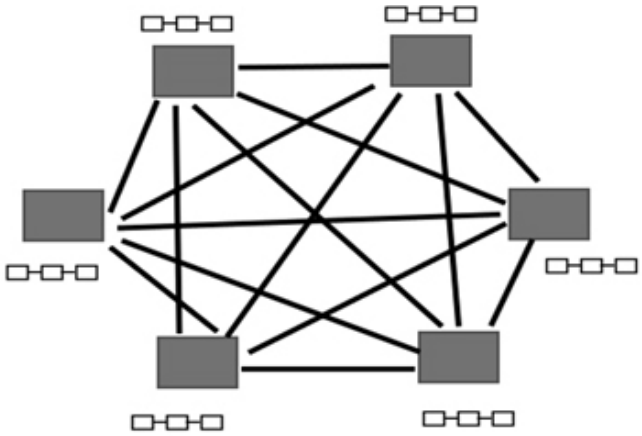


Figure 3 Every node in the blockchain has its copy of the data

Replicating the data on each node in the blockchain network will consume a lot of memory space. So, only the Merkle root (block header) is replicated over the network. The Merkle root is nothing but the root of the binary hash tree. The Merkle tree is also called a binary hash tree. The Merkle Tree emerged in 1979 and was named after its inventor Ralph Merkle. A data verification process in Merkle design would allow computers to work much faster than before. The world of cryptography andthe working of encrypted computer protocols has changed by Merkle Tree. As a result, Merkle Trees has gained much popularity in cryptocurrency over the years. Merkle tree is responsible for data verification. Figure 4 shows the working of the Merkle tree. Hashing of the pair is done repeatedly until the single hash remains. The hashing process starts from the leaf nodes. Here Hash0, Hash1, Hash2, and Hash3 are the hashes of individual data or blocks. The hash of Hash0 and Hash1 is stored in Hash01, and the hash 0f Hash2 and Hash3 is stored in Hash23. Root Hash is the hash of Hash01 and Hash23. In short, the Merkle tree contains the hash of the complete tree.

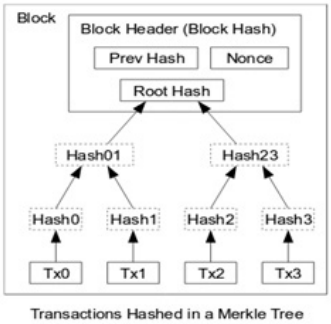


Figure 4 Transaction Hashed in Merkle Tree

Figure 5 shows how new blocks are added to the blockchain network. Whenever anyone wants to add a new record, it generates new a block. A new block isadded to the blockchain network only after the consensus mechanism or ordering service depending on the type of blockchain network. If the blockchain network is public, a consensus mechanism is used, and if a blockchain network is private ordering service is used. This way, only valid records are added to the blockchain network and security is maintained. Records once added to the blockchain cannot be changed. Making any changes to the record creates a new block unlike updating the record in a traditional database. In case data or block is to be changed again consensus mechanism or ordering service is used, in this way blockchain network maintenance trust in an untrusted environment.

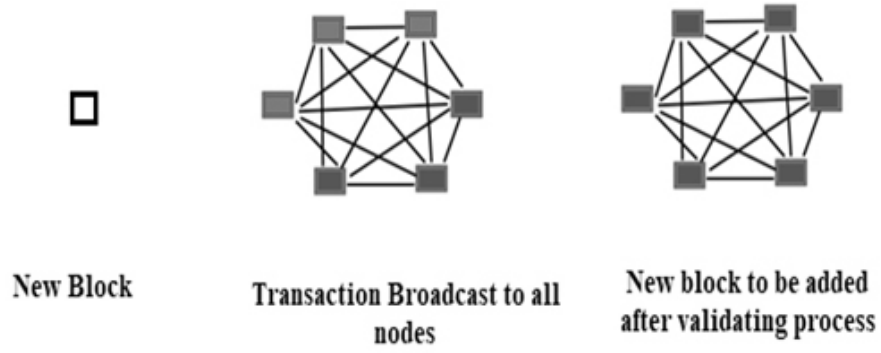


Figure 5 New Blocks Added to the Blockchain Network

Smart Contracts

Smart contracts are the successor of the vending machine as freshmen can get products in return for coins from vendors, and security mechanisms and lockboxes keep money secure in the vending machine (Szabo, 1997).

Smart contracts are small programs that help to automate transactions without any middleman. Smart contracts are always deployed on the blockchain network. Which in turn provides a secure, automatic, faster, and document-free environment. Smart contracts can be written in a general-purpose language or platform-specific language depending on the blockchain development methodology. Smart contracts are written in an if-then structure and are processed automatically on satisfying the specific condition.

Literature Review:

To solve regulatory and technical problems in blockchain technology, some regulations and legal frameworks are needed (Guo Ye, 2016). That's why to conduct research on interbank market blockchain technology, a Workgroup was established in Chinain August 2016. Resolving, these regulatory issues blockchain will be integrated into the banking system. (Alidin, 2018) presented a general structure of integrating Islamic banking with blockchain technology based on MuleSoft and Hyperledger to solve the issues in Islamic banking and also stated that the current blockchain solutions for financial institutes face scalability and regulatory issues. Proof of value (POV) and diffusion of innovation model will help to decide whether to adopt blockchain technology or not and help future research in banking. (Dozier Priya D, 2020) used grounded theory methodology to analyzethe research question: "How do financial services, firms evaluate blockchain technology for potential use?". The POV model will be used for identifying blockchain use cases and formal innovation analysis processes.BlendTBS, is a blockchain-enabled decentralized time banking system proposed by (Lin, 2019) based on the Ethereum platform. Where time is credited or debited on the service provider and service consumers respectively. The BlendTBS is designed to reward the residents based on their social activities.A prototype is implemented on a permissioned blockchain network and a study was conducted on a traditional community on the island of Aneityum, Republic of Vanuatu. Consequently, the BlendTBS system will encourage the residents in the communities to

behave nicely and make the entire community more trustworthy and safer by crediting time to those who have trust-keeping behaviors, and obtain higher priority in the community.The Proposal of the business and software platform architecture with an execution model to track and identify all activities in a banking system is discussed by (S. Sakho, 2019). To protect assets, data, and transactions banks or financial institutions have to adopt blockchain technology massively.

Current Challenges:

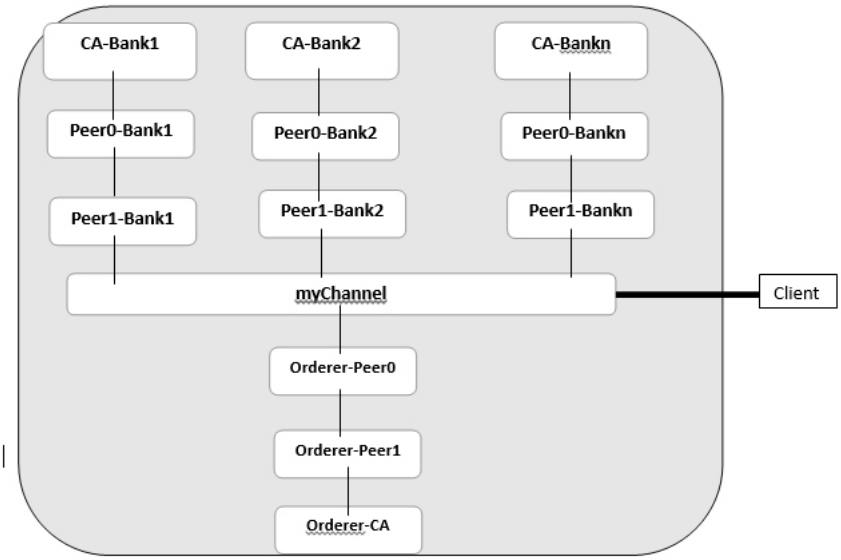
After literature survey authors found out some challenges, listed as below

- Different financial institutions have different data storage format, i.e same solution cannot be applicable for all institutions.
- Many papers presented implementation details but they lack the performance analysis in the perspective of scalability and feasibility.
- As blockchain is secure it self but for securing first party entry some security mechanism should be applied.
- Current KYC system has lot of complex processing.

Proposed Design:

Hyperledger fabric based blockchain solution for KYC is presented in this section.

Hyperledger Fabric is an open-source permissioned distributed ledger technology (DLT) platform used to develop enterprise solutions. The Hyperledger Fabric project is led by the Linux Foundation, which is well known for developing manyopen-source projects.More than 35 organizations and nearly 200 developers contribute to the Hyperledger community. Hyperledger fabric provides modular architecture for developing enterprise applications. Fabric platform supports general-purpose programming languages such as Java, Go, and Node.js, unlikeother platforms that allow only domain-specific languages (DSL). This platform supports pluggable consensus protocols. Developers can choose a consensus protocol as per the use case, which will provide better performance and throughput.



Conclusion:

This paper discusses the challenges in the current KYC system and provides design framework for blockchain solution based on Hyperledger fabric framework for e-KYC for FIs such as banks.

Complexity of current KYC system will be reduced by blockchain technology. The proposed blockchainsolution offers reduced cost, increased efficiency, redundancy elimination, transparent transactions and improved end user experience.

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AN INNOVATIVE BLOCKCHAIN-BASED HEALTHCARE ELECTRONIC HEALTH RECORD SECURITY AUTOMATION SYSTEM

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ABSTRACT

This research recommends an Integrated Health Record Automation Management (IHRAM) system for the e-Healthcare system. By integrating disparate health information from various providers, this IHRAM removes a major barrier to patient care. The goal of developing and implementing a Patient Centric Smart Health Contract (PCSHC) is to provide a managed, controlled access solution for all parties involved in electronic health care systems, including patients, doctors, nurses, and other medical staff. Now that this IHRAM is in place, it is much easier to access patients' records, even though they may be located at different medical facilities. via the use of Blockchain technology, this PCSHC guarantees that patients can easily access their electronic health records via their healthcare providers and that a thorough record is generated for every event by means of a distributed ledger. Cryptographic hash functions are an essential part of the proposed system because of the high degree of security and integrity they provide. Experiments are done and validated utilizing several trials to determine the effectiveness of the proposed PCSHC. We have evaluated the proposed Patient Centric Smart Health Contract system using quantitative metrics such as Transactions Per Second (TPS) and qualitative metrics like Latency of a Transaction (LT). According to the results, the proposed PCHSC has a lower TPS and LT consumption.

Keywords:Engineering and Technology, centric E health system, modified merkle tree, ensuring security

INTRODUCTION

Many healthcare institutions have made the transition from paper-based to electronic health records (EHRs) thanks to advancements in information technology. It is composed of electronic health records, personal information, and data pertaining to patients' health. Disease information, medication history, prescriptions, microbiological test results, imaging studies, and other reports are all part of the electronic health record. The Internet and cloud networks play an increasingly important role in storing and facilitating access to massive amounts of health data due to the proliferation of electronic health records (EHRs) and other healthcare technologies in the big data age. Multiple assaults occur because to the Internet's inherent insecurity, maintenance performed by other parties with limited access to data, financial obligations, and privacy violations. The need for a quick and efficient solution to ensure the storage, protection, exchange, and accessibility of health data across different parties is heightened by the precarious nature of Internetworking. Indeed, in order to handle the exponential expansion of health information, a secure patient-centric electronic health record management system is necessary.

LITERATURE REVIEW

Chelladurai (2022) This study presents a controlled answer to the needs of patients, doctors, and health care providers via the construction of blockchain smart contracts. In order to construct an intelligent e-health system, the suggested solution intends to use a blockchain platform for the sharing of health information. In order to create immutable patient logs using a Modified Merkle Tree data structure, update medical records, facilitate health information exchange between various providers,

and establish viewership contracts on a peer-to-peer blockchain network, the suggested system is launching health models. Within this framework, blockchain serves as a repository for clinical data, giving patients and their healthcare professionals easy access to electronic health records and a comprehensive distributed ledger record of all occurrences. The system's high level of security and integrity, achieved by use of cryptographic hash functions, is a notable feature. The suggested technology has been tested on several trials to ensure its efficacy. The proposed system's performance has been evaluated using both quantitative and qualitative indicators. These metrics include latency, transactions per second, and resource use.

Agha (2023) This study investigates the potential of blockchain technology to safeguard EHRs via the integration of Internet of Things (IoT) sensors that allow for the real-time monitoring of patients. Security, privacy, data integrity, and accessibility are some of the most pressing issues in the healthcare sector, and resolving them is our top priority. The distributed and immutable nature of blockchain technology is key to our system's goal of improving the safety and dependability of electronic health records. On top of that, vital indicators may be monitored in real-time by IoT sensors, allowing for fast interventions. Contributing to better data security and patient care, this research explores both the technical and practical elements of healthcare implementation.

Panigrahi (2022) Several industries are beginning to see the benefits of blockchain technology since it offers a safe and efficient way to communicate data. These industries include finance, supply chain management (SCM) across industries, the internet of things (IoT), and health care systems (HCS). Patients and suppliers are able to transmit information effortlessly because to the HCS application's interoperability and security. When these characteristics are missing, it shows that the patient has trouble understanding his or her own health situation. Therefore, the HCS may become more efficient and effective by integrating blockchain technology, which will address this drawback. These advantages provide the groundwork for blockchain technology's use in many areas of HCS, including but not limited to: patient electronic health records (EHRs), EMRs for different medical devices, billing, telemedicine systems, and so on.

Alam (2021) Most healthcare facilities are transitioning away from paper-based methods of record keeping and toward electronic health records (EHR). It is essential that different parties share data records and that users have the ability to choose who may access their information. These facts highlight the need of interoperability and consumer control over their personal data, in addition to the fundamental requirements of information secrecy, confidentiality, and integrity. Concerns about data security, trust, and administration plague EHR systems. After the recent COVID-19 outbreak, many record-keeping apps, websites, and tools were released. Additionally, precise and trustworthy data is required for future projection, contact tracing, monitoring, and early diagnosis, all of which need the sharing of many personal health information among various parties. People will be wary of disclosing private information for fear of societal shame and invasion of privacy.

Alsudani (2023) hospitals store patient data in Electronic Medical Records (EMRs) that are structured around client/server architecture. In order to keep tabs on a particular patient, many hospitals use the same database. Because of these restrictions, a personalized health record cannot provide different connected professionals and patients with a unified, encrypted, and private medical record. Complex and expensive are the hallmarks of modern healthcare systems. Better health record management, however, and Blockchain technology could make this less of an issue. Healthcare services stand to benefit greatly from the data availability, trust, and security features of the Blockchain, which will help alleviate some of the problems associated with the complexity, reliability, compatibility, and anonymity of the conventional customer/server architecture of EMR management platforms. In this work, the authors suggest an EHRM-IoMT system, which is based on the Internet of Medical Things. Blockchain efficiency and the client/server paradigm are the subjects of this paper's investigation and analysis. The research results demonstrate that a Blockchain-based patient-centered approach has the

potential to accomplish outstanding results. In addition, healthcare providers may be able to rely on Blockchain's accurate and immutable personal data to improve IoMT-based forecasting and diagnosis via the use of machine learning and artificial intelligence.

RESEARCH METHODOLOGY

Design View of the Proposed System

This section presents the proposed Blockchain smart contract system from a design perspective. In Figure 1 we can see the schematic of the Blockchain-based secure health data management system that has been suggested. A health blockchain, which includes the steps to create, store, update, view, and share full patient records on the Blockchain network, is depicted by the proposed **system.**

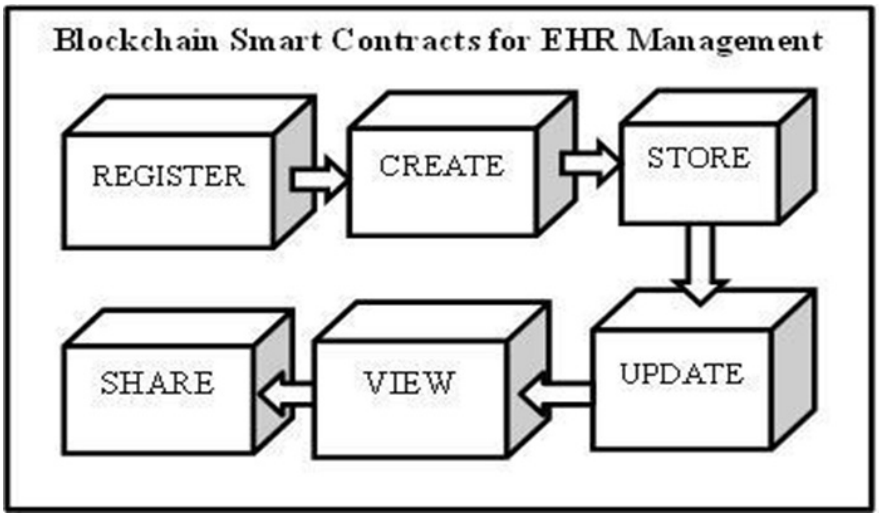

Figure 1 Block Diagram of the Proposed Smart Contract System

There are a total of four models in the suggested system: one for creating immutable logs, one for updating, sharing data, and viewing, and three for permissions. In addition to storing health records, the immutable log creation model executes three smart contracts: one for patient registration and another for the creation of electronic health records. These records will include things like the patient's personal details, medication details, physician details, medical history, prescriptions, results of microbiological tests, and any type of diagnosis (ECG, ECHO, MRI, CT scan, etc.). The proposed system's three authorization types are implemented via three separate smart contracts.

All three types of permission are in charge of approving changes to health data, allowing access to other health care providers on the Blockchain, and allowing record owners to see their own information. In Table 1 we can see all of the components of the suggested system.

Table 1 System Entities of the Proposed Smart Contract System

S.No	System Entities
1.	Patient
2.	Healthcare Service Provider
3.	Doctors / Caregivers / Clinical Authorities
4.	Blockchain Repository
5.	EHR Manager

The patient is the primary recipient of services under the suggested model. The second part of the healthcare system is the organization or individual that actually delivers medical treatment. Doctors, nurses, and other clinical authorities constitute the third component of the suggested system and would be in charge of making a patient's diagnosis. All medical histories and diagnostic findings are saved in the Blockchain repository, the fourth component of the system. The Electronic Health

Record (EHR) Manager is the system's fifth entity; it offers administrative and smart contract functions. There is always a wall of separation between the healthcare professional and the patient. Collaboration between the provider entity and the other three entities—doctors, caregivers, and clinical authorities—as well as the EHR manager and blockchain repository is constant. A patient seeking consultation at Hospital1/Provider1 is shown in Figure 2.

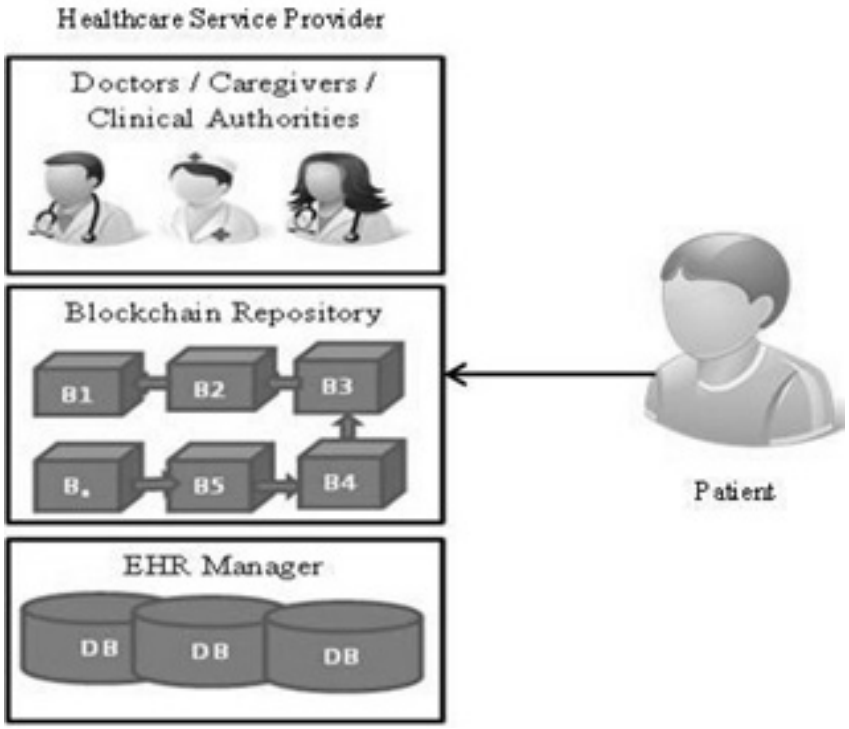

Figure 2 Patient and Health Service Provider in the e-Health System

At the outset, data transfer of any sort requires registration of all stakeholders, including patients, physicians, caregivers, clinical authorities, the EHR Manager, and others like insurance and microbiological laboratory personnel. After completing the registration procedure, patients using the proposed patient-centric smart contract system may seek further evaluations from any healthcare professional on the P2P Blockchain network.

Architecture of the Proposed Smart Contract System

The proposed electronic health record (EHR) management system's architecture is laid out in this part. It is constructed on top of a Blockchain smart contract. Figure 3 shows the proposed Blockchain Healthcare system's design.

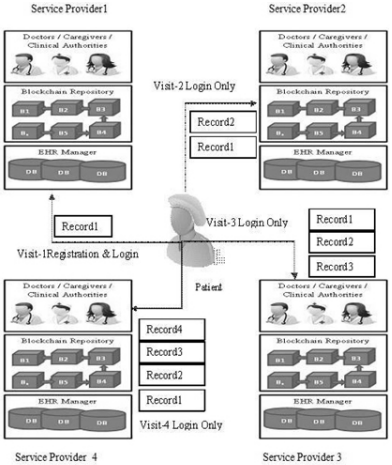

Figure 3 Architecture of the Proposed Blockchain Smart Contract System

From a bird's-eye perspective, the system controls one patient's healthcare and communicates the health Blockchain with four providers. Furthermore, the figure shows how a patient's health data are accessible across providers when they visit each service provider at different intervals.

The patient is regarded as the data owner in the proposed system and is tasked with providing the system with their personal health information. Figure 3 shows the patient's experience as they get care from four different physicians over the course of many visits. The patient seeks medical advice from a doctor at the health care provider1 for the very first time in this case. Prior to therapy, the patient is required to complete a login and registration procedure. The patient's login credentials are saved at Hospital1 / Peer1 after the registration procedure. Doctor consultations at Hospital1 and Peer1 are now open to the patient. Following the consultation, the clinical authorities input the patient's medical data into the Blockchain system. This includes prescriptions, results of microbiological tests, and payments for these records. Patient P1's whole medical history is then stored in a block by the suggested method. Imagine a future in which patient P1 visits a specialist at Hospital2 / Peer2 for a different ailment. With the credentials generated by the current system, patient P1 may now see a doctor at hospital 2. With P1's consent, the suggested system now pulls their current medical records. A new block is established for patient P1 with all of their health information at Hospital2 after the consultation procedure at Hospital1. Later on, let's pretend that P1 visits a super specialty doctor at Hospital3 or Peer3 for a different ailment. A Blockchain is therefore built once the blocks are produced. The suggested solution creates smart contracts to carry out this scenario.

EXPERIMENTS AND RESULTS

The experimental results that were used to assess the proposed Blockchain smart contracts' performance are now available. This suggested setup is tested and implemented on a Windows 10 PC with an Intel Core i3 @ 1 GHz CPU and 4 GB of RAM. The suggested system's development environment is split into two sections: the front-end and the back-end. The suggested system's back-end implementation is built entirely in Python 3.8.4. Building blocks, hashing them, constructing a chain of blocks, and inserting their data into the database server are all tasks that are accomplished using the Python IDLE. HTML and PHP are used to construct the front-end, or GUI, implementation. Various features, including login, registration, record creation, storage, update, sharing, and display, are offered via the web application's front-end interface.

