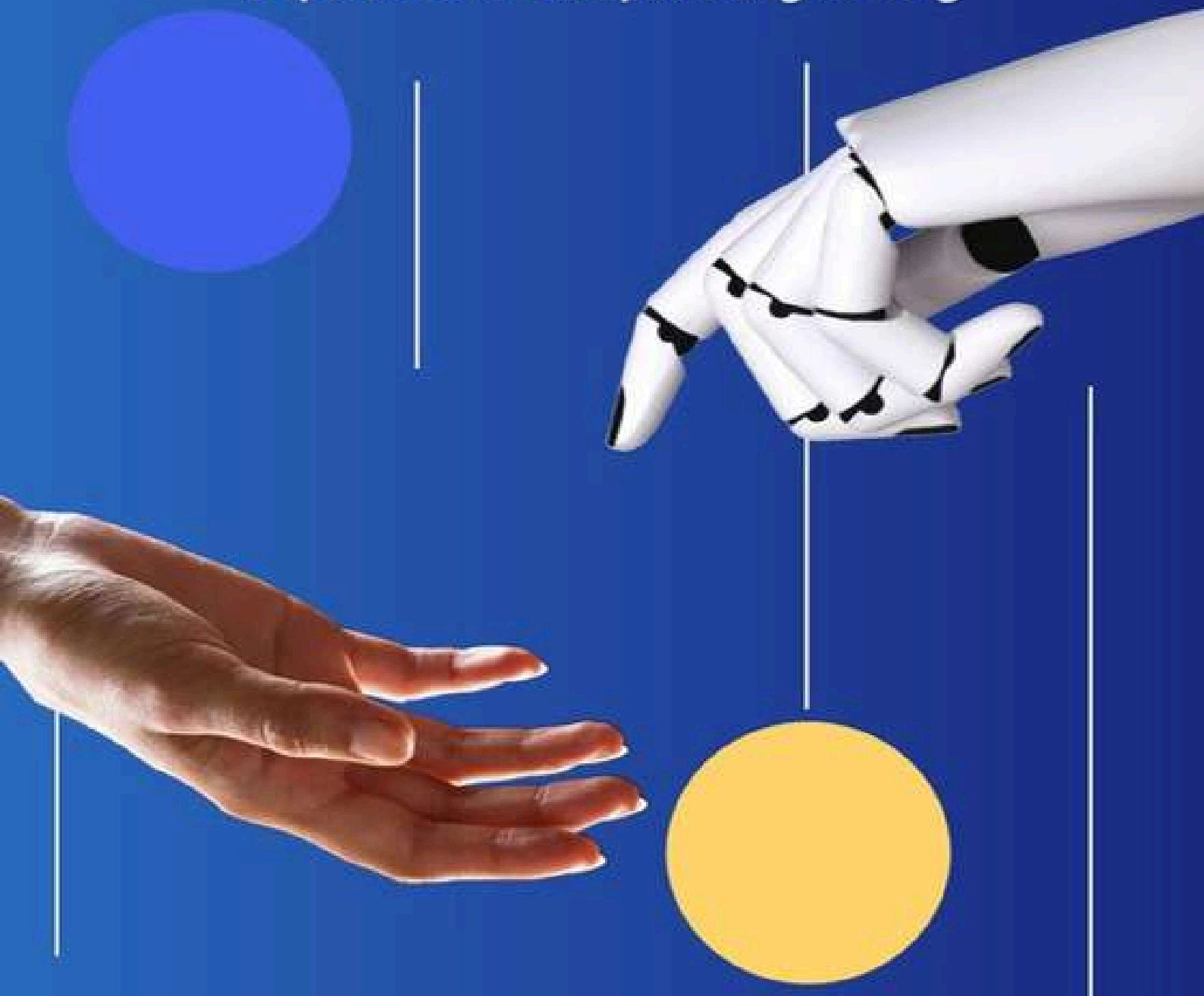
R. C. PATEL
INSTITUTE OF TECHNOLOGY

An Autonomous Institute

Department of Computer Engineering



The TechnoVerse

Technical Magazine for A.Y. July 2023 - June 2024

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DEPARTMENT OF COMPUTER ENGINEERING

R. C. PATEL
INSTITUTE OF TECHNOLOGY
An Autonomous Institute

Department of Computer Engineering

Vision of the Department

To provide high quality Computer Engineering education with socio-moral values.