Experiments were conducted to assess the performance of the suggested smart contracts system, and the outcomes were assessed using these industry-standard measures.

Resource Utilization:It is calculated by monitoring the CPU and memory use of the proposed Blockchain system over a certain time frame.

System Throughput:The success rate is determined by the number of legitimate transactions that the Blockchain system commits during a certain time period.

Delay / Latency:Latency is the amount of time it takes for a network to employ a transaction impact. From the moment of submission until the result is accessible in the Blockchain system, the whole time is included.

On average, 64 percent of the CPU and 75 megabytes of memory were used up by the group of 100 patients whose medical information were stored. The CPU utilization for 200 patients is 78% with 145 MB of memory; for 300 patients it's 91% with 215 MB of memory; for 400 patients it's 98% with 290 MB of memory; and for 500 patients it's 100% with 290 MB of memory. The system reports 300 MB of RAM and 100% CPU use. Table 2 displays the findings of the experiment with five separate patient groups, which measured the CPU and memory consumption.

Table 2 Results of CPU and Memory Utilization for various Patient Groups with the Proposed Blockchain based System

Performance Measure Resource Utilization

Patient Groups	**100**	**200**	**300**	**400**	**500**
CPU Utilization (%)	64	78	91	98	100
Memory Utilization (MB)	75	145	215	290	300

The average CPU and memory consumption for keeping 100 patients' health records in the current non-Blockchain based conventional systems was 63% and 65 MB, respectively. A total of 71% CPU utilization and 130 MB of memory were recorded for 200 patients; 83% CPU utilization and 190 MB of memory were recorded for 300 patients; 96% CPU utilization and 250 MB of memory were recorded for 400 patients; and 100% CPU utilization and 280 MB of memory were recorded for 500 patients. Table 3 displays the results of the experiments with CPU and memory consumption for five distinct patient groups.

Table 3Results of CPU and Memory utilization for various Patient Groups with Existing Non-Blockchain based Traditional System

Performance Measure Resource Utilization					
Patient Groups	100	200	300	400	500
CPU Utilization (%)	63	71	83	96	100
Memory Utilization (MB)	65	130	190	250	280

Table 2 shows the findings of CPU time and memory consumption for the proposed system, whereas Table 3 shows the results for the non-blockchain conventional systems. The X-axis shows the patient groups, and the Y-axis shows the percentage of resource utilization. We also compare the proposed Blockchain system's CPU use and memory utilization to the current non-Blockchain conventional system for easier comparison and better understanding.

(b) Non Blockchain based Traditional Systems

Due to this, the suggested system's memory use is more equitable for all patient groups in comparison to conventional systems. We see that the suggested Blockchain healthcare system uses much less CPU and Memory when we raise the number of participants from 100 to 500 compared to conventional healthcare systems.

Transaction reaction time is another metric used to quantify the proposed system's throughput. The suggested system uses the previously defined patient groups to estimate average throughput in order to assess resource use. After 100 patient groups, the suggested method takes 5.82 seconds, after 200 it takes 10.54 seconds, after 300 it takes 14.57 seconds, after 400 it takes 17.89 seconds, and after 500 it takes 21.73 seconds. No matter how many transactions there are for any one patient in the sample, the suggested system's transaction response time will fluctuate. Additionally, Table 4 displays the findings of calculating the average throughput that was produced throughout experiments with the current non-Blockchain based conventional systems, all applied to the identical patient groups.

Table 4Results of Performance measure Throughput for various Patient Groups with the Proposed System and Non-Blockchain based Traditional System

Performance Measure Throughput (ms)

Patient Groups	**100**	**200**	**300**	**400**	**500**
Proposed Blockchain based System	5.82	10.54	14.57	17.89	21.73
Traditional non-Blockchain based Systems	16.17	23.83	36.51	49.32	52.14

The findings, which demonstrate the average throughput of both the proposed and current conventional systems that do not use blockchain technology, are shown in Table 4. The X-axis shows the patient groups, and the Y-axis shows the throughput in seconds.

The findings are also compared with current non-Blockchain conventional systems for better

understanding and comparison. Before we look at the suggested Blockchain system, we can see that all patient categories have high average throughput in the current conventional systems.

The sum of all the times a transaction's reaction time is longer than its throughput is called the metric delay. Table 5 displays the measured performance metric delay for the proposed system for the same patient groups. At 100 patients, the suggested method takes 2.13 seconds; at 200, 2.74 seconds; at 300, 3.46 seconds; at 400, 4.28 seconds; and at 500, 4.81 seconds.

Table 5Results of Performance measure Delay for various Patient Groups with the Proposed System and Non-Blockchain based Traditional System

Performance Measure Delay (seconds)

Patient Groups	100	200	300	400	500
Proposed System	2.13	2.74	3.46	4.28	4.81
Non-Blockchain Traditional Systems	2.98	4.53	3.92	5.16	4.74

Table 5 shows the results of the proposed system's delay for different patient groups compared to the existing system that is not based on blockchain technology. With patient groups on the X-axis and time taken on the Y-axis, the resulting delay findings are shown for simple comparison and improved comprehension with the current conventional approach.

CONCLUSION

This paper presents the design and implementation of a patient-centric smart contract system for use in an e-Health scenario. In order to facilitate the automated development of digital health records, the establishment of immutable patient logs, the safe storage of records and information, and the quick access of records and information amongst health care providers, six smart contracts have been developed. Patients will have full access to their electronic health records via their healthcare providers and a comprehensive distributed ledger record of all occurrences thanks to the proposed smart contract system that uses Blockchain as a repository for clinical data. In order to assess the proposed system's performance in terms of Throughput, Transaction Response Time, Delay, and Resource Utilization, a battery of tests was run. The suggested system's findings demonstrate that Blockchain smart contracts may enhance system throughput and performance while reducing network latency and resource consumption.

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TRADITIONAL MARKETING DIGITAL MARKETING

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Traditional Marketing:

Traditional marketing is any form of marketing that uses offline media to reach an audience.

8 Traditional Marketing Methods

- Handouts. A handout is a printed document like a flyer or brochure that can promote a business, event or sale.
- Billboards. You can typically find billboards along highways or major roads. ...
- Direct mail.
- Print Ads.
- Event Marketing.
- Broadcasting.
- Cold calling.
- Product Placement.

What are the 4 phases of Traditional Marketing?

Simply put, this old method of traditional advertising and selling that were utilized in the past days for product marketing.

Four Phases of Traditional Marketing:

Interest, Awareness, Desire, and Decision.

To draw digital marketing vs traditional marketing statistics, it is observed that digital marketing generates 50% more customer engagement than traditional marketing.

On the contrary, traditional marketing is more productive to reach local audiences marketing channels rarely change than using digital marketing. To be precise, digital marketing is the same as traditional marketing or advertising, but with the replacement through social media marketing, digital devices, and other online means.

But the real question is, is digital marketing better than traditional marketing? Let us unravel how digital marketing and traditional marketing differ in the aspect of advancement, benefits, factors, and differences in the marketing process.

What is Digital Marketing?

Digital Marketing (information driving-advertising) is a modern marketing technique for the selling or advertising of products and services using digital technologies. In addition, the use of digital devices and other virtual mediums.

The customers have flexibility over ad options and are a two-way communication that serves better customer support. In the digital age of business, this advertising or Marketing through digital means of social platforms like Google, Facebook, Instagram, LinkedIn, YouTube, etc.

Perhaps, a strong type of marketing strategy with the benefit that can be monitored, tracked, and measured with the type of marketing that involves promoting, and selling products and services via online marketing.

Fours Phases of Digital Marketing:

Planning, Conversation, Content, and Execution are the four phases of Digital Marketing.

Digital marketing keeps evolving with the new trends and technology coming up. The digital marketing strategy requires the use of the internet and devices.

In comparison to traditional marketing that has been in long practice, the method and the future of digital marketing have a strong impact and quick solutions.

The common digital marketing methods are of 8 types:

- Affiliate Marketing
- Content Marketing
- Email Marketing
- Mobile Marketing
- Marketing Analytics
- Pay-per-Click
- Search Engine Optimization
- Social Media Marketing, Sponsor Pages, Google Ad, Youtube ad etc.

Traditional Marketing vs Digital Marketing - Main Advantages

With Traditional Marketing:

- Local Reach.
- Face to Face Communication Building Longer Brand Impression.
- Sustainable Measures.
- Less Potential Risk.
- Stability and Security of the Brand.
- For small Business Model it is very suitable.

With Digital Marketing:

- Global Reach
- Reduce Costs
- Measurable Outcome
- Personalization
- Social Currency
- Better Conversion Costs
- Transparency
- Higher Revenue Organizations we can reach and approach for Business.

Traditional Marketing Channels:

- Phone Calls
- Face-to-Face Meetings
- Direct Mail
- Print Advertisements
- Speaking Engagements
- Networking
- Email Marketing

Advanced Methods of Digital Marketing:

1. Guest Posting - Blogging Top Tools for Guest Blogging:

- BuzzStream
- Respona
- JustReachOut
- BuzzSumo
- Clearscope

- RocketReach
- Ahrefs
- SEMRush
- SimilarWeb
- HubSpot CRM
- Personalization
- Retargeting
- Pubilic Relations Efforts
- Targeted Advertisements

2. Personalization / Customization as per our Client's requirements.

3. Retargeting Ads

Think of retargeting ads as that friend who is always encouraging you to spend and "live a little." In the marketing world, it's the process of re-engaging consumers who have interacted with your brand to lead them further down the sales funnel.

4. Public Relations Efforts

Public Relations (PR) is all about maintaining a favorable image with the public (your audience). The ROI from having a PR team may be harder to measure when things are positive, but it becomes clearer in times of crisis.

Customers rely on a variety of factors to determine if they will engage with a brand. According to a 2019 report from Synup, 83% of consumers find reviews and ratings critical when choosing a retail store. Respondents also reported that they trust word-of-mouth recommendations most, over social media recommendations and website content.

With this in mind, maintaining a positive public image will continue to be a top priority for businesses.

5. Targeted Advertising

Even with growing concerns surrounding data privacy, studies suggest that consumers still want targeted advertising. Most Gen Xers and Millennials expect a personalized offer when interacting with brands. One study by SmarterHQ reported that 72% of consumers will only engage with brands whose marketing messages are tailored to consumers' interests.

However, there is an important balance to strike between personalization and privacy. According to the study, consumers find push notifications to be an intrusion, 74% more than other channels. They prefer personalization as it relates to products, such as recommendations, reminders, and offers.

2. Search Targets Strategy Development

SERP stands for Search Engine Results Page. A SERP is the web page you see when you search for something on Google. Each SERP is unique, even for the same keywords, because search engines are customized for each user. A SERP typically contains organic and paid results, but nowadays it also has featured snippets, images, videos, and location-specific results.

As a marketer, it's essential to stay up-to-date with new SERP features. Ranking #1 organically doesn't provide as much visibility as it used to, so it's imperative for marketers to take full advantage of Google SERP tools to learn how they can rank higher.

There's a marketing joke that goes something like this: "Where's the best place to hide a dead body? Page two of Google." Nowadays, a good place to hide a dead body is actually anywhere below these SERP features. Here's how you can keep up.

SERP FEATURES

1. Rich Snippets
2. Paid Results

3. Universal Results
4. Local SERP
5. Vertical Search
6. Knowledge Graph data
7. Miscellaneous

1. Rich Snippets:

A rich snippet contains more information than a normal snippet does, including pictures, reviews, or customer ratings. You can recognize a rich snippet as any organic search result that provides more information than the title of the page, the URL, and the meta description. Site operators can add structured data markup to their HTML to help search engines understand their website and optimize for a rich snippet. The Starbucks app, for example, includes customer ratings and pricing within the search description.

2. Paid Results:

Paid results are the ads and sponsored posts that appear at the very top of the SERP. Google differentiates paid from organic by providing a sponsored or ad label, as you can see below, or by boxing it off in a separate area of the page or using another visual cue.

3. Universal Results:

Universal results are Google's method of incorporating results from its other vertical columns, like Google Images and Google News, into the search results. A common example of universal results are Google's featured snippets, which deliver an answer in a box at the top of the page, so users ideally don't have to click into any organic results. Image results and news results are other examples.

4.Local SERP:

Local SERPs appear any time your search intent implicitly relates to location. For example, if you type in "restaurants", "gas station", or the name of a specific product sold in stores,

Google will surface locations near you that match your query, and show you exactly where you can find them on a map.

5. Vertical Search:

Vertical search is the box that appears at the top of the page when your search requires Google to pull from other categories, like images, news, or video. Typically, vertical search relates to topical searches like geographical regions -- for example, when you search "Columbia, South Carolina," Google delivers a "Things to do in Columbia" box, along with a "Columbia in the News" box.

6. Knowledge Graph data:

When your search likely only has one answer -- "what's the weather", for example, or "who is married to Channing Tatum" -- Google will surface a Knowledge Graph: a box that pulls the answer to your query directly from an organic result and into a box at the top of the page.

Google SERP Tools Now that you have a sense of the different SERP features, you're probably wondering how you can rank higher in SERP … and, ideally, how you can capture a feature like local SERP or universal results. Here are some of our favorite tools to help you evaluate your current standing in SERP, compare keyword ranking to competitors, and ultimately figure out how to rank higher:

1. WhatsMySerp

WhatsMySerp provides advanced SEO tools to scan and analyze your rankings for different keywords, as well as your overall website ranking on SERP. This tool allows you to search for up to 25 keywords at once, making it ideal for a quick-and-dirty overview of how your site is ranking in search engines.

Price: Free

2. RankWatch

RankWatch provides an in-depth analysis of your URLs, backlinks, keywords, and other SEO elements. The tool also conducts comparative analysis on your competitor's websites and the number of keywords they are ranking for, so you can strategize how to outrank other businesses in search results.

Price: $29/month

3. MozPro

It's good to know how you rank both nationally and locally for keywords, but it's undoubtedly more helpful to get actionable data and insights on how to improve. Moz Pro offers strategic advice on ranking higher, a major benefit to the tool. It also crawls your own site code to find technical issues, which will help search engines understand your site and help you rank higher. Price: $99/month

4. SerpBook

If you're an SEO expert in charge of handling clients' rankings, SerpBook is a useful organizational tool for assigning groups of keywords to individual clients, scheduling which reports you want sent to which clients, and enabling clients to log into your account and check their ratings.

Price: $30/month

5. Moz Local

With 61% of local searches resulting in a purchase, it's important to ensure your business is optimized for local SEO. Moz Local scours 15 sources, including Google and Facebook, to check out how your business ranks locally. Similar to Moz Pro, Moz Local offers actionable advice for fixing incomplete or inconsistent listings.

Price: Free

6. SemRush

SemRush helps you compete for SERP features including featured snippets, local SEO, Knowledge Graph data, and Google News by figuring out which keywords your competitors are ranking for within these SERP features.

Price: $99.95/month

7. SerpWatcher

SerpWatcher is an easy all-in-one dashboard that delivers an overview of your SERP performance. Even better, you can create a list of custom keywords and track data on those alone, so you're not overwhelmed by data you're not interested in. SerpWatcher handily emails you whenever your keywords enter or leave page one of search engines.

Price: $29.90/month.

Making Vertical Search Visible

Sadly, many people are unaware of the vertical search resources that are out there. Indeed, Google has long put links to its vertical search services above the search box on its home page. First they were in the form of "tabs," then later as regular links that currently promote that you can vertically search for images, or video, or news, or maps or in many more specialized areas.

To really understand all the vertical searches Google itself runs, consider this list:

1. Blog Search
2. Book Search
3. Catalogs
4. Code Search
5. Directory
6. Finance
7. Images
8. Local/Maps
9. News

10. Patent Search
11. Product Search
12. Scholar
13. Video
14. Web Search

Purpose of Business is Earning Revenue in $$$$$$$$$$..!

In today's World the purpose of any Business is to bring highest revenue through Products, Services, IT and Non IT services to the overwhelming Customers who are having potenetial to pay our Business.

To serve Global Clients, Traditional Marekting methods are almost outdated. To reach global Clients and earn more Business, Clients, Customers are preferring to do Digital Marketing.

Digital Marketing Objectives:

- Through Digital Marketing, Calling, Advertising, Emailing and all methods of Digital Marketing the first Objective is to get the Contact Details and Leads from Clients.
- Then approach the Clients and take it to next level.
- Final goal is to sell the Products Globally.
- Finally, Company's want to sell the IT and Non IT Services Globally.
- Research about Potentional Clients, Contacts and Pitch in to them.
- Lead Generation about Client Contacts is the key role in Digital Marketing process where we fetch data about the targeted Organizations.
- Showcase your Products, Services to Global Customers.
- Attract Customers through Digital Marketing Strategies to buy Companies Services.
- Visit Customer Sites for final decision making meetings.

Digital Marketing Key Results:

- In today's Information Technology World every Company wants to get business from Multinational Companies and to do that Digital Marketing is the Key to Success.
- Key Result of Digital Marketing is to find Lead Contacts from Client's who are having potential business.
- Approaching that Contacts through different methods and represent our Company's Capabilities, Experience, Revenue, Compatibility, Past Performance and get the business.
- Nowadays Digital Marketing also includes Registration to Multiple Client's Vendor Supplier Portal.
- Now, all Fortune 1000 Companies will not directly work with anyone. If you want to work with Fortune Companies, you should be registered to their Vendor Management System as a Vendor Supplier.
- So, to get new Projects your Company should register to Private, Government, Central, Federal, State, City, County. So that you can get business from them.
- Methods of doing business are totally changed in this Information Technology era.

QUANTUM COMPUTING: A PARADIGM SHIFT IN INFORMATION PROCESSING

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Abstract:

This paper explores the revolutionary field of quantum computing and its potential to transform the landscape of information processing. We delve into the fundamental principles of quantum mechanics that underpin quantum computing, examine recent advancements in quantum hardware and algorithms, and discuss the implications of quantum computing for various applications. Through an analysis of current research trends and challenges, we aim to provide insights into the transformative impact of quantum computing and its future directions.

1. Introduction:

- Overview of the limitations of classical computing and the need for alternative computational paradigms.
- Introduction to quantum computing as a promising approach that leverages quantum mechanics for enhanced computational power.
- Objectives and organization of the paper.

2. Fundamentals of Quantum Computing:

- Explanation of key concepts in quantum mechanics relevant to quantum computing, including superposition, entanglement, and quantum interference.
- Introduction to qubits and their unique properties, such as coherence and superposition.
- Overview of quantum gates and quantum circuits as the basic building blocks of quantum algorithms.

3. Quantum Algorithms and Applications:

- Survey of notable quantum algorithms, such as Shor's algorithm for integer factorization and Grover's algorithm for unstructured search.
- Discussion of potential applications of quantum computing across various domains, including cryptography, optimization, and simulation.
- Case studies illustrating the practical utility of quantum algorithms in real-world scenarios.

4. Quantum Hardware and Technologies:

- Overview of different approaches to building quantum computers, including superconducting qubits, trapped ions, and photonic qubits.
- Examination of recent advancements in quantum hardware, such as increased qubit coherence and error correction techniques.
- Discussion of challenges in scaling up quantum hardware and achieving fault-tolerant quantum computation.

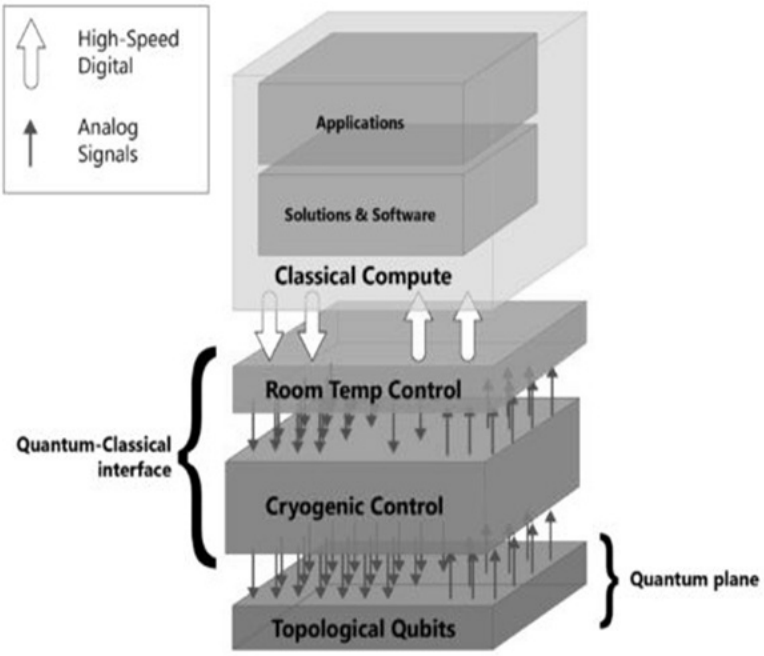
5. Quantum Software and Programming:

- Introduction to quantum programming languages and software development tools, such as Qiskit and Cirq.
- Overview of quantum compilation techniques and optimization strategies for quantum algorithms.

- Case studies demonstrating the design and implementation of quantum algorithms using quantum software frameworks.

6. Challenges and Future Directions:

- Identification of key challenges facing the field of quantum computing, such as decoherence, noise, and algorithm design.
- Discussion of potential future directions and emerging research areas in quantum computing.
- Reflection on the broader implications of quantum computing for science, technology, and society.



7. Conclusion:

- Summary of key findings and insights from the paper.
- Reflection on the transformative potential of quantum computing and its implications for the future of information processing.
- Recommendations for future research and development efforts in quantum computing.

8. References:

- *Citations of relevant literature, research papers, and resources referenced throughout the paper.*
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CLOUD COMPUTING : REVIEW

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ABSTRACT

Cloud means Internet which is used anywhere ,anytime to store , edit or send the files online. Cloud computing is one of the most disruptive technologies now a days. [6] Cloud computing provides applications and services without installation at any computer. This is most efficient computing by centralizing, storage , Memory , processing and Bandwidth cloud computing run on a distributed network using virtualizes resource and accessed by internet protocols.[2] The Cloud Computing Technology act as a mediator between public and private partnership.[7] The biggest reencounter in cloud computing is the security and privacy problems caused by its multi-tenancy nature and the outsourcing of infrastructure, sensitive data and hair-trigger applications.[3] Most of Enterprises are rapidly raising cloud services for that businesses , measures need to be ripened so that organizations can be unpreventable of security in their merchant and can segregate a suitable vendor for their computing need. The services of cloud computing is pay – per – use pattern at any time. Due to benefits with Cloud computing such as efficiency, flexibility, easy set up and overall reduction in IT cost , cloud computing paradigm could raise privacy and confidentiality risks. This technology is maturing rapidly and is being adopted in many applications including government, business, and education.[3]

Introduction

Cloud Computing is the delivery of computing services which provides servers, storage, databases, networking, software, analytics, intelligence, and more, over the Cloud (Internet) which run on a distributed network, using virtualizes resources and accessed by internet protocol[1]. Cloud means Internet which is used anywhere ,anytime to store , edit or send the files online. Cloud computing is one of the most disruptive technologies now a days. Customer pay for the services which is pay – per – use pattern at any time. [5]It is a set of network enabled services that offer scalable, guaranteed typically customized , relatively affordable services in an easy – to – use manner. There is no space required for server and also any hardware and software maintenance. In cloud computing security standard are high due to investment for the providers done for securing the data. The software is updated automatically.

Cloud computing requires internet to store data easily in Google Drive , Dropbox and can be accessed from anywhere in county[6]. For the data there is no need to handle any hardware devices. Data can be accessed if any problem with pc, laptop or any hardware devices occurs. Eg. Of Cloud Computing like Goole Drive, Dropbox, Facebook, Gmail, Picasa, Flickr, Hubspot, Saleforce, Adobe Marketing Cloud , Goole Docs , Amazon Web Services Slide Rocket and IBM Cloud.

Cloud Computing is defined as computing approach in which enormously scalable IT- related capabilities are delivered as service through internet. This is the service which provides hardware and software on customer demand across a network. Cloud Computing are four types namely Private Cloud, Public Cloud, Community Cloud and Hybrid Cloud. The Popular service models are of four type like Platform as a service, Infrastructure as a service, Software as a service and Database as a service.

History

Before emerging cloud computing , there was Client / Server computing which was centralized storage in which all software application , data , controls are resided on the server side.

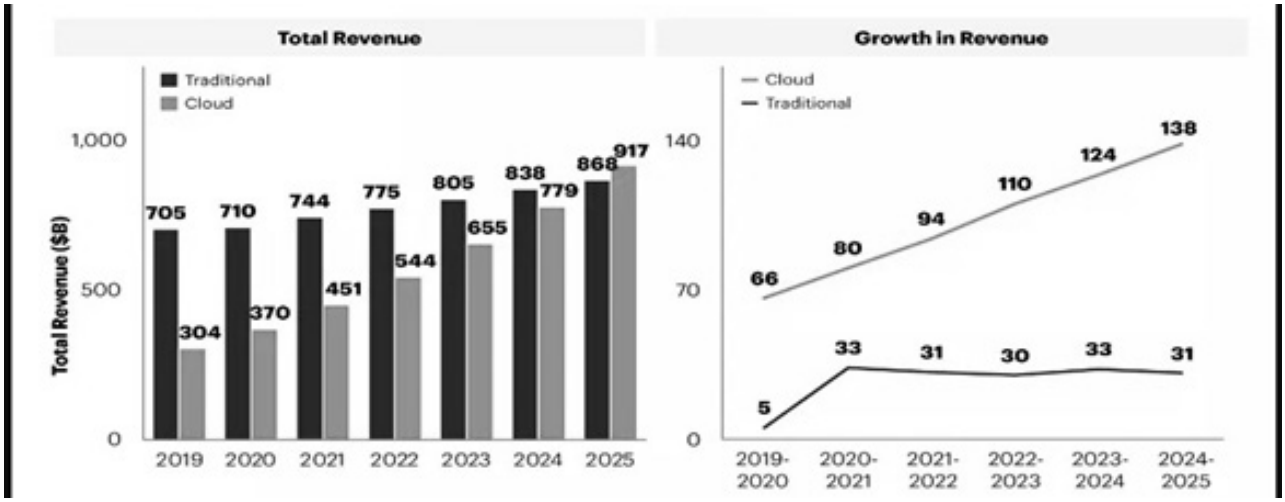
At around 1961, Jhon MaCarthy suggested in a speech at MIT that computing can be sold like a utility. The name Cloud was introduced in telecommunication industry as a virtual private network. There was wastage of Bandwidth using point – point data lines. Network utilization was balanced using virtual private network.[5]

In 1999, saleforce.com started delivering applications to users using a simple website. The application were delivered to enterprises over the internet , and in this way dream of cloud computing came true.[5]

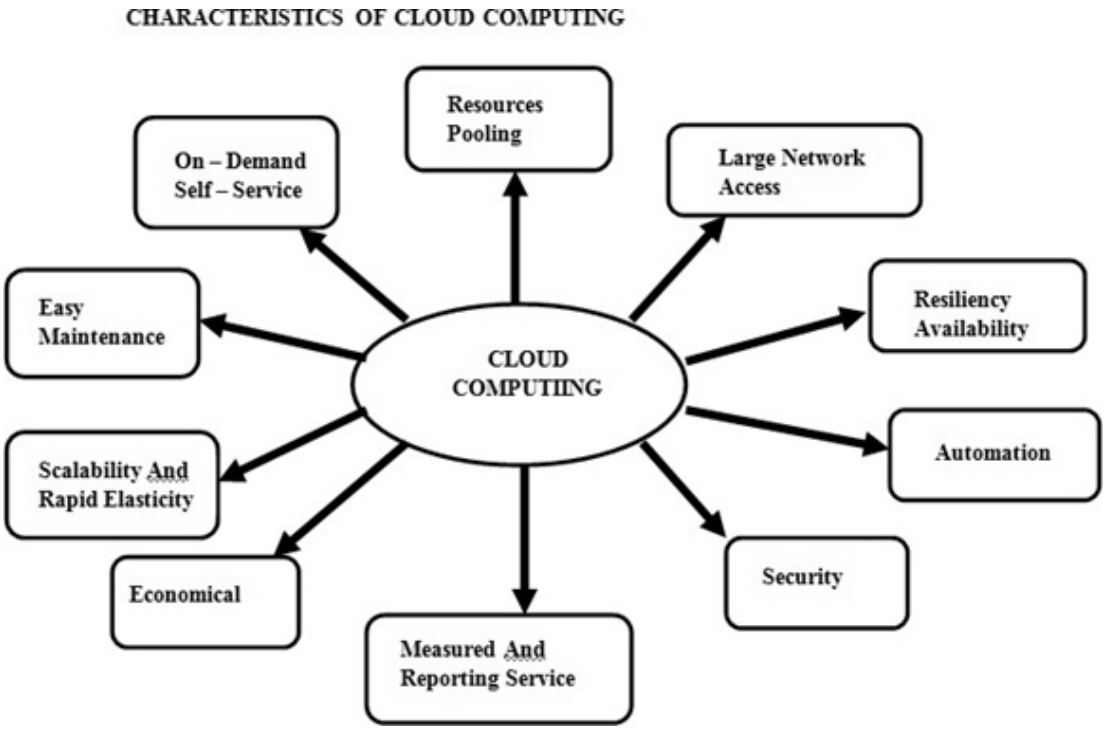
In 2022, Amazon introduced Amazon web services and this has been of great help to their business. [6]

In 2009, Google Apps also started to provide cloud computing enterprise application .[10]

In 2009, Microsoft launched Window Azure , and companies like Oracle and HP have all joined the game. This proves That today, cloud computing has become mainstream.[6]



CHARACTERISTICS OF CLOUD COMPUTING



1. Resources Pooling[14] :

Resources Pooling is one of the most important feature of cloud computing. Resource Pooling means that a cloud service provider provides the different services according to there need among multiple users. It works on multi client strategy. The charging process of allocating resources in real-time does not mismatch with the client's experience.

2. On – Demand Self – Service[14] :

This enables the vendee to continuously monitor server uptime, capabilities and allocated network storage. This is a fundamental full-length of deject computing, and a consumer can moreover tenancy the computing capabilities equal to their needs.

3. Easy Maintenance [14]:

Servers are easily maintained, and time –out or sometime zero. Cloud computing powered resources often undertaken several updates to optimize their capabilities and potential. Updates are increasingly viable with devices and perform faster than previous versions.

4. Scalability And Rapid Elasticity[14] :

One of the most important features and benefits of cloud computing is scalability. Cloud scalability allows you to handle workloads that need a lot of servers but only run for a short period of time. Many customers run workloads that are very cost-effective because of the speed of cloud computing.

5.Economical[14] :

This cloud feature helps to reduce the IT costs of the organization. In the cloud computing, the clients have to pay the administration fees for the space they are using. There is no need to pay any cover-up fees or additional fees. Administration is very cost-effective, and in many cases, some of the space is allocated free of charge.

6. Measured And Reporting Service[14] :

One of the key features of the cloud that makes it the best option for organizations is reporting services. This measurement and reporting service helps both the cloud provider and their customers to track and report on which services have been utilized and for what purpose. This helps in tracking billing and making sure resources are being used efficiently.

7.Security [14]:

Data security is one of the weightier features of cloud computing. Cloud services make a reprinting of the stored data to prevent any kind of data loss. If one server loses data by any chance, the copied version is restored from the other server. This full-length comes in handy when multiple users are working on a particular file in real-time, and one file suddenly gets corrupted.

8.Automation [14]:

Automation is an essential full-length of cloud computing. The worthiness of cloud computing to automatically install, configure and maintain a cloud service is known as automation in cloud computing. In simple words, it is the process of making the most of the technology and minimizing the transmission effort. However, achieving automation in a cloud ecosystem is not that easy. This requires the installation and deployment of virtual machines, servers, and large storage. On successful deployment, these resources moreover require unvarying maintenance.

9.Resilience [14]:

Resilience in cloud computing ways the worthiness of a service to quickly recover from any disruption. The resilience of a cloud is measured by how fast its servers, databases and network systems restart and recover from any loss or damage. Availability is flipside key full-length of cloud computing. Since cloud services can be accessed remotely, there are no geographic restrictions or limits on the use of cloud resources.

10. Large Network Access[14] :

A big part of the cloud's characteristics is its ubiquity. The vendee can wangle cloud data or transfer data to the cloud from any location with a device and internet connection. These capabilities are misogynist everywhere in the organization and are achieved with the help of internet. Cloud providers unhook that large network wangle by monitoring and guaranteeing measurements that reflect how clients wangle cloud resources and data: latency, wangle times, data throughput, and more.

Types of Cloud Computing

Cloud Computing can be categorized with different types of Cloud Computing based on wide categorized are Deployment Model and Server Model.

A) Deployment Model[7]

Development Model is categorized into three type i.e Public Cloud , Private Cloud and Hybrid Cloud.

1) Public Cloud[5],[7]:

The public cloud is a computing service supplied by the third party providers atop the public internet . These services are available for any user who wants to use them and they have to pay only for the services they consumed.

In public cloud, computing resources are managed and operated by the Cloud Service Provider (CSP). The CSP looks after the supporting infrastructure and ensures that the resources are accessible to and scalable for the users.

Example: Amazon elastic compute cloud (EC2), IBM Smart Cloud Enterprise, Microsoft, Google App Engine, Windows Azure Services Platform.

2) Private Cloud[5],[7]:

Private cloud is also known as an internal cloud or corporate cloud .The computing services provided over the internet or private network come under the private cloud and these services are offered only to the selected users in place of common people . A higher security and privacy is delegated by private clouds through the firewall and internal hosting . Cloud Computing can be deployed using Open source tools such as Open stack and Eucalyptus.

Examples: VMware vSphere, OpenStack, Microsoft Azure Stack, Oracle Cloud at Customer, and IBM Cloud Private.

3) Hybrid Cloud[5],[7]: Hybrid cloud is the combination of public cloud and private cloud. In the hybrid cloud, each cloud can be managed independently but data and applications can be shared among the clouds in the hybrid cloud . It is used to create flexible and scalable computing environment . The Public cloud portion allows using cloud services provided by third party providers , accessible over the internet.

Example: Google Application Suite (Gmail, Google Apps, and Google Drive), Office 365 (MS Office on the Web and One Drive), Amazon Web Services.

B) Service Model[8]

Clouds based on service models can be categorized as Iaas , Paas , Saas , Daas

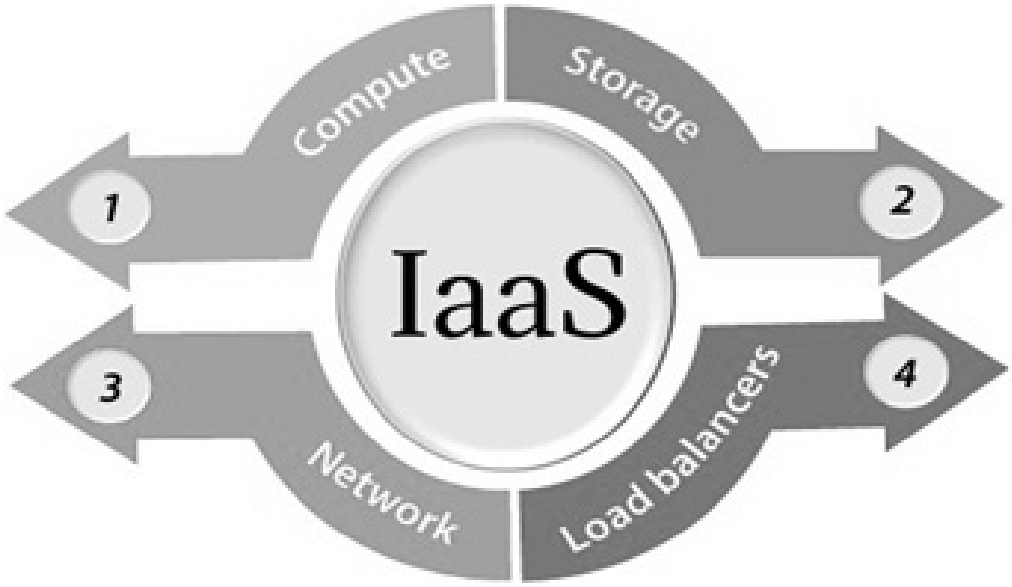
A) Iaas[3],[10]

IaaS stands for Infrastructure as a service and is also known as Hardware as a Service (HaaS). Iaas is a cloud service that provides basic computing infrastructure to managed over the internet. The main advantage of using IaaS is that it helps users to avoid the cost and complexity of purchasing and managing the physical servers. Instead of buying servers, software, data centre space or network equipment, clients instead buy those resources as a fully outsourced service on demand. User can access to infrastructure using virtual machine.

Example: DigitalOcean, Linode, Amazon Web Services (AWS), Microsoft Azure, Google Compute Engine (GCE), Rackspace, and Cisco Metacloud.

IaaS provider provides the following services [13]–

1. Compute: Computing as a Service includes virtual central processing units and virtual main memory for the end- users.
2. Storage: IaaS provider provides back-end storage for storing files.
3. Network: Network as a Service (NaaS) provides networking components such as routers, switches, and bridges for the Vms.
4. Load balancers: It provides load balancing capability at the infrastructure layer.



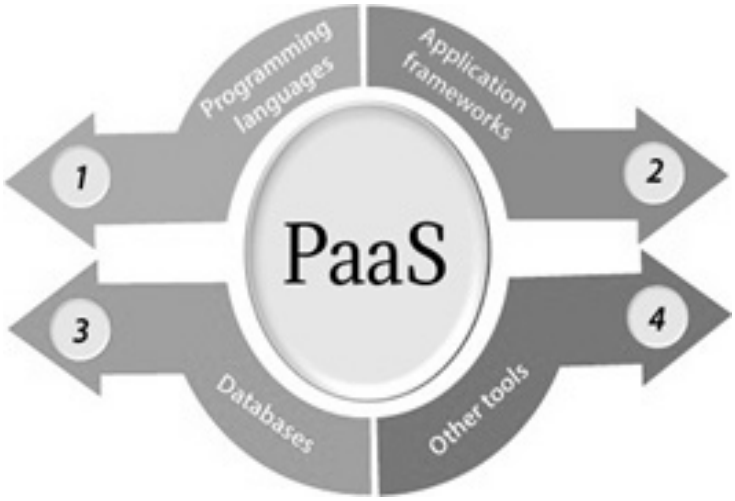
2) Paas[3],[10]

PaaS stands for Platform as a service which is created for the programmer to develop, test, run, and manage the applications. A computing platform that allow the designing of web applications quickly and easily without the complexity of buying and maintaining the software and infrastructure is defined as Platform as a Service. Here the service provided by the company includes basic standards of development and how you can distribute them effectively. Here the environment would contain an OS, a database, an environment where programming language can be executed and a web server.

Example: AWS Elastic Beanstalk, Windows Azure, Heroku, Force.com, Google App Engine, Apache Stratos, Magento Commerce Cloud, and OpenShift.

There are the following services provided by PaaS providers [12]-

1. Programming languages
   PaaS providers provide various programming languages for the developers to develop the applications.
2. Application frameworks
   Paas is used to provide application framework to easily understand the application development.
3. Databases
   PaaS providers provide various databases to communicate with the applications.
4. Other tools
   PaaS providers provide various other tools that are required to develop, test, and deploy the application [12]



3) SaaS[3],[10]

SaaS stands for Software as a Service which is also known as "on-demand software". It is a software in which the applications are hosted by a cloud service provider. Users can access these applications with the help of internet connection and web browser on pay – as – you – go pricing model. All software and hardware are provided and managed by a vendor so you don't have to maintain anything. This minimizes the support and maintenance cost effectively. effectively. Recent reports show that SaaS will soon become common in every organization and it is important that buyers and users of technology understand what SaaS is and where it is suitable

Example: BigCommerce, Google Apps, Salesforce, Dropbox, ZenDesk, Cisco WebEx, ZenDesk, Slack, and GoToMeeting.

There are the following services provided by SaaS providers[11] -

1. Business Services :

SaaS Provider provides various business services to start-up the business.

2. Document Management :

SaaS document management is a software application offered by a third party for creating, managing, and tracking electronic documents.

3. Social Networks :

social networking sites are used by the general public, to convenience and handle the general public's information.

4. Mail Services :

To handle the unpredictable number of users and load on e-mail services, many e-mail providers offering their services using SaaS.

4) DaaS[3],[10]

Desktop as a Service (DaaS) is a cloud computing offering where a service provider distributes virtual desktops to end-users over the Internet, licensed with a per-user subscription. The provider takes care of backend management for small businesses that find their virtual desktop infrastructure to be too expensive or resource-consuming. This management usually includes maintenance, backup, updates, and data storage. Cloud service providers can also handle security and applications for the desktop, or users can manage these service aspects individually.

There are two types of desktops available in DaaS - persistent and non-persistent[6].

- Persistent Desktop: Users can customize and save a desktop from looking the same as each user logs on. Permanent desktops require more storage than non-permanent desktops, making them more expensive.
- Non-persistent desktop: The desktop is erased whenever the user logs out-they're just a way to access shared cloud services. Cloud providers can allow customers to choose from both, allowing workers with specific needs access to a permanent desktop and providing access to temporary or occasional workers through a non- permanent desktop.

Literature

Cloud computing also known as the internet , was first proposed in 1960 to connecting information , data , and people together globally. In 2006, the evolution of cloud computing started with Amazon elastic cloud computing[2]. In 2008, Google introduced rolled out Oracle Cloud Computing[2]. It is focused to increase information technology industry to developing countries. Cloud computing is the delivery of on – demand computing services over the internet on a pay as – you – go basis[2]. To encourage better performance to increase the effectiveness and enhancement of data storage, the increase the storage capacity of online data.

Cloud computing allows small companies to save and distribute data. It gives security from hackers by targeting computer to steal valuable data and damage data store using ransomware.

5G network was launched by internet service provider to increase the quality of services in 2019 with better speed . Furthermore, due to the widespread availability and improvement of smart phones, mobile cloud computing must be managed in terms of supporting apps and processing capacity.

Life Cycle of a Cloud Computing Solution

Understand the requirements of the business and determine what type of application to run on the cloud. Choose a compute service that will provide the right support where you resize the compute capacity in the cloud to run application programs. Choose a storage service where you can backup and archive your data over the internet. Define the network that securely delivers data , videos , application etc, with low latency and high transfer speed. Set up your security which enable service for user authentication or limiting access to a certain set of users on your AWS resources.[10] Can have complete control on tour cloud environment by defining management tools which monitor AWS resources and the customer application running on AWS platform[8]. Verify the process using AWS developer tools where you can build , test and deploy your code quickly. Finally , analyze and visualize data by using analytics services where you can start querying data instantly and get result.[10]

Methodology

According to , the research technique approaches and methods form the research methodology used in collecting information regarding different parts of a problem[9]. The method adopted is descriptive method. Materials for the writing was sourced through Google scholar, Scopus. We came across different views about cloud computing by different authors. Different authors had their own definition of cloud computing. The key thing we discovered about cloud computing is that you pay as you use the service. [9]

Conclusion

In this research ,We had seen how other technology had contributed in the evolution of cloud computing technology which helps to reduce data delay and redundancy.[2] Here we had seen hardware's and impact of new type of distributed software infrastructure's. The differentiate cloud in private , public , hybrid has been seen with various cloud services available in the public .[3] Finally, Any organization that wants to adopt cloud computing should consider there security and privacy.

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GREEN COMPUTING GOOD IMPACT TOWARDS ENVIRONMENT

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Abstract:

Today, the global demand for computing resources continues to increase, the environmental impact of electronic devices has become a critical concern. The electronic devices like computers, laptops, mobile phones etc. are used in very huge amount.Usage of all these lead to the damage of environment. So to reduce the environmental impact of computing technology and develop environment friendly technologies green computing is used.We can also say green computing is sustainable and eco-friendly computing.Energy star rating was introduced for electronic devices to promote the idea of green computing. This research abstract provides a comprehensive review of the current state of green computing, highlighting key technologies, and initiatives aimed at reducing energy consumption, electronic waste, and overall environmental impact.

The primary goal of green computing is to reduce the environmental impact of information technology (IT) and promote sustainability throughout the entire lifecycle of computing devices and services. This encompasses various aspects, including energy efficiency, electronic waste management, and the use of environmentally friendly materials.Present study will help us to know the impact of green computing is very helpful to save environment and what type of technologies IT companies should use to develop sustainable computing.This research paper aims to explore and highlight the positive impacts of green computing on the environment.

Keywords: Green computing, energy star rating, electronic devices, environment, computer technologies.

Introduction:

In recent years, the rapid advancement of technology has brought about unprecedented innovation and convenience. However, this progress has not come without environmental consequences. The ever-increasing demand for computing power and electronic devices has led to concerns about the environmental impact of the information technology (IT) industry. In response to these challenges, the concept of green computing has emerged as a proactive and sustainable approach to mitigate the environmental footprint associated with computing and IT practices.

Green computing, also known as eco-friendly computing or sustainable IT, is a multidisciplinary field that focuses on designing, manufacturing, using, and disposing of computing technologies in an environmentally responsible manner. The primary goal is to minimize the negative impact of IT on the environment by promoting energy efficiency, resource conservation, and the adoption of eco-friendly technologies throughout the lifecycle of computing systems. Green computing supports Reduce, Reuse, Recycle.

The environmental challenges posed by conventional computing practices are manifold. From the massive energy consumption of data centres to the improper disposal of electronic waste (e-waste), the IT industry has contributed significantly to pollution, resource depletion, and climate change. Green computing seeks to address these challenges by integrating environmentally conscious practices into the design, implementation, and operation of computing systems.

Key components of green computing include the development and deployment of energy-efficient hardware, the optimization of data centre operations, adoption of virtualization and cloud computing,

responsible e-waste management, and the promotion of sustainable computing practices within organizations. By embracing these principles, green computing aims to create more sustainable and ecologically friendly IT ecosystem.

The significance of green computing lies in its commitment to reducing the carbon footprint, energy consumption, and resource depletion associated with conventional computing practices.By promoting energy efficiency, sustainable design, and responsible waste management, green computing aligns technological progress with environmental responsibility. From reducing electronic waste to optimizing energy consumption in data centres, green computing represents a collective effort to harmonize technological innovation with ecological well-being.

For energy consumption Bureau of Energy Efficiency (BEE) has developed 5 star rating system for electrical devices that will help recognise an energy-efficient device. This energy star provides a rating to this electronic devices which used to minimizethe badimpact of the electronic devices on environment.Theyare little more expensive than regular ones, but will surelyreduce electricity bill and power consumption and saving more energy than normal.The ratings are in a range of 1 to 5 stars where device energy efficiency an energy star refers to the device energy efficiency, i.e. 1 star is least efficient and 5 stars is the most efficient.1

Objective:

Green computing, with the focus on environmentally responsible practices within the information technology (IT) industry, has a multitude of positive impacts on the environment. Following are several ways in which green computing contributes to environmental well-being:

Energy Efficiency:

Green computing relies on the use of low energy consuming hardware and software, reducing the overall energy consumption of IT infrastructure.

Power management techniques, such as sleep mode and dynamic frequency scaling, help optimize energy use during periods of inactivity.

Renewable Energy Sources:

Adopting green computing practices often involves transitioning towards the use of renewable energy sources, such as solar or wind power, to power data centres and IT facilities.

This shift reduces reliance on non-renewable energy, mitigating the environmental impact associated with fossil fuel consumption.