Mission of the Department

M1 To provide state-of-the-art ICT based teaching-learning process.

M2 To groom the students to become professionally sound computer engineers to meet emerging needs of industry and society.

M3 To make the students employable professionals by inculcating ethical values.

Program Educational Objectives (PEOs) of the Department

PEO1 Graduates will have technical proficiency, lifelong learning skills to become a professional, entrepreneur and leader.

PEO2 Graduates will function effectively in diverse cultural and professional environments, respecting societal perspectives and inclusive practices.

PEO3 To foster ethical and social values to be socially responsible human being.

Program Specific Outcomes (PSOs)

PSO 1 Apply programming principles, algorithms, and data structures to design efficient software solutions and intelligent systems using structured, object-oriented, and emerging technologies**.**

PSO 2 Design, develop, and deploy responsive web and mobile applications integrated with databases and cloud platforms, leveraging modern frameworks and tools for digital transformation.

DEPARTMENT OF COMPUTER ENGINEERING

ABOUT THE DEPARTMENT

Established in 2001, the Department of Computer Engineering at R. C. Patel Institute of Technology (RCPIT), Shirpur, offers a dynamic and industry-aligned education that promotes innovation, research excellence, and professional growth. The department offers a B.Tech. undergraduate program, a postgraduate M.E. program since 2010, and a Ph.D. research program recognised by Dr. Babasaheb Ambedkar Technological University, Lonere. Supported by a team of qualified and experienced faculty members, including doctoral degree holders and faculty actively engaged in research, the department fosters a strong academic and research-oriented culture. With a wide alumni base placed in reputed industries and academic institutions worldwide, the department maintains strong professional and industry connections and has consistently demonstrated excellence through quality publications, patents, copyrights, and outstanding academic results. A robust learning environment with modern laboratories, ICT-enabled classrooms, high-speed internet connectivity, and advanced computing infrastructure supports effective teaching and learning. Innovative practices such as blended learning through LMS platforms, project-based learning, add-on certification courses, mentoring systems, active student technical communities, industry collaborations, and entrepreneurship initiatives enhance students' technical competence, communication skills, and lifelong learning abilities. Through outcome-based education and continuous improvement practices, the department is committed to developing skilled engineers, innovative problem solvers, and responsible global citizens capable of meeting global technological challenges.

DEPARTMENT OF COMPUTER ENGINEERING

FROM Director'S DESK

Prof. Dr. Jayantrao Bhaurao Patil
Director, RCPIT, Shirpur

Dear Students, Faculty Members, Staff, Parents, and Esteemed Stakeholders,

I am pleased to reflect on the Academic Year 2022–2023, which marked steady academic progress and continued commitment to quality education at R. C. Patel Institute of Technology, Shirpur.

Throughout the year, the institute remained focused on promoting academic excellence, innovation, and professional ethics. Our dedicated faculty members played a key role in delivering effective teaching and mentoring, while continuously enhancing their academic and professional competencies.

Students actively participated in academic and co-curricular activities, which encouraged skill development, teamwork, and leadership. These experiences complemented classroom learning and helped prepare them for future professional challenges.

We also continued efforts to strengthen industry interaction and promote skill-oriented learning, ensuring our students are Well-prepared for a dynamic and competitive environment. I sincerely appreciate the efforts of our faculty, staff, students, and the continued support of parents and stakeholders. Let us move forward with confidence and determination to achieve greater milestones in the years ahead.