Reduced Carbon Footprint:

By optimizing energy efficiency and utilizing renewable energy sources, green computing helps lower the carbon footprint of IT operations.

Reduced carbon emissions contribute to mitigating climate change and minimizing the environmental impact of technology.

Resource Conservation:

Green computing promotes responsible resource management, reducing the consumption of raw materials in the manufacturing of IT equipment.

Efforts to extend the lifespan of devices through upgrades and recycling contribute to resource conservation.

E-Waste Reduction:

Implementing proper disposal and recycling programs for electronic waste(e-waste) prevents hazardous materials from entering landfills.

Green computing encourages the reuse of components and materials, minimizing the environmental impact of discarded electronics.

Server Virtualization and Cloud Computing:

Technologies like server virtualization allow multiple virtual servers to run on a single physical

server, reducing the number of physical machines and optimizing resource utilization.

Cloud computing enables resource sharing, reducing the need for individual organizations to maintain and power their data centres.

Sustainable Design and Manufacturing:

Green computing advocates for the use of eco-friendly materials and sustainable design practices in the manufacturing of IT equipment.

Designing products with longevity in mind contributes to a reduction in electronic waste generation.

Corporate Social Responsibility:

Adopting green computing practices aligns with corporate social responsibility(CSR) goals, enhancing an organization's reputation and stakeholder relationships.

It shows a dedication to sustainability and environmental management.

Cost Savings:

Green computing practices often result in cost savings through reduced energy consumption, lower operating expenses, and potential incentives for adopting sustainable technologies.

Public Awareness and Education:

Green computing initiatives contribute to raising public awareness about the environmental impact of IT.

Education on eco-friendly practices fosters a more informed and environmentally conscious society.

Background:

Traditional computing practices are associated with several environmental challenges that have raised concerns about sustainability and the overall ecological impact of the information technology (IT) industry. Here are some key environmental challenges associated with traditional computing practices:

High Energy Consumption:

Data centres, which are critical components of traditional computing infrastructure, consume vast amounts of energy for powering servers, cooling systems, and other equipment. This leads to high energy consumption contributes to increased carbon emissions and places a strain on energy resources, often relying on non-renewable sources.

Electronic Waste (E-Waste) Generation:

Rapid technological advancements and short product lifecycles result in the frequent replacement and disposal of electronic devices, leading to significant e-waste generation.This leads to improper disposal of e-waste poses environmental risks, as electronic components contain hazardous materials that can contaminate soil and water.

Resource Depletion:

The manufacturing of IT equipment requires the extraction and processing of raw materials, contributing to resource depletion. This leads to resource-intensive manufacturing processes contribute to habitat destruction, soil erosion, and other environmental issues associated with resource extraction.

Limited Use of Renewable Energy:

Many traditional data centres and IT facilities rely on electricity generated from non-renewable sources, such as coal or natural gas.This leads to dependence on non-renewable energy sources increases carbon emissions and make worse the environmental impact of IT operations.

Inefficient Hardware Utilization:

Traditional computing setups often involve underutilized hardware, with servers operating at low capacity and inefficient resource allocation.This leads to inefficient hardware utilization and wasted energy and resources, contributing to unnecessary environmental strain.

Heat Dissipation:

The need for cooling systems in data centres to dissipate heat generated by servers and other equipment adds to overall energy consumption.This leads to increased energy use for cooling systems contributes to the environmental footprint of data centres.

Limited End-of-Life Recycling:

Many electronic devices are not properly recycled at the end of their life cycle, leading to landfill disposal or incineration.This leads to inadequate recycling practices result in the loss of valuable materials and contribute to pollution from the breakdown of electronic components.

Lack of Sustainable Design:

Traditional IT products often lack sustainable design features, such as modular components for easy upgrades or eco-friendly materials.This leads to the absence of sustainable design practices leads to increased e-waste and resource consumption during manufacturing.

Global Supply Chain Impact:

The global nature of the IT supply chain involves the transportation of components and products across long distances, contributing to carbon emissions.

This leads to the carbon footprint associated with transportation adds to the overall environmental impact of traditional computing practices.

Addressing these environmental challenges requires a shift towards green computing practices, which focus on energy efficiency, resource conservation, responsible e-waste management, and the adoption of sustainable technologies throughout the IT lifecycle.

Green Computing Strategies and Technologies:

Green computing encompasses a variety of strategies and technologies designed to reduce the environmental impact of information technology (IT) operations. These approaches aim to improve energy efficiency, minimize resource consumption, and promote sustainability throughout the lifecycle of IT systems. The key strategies and technologies contributing to the positive environmental impact of green computing:

Energy-Efficient Hardware:

Strategy: Adopting energy-efficient components, such as processors, memory, and storage devices.

Technology: Manufacturers design and produce hardware with low power consumption and advanced power management features.

Virtualization:

Strategy: Consolidating multiple virtual servers on a single physical server to optimize resource utilization.

Technology: Virtualization software, such as VMware or Hyper-V, enables the creation of virtual instances, reducing the need for physical servers.

Cloud Computing:

Strategy: Outsourcing IT services to cloud providers to support shared resources and on-demand scalability.

Technology: Cloud platforms like Amazon Web Services (AWS), Microsoft Azure, and Google Cloud provide energy-efficient data centers and resource-sharing capabilities.

Power Management Techniques:

Strategy: Implementing power-saving features and techniques to reduce energy consumption during periods of inactivity.

Technology: Advanced power management features in hardware and operating systems, such as sleep mode and dynamic frequency scaling.

Renewable Energy Sources:

Strategy: Transitioning to renewable energy sources, such as solar or wind power, for powering data centers.

Technology: Integration of renewable energy infrastructure, including solar panels and wind turbines, to generate electricity for IT operations.

Green Data Centre Design:

Strategy: Designing and constructing data centers with energy efficiency and sustainability in mind.

Technology: Innovative cooling systems, efficient power distribution, and advanced building designs contribute to green data center initiatives.

Sustainable Manufacturing:

Strategy: Using eco-friendly materials and adopting sustainable practices in the manufacturing of IT equipment.

Technology: Manufacturers employ sustainable design principles, recycled materials, and energy-efficient production processes.

Lifecycle Extension and Upgrades:

Strategy: Extending the lifespan of IT equipment through upgrades and maintenance rather than frequent replacements.

Technology: Designing devices with modular components, making upgrades easier and reducing the need for complete replacements.

Electronic Waste (E-Waste) Management:

Strategy: Implementing responsible e-waste management practices, including proper disposal and recycling programs.

Technology: Recycling facilities equipped to handle electronic components, extracting valuable materials and minimizing environmental impact.

Green Software Development:

Strategy: Developing software with a focus on efficiency, optimized code, and reduced resource requirements.

Technology: Tools and frameworks that enable energy-efficient software development and runtime environments.

Smart Building Technologies:

Strategy: Implementing smart technologies to optimize energy usage in IT facilities and offices.

Technology: Automated lighting, heating, and cooling systems controlled by sensors and smart algorithms for efficient energy management.

Corporate Social Responsibility (CSR) Initiatives:

Strategy: Integrating green computing into CSR programs, aligning IT operations with environmental sustainability.

Technology: Implementation of policies, employee training, and initiatives that promote eco-friendly IT practices.

Regulatory Compliance and Certification:

Strategy: Adhering to government regulations and obtaining certifications for environmentally responsible IT practices.

Technology: Compliance tracking systems and certification processes that validate adherence to green computing standards.

Challenges and Solutions:

While green computing offers numerous benefits for the environment, there are challenges

associated with adopting these practices. Going through these challenges requires to be careful for consideration and strategic planning. Here are some common challenges and potential solutions:

Initial Costs: One of the primary challenges is the perceived high initial costs of implementing green computing technologies and practices. Energy-efficient hardware and renewable energy sources may have higher upfront expenses.

Solution: Companies can focus on the long-term cost savings associated with energy efficiency. Government incentives and subsidies for adopting green technologies can also help offset initial costs. Proper financial planning and considering the total cost of ownership over the lifespan of the technology can demonstrate the economic advantages.

Resistance to Change: Resistance from employees and management can hinder the adoption of green computing practices. People may be resistant to new technologies or may not fully understand the benefits of adopting sustainable IT practices.

Solution: Education and communication are key. Companies should provide comprehensive training programs to educate employees about the benefits of green computing. Clear communication about the positive impact on the environment and potential cost savings can help overcome resistance.

Legacy Systems: Many organizations have legacy systems that are not energy-efficient or environmentally friendly. Replacing or upgrading these systems can be challenging and costly.

Solution: Companies can gradually phase out legacy systems and prioritize the adoption of energy-efficient technologies during regular upgrade cycles. Virtualization and cloud computing can also help extend the lifespan of existing hardware while improving overall efficiency.

Data Security Concerns: Companies may be hesitant to move to cloud computing or implement virtualization due to concerns about data security and privacy.

Solution: Employing robust security measures, encryption protocols, and compliance with industry standards can address data security concerns. Choosing reputable and certified cloud service providers with a strong track record in security can help build trust in the adoption of these technologies.

Lack of Standardization: The lack of standardized metrics for measuring and reporting the environmental impact of IT operations can make it challenging to compare and evaluate the effectiveness of green computing initiatives.

Solution: Industry stakeholders, organizations, and governments can collaborate to establish standardized metrics and certifications for green computing. This can provide clear benchmarks and guidelines for companies looking to adopt sustainable IT practices.

Limited Awareness and Expertise: Lack of awareness and expertise among IT professionals and decision-makers about green computing practices may impede adoption.

Solution: Ongoing training and professional development programs can help build awareness and expertise within the organization. Encouraging certifications related to green IT and sustainability can empower IT professionals to make informed decisions.

Regulatory Challenges: In some regions, there may be a lack of clear regulations or incentives to encourage businesses to adopt green computing practices.

Solution: Advocacy efforts and collaboration with industry associations can help encourage the development of clear regulations and incentives. Engaging with policymakers to promote environmentally friendly practices and seeking out voluntary certification programs can demonstrate commitment to sustainability.

Addressing these challenges make meaningful progress toward adopting green computing practices for the benefit of both their business and the environment.

Global Impact and Policy Implications:

The widespread adoption of green computing on a global scale can have significant and far-reaching positive impacts on the environment, economy, and society. Here are some key areas where the global impact of green computing can be observed:

Environmental Benefits:

Reduced Carbon Footprint: Energy-efficient computing practices, renewable energy sources, and improved infrastructure can lead to a substantial reduction in carbon emissions associated with IT operations.

Conservation of Resources: Green computing promotes responsible resource use, leading to reduced electronic waste and the conservation of raw materials through recycling and sustainable manufacturing practices.

Energy Savings:

Global Energy Consumption Reduction: The adoption of energy-efficient hardware, software, and data centre management practices can contribute to a significant reduction in global energy consumption by the IT sector.

Economic Advantages:

Cost Savings: Green computing practices can lead to lower operational costs for businesses through energy efficiency, resource optimization, and extended equipment lifespan.

Job Creation: The transition to green technologies and the development of sustainable IT practices can create job opportunities in areas such as renewable energy, energy-efficient technology manufacturing, and green infrastructure development.

Technological Innovation:

Stimulated Research and Development: The emphasis on green computing can drive innovation in energy-efficient technologies, sustainable materials, and eco-friendly manufacturing processes, fostering a culture of continuous improvement.

Climate Change Mitigation:

Contributions to Climate Goals: The reduction in energy consumption and greenhouse gas emissions from the IT sector contributes to global efforts to mitigate climate change, aligning with international agreements and goals.

Improved Corporate Social Responsibility (CSR):

Enhanced Corporate Image: Companies that prioritize green computing practices are likely to be viewed more favourably by consumers, investors, and stakeholders, enhancing their corporate image and reputation.

Positive Stakeholder Relationships: Demonstrating a commitment to environmental responsibility through green computing can strengthen relationships with customers, suppliers, and the broader community.

Health and Well-being:

Reduced Environmental Impact: Green computing practices lead to reduced pollution, electronic waste, and exposure to harmful substances, contributing to improved environmental and public health.

Enhanced Quality of Life: Sustainable IT practices can indirectly contribute to a higher quality of life through a healthier environment and the adoption of technologies that enhance well-being.

Educational and Social Impact:

Increased Awareness: Widespread adoption of green computing fosters awareness of environmental issues associated with technology, encouraging individuals and organizations to make informed, sustainable choices.

Education and Advocacy: The global impact includes the potential for educational programs and advocacy efforts to promote green computing practices, influencing behaviour and decision-making on a broader scale.

Conclusion:

Green computing has a positive impact on the environment by promoting energy efficiency, resource conservation, waste reduction, and a shift towards sustainable practices within the IT industry. As

organizations and individuals embrace green computing principles, they play a vital role in creating a more environmentally sustainable and responsible technological landscape.

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GREEN COMPUTING : AN ECO FRIENDLY IT ENVIRONMENT

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Abstract:

Green computing, the study and practice of efficient and eco-friendly computing resources, is now under the attention of not only environmental organizations, but also businesses from other industries in this paper we have traced out certain innovative measures which may be helpful for overcoming the major problems which are emerging due to the immense usage of computing devices. With the pervasive increase of computing, to meet the requirements the energy consumptions are climbing to their peak, beside the clarion call in order to reduce consumption and reverse greenhouse effects, it's becoming a major challenge for the IT leaders to develop and meet with the current expenses related to computing in the present financial crisis. Green computing or green IT, refers to environmentally sustainable computing or IT.

Keywords: Green Computing, Hibernate the computer, VPN, CO2..

I. INTRODUCTION

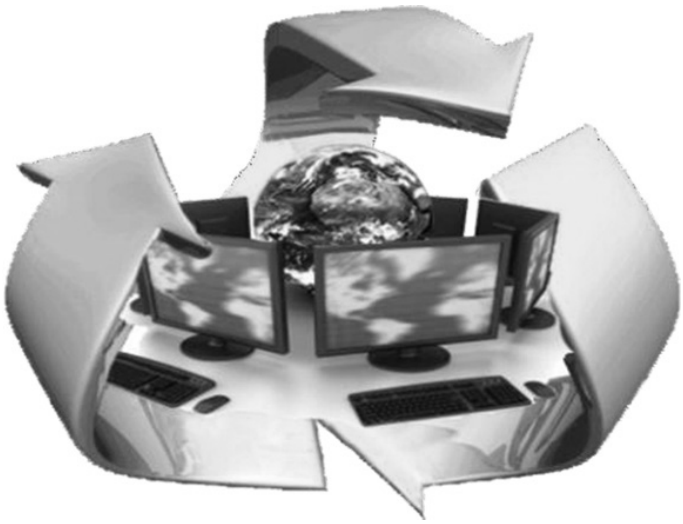


Fig: Green Computing

In recent years, companies in the computer industry have come to realize that going green is in their best interest, both in terms of public relations and reduced costs In the article Harnessing Green IT: Principles and Practices, San Murugesan defines the field of green computing as "the study and practice of designing, manufacturing, using, and disposing of computers, servers, and associated subsystems—such as monitors, printers, storage devices, and networking and communications systems—efficiently and effectively with minimal or no impact on the environment."

Making use of computing resources effectively is termed as Green Computing, during green computing it is observed that with the not only the product life time increases but also helpful in recyclability and bio degradability leading to the reduction of hazardous materials and maximizing the energy efficiency , with lot of positive sides of green computing lot of industries are attracting towards it as it not only saves the energy and money but also helpful to reduce the misuse of the computing resources.

Global warming is one of the principal problems which the world is facing today; it is believed that heating effects in the atmosphere is tremendously increasing due to more production of carbon dioxide and other greenhouse gases, which are ringing danger bells for human life. As the computing devices are mainly used in the industry side, industries depend too heavily with the computing devices in their industrial activities, when the computer dependent industrial needs are not balanced with other computing devices by the computing industries this may even lead to suffering of the global market. During this period when the computing industries were losing control over the usage of computing resources, while searching for new replacements for these problems experts laid path to a new technology termed as Green computing. In order to point out few things, if which when carried out would lead to an Eco friendly IT environment so we carried out a small overview covering all the necessary steps to make computing an eco friendly.

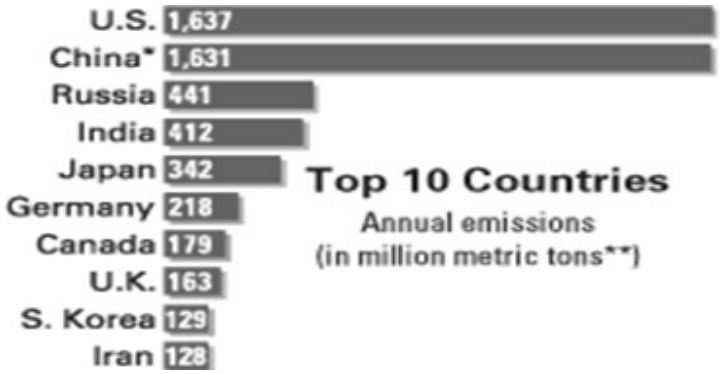
II. HISTORY OF GREEN COMPUTING

U.S Environmental Protection Agency has launched Energy star In 1992, which is an international standard for energy-efficient electronic equipment, climate control equipment and other technologies. Energy Star switches the product into ―sleep mode when not in use for reducing the amount of energy consumed by a product rather than the amount of power used by a product when it is in ― standby mode. At the same time for achieving low magnetic and electrical emissions from CRT-based computer displays raising public awareness on conservation of energy, training, state examinations for energy managers and their energy- conservation campaign.

III. HOW THE COMPUTING DEVICES HARM THE ENVIRONMENT

Without our knowledge every one of us is wasting some or the other form of energy especially when the computing devices are kept in the standby modes this wastage is more during which a lot harmful emission of CO2 is occurring this small amount of emission of harmful gasses are more in number according to the reports collected recently it was observed that 20KWh of energy is wasted in a year due to the devices working in the stand by mode. This kind of emission of CO2 by the devices is considered to be one seventh the percentage of the emission of the same gases from the automobiles.

Following Figure shows top 10 countries annual carbon dioxide emissions:



IV. EFFORTS TO IMPLEMENT GREEN COMPUTING

We do not need to stop using computer system and power to save our environment but we have to make some effective efforts by adapting green technology to promote an eco-friendly computing environment at low cost by reducing power consumption. By adapting following tips we can go green to make our environment healthy:

1. Purchase energy star labeled products: Manufacturing of various electrical and electronics equipment with energy star labeling ensures less power consumption. Therefore we need to use monitors, air conditioners, refrigerators and other technologies with energy star label to go green.

2. Unplug the electronics appliances when not in use: Various experts says that most of the plugged in electronic gadgets uses low amount of electricity, but some other electronics devices like computer systems and television sets consumes a lot of electricity even when they are in standby mode. Therefore we need to unplug various electronics devices when they are not in use to save money and electricity
3. Use flat screen monitors rather than CRT monitors: CRT monitors uses approximate 90-110 watts power whereas LCD or LED monitors uses 35-45 watts power which is very less as compare to CRT monitors. Therefore we need to use flat screen monitors like LCD or LED monitors in the place CRT monitors in order to reduce power consumption.
4. Use soy ink or non-petroleum-based inks for printing: Soy ink is renewable, biodegradable which is prepared from soybean oil which is better than other ink options which are prepared from various hazardous solvents.
5. Purchase eco-friendly printing papers: We have to buy environment friendly printing papers which are prepared from more sustainable materials like organic cotton, bamboo etc.
6. Avoid using screen savers: We have to stop using screen savers for reducing power consumption. Moreover when we use screen saver, it also uses some amount of processor power and memory.
7. E-waste management: Electronic waste is responsible for various harmful effects on our environment as it includes various hazardous substances like mercury, lead, cadmium etc. So we have to stop informal disposing of electronic devices.
8. Recycling: Recycling of waste electronics recovers many valuable substances like aluminum, copper and gold etc. from the waste electronic devices. As a result of this we can control pollution and save our atmosphere.

V.APPROACHES TO GREEN COMPUTING

Cost of energy plays a crucial role in the data center whether they may be related to internal IT operations or IT outsourcing , cooling , equipment operations such as data servers, during the present time focusing is done only on energy costs rather than equipment costs..

Virtualization: Computer virtualization is the process of running two or more logical computer systems on one set of physical hardware. The concept originated with the IBM mainframe operating systems of the 1960s, but was commercialized for x86- compatible computers only in the 1990s..

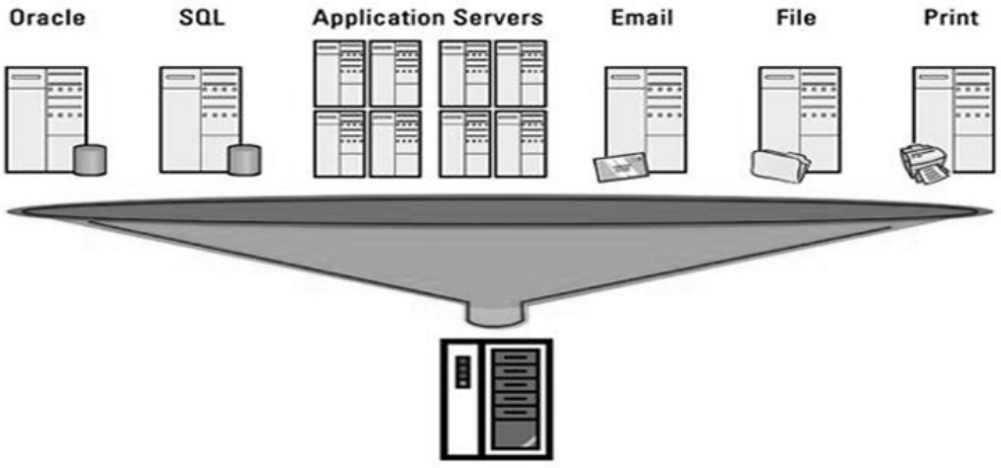


Figure 1. : Virtualization

With virtualization, a system administrator could combine several physical systems into virtual machines on one single, powerful system, thereby unplugging the original hardware and reducing power and cooling consumption. The concept of virtualization with respect to storage, desktop ,server not only increases the energy but also cost effective there by when the desktops are being replaced by the thin client machines it not only reduce the energy but also cost effective similarly other contents

also

Power supply

Computing equipment are not designed with the view of energy efficient, due to which most of the computers utilize more powers even at their normal operations which leads to high electric bills and more vital environment impact. To overcome this 80 plus voluntary certification system is followed by the power supply manufacturers.

Storage Video Card

Cost, performance and capacity are the three available things; these three can be achieved only by paying attention on the concept of manufacturing reduced power

Consumption devices, there by resulting reduced RAM low power idle mode with stable rotation speed which leads to high performance and high possible capacity.

Display

fluorescent bulbs are used in LCD monitors for the display where as an array of LED's are replaced in place of fluorescent bulbs in other display devices , during the sleep mode LCD monitors use less energy when compared to the situation when they are active, compared to CRT's LCD's more power conservative.

IT Equipment Recycling

After using computing equipment for a stipulated period of time they are not needed further, but at the same time they are not bio degradable so they create problems so in order to overcome this the products should be made with such as materials such that after their period of use the raw material of them should be utilized for the future manufacturing of the computing devices so this creates the concept of recycling due to which the hazardous materials such as lead and other which are then utilized for the next product rather than leaving them as it is.

Remote Conferencing & Telecommuting Strategies Regarding the harms of green house gas emission and with the hike of fuel costs most of the companies have reduced their travels in order to cut the cost and decrease the environmental impact these reductions can be carried out by the following activities

- By conducting remote conferencing & collaboration between offices and clients
- Online collaboration environments telecommuting strategy
- Virtual Private Network (VPN) or voice communications which are carried out from everywhere.
- Developing various policies where people are allowed to work for less number of days and which attract the people to work even from home.

Product longevity

By increasing the life time of equipment one can contribute much to green computing this can be achieved by upgrading and modularity of the product these things were suggested by Gartner , so rather than manufacturing of a new PC if components of existing computing devices are manufactured with upgrading then it leads to product longevity.

Algorithmic efficiency

Algorithms also play an vital role in green computing if good algorithmic programs are written then they consume less energy there by reducing the production of CO2 emission, recently during the study by Alex Wissner Gross a physicist at Harvard showed that an average Google search produces 7 grams of CO2 but this was wrongly proven by Google saying that it produces a negligible CO2 release.

Resource allocation

Electric expenses can be reduced with the help of well developed algorithms which lay path for the data to their data centers, it has been proved by various researches that Energy allocation algorithms are very successful in routing traffic; this concept can also be used to avail the effective usage of the

available energy rather than going for the production of the new.

Terminal servers

This concept creates thin clients where 1/8 of the energy of normal work station is used this results in the decrease of energy costs and consumption and also creates virtual labs. Examples of terminal server software include Terminal Services for Windows and the Linux Terminal Server Project (LTSP) for the Linux operating system.

VI.EFFORTS FOR GREEN COMPUTING

One need not stop using computer or even using electricity but some efforts to do environment health. The following actions are required

- Use only Energy Star labeled products
- Turn off the Computing device when not in use Use sleep mode when computing not in use.
- Hibernate the computer (shutting down the system for a short period of time when it is not in use).
- Set a power plan.
- Avoid using screen saver
- Turn down the monitor brightness Use LCD rather than CRT monitors

VII.CONCLUSION

It has been observed that the tremendous mushrooming growth of IT industries is slowly poisoning the environment, which requires an immediate attention. Green computing is a approach that asks how we can satisfy the growing demand for network computing without putting such pressure on the environment. There is an alternative way to design a processor and a system such that we don't increase demands on the environment, but still provide an increased amount of processing capability to customers to satisfy their business needs. Green computing is not about going out and designing biodegradable packaging for products. Now the time has come to think about the efficiently use of computers and the resources which are non-renewable. It opens a new window for the new entrepreneur for harvesting with E-waste material and scrap computers. The greenest computer will not miraculously fall from the sky one day; it'll be the product of years of improvements. The features of a green computer of tomorrow would be like: efficiency, manufacturing & materials, recyclability, service model, self-powering, and other trends. Green computer will be one of the major contributions which will break down the 'digital divide', the electronic gulf that separates the information rich from the information poor. Hope that we have provided a satisfied approach of green computing.

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RESEARCH PAPER ON
A STUDY OF CYBER SECURITY AND ROLE OF SOCIAL MEDIA IN CYBER SECURITY.

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Abstract

In the current world that is run by technology and network connections, it is crucial to know what cyber security is and to be able to use it effectively. Systems, important files, data, and other important virtual things are at risk if there is no security to protect it. With the development of the fresh technology in cyber security, the attackers similarly do not collapse behind. Cyber security is essential because military, government, financial, medical and corporate organizations accumulate,… etc. Cyber security is the practice of defending computers, servers, mobile devices, electronic systems, networks, and data from malicious attacks.

Keywords: cyber security, cyber crime , cyber laws , social media.

1. Introduction

Today Internet is the fastest growing infrastructure in every day life Today man is able to send and receive any form of data may be an e-mail or an audio or video just by the click of a button but did he ever think how securely his data id being transmitted or sent to the other person safely without any leakage of information?? The answer lies in cyber security.

Today more than 60 percent of total commercial transactions are done online, so this field required a high quality of security for transparent and best transactions. Hence cyber security has become a latest issue The fight against cyber crime needs a comprehensive and a safer approach.Every individual must also be trained on this cyber security and save themselves from these increasing cyber crime . Implementing effective cybersecurity measures is particularly challenging today because there are more devices than people, and attackers are

becoming more innovative. A successful computers, networks, programs, or data that one intends to keep safe.

2. OBJECTIVE

The principle target of our paper is to spread the knowledge of the crimes that take place through the internet or the cyberspace and safeguard the people, and search role of social media in cyber security.

3. Cyber Security

We are presently living in a world

where all the information is maintained in a digital or a cyber form. In today's connected world, everyone benefits from advanced cyberdefense programs. In the case of home users, cyber-criminals would continue to target social media sites to steal personal data.

4. Cyber Crime

Social media plays a huge role in cyber security and media plays a huge role in cybersecurity approach has multiple layers of protection spread across the

Incidents	Jan to June 2012	Jan to June 2023
Fraud	2439	249,000
Cyber Crime	65000	9 trillion

Table 1

We cannot define the cyber crime in one definition.

Sussman and Heuston first proposed the term "Cyber Crime" in the year 1995.

We can define "Cyber Crime" as any malefactor or other offences where electronic communications or information where all the information is maintained in a digital or a cyber form.

In simple term we can describe "Cyber Crime" are the offences or crimes that takes place over electronic communications or information systems. Cybercrime encompasses a wide range of criminal activities that are carried out using digital devices and/or networks. These crimes involve the use of technology to commit fraud, identity theft, data breaches,

other Viruses. Usually in common man's language malicious acts. Ccyber crimes includes crimes that have been made possible by computers, such as network intrusions and the dissemination of computer cyber crime may be defined as crime committed using a computer and the internet to steel a person's identity or sell contraband or stalk victims or disrupt operations with malevolent programs.

In the year 2000, The Tenth United Nations Congress on the Prevention of Crime and the Treatment of Offenders placed cyber crimes into five categories: unauthorized access, damage to computer data or programs, sabotage to hinder the functioning of a computer system or network, unauthorized interception of data within a system or network, and computer espionage.

cyber security and should be checked if it has originated from a trusted and a reliable source and that they are not altered. Authenticating of these documents is usually done by the anti virus software present in the devices. Thus a good anti virus software is also essential to protect the devices from viruses.

Cyber laws play a pivotal role in protecting intellectual property rights in the vast digital domain. These laws prevent the unauthorized use and distribution of digital content, encouraging innovation and creativity by safeguarding the fruits of intellectual labor. A cybersecurity attack c a n result in everything from identity theft, to extortion attempts, to the loss of important data like family photos. Everyone relies on critical infrastructure like power plants, use and distribution of digital content, encouraging innovation and creativity by safeguarding the fruits of intellectual labor. Securing these and other organizations is essential to keeping our society functioning.Everyone also benefits from the work of cyberthreat researchers, like the team of 250 threat researchers at Talos, who investigate new and emerging threats and cyber attack strategies. They reveal new vulnerabilities, educate the public on the importance of cybersecurity, and strengthen open source tools. Their work makes the Internet safer for everyone.

Privacy and security of the data will always be top security measures that any organization takes care. We are presently living in a world

6. Cyber Security threats

Phishing

General Assembly of United Nations by a resolution dated 30 January 1997"

7.2 Indian Penal Code (IPC) (1980): This cybercrime prevention act has primary relevance to cyber frauds concerning of the Indian Parliament (no 21 of 2000), it was notified on 17th October 2000. It is the most important law in India that deals with the

5. Cyber Security

In today's connected world, everyone benefits from advanced cyberdefense programs. At an

gain unauthorized access or to cause damage to a computer.

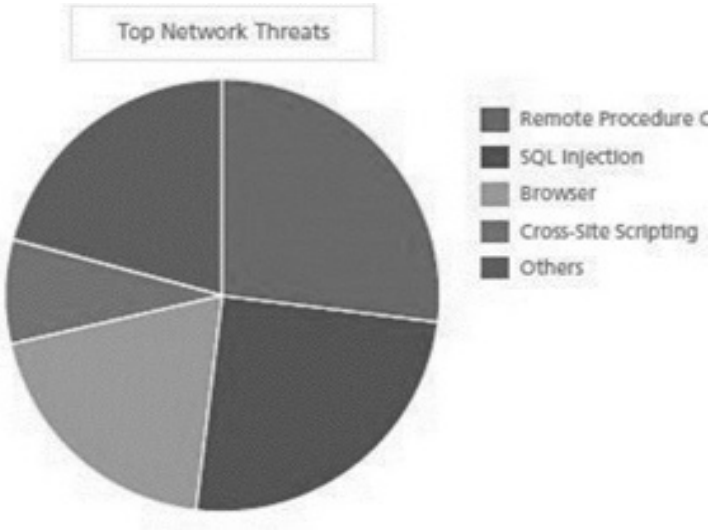
Phishing is the practice of sending fraudulent emails that resemble emails from reputable sources. The aim is to steal sensitive data like credit card numbers and login information. It's the most common type of cyber attack. You can help protect yourself through education or a technology solution that filters malicious emails.

6.2 Social engineering

Social engineering is a tactic that adversaries use to trick you into revealing sensitive information. They can solicit a monetary payment or gain access to your confidential data. Social engineering can be combined with any of the threats listed above to make you more likely to click on links, download malware, or trust a malicious source.

4.3 Malware

Malware is a type of software designed to must find new ways to protect personal information.



7. Cyber Laws

The Information Technology Act of India, (2000): According to Wikipedia "The

Information Technology Act, 2000 (also known as ITA-2000, or the IT Act) is an act digital crimes or cyber crimes and electronic commerce. It is based on the United Nations Model Law on Electronic Commerce 1996 (UNCITRAL Model) recommended by the identity theft and other sensitive information theft.

Companies Act (2013): With the companies act enacted back in 2013, the legislature ensured that all the regulatory compliances are covered, including e- discovery, cyber forensics, and cybersecurity diligence. The Companies Act provides guidelines for the responsibilities of the company directors and leaders concerning confirming cybersecurity obligations.

NIST Compliance: The Cybersecurity Framework (NCFS), authorized by the National Institute of Standards and Technology (NIST), contains all the guidelines, standards, and best practices necessary to responsibly address cybersecurity risks.

8. ROLE OF SOCIAL MEDIA IN CYBER SECURITY

As we become more social in an increasingly connected world, companies must find new

ways to protect personal information. Social media plays a huge role in cyber security and should be checked if it has originated from a trusted and a reliable source and that they are not altered. Authenticating of these documents is usually done by the anti virus software present in the devices. Thus a good anti virus software is also essential to protect the devices from viruses.

Malware scanners

This is software that usually scans all the files and documents present in the system for malicious code or harmful

viruses. Viruses, worms, and Trojan horses are examples of malicious software that are often grouped together and referred to as malware.

Firewalls

A firewall is a software program or piece of hardware that helps screen out hackers, viruses, and

worms that try to reach your computer over the Internet. All messages entering or leaving the internet pass through the firewall present, which examines each message and blocks those that do not meet the specified security criteria. Hence firewalls play an important role in detecting the malware.

Anti-virus software

program to download profiles of new viruses so that it can check for the new viruses as soon as they are discovered. An anti virus software is a must and basic necessity for every system.

Antivirus software is a computer program that etects, prevents, and takes action to disarm or remove malicious software programs, such as viruses and worms. Most antivirus programs include an auto- update feature that enables the

9. Conclusion

Computer security is a vast topic that is becoming more important because the world is becoming highly interconnected, with networks being used to carry out critical transactions. Cybercrime has become great threats to mankind. Protection against cybercrime is a vital part for social, cultural and security aspect of a country.There is no perfect solution for cyber crimes but we should try our level best to minimize them in order to have a safe and secure future. My main purpose of writing this paper is to spread the content of cyber crime among the common people. At the end of this paper "A brief study on Cyber

Crime and role of social media in cyber security is acknowledged.

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CYBER SECURITY

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Abstract

Cyber Security is working on electronic devices like Mobile, Electronic Systems, Computers, Servers and Networks etc. Security is the protecting shield of malicious attacks which will corrupt or damage of your data. It will protect against unauthorized access or attacker on your system. Cyber Security is related to cybercrimes which occurs when group of activities perform by people by causing network disruption, stealing private and confidential data.

Keywords- Cyber Security, Threats, Risk & Detection, Merging Technologies

INTRODUCTION

This article aims to domain of cyber security. exploring, its principles, challenges and innovative of solutions in new daily updated technologies. Cyber-attacks come in various forms, ransom ware and phishing attacks. This attacks are not only disrupting critical services and infrastructure but also in digital systems of our interconnected society. Moreover, such technologies are relating like Artificial Intelligence (AI), internet of things (IOT), Block Chain has introduced new dimensions to cyber security.

I. UNDERSTANDING CYBER THREATS

Cyber threats are malicious activities and techniques are exploiting in digital systems and networks. Understanding of various types of cyber threats is developing in cyber security strategies. Some of them are as follows:

1. Malware: Malicious Software, developed by Cyber Criminals (Hacker's). Stealing information and corrupt or damage confidential data.
2. Phishing: It is an technique working on Web site to acquire like Bank accounting related confidential numbers through website or fraud emails, and messages.
3. Denial Of Service (DoS) and Distributed Daniel OF Service (DDoS): DoS and DDoS are working on disrupt functioning of a websites, servers and networks. These attacks are work while load traffic on server inaccessible to users. Cause loss of financial and down the loading time.
4. Insider Threat's: its working on involving malicious actions such as used within that organization known person who misuse of their access to their organization network and data.

Fig. Ref image On site - https://www.linkedin.com/pulse/importance-cybersecurity-business-team lease digital

II. RISK DETECTION AND CHALLENGES

Cyber Security Faces lots of challenges and risks while connecting with Today's digital Network world. To understanding these Cyber Risks and challenges while developing strategies to protect against cyber crime threats. Some of them:

• Cyber Threats :

cyber threats like malware, ransom ware, phishing attacks, and advance persistent Threats (APT's) these threats can target organizations and critical infrastructure.

• Data Losses :

Data losses of sensitive information, such as personal data, financial records to unauthorized access to do it fraud and damage their sensitive data information.

• Complex It Environments :

The Increasing IT environments, including hybrid deployments of cloud, Internet Of Things(IOT) devices, and mobile endpoints and complicates cyber security efforts.

III. MERGING TECHNOLOGIES WITH CYBER SECURITY

• Artificial Intelligence (AI) and Machine Learning (ML)

AI and ML technologies are revolutionary cyber security by enabling threat detection, behavior analysis. ML algorithm can adopt and real-time cyber threats and response capability.

• Block chain Technology

Block chain technology offers and system enhance data and transparency. In cyber security block chain can be securely identify management and secure data exchange.

• Internet Of Things (IoT)

The IoT devices introduce new cyber security challenges due to their interconnected process and limited features of security.

Technologies such as a device authentication, booting systems, encrypt communication protocols are essential for security purpose. IoT Security must use for accessing devices and less risk management processes.

• Cloud Security

Cloud computing provides more scalability, flexibility, and cost efficiency. Its introduce uniquely secured challenges like data privacy and sharing responsibility. Cloud native security monitoring to protect cloud- based assets and data. DevSecOps practices to integrate security in deployment lifecycle.

• Biometric Authentication

Biometric recognition like authentication such as fingerprint recognition, face detection, iris scanning are some of based on it. Its working in MFA Multi Factor Authentication combine biometric with authentication factors.

• Security Automation

Security automation working on automated create and task performs its schedule wise working of its tasks and threat hunting activities. Automatic threats detects and response automatically handle of that detected threats and reduce its response time to find and resolve that response.

IV. CASE STUDIES AND PRACTICAL APPLICATIONS

1. THE WANNA CRY RANSOMWARE ATTACK (2017):

The Wanna Cry ransom ware attack targeted hundreds of thousands of computers worldwide, encrypting data and demanding ransom payments in Bitcoin.

Organizations affected by Wanna Cry, including healthcare institutions and government agencies, faced significant disruptions and financial losses.

The attack underscored the importance of patch management, regular software updates, and robust backup and recovery strategies in mitigating the impact of ransom ware attacks.

2. Equifax Data Breach (2017):

The Equifax data breach exposed the personal information of over 147 million consumers, including names, Social Security numbers, birth dates, and credit card numbers.

The breach was attributed to a vulnerability in the Apache Struts web application framework, which was exploited by cyber attackers to gain unauthorized access to sensitive data.

The incident highlighted the importance of vulnerability management, intrusion detection, and incident response capabilities in detecting and responding to data breaches.

3. Stuxnet Cyber Weapon (2010):

Stuxnet was a sophisticated cyber weapon designed to target Iran's nuclear program by sabotaging centrifuges used for uranium enrichment.

The Stuxnet malware exploited multiple zero-day vulnerabilities and utilized advanced techniques to evade detection and propagate within targeted systems.

The incident raised concerns about the use of cyber weapons for offensive purposes and highlighted the need for enhanced cybersecurity measures to defend against state-sponsored cyber-attacks.

4. NotPetya Cyber Attack (2017):

The NotPetya cyber-attack targeted organizations globally, encrypting data and disrupting critical infrastructure, including transportation, healthcare, and finance sectors.

The attack exploited a vulnerability in the Windows operating system and spread rapidly through infected networks, causing widespread chaos and financial losses.

The incident emphasized the importance of network segmentation, data backups, and incident response planning in mitigating the impact of large-scale cyber-attacks.

5. Sony Pictures Cyber Attack (2014):

The Sony Pictures cyber-attack involved the theft and release of sensitive corporate data, including internal emails, employee records, and unreleased films.

The attack was attributed to a group of hackers linked to North Korea, who targeted Sony Pictures in retaliation for the production of a controversial film.

The incident highlighted the need for robust perimeter defenses, employee training, and incident response capabilities to defend against targeted cyber-attacks and insider threats.

6. Target Data Breach (2013):

The Target data breach compromised the credit and debit card information of over 40 million customers, resulting in financial fraud and reputational damage to the retail giant.

The breach was facilitated by malware installed on point-of-sale (POS) systems, which allowed cyber criminals to steal payment card data during transactions.

The incident underscored the importance of secure payment processing, network segmentation, and continuous monitoring to detect and respond to cyber threats in real time.

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Ref Img From: - Equifax Data Breach Ref.ImageFromGoogle. https://sevenpillarsinstitute.org/case-study-equifax-data-breach/

Wanna Cry Ransomware Attack Live Image from google

Ref Image from: https://en.wikipedia.org/wiki/WannaCry_ransomware_attack

V. FUTURE DIRECTIONS

1. AI and Machine Learning in Security: AI and machine learning are increasingly being integrated into cyber security systems to identify and respond to threats more effectively. These technologies can analyze large volumes of data to detect patterns and anomalies indicative of cyber attacks.

2. Zero Trust Architecture: The Zero Trust model assumes that threats may exist both inside and outside the network. It requires strict identity verification for anyone trying to access resources on the network, regardless of whether they are inside or outside the organization's perimeter.

3. Cloud Security: As more organizations move their data and services to the cloud, securing cloud environments becomes critical. Cloud security encompasses measures to protect data, applications, and infrastructure hosted in cloud environments from unauthorized access, data breaches, and other threats.

4. IoT Security: With the proliferation of Internet of Things (IoT) devices, securing these connected devices and the data they generate is becoming increasingly important. IoT security involves

implementing measures to protect IoT devices, networks, and data from cyber threats.

5. DevSecOps: DevSecOps integrates security practices into the DevOps process, ensuring that security is built into software development and deployment pipelines from the outset. This approach helps identify and mitigate security vulnerabilities early in the development lifecycle.

6. Quantum Cryptography: As quantum computing technologies advance, traditional cryptographic algorithms may become vulnerable to attacks. Quantum cryptography offers a potential solution by leveraging the principles of quantum mechanics to secure communications and data against quantum attacks.

7. Biometric Security: Biometric authentication methods, such as fingerprint scanning, facial recognition, and iris scanning, are increasingly being used to enhance security and improve user authentication processes.

8. Supply Chain Security: With the increasing complexity of supply chains, securing the software and hardware components sourced from third-party vendors is essential to prevent supply chain attacks and ensure the integrity of products and services.

9. Cyber security Regulations and Compliance: Governments and regulatory bodies are implementing stricter cyber security regulations to protect consumer data and ensure the resilience of critical infrastructure. Compliance with these regulations is becoming a top priority for organizations across various industries.

10. Cyber security Awareness and Training: Human error remains one of the leading causes of cyber security breaches. Investing in cyber security awareness training programs can help educate employees and end-users about cyber security best practices and mitigate the risk of social engineering attacks.

VI. CONCLUSION

In conclusion, cybersecurity is an essential component of our digital world, encompassing a wide range of technologies, practices, and strategies aimed at protecting digital assets, data, and privacy from cyber threats. As technology evolves and becomes more intertwined with our daily lives and critical infrastructure, the importance of cybersecurity continues to grow. Effective cybersecurity requires a multi- faceted approach that includes implementing robust technical controls, employing security best practices, fostering a culture of cybersecurity awareness, and complying with relevant regulations and standards.

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CYBERBULLYING UNVEILED: GLOBAL PATTERNS, INDIAN PERSPECTIVES, AND LEGAL SAFEGUARDS

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Abstract

This article explores the pervasive issue of cyberbullying, particularly in the context of India's dynamic digital landscape. With the exponential growth of internet users, including children and adolescents, the challenges of online child exploitation have risen significantly. The article delves into various types of cyberbullying, its global prevalence, and the alarming statistics related to its impact on youth. Focusing on India, where cyberbullying rates are notably high, the article highlights the urgent need for education, awareness, and legal measures to combat this growing menace. It examines existing legal provisions related to cyberbullying in India while emphasizing the necessity for collaborative efforts among schools, parents, social media platforms, and the government to create a safer online environment for children.

Introduction

With millions of people adding every year, today, India has one of the highest number of internet users, more than the total population of many countries in the world. In rural India nearly half of the population have access to digital services despite connectivity boom has happened in the last decade that has impacted the life of even rural populations significantly. With it, especially for children and adolescents who contribute a significant number of users, came new challenges of online child exploitation. There has been a noticeable rise in cyberbullying in India since the Covid-19 epidemic. Cyberbullying has increased by many folds in India with the swift adaption on the digital technology and emergence of digital communication platforms, particularly with the expansion of online learning, remote working, and social media usage. People had to stay indoors and extensively rely on digital communication networks during the lockdown measures followed after the onset of the pandemic.

Statement of Problem:

The escalating prevalence of cyberbullying, accentuated by the rapid expansion of internet users in India, poses a significant threat to the well-being of children and adolescents. Despite the exponential growth of digital connectivity, there exists a critical gap in understanding, awareness, and effective countermeasures to combat the various forms of cyberbullying. This article aims to address the pressing issue by examining the types of cyberbullying, its global impact, and the specific challenges faced in India, where rates are alarmingly high. The lack of comprehensive education, awareness programs, and legal provisions exacerbates the problem, necessitating urgent attention and collaborative efforts to create a safer online environment for the youth.

Objectives of the study

1. To assess the prevalence and types of Cyberbullying
2. To examine the statistics of Cyberbullying on global and national level.
3. Evaluate the effectiveness of current legal provisions and mitigation strategies in India addressing cyberbullying

Types of cyberbullying

1. Harassment::Harassment in the digital realm involves the persistent and intentional sending of hurtful, threatening, or offensive messages to an individual. This form of cyberbullying can take

place across various online platforms, including social media, email, or messaging apps. The primary objective is to inflict emotional distress, creating a hostile onlineenvironment that adversely affects the victim's mental and emotional well-being.These messages usually follow a constant pattern with the intent to hurt.

2. Flaming: Flaming signifies a type of cyberbullying that involves sending of offensive or hurtful texts, messages or emails, directly to the victim. Vulgar and abusive words are sent which are aggressive in nature.

3. Exclusion: Exclusionary cyberbullying involves purposefully leaving someone out of online groups, activities, or conversations. This act of social exclusion can be highly damaging, leading to feelings of rejection, isolation, and diminished self-esteem for the victim. The intentional exclusion from digital communities can have lasting psychological effects on the individual's sense of belonging.

4. Doxing: Doxing, derived from "document tracing," is a malicious act where an individual's private or sensitive information is publicly revealed without their consent. This information may encompass addresses, phone numbers, workplace details, or other personal data. Doxing exposes the victim to potential real-world harm, such as stalking or identity theft, amplifying the impact of cyberbullying beyond the digital realm.

5. Impersonation: Impersonation in the cyber context involves pretending to be someone else online with the intention to deceive, manipulate, or harm the reputation of the victim. Cyberbullies may create fake profiles, use another person's identity, or impersonate someone known to the victim. This form of deception can result in the spread of false information, damage to personal relationships, and significant emotional distress for the victim.

6. Outing: Outing is the act of publicly disclosing someone's private information, particularly related to their sexual orientation, without their consent. This invasive act can lead to discrimination, humiliation, and profound emotional distress for the victim. Outing violates an individual's right to privacy and can have lasting consequences on their personal and social relationships.

7. Cyberstalking: Cyberstalking goes beyond conventional harassment, encompassing persistent and intrusive online behavior. This may include monitoring an individual's online activities, sending threatening messages, making unwarranted contact, and overall instilling significant fear and distress in the victim. Cyberstalking can have severe psychological consequences and may escalate into real-world harassment, posing a direct threat to the victim's safety.

8. Trolling: Trolling is a deliberate and disruptive form of cyberbullying where individuals post provocative or offensive content online with the aim of eliciting strong reactions from others. Trolls intentionally disrupt online discussions, create chaos, and generate negative responses within digital communities. The unpredictable and often anonymous nature of trolling makes it challenging to prevent and address effectively.

9. Digital Manipulation: Digital manipulation involves altering images or videos to embarrass, deceive, or harm the reputation of the victim. This form of cyberbullying leverages technology to manipulate visual content for malicious purposes, intensifying the emotional impact on the targeted individual. It can lead to public embarrassment, damaged relationships, and a sense of powerlessness for the victim who may feel violated through the manipulation of their digital presence.

10. Catfishing: Catfishing involves creating a fake online persona to deceive others. Cyberbullies may use manipulated images, fictional details, and deceptive communication to establish relationships with unsuspecting individuals. The ultimate goal is emotional manipulation, often leading to harm and psychological distress for the victim who may have invested trust and emotions in the fabricated relationship. Catfishing not only involves deception but also plays on the victim's emotions, leading to a profound impact on their mental and emotional well-being.

Cyberbullying around the world

Internet connectivity is important because it provides both educational and social benefits for young people. Unfortunately, these positive attributes are counterbalanced by potentially dangerous consequences.Alongside improving communication and democratizing access to information, the internet lets people conceal themselves behind a mask of anonymity. This creates a whole new set of risks for children – and often adults too.The internet creates not only a threat for teens who could fall victim to cyberbullying – but also the potential for children to engage in online crimes, trolling, and cyberbullying themselves. That makes cyberbullying a topic that all parents and guardians need to be aware of.Schools, governments, and independent organizations are attempting to raise awareness of cyberbullying and online stalking, but the cyberbullying statistics in this article illustrate that the problem is not going away anytime soon.

In 2018, Ipsos surveyed adults in 28 countries, creating one of the largest-scale studies on cyberbullying to date. Unfortunately, it hasn't repeated this survey since, but the old data is nonetheless eye-opening and informative.In total 20,793 interviews were conducted between March 23 – April 6, 2018, among adults aged 18-64 in the US and Canada, and adults aged 16-64 in all other countries. Of particular interest are Russia and Japan. In both countries, parents expressed extremely high levels of confidence that their children did not experience cyberbullying of any kind.Meanwhile, Indian parents remained among the highest to express confidence that their children were cyberbullied at least sometimes, a number that only grew from 2011 to 2018. Across Europe and the Americas, it also appears more parents are either becoming aware of their children's negative experiences with cyberbullying, or their children are increasingly experiencing such attacks online.

1. 60 percent of parents with children aged 14 to 18 reported them being bullied in 2019

More parents than ever report that their children are getting bullied both at school or online. Comparitech conducted a survey of over 1,000 parents with at least one child over the age of 5.

The study found:

- 47.7% of parents with children ages 6-10 reported their children were bullied
- 56.4% of parents with children ages 11-13 reported their children were bullied
- 59.9% of parents with children ages 14-18 reported their children were bullied
- 54.3% of parents with children ages 19 and older reported their children were bullied

2. One-fifth of all bullying occurs through social media

Although the vast majority of parents reported bullying in school, 19.2% stated that bullying occurred through social media sites and apps. A further 11% indicated bullying occurred through text messages, while 7.9% identified video games as a source. Meanwhile, 6.8% reported bullying occurred on non-social media websites, while 3.3% indicated the bullying occurred through email. Some parents even witnessed cyberbullying occur, with 10.5% of parents indicating they observed the cyberbullying themselves.

3. Attitudes regarding the pandemic and lockdowns directly contributed to cyberbullying

A study written by scholars working at the Universities of Florida and Denver revealed that the global pandemic had a marked effect on cyberbullying levels on Twitter. According to that study, the analysis of 454,046 publicly available tweets related to cyberbullying revealed a direct correlation between the pandemic and cyberbullying incidents.According to Very well, that increase was due in part to the extra leisure time and online presence that children had due to lockdown and online schooling. A report from Common Sense Media indicated that children and teens spent around 17 percent more time on social media sites due to the pandemic.Psychological reasons, including self-preservation and self-defensebehaviors, have also been cited (by Verywell) as a possible causes for the sudden rise in cyberbullying and online toxicity during the pandemic.

4. Most parents respond proactively after their children are cyberbullied

There are a large number of ways parents can respond to cyberbullying, but it appears the most

common response is to talk to children about online safety.Comparitech found 59.4% of parents talked to their children about internet safety and safe practices after cyberbullying occurred. Parents may need to take more steps to intervene, however, as only 43.4% identified adjusting parental controls to block offenders, only 33% implemented new rules for technology use, and only 40.6% saved the evidence for investigators.Very few parents (just 34.9%) notified their child's school about cyberbullying. And a small number (10.4%) took the nuclear option and completely took away their child's technology in response.

5. Most teens have now experienced cyberbullying in some way

Cyberbullying: A Narrative Review (Grover et al., 2023) notes that it's difficult to accurately define how common cyberbullying is because incidence rates vary based on location, the victim's age, number of occurences, and even disagreement over what constitutes online bullying. Still, after reviewing the existing literature, it estimates that the average victimization rate is around 21 percent.A 2022 Pew Research study found that nearly half of all teens (49%) had experienced some form of cyberbullying. The most common type was offensive name calling, but one in ten had also received physical threats.Another study from 2021 shows that this isn't unique to teens, with around 40 percent of Americans under 30 having experienced online harassment. Of these, 50% identified politics as the reason behind the incident.

Among teens, the most common specific types of cyberbullying include:

- Offensive name-calling (32 percent)
- Spreading of false rumors (22 percent)
- Receiving unsolicited explicit images (17 percent)
- Repeated requests for their location or whereabouts (15 percent)
- Physical threats (10 percent)
- Having explicit images of them shared without their consent (7 percent)

6. Cyberbullying may be contributing to the increase in youth suicides

In the United States, suicide is one of the leading causes of mortality for people between the ages of 10 and 44. According to the CDC, there were 13.7 such incidents per 100,000 citizens in 2021, with rates remaining fairly similar across all regions of the country.

Cyber Bulling In India

India has the highest rate of cyberbullying worldwide, at over 85% of children reporting it. The poll has also found that Indian children reported cyberbullying someone twice as often as children worldwide. In India, 46% of children reported cyberbullying a stranger, compared to 17% globally, while 48% reported cyberbullying they know, compared to 21% of children in other nations. Spreading false rumours (39%), being excluded from chats or groups (35%), and name-calling (34 per cent) were the top three types of cyberbullying reported in India.

In current situation, to fight back the rapidly growing cyberbullying behaviour, it is important to understand context and the entire ecosystem of cyberbullying and potential risks associated with it. The bigger question is, what is cyberbullying and how it can affect any children. When someone is harassed, threatened, or harmed through a digital medium, this is known as cyberbullying. It can manifest itself in a number of ways, including by sending unpleasant messages, publishing humiliating comments, disclosing personal information, and circulating rumours. Cyberbullying is more difficult to recognise and prevent since it can occur anytime, anyplace, and to anybody, unlike conventional bullying. Cyberbullying against children can have devastating repercussions, resulting to low self-esteem, depression, anxiety, and in severe cases, even suicide. Children who are the victims of cyberbullying could feel alone, hopeless and powerless, which would make them uninterested in school and other activities. Also, it may have an impact on their social abilities and connections, making it more difficult for them to make new friends and keep up with old ones.

The high rate of cyberbullying in India is partially due to a lack of knowledge and instruction

regarding online safety. Many children and adolescents aren't aware of the dangers of talking to strangers online or disclosing personal information online. Also, there is a paucity of knowledge regarding how cyberbullying affects both the victim and the offender.

To combat cyberbullying in India, there are several steps that can be taken. First and foremost, education and awareness are key to addressing cyberbullying in India. Schools and colleges can play an important role in educating students about cyberbullying and its consequences.

We can fight to stop cyberbullying and create a safer online environment by educating individuals about the risks of cyberbullying, encouraging responsible technology usages, empowering bystanders, and supporting mental health. Secondly, parents also need to be aware of the issue and monitor their children's online activities to prevent them from becoming victims or perpetrators of cyberbullying. Parents can contribute to the creation of a safer online environment for their children and others by educating their children about cyberbullying, encouraging responsible internet use, fostering open communication, promoting empathy and kindness, and being supportive of their child. Thirdly, social media platforms can also take steps to address cyberbullying. They can implement stricter policies and guidelines to prevent cyberbullying, such as banning fake profiles and providing tools to report cyberbullying. They can also work with law enforcement agencies to identify cyberbullies and take appropriate action against them. Social media sites can employ artificial intelligence (AI) and machine learning to find and delete cyberbullying content before it spreads. With the aid of this technology, cyberbullying behaviour patterns can be recognised, and steps can be taken to stop it from getting worse. Lastly, Finally, there needs to be greater collaboration between government, civil society, and the private sector to address cyberbullying in India. This can include measures to enhance digital literacy, assistance to victims of cyberbullying, and attempts to establish a safer and more inclusive online environment.

The Indian government has recognized the problem of cyberbullying and has taken steps to address it. The Ministry of Home Affairs launched the Cyber Crime Prevention Against Women and Children (CCPWC) initiative, which aims to provide a safe and secure online environment for children. The initiative provides a helpline and a portal where children can anonymously report cyberbullying. The Ministry of Home Affairs has also launched National Cyber Crime Reporting Portal to enable citizens to report cybercrimes, including cyberbullying, and receive prompt action.

Although, the government has made some progress, there is still plenty that can be done to safeguard Indian children from cyberbullying. It is crucial to raise awareness of the problem and make sure that parents, educators, and other key players have the information they need to shield children from online predators. Also, it is crucial to guarantee that the people handling the issue are well informed and equipped and the legal system is strong enough to handle cases in an efficient manner. Finally, in order to create solutions that effectively shield children from online predators, government, civil society, and technological businesses need to work in coherence and synergistically

Legal provisions related to cyberbullying in India:

Although the rate of cyberbullying is increasing day by day in India, there lies no direct provisions dealing with the same. There are some sections of the Information Technology Act, 2000 and IPC which deal with the punishment related to cyberbullying, as have been discussed hereunder.

1. Section 66 A of the Information Technology Act, 2000

This section deals with the punishment for sending messages or emails which are harmful or abusive in nature through the internet or any other platform. These messages are sent to cause annoyance, injury, and inconvenience to the victim. It is also punishable under the provision when someone shares information that he believes to be false. Punishment under this section is 3 years of imprisonment, if the message sent was found grossly offensive. However, this provision was struck down by the Apex Court as it was declared unconstitutional in 2015 in the Shreya Singhal case, for the purpose of violating the freedom of speech.

2. Section 66 C of the Information Technology Act, 2000

This provision deals with the punishment for using electronic signature, password or any other identification feature of any other person dishonestly or fraudulently. A person is punishable under this provision up to 3 years of imprisonment or a fine up to one lakh rupees for identity theft.

3. Sec 66 D of the Information Technology Act, 2000

An individual who cheats by personation using any social media or communication device is punished under this provision. It means a person is typically punished for fraudulently pretending to be some other person.

4. Sec 66 E of the Information Technology Act, 2000

This provision was added in the Information Technology (Amendment) Act, 2008. It reduces the gender bias which was made in Section 354 C of the Indian Penal Code, 1860. This provision provides protection to both men and women. This provision specifically deals with privacy with respect to one's body parts. It is punishable to capture (any video, image, film or record through any means) publish,(that is available to the public) or to transmit an image film or video recorded that has been sent in such a way that it can be viewed by person or persons without the consent of the person, violating his or her privacy. This section covers two circumstances that would amount to a violation of the privacy of that person.

5. Section 67 of the Information Technology Act, 2000

Under this provision, publishing or transmitting any material which is obscene in nature and if such material tends corrupt people to read, hear or see the material, it would be considered as an offence. It means such material raises lustful thoughts in the person. The person committing offence under section 67 will be punished with imprisonment which may extend up to 3 years and fine up to 5 lakh rupees and on subsequent conviction the imprisonment may extend up to 5 years and of fine 10 lakh rupees.

6. Section 67 A of the Information Technology Act, 2000

Section 67 A deals with penalising the publishing or transmission of any material which contains sexually explicit content or act. The publication or transmission of such material should be in electronic form. Punishment under Section 67 A on 1st conviction is imprisonment which may extend up to 5 years also with a fine up to 10 lakh however on the second conviction, imprisonment may extend to 7 years and with a fine up to 10 lakh rupees.

Exception to Section 67 and Section 67 A:

- These sections do not extent to any book, paper, painting or figure in electronic form
- When a publication is for the public good and in the interest of science, literature, art, etc, then it does not come within the purview of these sections.
- When a publication is related to bonafide heritage or religious purposes, the act won't be categorised as those mentioned in these sections.

7. Sec 67 B of the Information Technology Act, 2000

This section deals with the transmission of material that depicts children involved in sexually explicit conduct or act. Any person who creates text, advertisements or images or records anything which depicts children in a vulgar or obscene manner, is punishable under Section 67 B.

8. Section 292 A of the Indian Penal Code, 1860

This section deals with the printing of any matter in grossly indecent manner or matter intended for blackmail; it includes printing, selling or conveying any printed or written document which is indecent or intended for blackmail. Taking part in or receiving any profit from such business which includes sale, import, export or printing etc, of such materials or advertising the same which would be injurious to morality, is punishable under this provision.

9. Section 354 C of the Indian Penal Code, 1860

This section deals with voyeurism. Under this provision, if any man who captures the image or

watches any woman engaged in some private act in such circumstances where she presumes privacy or spreads such images to a third party, would be considered as an offence. This provision is gender specific, i.e.it only covers males. Females are not punished under this provision. On first conviction, he shall be punished with imprisonment which should not be less than 1 year and this may extend to 3 years with a fine. This imprisonment increases on a second conviction of at least 3 years which may extend to 7 years with a fine.

10. Section 354 D of the Indian Penal Code, 1860

This section only covers women. Any stalking of males is not covered under Section 354 D. In the case of the State of West Bengal v. Animesh Boxi (2018), the accused hacked the victim's phone and took control of some of her private pictures. He blackmailed her by threatening to post those pictures on a pornography website. Here the court held that the victim has suffered from virtual rape. Thus the accused will be convicted under Section 354 D of IPC.

11. Section 499 of the Indian Penal Code, 1860

This section deals with defamation. As discussed in this section, the scope of defamation is quite broad. Along with offline defamation in written or oral form, it also includes any speech or document in online format which are posted on online platforms by any person which tends to harm the reputation of any other person. Such a person will be considered as doing online defamation and he will be penalised under Section 500 of IPC which deals with the punishment of the same. The punishment is simple imprisonment which may extend to 2 years or a fine or both.

12. Section 507 of the Indian Penal Code, 1860

This section specifically addresses criminal intimidation through the use of anonymous communication. It means that when any person through a fake identity (which is not known), or through an unknown telecommunication source; it may be any social media platform, threatens another person shall be punished with imprisonment of maximum of 2 years.

13. Section 509 of the Indian Penal Code, 1860

If a person does any act or utters any word or makes such gestures or sounds with the intention to intrude on the privacy and to offend the modesty of women, he shall be punished with simple imprisonment which may extend to three years with a fine. The intention is the most important essential of the section. If any person tries to harass a woman through electronic mode or by using any telecommunication device shall be punished with fine and rigorous imprisonment which shall not be less than two months however this rigorous imprisonment may extend to 2 years also.

These legal provisions are crucial in combating various forms of cyberbullying, from identity theft and impersonation to the transmission of explicit content. Keep in mind that staying informed about any legal updates is essential, as laws may evolve over time. Legal professionals can provide the most accurate and up-to-date guidance on dealing with cyberbullying cases in India.

CONCLUSION

In India, the rise in internet users, especially among kids and teens, brings a concerning issue - cyberbullying. The various forms of online harassment, like spreading rumors or impersonation, are creating a tough online environment. Covid-19 has made it worse, increasing online time and cyberbullying incidents.Globally, studies reveal a spike in cyberbullying, with parents reporting their kids being bullied more. Social media platforms need stricter rules to combat this. Unfortunately, India tops the charts with the highest cyberbullying rate globally. Government initiatives exist, but more needs to be done.Laws like the Information Technology Act play a role, but they must keep up with the digital world. The fight against cyberbullying requires everyone - schools, parents, and social media platforms working together. Creating awareness, using technology wisely, and having strong laws can make the internet safer. For India, it's crucial to protect its youth by promoting empathy, responsible online behavior, and quick legal actions against cyberbullying.

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DIGITALMARKETING

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ABSTRACT:

Digital marketing is the use of digital technologies and platforms to promote products and services, as well as to connect with potential customers. It is an incredibly versatile and powerful tool that can be used in various ways to reach people worldwide. Digital marketing utilizes multiple digital technologies to deliver promotional messages, such as mobile phones, computers, and other digital media and platforms. It can be used for B2B (Business to Business) and B2C (Business to Consumer) marketing, depending on the goal and objectives ofthe campaign. Digital marketing offers unique advantages such as greater reach, improved targeting, personalized messaging, and better ROI (Return on Investment). It also allows businesses to stay up-to-date with marketing trends and technologies. With the right strategies and tactics, companies can leverage digital marketing to increase their visibility and reach a larger audience. The term digital marketing refers to the use of digital channels to market products and services to consumers. This type of marketing involves the use of websites, mobile devices, social media, search engines, and other similar channels.

Keywords: Digital Marketing, ROI, SEO, Artificial Intelligence, Virtual Reality, Augmented Reality, PPC, SEM

INTRODUCTION:

Digital marketing is the use of digital channels to market products. Also known as online marketing, digital marketing promotes brands and connects them to potential customers via the internet. It takes many forms, including: Search engines, Websites, Social media, Email, Mobile apps, Text messaging, Web-based advertising and so on.

Philip Kotler is the father of digital marketing. Known for founding marketing as an academic discipline, he has written over 60 marketing books. The digital age took off with the coming of the internet and the development of the Web 1.0platform.TheWeb 1.0platformalloweduserstofindtheinformation they wanted but did not allow them to share this information over the web. Up until then, marketers worldwide were still unsure of the digital platform.

Any type of marketing can help your business thrive. However, digital marketing has become increasingly important because of how accessible digital channels are. In fact, there were 5 billion internet users globally in April 2022 alone.

Whatare the5DsofDigitalMarketing?

- Digital Devices– Digital devices are those that people use almost every day. Examples: laptops, desktops, smart phones, tablets, smart TVs, wearable devices, gaming devices.
- Digital Platforms–These are the platforms with which users interact regularly. You can use them for advertising. Examples: social media, search engines, websites.
- Digital Media – Paid or owned digital media channels can be used to reach your target audience. Examples: online ads, social media marketing, SMS, email marketing.
- Digital Data – Data about your target audience used to achieve a marketing goal is called digital data. You can generally collect data about your target audience through surveys, apps, and other means. Examples: apps, contact forms, surveys.

- Digital Technology –Digital technology is all about using technology to achieve a marketing goal. Examples: artificial intelligence, virtual reality, augmented reality.

Evolution Of Digital Marketing

- 1990 : The term "Digital Marketing" was first used. In that particular year, 'Archie" first search engine was launched.
- 1993 : In this year first clickable web-ad banner was introduced.
- 1994 : TherewasthelaunchofYahooandthefirste-commercetransaction, over Net Market.
- 1996 : In this year small search engines were introduced i.e. Hotbot, Looksmart, and Alexa.
- 1997 : There was the launch of the first social media site which is SixDegree.com.
- 1998 : This year was the changing year where there was the birth of Google, Microsoft launched MSN, and Yahoo! Introduced Yahoo! Web search.
- 2000 : During this year Internet bubble burst, SixDegree.com shut down, and also smaller search engines were wiped out.
- 2001: This year's first mobile marketing campaign was introduced i.e.Universal Music.
- 2002 : This year is the birth year of LinkedIn.
- 2003: In this year WordPress was introduced and launched MySpace
- 2004: This year was changing year when Gmail was launched, Google goes public and Facebook goes live.
- 2005:Youtube was introduced in this particular year.
- 2006 : Microsoft launches MSLive Search. In this year Twitter was launched, moreover Amazon's e-commerce sales crossed $10 billion.
- 2007 :Tumblr, Web streaming service : Hulu, and iPhone were launched.
- 2008 :This year China takeover America in terms of the number of users and even Spotify was introduced to listen to online songs
- 2009 : Google launches Instant for real-time search engine results. In this year Whatsapp was introduced to make communication easier.
- 2010 : Pinterest and Instagram were launched.
- 2011: In this year Google Buzz shut down and also web overtake the TV viewership among the youth generation.
- 2012 : There was a progressive increment in Social Media Budget that is upto 64%.
- 2013 : Yahoo acquired Tumblr in this particular year.
- 2014 : In this year so many things happened like Mobile exceeds PC internet usage.
- 2015 : In this era, Snapchat was launched and also there was the rise of predictive analytics.
- 2016 : Yahoo discontinued some of its services
- 2017 : TikTok was launched
- 2019 : Google+ left the market
- 2021 : 99% of digital marketers use social media sites for marketing purposes
- 2023: AI Chatbots like ChatGPT have taken over the internet.

Traditional Marketing Vs. Digital Marketing:

The following table lists a few points that differentiate digital marketing from traditional marketing

Traditional Marketing	Digital Marketing
Communication is unidirectional. Means, a business communicates about its products or services with a group of people.	Communication is bidirectional. The customer also can ask queries or make suggestions about the business products and services.
Medium of communication is generally phone calls, letters, and Emails.	Medium of communication is mostly through social media websites, chat, and Email.

Campaigning takes more time for designing, preparing, and launching.	There is always a fast way to develop an online campaign and carry out changes along its development. With digital tools, campaigning is easier.
It is carried out for a specific audience throughout from generating campaign ideas up to selling a product or a service.	The content is available for general public. It is then made to reach the specific audience by employing search engine techniques.
It is conventional way of marketing; best for reaching local audience.	It is best for reaching global audience.
It is difficult to measure the effectiveness of a campaign.	It is easier to measure the effectiveness of a campaign through analytics.

Digital Marketing Channels

Digital marketing channels are platforms you can use to reach your target audiences online. They might include social media, search engines or websites. Digital marketing channels give you the opportunity to sell products, build brand awareness and position yourself within a given industry.

Social Media Marketing:

Social media marketing is the process of promoting your brand, products, or services on social media platforms like Facebook, Instagram, TikTok, Twitter, and LinkedIn.

This Channel is for Ecommerce brands, retailers, creative agencies, freelancers, and many other businesses that deal with the public see enormous benefits from an investment in social media.

Search Engine Optimization (SEO):

SEO is the process of improving the ranking of a website on search engines. The higher the ranking, the more likely people are to find the website, and the higher your website traffic numbers from organic search.

SEO is about making your website page rank higher on internet search engines like Google, Bing, etc. The higher a site appears on the search results page, the more likely consumers are to see it and potentially click to visit it.

To win at organic search, you need to understand many complex concepts, including keyword research, back links, and how Google's algorithms treat page experience and trust signals.

Email Marketing:

Email marketing is a direct marketing channel where you send marketing materials to subscribers' email addresses. Email offers a much more personal way of connecting with your targeted customers. You can offer exclusive 'insider' content, special discounts, and customized content to your email subscribers to make them feel special.

This Channel is for: If you publish content on your website's blog, offer periodic sales or giveaways, or want to promote a new product offering, then email marketing may be an effective online marketing channel for you.

Video Marketing:

Video marketing is using videos to promote your business and product/services. With people watching an average of 19 hours of video per week, video marketing is an opportunity most businesses can't pass up. And video marketing is a goldmine for capturing attention and turning interest into sales.

This Channel Is For: Anyone who has a smart phone can record a shareable video to market products or services.

Pay-per-click(PPC) or Search Engine Marketing (SEM):

PPC advertising enables marketers to reach audiences on news and other websites and digital

platforms through paid ads. Marketers can set up PPC campaigns on Google, Bing, LinkedIn, Twitter, Pinterest, and Facebook and show their ads to people searching terms related to their products or services.

PPC advertising is the process of buying visibility onsearch engine results pages (SERPs). SEM refers to paid advertisements that appear at the top of the SERP. The cost of these ads typically depends on the number of clicks the link receives, hence "pay-per-click."This Channel Is For: PPC isn't for everyone. But for those who have a fairly sizable marketing budget, it can be an ideal way to generate quick leads, which hopefully lead to conversions.

Affiliate Marketing:

Affiliate marketing is a commission-based sales scheme that rewards web publishers when they sell one of your business' products through their website, social media profile, or another digital platform.

Affiliate networks act as the 'middle-men' between advertisers and publishers, helping ensure everything is tracked and the right commission is paid. Affiliate marketing is an effective way to expand your reach by getting in front of others' audiences.

This Channel is for: Affiliate marketing is ideal for e-Commerce businesses selling physical products, but it can also work well for digital products like courses and downloadable content.

Influencer Marketing:

Influencer marketing is when a brand builds awareness and trust for a product among an influencer's followers by using the influencer's power.

Influencer marketing is a type of social media marketing that uses endorsements and product mentions from influencers — individuals who have a dedicated social following and are viewed as experts within their position / role.

This Channel is for: Influencer marketing is most effective when you have identified the audiences you would most like to reach online.

Content Marketing:

Content marketing is the strategic planning, creation, publication, and distribution of valuable content to your target audience. Unlike ads, which interrupt the individual in order to try to sell something, content marketing delivers VALUE throughout the customer journey.

It is often less promotional and more educational than other digital marketing campaigns. Some of the most common types of content marketing assets include: Blog posts, White papers, E- books, Case studies, Infographics.

Mobile Marketing:

Mobile marketing is any advertising activity that promotes products and services via mobile devices, such as tablets and smart phones. It makes use of features of modern mobile technology, including location services, to tailor marketing campaigns based on an individual's location. The top mobile marketing apps include Facebook Pages, WhatsApp Business, YouTube Studio, Instagram Business, and Twitter for Business.

Therefore Mobile marketing is an affordable way to reach your target audience via smart phones, tablets, or other digital devices, where people spend the majority of their time in today's world. Mobile marketing is low-cost and can be targeted based on a variety of inputs from the company.

Referral marketing:

Referral marketing is a highly valuable digital marketing channel. People listen to their friends, family, and online peers.

Referral marketing uses customer recommendations and word-of-mouth to earn new customers. Happy customers are your brand's biggest asset because people trust their friends' and family's opinions more than anything else. Referral marketing encourages people to promote your business by

rewarding them for spreading the good word. Referral marketing often comes in the form of online reviews, comments on product listings, and social media discussions.

Advantages/Benefits Of Digital Marketing:

1. Global reach: With digital marketing, businesses can access a global audience across locations and time zones. Instead of limiting your reach to people in your community, you can target potential customers in your state, country, and even globally.
2. Cost efficiency: The next advantage of digital marketing is its low cost. Whether you want to advertise your company locally or globally, digital marketing offers cost-effective alternatives. It enables even the tiniest businesses to compete with larger corporations by employing highly targeted techniques. Most of these methods (such as SEO, social media, and content marketing) will be free to begin with.
3. Measurable results: Not only is digital marketing more affordable than offline marketing tactics — it's also highly measurable. With digital marketing, you can track nearly every touch point users have with your brand. Whether it's social media views, ad clicks, email opens, or organic page views, every aspect of digital marketing is highly trackable. It's much easier to prove the return on investment(ROI) of your digital marketing efforts as a result, which helps you better understand the results you're generating and where to keep investing.
4. Effective targeting: Digital marketing allows you to pinpoint the best audience for your messages using online audience and targeting information. You can also collect data from your digital campaigns to see which content works best for certain types of customers.
5. Increased engagement: By default, digital marketing is intended to be very engaging. Users can share a blog post, like a photo, bookmark a video, or interact with your website by clicking on a sponsored ad. The more you engage with clients online, the more loyal they will become.
6. Flexibility: Digital marketing gives you the flexibility to choose from different channels and strategies. It's also flexible enough that you can adjust your approach over time as you learn more about what works for your audience and business.
7. Improved conversion rate: When a customer converts, they take a desired action. That might be subscribing to your email newsletter or making a purchase. Your conversion rate measures the percentage of customers who take that desired action. Generally speaking, the higher your conversion rates, the more successful your marketing efforts.
8. Social currency: Social currency is what happens when content passes from user to user, eventually becoming viral and making a name for your brand. Today, thanks to the power of digital strategies like social media marketing, your business can build social currency by creating content that's highly relevant, entertaining, and timely. Social currency keeps the conversation going long after your brand's posts go live and can keep your business top of mind with consumers.
9. Greater ROI (Returns on Investment): Digital marketing gives businesses more value for their investment — and it's easier to prove ROI because you can easily attribute sales and conversions to specific campaigns and touch points. In an age where marketers increasingly need to do more with fewer resources, digital channels empower businesses to market themselves in the most cost-effective way.
10. Brand Awareness: Digital marketing can help businesses build brand awareness and recognition. This is important for businesses that want to attract new customers and grow their business. With digital marketing, your company can establish brand credibility across a larger market.

Disadvantages Of Digital Marketing:

1. High competition

The digital marketing campaign should be well thought out, stand out, grab attention, and impact the target audience since the competition has grown many folds recently. Any monotonous approach

or repeated method will drive the brand out of the competition in no time. Digital marketing campaigns have become very competitive. Thus, brands must be relevant to the customers' needs and be quick in responding.

2. Dependability on Technology

Digital marketing is purely based on techno0logy, and the internet is prone to errors. There are times when the links may not work, landing pages may not load, and page buttons don't simply do their job. This leads prospective customers to switch to other brands. Therefore, to avoid this, a test of the website is necessary.

3. Time Consuming

One of the biggest disadvantages of digital marketing campaigns is their time-consuming nature. Unorganized tactics and strategies may consume a lot of time, and it becomes difficult to devote the desired time to the campaign. This will eventually lead to negative results.

4. Security and Privacy Issues

Security is the primary requirement for any brand. Hence website protection is something to be executed seriously as a digital marketer. Securing and safeguarding the network connections by using firewalls and encryption tools like VPN is always suggested. The basic approach of having a good antivirus is most desirable. Protecting the customer data should be the top priority as it may be compromised during data breaches.

CONCLUSION

Digital marketing is an important component of any successful business strategy. It allows companies to reach a wider audience and create a personalized connection with customers. It also provides businesses with an opportunity to engage with customers on a more personal level, creating a sense of trust and loyalty. Additionally, digital marketing gives businesses access to real-time analytics, enabling them to make informed decisions and track the success of their campaigns.

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DIGITAL MARKETING

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Abstract

Digital marketing is the new method of marketing commodities using digital technology, mostly through internet. Digital marketing is built on the internet that can create and convert brand value from producer to customer by various digital networks. The development of digital marketing has altered the method comprise use technology for promotion as digital a small platform are progressively changed into advertisement plans, as individual use digital campaign like mobile, computer, laptop and tablet instead of visiting physical market. Digital marketing elements like search engine optimizing is also called as organic method of ranking the website, pay per click, content marketing, e-mail marketing, social media, social media optimization, show promotion besides e-commerce marketing are becoming more common in advertising technology.

Introduction

Any marketing that uses electronic devices and can be used by marketing specialist to convey promotional messaging and measure its impact through your customer journey. In practice, digital marketing campaigns that appear on a computer, phone, tablet or other device. It can take many forms, including online video, display ads, search engine marketing, paid social ads and social media posts.

Digital marketing often compared to "traditional marketing" such as magazine ads, bill boards and direct mail oddly (on expected) television is usually lumped in with traditional marketing. Digital marketing also called online marketing, it is the promotion brands to connect with potential customers using the internet and other form of digital communication. This includes not only e-mail, social media, and web-based advertising, but also text and multimedia messages as a marketing channels.

Key forms of digital marketing:-

- Websites and SEO content
- Blogs
- Internet banner ads
- Online video content
- Pay-per-click(PPC)advertising
- E-mail marketing
- Social media marketing (facebook, twitter, linkedIn etc)
- Mobile marketing(SMS)

What is digital marketing strategy?

Experts define digital marketing strategy as using online resources to reach the target customer. Identification where, why, and how a company makes a profit is one of the building block of a digital marketing strategy. It help formulate a marketing plan that aligns with the business goals and customer requirements. A brand has to evaluate owned, paid and earned media while formulating a digital marketing strategy. While own media consists of the organizations communication channels, earned media and paid media are external communication channels.

Digital Marketing Strategy Vs. Digital Marketing Tactics :

Digital marketing strategy is the process of identifying a company's goals, and a digital marketing

campaign campaign is the process of actualizing their goals. The success of a company's marketing plan relies heavily on the proper implementation and completion of digital marketing tactics.

What is the importance of Digital Marketing Strategy? Competitive advantage over peer:

Digital marketing strategy helps business take over their business peers. It suggests ways to evoke creativity and innovation in product design, development, and promotion, eliminating competition.

Staying Relevant :

In the current business media, staying relevant is the number one priority of business organizations as it helps them (the company) to keep on the top of new competition. Digital marketing strategy helps companies achieve that will help of modern tools and techniques.

Reaching a global evidence :

Digital marketing channels connect brands to a global audience by giving them the medium and exposure required to expand their business.

Digital Marketing Strategy in Automobile Industry :

The performance of the U.S. automobile industry in 2019 was relatively modest, with average vehicle sales at 16.9 million, up from 17.3 million in 2018 and 17.23 million in 2017. Despite the impressive level of wholesale auto sales over the years, professionals and analysts are concerned about the challenges ahead. This is partly due to trade uncertainty between the ongoing trade stalemate between the US and China, which hassled to a decline in trade investment and manufacturing output. Let's not forget the corona virus outbreak that presents new challenges to automobile industry. Locking measures against the spread of the disease led to the closer of production plants, disruption of supply chains and retail outlets closing their doors. Many potential car buyers and individual in need of automobile service have used the internet to research already available service providers and weigh their performances. The only difference now is that this use has tripled with home stay orders across the state, and some people who fear long-term health are simply entering the store, to use the internet as an alternative option. This is an additional reason why you should invest your time, energy, and resources in using an online marketing channels and effective strategy, which allows you to talk directly with your customers and bring them into your business.

Without digital marketing, you will not be able to target your preferred customer population or inform or convince them that your business is capable of handling their specific needs.

Therefore, the automobile industry needs to finalize the issue of why digital marketing is taking place at this time and beyond.

Introduction to Tata Motors :

Tata motors is a part of the USD113 billion Tata group founded by Jamsetji Tata in 1868, Tata Motors is among the world's leading manufacturers of automobiles. The company believe in' Connecting aspirations', by offering innovative mobility solutions that are in line with customers' aspirations. Tata Motors is India's largest automobile manufacturer, and the company continue to take the lead in shaping the Indian commercial vehicle landscape, with the introduction of leading-edge power trains and electric solutions packaged for power performances and user comfort at the lowest life-cycle costs.

The company's new passenger cars and utility vehicles are based on Impact Design and offer a superior blend of performance, drive ability and connectivity.

Tata Motors' subsidiary, Jaguar Land Rover is Britain's largest automotive manufacturer which designs, manufactures and sells some of the world's best-known premium cars. The two iconic brands of JLR include Jaguar, with a range of luxury sedans, sports cars and luxury performance SUVs, and Land Rover, encompassing a portfolio of premium all-terrain vehicles. Tata Motors has a global footprint with operations in the UK, South Korea, South Africa and Indonesia through a strong global network of 97 subsidiary and 9 associate companies, including Jaguar Land Rover in the UK and Tata

Daewoo in South Korea Introduction to Tata Motors Excel vehicles Kolhapur Part of the USD128 billion Tata group founded by Jamsetji Tata in 1868, Tata Motors is among the world's leading manufacturers of automobiles. We believe in' Connecting aspirations', by offering innovative mobility solutions that are in line with customers' aspirations. We are India's largest automobile manufacturer, and we continue to take the lead in shaping the Indian commercial vehicle and scope, with the introduction of leading-edge power trains and electric solutions packaged for power performances and user comfort at the lowest life-cycle costs. Our new passenger cars and utility vehicles are based on Impact Design and off era superior blend of performance, drive ability and connectivity. The address of this dealer is Gat No 680 & 681 & 691, Karveer,Kaneriwadi,Kolhapur,andMaharashtra-416234.

Management Problem :

Here are the main reasons why the automobile industry is using digital marketing to boost their business Adaptability Businesses in the automobile industry, such as car dealerships, rely on word traffic and word of mouth to increase their customer base and increase instant sales. But this presents a big problem because staying at home and staying on orders has led to a sharp drop in vehicle traffic and is a serious concern for auto retailers Social exclusion may have created a physical distance between these businesses and customers, but it connects them in a new way- the Internet! That is why digital communication and a comprehensive online approach are important to mitigate the effects of current disruptions. Auto businesses need to understand that the current hurdle is temporary and that there are still customers who need specific auto products and services after Lockdown In other words, they need you, you need to be available Changing your strategy increases your visibility, allowing you to communicate effectively and timely with customers in the right place and at the right time Influence Purchase Results. The effort and resources you now invest in during the lockout will determine your rewards. When many businesses are suspending their marketing efforts, you especially need to reduce the doubling of the digital space. You need to continue your communication and marketing efforts online to stay at the forefront of customer decision-making. According to Google statistics, it takes an average of 2.7 months to decide between buying a new car.

Since these buying results take a considerable amount of time, you need to double your digital marketing efforts and reach out to customers early in the car-buying journey. While they may not make an immediate purchase, the idea is that you should be at the forefront of customers purchasing decisions until they are ready Being recently sealed in your home is a wonderful opportunity for you to concentrate your energy on developing a vibrant and credible digital marketing strategy. When this whole situation passes, there is still a crowd of potential buyers interested in buying the car. However, only companies that have an effective approach to capturing and convincing potential buyers are successful.

Brand Awareness :

DIGITAL MARKETING STRATEGIES Most businesses in the automobile industry, from supply stores to sales, repair, and rental facilities, typically use basic marketing techniques to visit their company and then pick it up from there. But what is happening now is that the economic downturn resulting from the epidemic is leading to massive unemployment and uncertainty, even among those who are still employed.

Undoubtedly, the current situation is forcing consumers to prioritize their spending habits, so buying a car is less of apriority at this time. This means that your current marketing attitude should change very fast. Do not forget that there will be a gradual increase in vehicle use as lockdown operations are slowly being phased out and millions are returning to work, indicating the potential demand for certain types of automobile services from maintenance, service, or repair. Most car buyers or those with automobile service requirements can be sure that they will explore and consider their options using the internet. However, only brands with a significant voice among these individuals can benefit from any need for automobile services.

So, if potential buyers and customers need any automobile product and/or service that your business offers, you want your automobile company to be on their minds. The best way to achieve this is through an adaptive and responsive online marketing strategy. Therefore, by making the voice consumer role an invaluable and valuable component, you need to develop provocative messages through effective digital marketing channels. Specify the current situation Car buyers or essential employees in need of an automobile product or service will use the Internet to search for automobile-related service providers. For your business to be an outlet for these automobile-related products or services, you need to establish and maintain a presence in the digital space. In addition, through digital marketing, you can create and deliver information-based online messages that speak directly to potential buyers and customers of your business, a new approach to providing services to customers during the currentcrisis.Forexample,usinganeffectivedigitalmarketingchanneland the right message can inform people about your business transition to deliver products online or use alternative service delivery methods If you cannot walk or visit your stores, it's an incredible way to let consumers know that they still have access to the automobile products and services they need. To ensure the safety of your employees and customers who want to go to the store, it would be a great idea to include the steps you take in your company.

CONCLUSION :

From this study we can conclude that Tata Motors Excel Vehicles is a well-organized company providing tremendous facilities and services to its customer. I have completed there search work on Digital Marketing Strategies adopted by Tata motors excel vehicles Kolhapur. During this period, I have learnt the importance of digital marketing in an organization.

Digital marketing helps promoting business products and services across the internet and is very cost efficient and the company has a great online presence that includes social media and company's website which helps to lead generations/conversion of customers from online visitors to an actual physical customeral so it increases brand awareness online.

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ई – लोकशाही संकल्पना आणि आव्हाने

डॉ.आण्णासाहेब हरदारे
सहयोगी प्राध्यापक,
राज्यशास्त्र विभाग, शिवराज कॉलेज, गडहिंग्लज

प्रस्तावना

ई–लोकशाही (इलेक्ट्रॉनिक आणि लोकशाही या शब्दांचे मिश्रण), ज्याला 'डिजिटल लोकशाही' किंवा 'इंटरनेट लोकशाही' म्हणूनही ओळखले जाते.ज्यावेळी राजकीय व्यवस्था आणि प्रशासन आपल्या प्रक्रियेत माहिती आणि संप्रेषण तंत्रज्ञान (ICT) वापरते त्याला ई – लोकशाही म्हणतात. (१) ई– लोकशाही (डिजिटल लोकशाही) हा शब्द 'स्टीव्हन क्लिट' यांनी सर्वप्रथम वापरला. आज २१व्या शतकातील राज्यव्यवस्था आणि प्रशासन ICT चा वापर करून, ई–लोकशाही, नागरी तंत्रज्ञान आणि ई–गव्हर्नमेंट सारख्या पैलूंसह लोकशाही वाढविण्याचा प्रयत्न करते आहे. तसेच इलेक्ट्रॉनिक लोकशाही (ई–लोकशाही) विविध प्रकारच्या परस्परसंवादी साधनांचे वर्णन करते जे विद्यमान आणि उदयोन्मुख मीडिया स्त्रोतांना एक मंच म्हणून समोर येते. लोकशाही मधील सार्वजनिक सदस्य जे देश,राज्य आणि जागतिक स्तरावरील निर्णयावर मते व्यक्त करण्यास आणि त्यांच्या समुदायावर प्रभाव पाडण्याचा प्रयत्न करतात. इलेक्ट्रॉनिक लोकशाही जुन्या तंत्रज्ञानाद्वारे जसे की टेलिव्हिजन वृतपत्रे आणि रेडिओ यांच्या जागी नवीन तंत्रज्ञान जसे की इंटरनेट, वेबसाईट, फेसबुक ,इमेल, गुगल फॉर्म, सेल फोन आणि इलेक्ट्रॉनिक मतदान प्रणालीद्वारे प्राप्त केली जाऊ शकते.

संशोधन उद्देश

१. ई– लोकशाही संकल्पना अभ्यासणे.
२. ई–लोकशाहीचे महत्व अभ्यासणे.
३. ई–लोकशाही समोरील आव्हाने अभ्यासणे.

संशोधन पद्धती

सदर संशोधन पेपरसाठी साहित्याच्या दुय्यम साधनाचा वापर केला आहे. यामध्ये संबंधित विषयावर लिहिलेले संदर्भ ग्रंथ, पुस्तके, मासिके वृतपत्रे आणि इंटरनेट चा वापर करण्यात आला आहे.

विषय विवेचन

जगातील भिन्न लोकशाही संरचनांमध्ये विविध अनुप्रयोगांचा समावेश असलेली संकल्पना म्हणून ई–लोकशाहीचा उदय झाला. ई–लोकशाही चा राजकीय मानदंड आणि सार्वजनिक सहभागावर महत्त्वपूर्ण प्रभाव पडतो. लोकशाहीच्या सैद्धांतिक शोधातून आणि तंत्रज्ञानाद्वारे सामाजिक आव्हानांना सामोरे जाण्यासाठी व्यावहारिक पुढाकारातून ही संकल्पना उदयास आली आहे. त्याच्या अंमलबजावणीची व्याप्ती आणि पद्धत बहुधा समाजाने स्वीकारलेल्या लोकशाहीच्या विशिष्ट स्वरूपावर अवलंबून असते, अशा प्रकारे लोकशाहीची अंतर्गत गतिशीलता आणि बाह्य तांत्रिक घडामोडी या दोन्हींद्वारे ई– लोकशाही आकार घेते.

ई– लोकशाही सहभागात्मक लोकशाहीचा प्रयोग

सहभागी लोकशाही हा सरकारचा एक प्रकार आहे, ज्यामध्ये नागरिक निवडून आलेल्या प्रतिनिधींद्वारे न करता त्यांच्या जीवनावर परिणाम करणारे राजकीय निर्णय आणि धोरणांमध्ये वैयक्तिकरित्या आणि थेट भाग घेतात. (३) लोकसहभाग या संदर्भात, राजकारणाच्या क्रियाकलापांमध्ये जनतेचा समावेश आहे. ही कोणतीही प्रक्रिया असू शकते जी जनतेला थेट निर्णय घेण्यामध्ये गुंतवून ठेवते आणि त्याच्या प्रत्यादानाचा विचार करते. भारतात ई लोकशाहीचा प्रयोग

तत्कालीन पंतप्रधान श्री.पी. व्ही, नरसिंह राव यांच्या काळात झाल्याचे आपल्याला पाहायला मिळते. १९९१ च्या जागतिकीकरणाच्या रेट्यातील सहभाग आणि पारदर्शकता या संकल्पने मुळे ई– लोकशाहीची संकल्पना समोर आली. ई. लोकशाही समर्थकांचा असा युक्तिवाद आहे की निर्णय प्रक्रियेत पारदर्शकता वाढवून, ई–लोकशाही सर्व नागरिकांना

कार्यवाहीचे निरीक्षण आणि समजून घेण्यास सक्षम बनवू शकते. आणि त्याची व्याप्ती अमर्याद असल्याने सहभागी लोकशाहीचा प्रयोग यशस्वी झाला आहे. अलिकडच्या वर्षांत, सोशल मीडियामुळे सहभागी लोकशाहीच्या आचरणात बदल होत आहेत. भिन्न दृष्टिकोन असलेले नागरिक प्रामुख्याने हॅशटॅग वापरून संभाषणात सामील होऊ शकतात. सार्वजनिक हित आणि सहभागाला प्रोत्साहन देण्यासाठी, स्थानिक सरकारांनी सार्वजनिक अभिप्रायावर आधारित निर्णय घेण्यासाठी सोशल मीडियाचा वापर सुरू केला आहे. (४) वापरकर्त्यांनी स्थानिक गरजा अधोरेखित करण्यासाठी ऑनलाइन समित्या देखील आयोजित केल्या आहेत आणि नागरिक आणि शहरातील एजन्सींसोबत काम करणारे बजेट प्रतिनिधी नियुक्त केले आहेत. (५) तसेच, त्यांच्याकडे दुर्लक्षित डेटा, दृष्टीकोन किंवा मते असल्यास, ते अर्थपूर्ण योगदान देऊ शकतात, हे योगदान केवळ अनौपचारिक डिस्कनेक्ट केलेल्या चर्चेच्या पलीकडे आहे; हे देशाचे कायदे प्रस्ताव, विकास आणि वास्तविक निर्मितीमध्ये नागरिकांच्या सहभागास सुलभ करते, अशाप्रकारे, ई–लोकशाहीमध्ये क्राउडसोर्स केलेले विश्लेषण अधिक थेट धोरण निर्मिती प्रक्रियेमध्ये समाविष्ट करण्याची क्षमता आहे.

ई- लोकशाही पारदर्शक लोकशाहीचा प्रयोग

ई–लोकशाहीमध्ये प्रातिनिधिक आणि प्रत्यक्ष लोकशाही या दोन्ही घटकांचा समावेश होतो. प्रातिनिधिक लोकशाहीमध्ये जे बहुतेक आधुनिक प्रणालींचे वैशिष्ट्य आहे, कायदा बनवणे, धोरण तयार करणे आणि नियमांची अंमलबजावणी करणे यासारख्या जबाबदाऱ्या निवडून आलेल्या अधिकाऱ्यांवर सोपवल्या जातात. हे थेट लोकशाहीपेक्षा वेगळे आहे, जिथे नागरिक स्वतः ही कर्तव्ये पार पाडतात. या सर्व माहिती वेबसाईट, इंटरनेट च्या माध्यमातून खुल्या केल्या जातात त्यामुळे राजकीय व्यवस्थेत आणि प्रशासनात पारदर्शकता येते. सरकार आणि प्रशासन मार्फत कोणतीही माहिती लपवली जात नाही. सर्व माहिती सार्वजनिक केली जाते. ई–लोकशाही सुधारणांच्या प्रेरणा वैविध्यपूर्ण आहेत आणि त्यांच्या वकिलांचे अपेक्षित परिणाम प्रतिबिंबित करतात. काहींचे उद्दिष्ट लोकांच्या हिताशी अधिक जवळून सरकारी कृती संरेखित करणे, लोकप्रियता प्रमाणे, मीडिया, राजकीय पक्ष आणि लॉबीस्टचा प्रभाव कमी करणे यासाठी त्याचा उपयोग होतो.

ई- लोकशाही कमीखर्चिक लोकशाहीचा प्रयोग

ई– लोकशाही ही आधुनिक लोकशाहीचे प्रतिक आहे. यामध्ये तंत्रज्ञानाचा वापर केला जातो.म्हणजेच शासन(सरकार) हे प्रशासन, नागरिक आणि इतर घटकाशी संपर्क साधताना तंत्रज्ञानाचा वापर करते. इलेक्ट्रॉनिक लोकशाही जुन्या तंत्रज्ञानाद्वारे जसे की टेलिव्हिजन, वृतपत्रे आणि रेडिओ यांच्या जागी नवीन तंत्रज्ञान जसे की इंटरनेट, वेबसाईट, फेसबुक, इमेल, गुगल फॉर्म, सेल फोन आणि इलेक्ट्रॉनिक मतदान प्रणालीद्वारे प्राप्त केली जाऊ शकते.त्याचा खर्च सर्वात कमी आसतो. सरकारचे प्रत्येक आदेश, निर्णय, कायदे हे इंटरनेट च्या माध्यमातून सर्वांसमोर पोचवले जातात.त्यामुळे कागदाचा खर्च, पाठवणीचा खर्च (पोस्टेज खर्च) आणि इतर खर्च वाचतात. तसेच कमी वेळामध्ये सर्व माहिती जास्तीत जास्त लोकांच्या प्रयत्न पोचते.

ई – लोकशाहीचे फायदे

१. नियोजन आणि निर्णय घेण्यावर प्रभाव टाकण्यासाठी वेबसाइटवर, ई–मेलद्वारे किंवा इतर इलेक्ट्रॉनिक संप्रेषण पर्यायांद्वारे त्यांची मते व्यक्त करण्यात अधिकाधिक लोकांना गुंतवून ठेवण्याचा हेतू आहे.
२. प्रस्ताव आणि समस्यांबाबत निर्णय घेणाऱ्या संस्थांना पाठवलेल्या टिप्पण्यांद्वारे त्यांच्या लोकशाही अधिकारांचा वापर करणाऱ्या लोकांची संख्या आणि विविधता वाढवते.
३. एक आभासी सार्वजनिक जागा तयार करते जिथे लोक संवाद साधू शकतात, समस्यांवर चर्चा करू शकतात आणि कल्पना सामायिक करू शकतात.
४. नागरिकांना त्यांच्या सोयीनुसार सहभागी होण्याची मुभा देते.
५. सापेक्ष सहजतेने आणि कमी खर्चात खूप मोठ्या प्रेक्षकांपर्यंत पोहोचू शकते. परस्पर संवाद सुलभ करते.
६. प्रभावीपणे आणि विकृतीशिवाय मोठ्या प्रमाणात माहिती प्रसारित करते.

ई – लोकशाहीसमोरील आव्हाने

- ऑनलाइन नसलेल्यांचा सहभाग होऊ शकत नाही.
- भारतासारख्या ग्रामीण भागातील लोकांच्याकडे ई–लोकशाही साठी आवश्यक आसे तंत्रज्ञान उपलब्ध नाही.
- ग्रामीण भागात अजून इंटरनेट सुविधा आणि नेटवर्क अभाव आहे.

- **भारतात आजूनही आवश्यक तेवढी तांत्रिक साक्षरता नाही.**
- **निकालांमध्ये फेरफार केला जाऊ शकतो म्हणून ऑनलाइन मतदानाच्या निकालांचा काळजीपूर्वक विचार केला पाहिजे.**
- **इनपुटच्या प्रचंड प्रमाणात संश्लेषण करण्यासाठी आणि इनपुटचा अर्थ समजण्यासाठी महत्त्वपूर्ण वेळ आणि मेहनत आवश्यक आहे.**

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AKILAKAM(THE KEYLESS LOCK)
SUB THEME: INTERNET OF THINGS

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ABSTRACT

As we know always use of non-conventional methodologies over conventional methodologies has always been superior and most efficient, cost-effective, and easy to handle. Hence we have decided to use biometric data to operate the lock which can be way easier to handle than the conventional locks used. The components involved are Arduino Nano, Fingerprint Sensor GT511C3, Solenoid 5V for actuation, and Battery 5V for power supply. Arduino IDE software is used for programming the required operation to be executed by the software by using the actuator Solenoid 5v. The outer frame of the lock is designed in the software CATIA. The design of the lock is done by considering various dimensional constraints, Ergonomic considerations, and manufacturing availability. As the component to be made is a prototype of our project we have decided to manufacture the Frame of the lock by 3D printing. The method used for manufacturing the component in 3D printing is Fused Deposition Molding (FDM). This is the easy efficient and cost-effective source available.

INTRODUCTION

Biometrics has been used as a reliable authentication system for a long time now. Today there exist complex biometric systems that can identify a person by his heartbeat rhythm or even by his DNA. Other feasible methods include voice recognition, Face recognition, Iris scanning, and Fingerprint Scanning. Which fingerprint recognition is the most widely used method, we can find it from a simple attendance system to smartphones to Security checks and much more. In this project, we will use the popular GT511C3 Finger Print Sensor (FPS) with Arduino. The GT511C3 is more advanced with high accuracy and faster response time, so we will use it with Arduino to enroll fingerprints on it and then detect the fingerprints whenever required.

LITERATURE REVIEW

After referring to various papers and research material gathered through various sources There are many FPS available to execute the required operation.

The idea amplifies the constructional features of a conventional lock making it a more secure and reliable product. The part of innovation is correlated with the use of compact components thus reducing the overall footprint of the project entirety thus the project can be defined as a stand-alone product rather than a project that can be implied in the real world.

PRINCIPLE

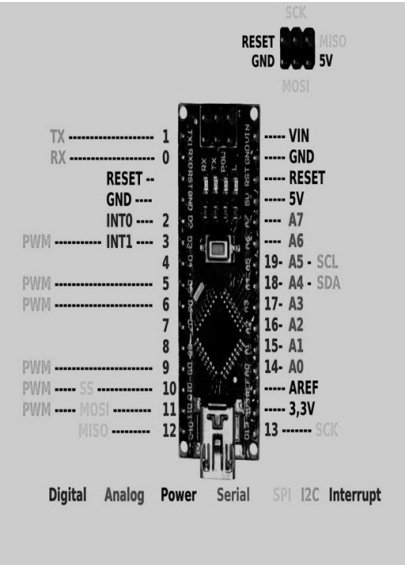
The main purpose of us doing this as a project is that the use of the conventional padlocking system is older and needs a drastic change in its operation by optimizing its conventional mechanical system and conversion into the new modified system by use of modern MECHATRONICS concept. The project comprises mechanical and electronic systems used to enhance the operation of the conventional padlocks and convert them into KEYLESS LOCK. Application of this mechatronic concept makes a drastic advancement in the operation of the conventional padlock system making it safer, easy to operate, and more user-friendly.

HARDWARE USED

The hardware of the project contains the following components:

- Arduino Nano
- GT511C3 Finger Print Sensor
- Connecting Wires
- Solenoid 5v
- Battery 9v

ARDUINONANO



UnderstandingArduinoNano

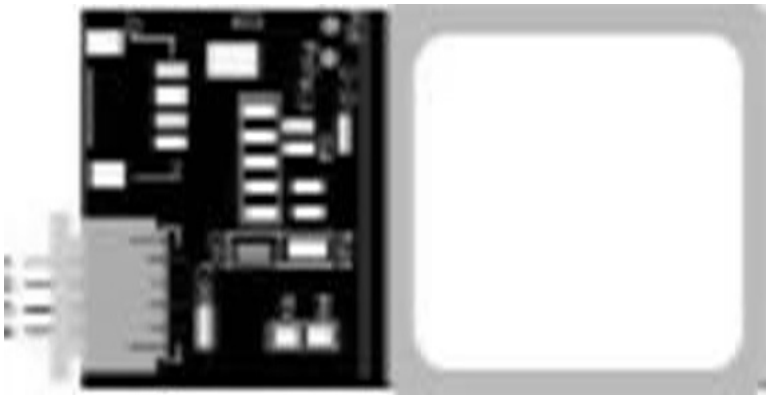
The Arduino board is designed in such a way that it is very easy for beginners to get started with microcontrollers. This board especially is breadboard friendly and is very easy to handle the connections.

- Arduino Nano is a small, compatible, flexible, and breadboard-friendly Microcontroller board, developed by Arduino. cc in Italy, based on ATmega328p (Arduino Nano V3.x) / Atmega168 (Arduino Nano V3.x).
- It comes with the same functionality as in Arduino UNO but is quite small.
- It comes with an operating voltage of 5V, however, the input voltage can vary from 7 to 12V.
- Arduino Nano Pinout contains 14 digital pins, 8 analog Pins, 2 Reset Pins & 6 Power Pins.
- Each of these Digital & Analog Pins is assigned with multiple functions but their main function is to be configured as input or output.
- They act as input pins when they are interfaced with sensors, but if you are driving some load then use them as output.
- Functions like pin Mode () and digital Write() are used to control the operations of digital pins while analog Read() is used to control analog pins.
- The analog pins come with a total resolution of 10bits which measure the value from zero to 5V.
- Arduino Nano comes with a crystal oscillator of frequency 16 MHz It is used to produce a clock of precise frequency using constant voltage.
- There is one limitation using Arduino Nano i.e. it doesn't come with a DC power jack, which means you cannot supply an external power source through a battery.
- This board doesn't use standard USB for connection with a computer, instead, it comes with Mini USB support.
- Tiny size and breadboard-friendly nature make this device an ideal choice for most of the applications where the size of the electronic components is of great concern.

SOLENOID5v

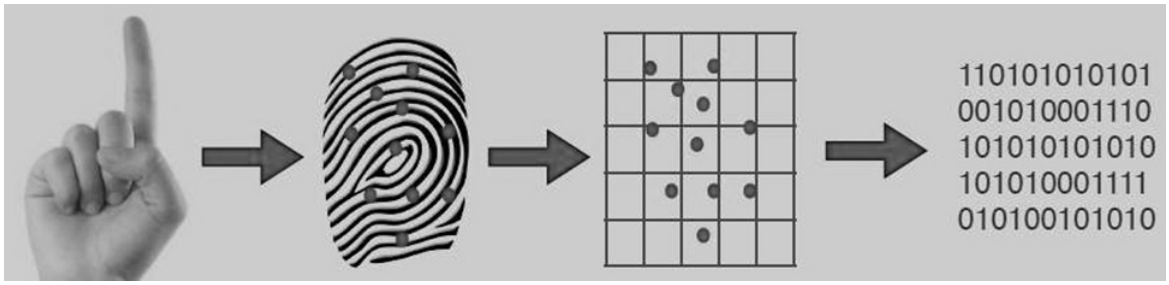
Solenoids are a great way to induce linear motion for pushing, pulling, or controlling switches and levers. This smaller solenoid is designed to work directly with 5V which makes it a great match for embedded projects. It has a throw of about 4.5mm and 2 M2 mounting holes on the body.

GT511C3Gt511c3WhatIsIt?



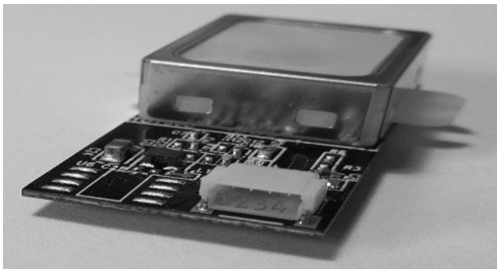
It has an optical sensor mounted on a small circuit board. The optical sensor scans a fingerprint and the microcontroller (Arduino) and software (Code/Program) process (understand) the fingerprint data.

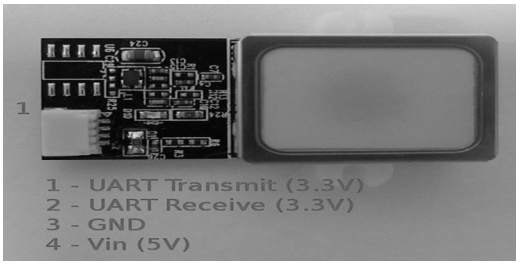
- Howopticalscanningdoestakeplace?



Optical as its name implies the optical sensor has a scanner type of camera that scans the fingerprint of the consumer and stores it in the Arduino software.Which further uses it for further operations.

GT511C3





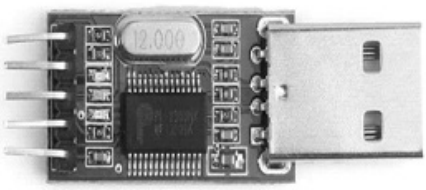
Pins1and2are3.3V TTLpinsusedto communicatewiththeFPSmodule. Thedefaultbaudrateis9600bpsafterpoweron	
Pin1	transmitpinoftheUARTontheFPS(UARTTx)andtransmitsalogichigh of up to amaximumof3.3V.
Pin2	thereceive pin oftheUART on theFPS(UART Rx) and canreceivea logichighlevelofupto3.3V. Thevoltagelevelsenttothispinfromamicrocontrollerneedstobereduced whenworkingwith5Vmicrocontrollers.
Pin3	commonGND(Ground)
Pin4	5V input

USB-UART

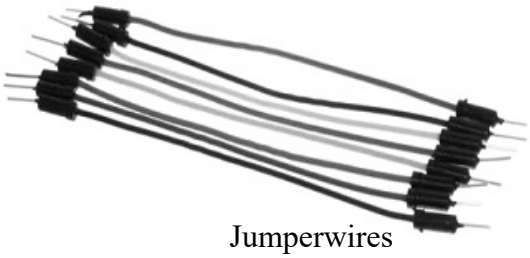
SerialtoUSBPL2303USB-UART

Used for interfacing the FPS with the PC for Enrollment, deletion, and verification of fingerprint through an SDK.

The components used include a serial to USB connector breadboard and jumper wires.



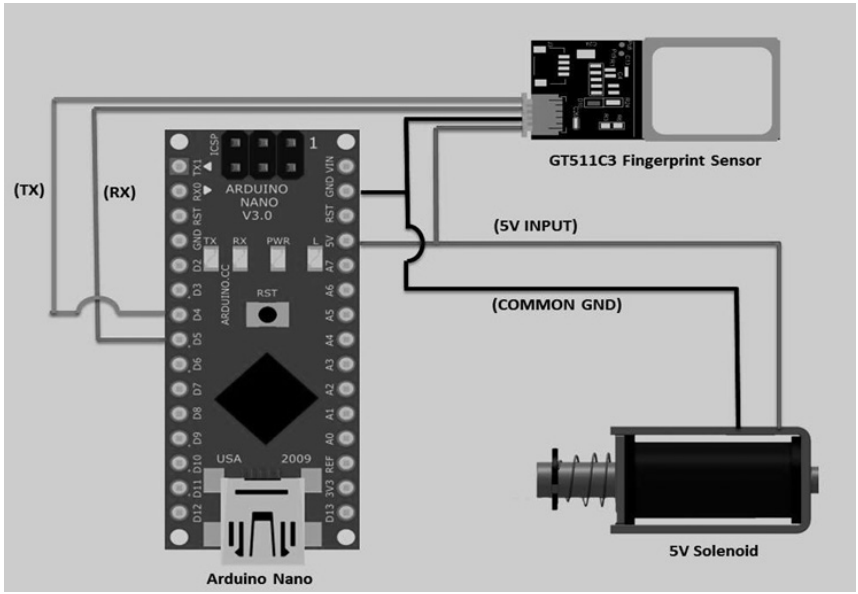
SerialtoUSBPL2303USB-UART



Jumperwires

ConnectingwithArduinoNANO

ThecircuitdiagrambelowshowsthefingerprintscannermoduleconnectedtoanArduinoNano.



PROGRAMMINGOFARDUINO

TheFPS(FingerPrintScanner)hasabacklightLEDthatcanbepoweredon oroff.

AsamplecodeforblinkingtheFPSona giventimeIntel

```
#include"FPS_GT511C3.h"#include"SoftwareSerial.h"
FPS_GT511C3fps(5,4);
voidsetup
S e r i a l . b e g i n ( 9 6 0 0 ) ; / / d e f a u l t b a u d r a t e f p s . U s e S e r i a l D e b u g = t r u e ; / /
somessagecanbedisplayedonserialcom.
fps.Open();
}
voidloop()
{
fps.SetLED(true);       //FPSBlinkLEDTestdelay(1000);
fps.SetLED(false);delay(1000);
}
```

PROGRAMMINGOFARDUINO

Mainprogram run(Wellthought2.0)

```
#include "FPS_GT511C3.h“#include "SoftwareSerial.h"intsolenoidPin=3;
FPS_GT511C3fps(6,9);//(ArduinoSS_RX=pin4,ArduinoSS_TX=pin5)
voidsetup()
{
Serial.begin(9600);//setupArduino'shardwareserialUARTdelay(100);
fps.Open(); //send serial command to initialize fpsfps.SetLED(true);//
turnonLEDsofpscanseefingerprintpinMode(solenoidPin, OUTPUT);pinMode(LED_
BUILTIN,OUTPUT);
}
voidloop()
{
//Identifyfingerprinttestif(fps.IsPressFinger())
{
fps.CaptureFinger(false);intid=fps.Identify1_N();
if(id<200)
{digitalWrite(LED_BUILTIN,HIGH);//turnthe LED on (HIGH is the voltage level)delay(1000);
second
digitalWrite(LED_BUILTIN,LOW);
LEDoffbymakingthevoltageLOWdelay
```

PROGRAMMINGOFARDUINO

Mainprogram run(Wellthought2.0)

```
Serial.print("VerifiedID:");Serial.println(id);
}
else
{//if unable to recognizeSerial.println("Fingernotfound");
}
}
else
{
Serial.println("Pleasepressfinger");
}delay(100);
}
```

PRINCIPLEOFWORKING

"Fingerprint scanning+ Program Run= Execution of Task(locking/unlocking)"

Our project runs on above mentioned tagline.

The project is quite simple in operation, When the one complete cycle of the project loop is covered the lock is in the locked condition.

When the fingerprint is placed over the Optical scanner while the light of the scanner is turned off the scanner scans the fingerprint of the finger placed over the screen.

After a set delay time, it will crosscheck the fingerprint recorded with the saved fingerprint.

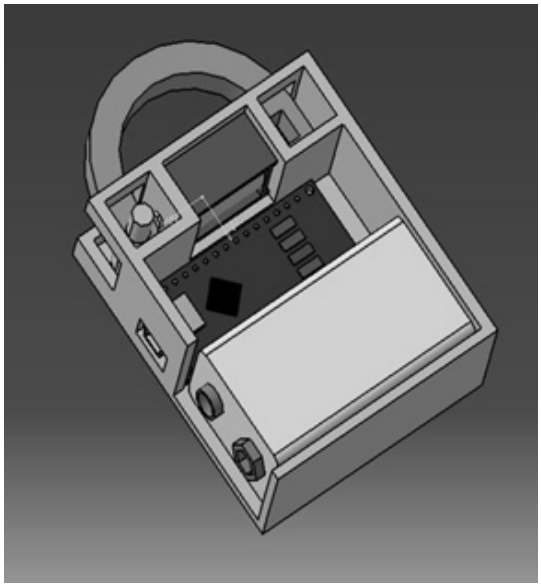
The program (Well thought) will run as mentioned above. The program will be executed.

If the fingerprint matches with the saved fingerprint, then the Arduino will actuate the solenoid.

The solenoid will actuate and the lock will be opened. The delay time for the lock to stay open is 5 seconds. After the solenoid will actuate to its original position.

Mountingofcomponents

Theapprox. imageofthefinalproductisdisplayedbelow.



Theentirecircuitryis placedintoacompactcustomcasemadeusing3DPrintingThe design has been developed using CATIA V5R16 CAD software and processedusingCURA3Dslicingsoftware. The FDM (Fused deposition Molding) Is used for manufacturing the components.FDMsarethe mostefficientandcost-effective method to manufacture 3D-printed components.

COSTANALYSIS

Sr. No.	Content	Cost Rs.
1	ARDUINONANO	400/-
2	GT511C3FINGERPRINTSENSOR	2200/-
3	SOLENOID5V	500/-
4	BATTERY9V	80/-
5	USBTOSERIAL&CONNECTINGWIRES	200/-
8	TOTAL	3380/-

CONCLUSION

- Despite the disadvantages and limitations of mechatronics in the optimization of conventional systems the process advances the mechanism, makes operating easy, more user-friendly, and increases efficiency.
- While conducting the project we undergo learning of programming, coding, and operation of

audio in the field of mechatronics.

- We also undergo the process of 3D printing manufacturing process.

FUTURESCOPE

With appropriatedesigning and custom circuits,the footprint canbe reduced and thisfeasibledesigncanbeproducedcansoldatamuchcheaperprice. Theuseofconventionallockswillbemodifiedwithmoresecuritywhenusedin the application. Withappropriatemanufacturing,morequalitycanbeachieved.

REFERENCE

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2. *https://en.wikipedia.org/wiki/Remote_keyless_system*
3. *https://en.wikipedia.org/wiki/Arduino*
4. *https://en.wikipedia.org/wiki/Solenoid*
5. *https://en.wikipedia.org/wiki/Fingerprint_scanner*
6. *https://en.wikipedia.org/wiki/USB_hardware*

कर्मवीर विठ्ठल रामजी शिंदे शिक्षण संस्था, गडहिंग्लज

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गडहिंग्लज, जि. कोल्हापूर

NAAC 'A' Grade (CGPA - 3.15)

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