DEPARTMENT OF COMPUTER ENGINEERING

FROM HOD'S DESK

Prof. Dr.Rajnikant B.Wagh
HOD (Computer Engineering)

It fills me with immense joy and a deep sense of privilege to share a few words as you explore the pages of the magazine, "TechnoVerse". The Computer Department strives to empower students to harness the best from their surroundings, transforming the knowledge they gain into a ladder for achieving greater heights. It is often through collective efforts that aspirations are discovered and realized.

I take pride in being part of the journey that shapes and nurtures students. In the Computer Department, we aim to develop every facet of a student's personality. I would like to take this opportunity to extend my heartfelt gratitude to all the faculty members and auxiliary staff for their dedicated contributions to making this edition a success.

DEPARTMENT OF COMPUTER ENGINEERING

MESSAGE BY EDITORIAL BOARD MEMBER

I am pleased to present the Department Magazine of Computer Engineering for the academic year 2023–24, which showcases the department's sustained commitment to developing students' technical proficiency, creativity, collaborative skills, and effective communication.

Throughout the academic year, students actively participated in academic pursuits, project work, technical documentation, and various skill-development initiatives. The contributions featured in this edition highlight student engagement with emerging technologies, innovation-driven thinking, and professional growth, in line with the objectives of outcome-based education.

I sincerely thank the student editorial team, contributors, and faculty members for their dedication and coordinated efforts in bringing out this publication. I trust that this magazine will encourage students to strive for excellence, embrace lifelong learning, and uphold ethical standards in their professional journey.

Prof. Vipul D. Punjabi
Editor
Assistant Professor
Department of Computer Engineering

DEPARTMENT OF COMPUTER ENGINEERING

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DEPARTMENT OF COMPUTER ENGINEERING

FACULTY ARTICLES

AI and tackling the sustainability challenge

Ms. Pallavi A. Agrawal

Assistant Professor
Computer Department

After decades of research since the end of the Second World War, the promise of Artificial Intelligence (AI) is now coming true. Applications of AI in language, genetics, robotics, finance, medicine, social media, etc., have the potential to recalibrate how humans work, reshape human values, and indeed redefine what it means to be human. On the one hand, AI will democratize the benefits of cutting-edge technologies by bringing them to everyone's palm through smartphones and wearables. Already, we have been witnessing how AI tools are helping us in myriad ways through apps used for navigation, weather prediction, editing photos, converting speech-to-text, writing essays, finding partners, etc. AI will continue to make our lives easier and more productive.

However, the development of advanced AI models poses a new sustainability dilemma. Consider the fact that training an AI model like ChatGPT-4 a single time has a carbon dioxide emissions footprint equal to many thousands (even hundreds of thousands) of human lifetimes, depending on the model's size. Now think about how different organizations are likely to train many thousands of such models in parallel! This is limited to only training the model. Another estimate says that each query to the model consumes four to five times more amount of energy than querying a search engine. As India prepares itself to jump on the AI bandwagon, it will require even more robust sources of energy to meet the demands of these models. India's heavy dependence on fossil fuels will exacerbate the situation as power-hungry AI models will lead to more carbon emissions into our atmosphere. As a result, our ecologically fragile regions will face the effects of more extreme weather events. This is not to suggest that Indian companies and universities should not work on advanced AI models. Of course, India must be at the forefront of advances in AI.

This is not a revolution we would want to miss at any cost. The recently launched ambitious AI Mission by the Government of India has earmarked more than 10,000 crore rupees for the development of AI infrastructure.

Among other initiatives, this mission aims at stimulating the establishment of physical infrastructure such as data centers which are generally huge (occupying the same area as many football fields combined). These data centers across the world have already overtaken the aviation industry by accounting for 2.5 to 3.7 percent of global carbon emissions. Only a few of the data centers across the world are presently "green" data centers, i.e., they derive their energy requirements through renewables.

For the foreseeable future, there will be a multifold increase in the demand for such data centers to develop more powerful AI algorithms. One of the ways policymakers can intervene in this regard is by forming policies that nudge AI developers into making more energy-efficient models by optimizing the model architecture and processors. For example, the open-access BLOOM model, developed by the BigScience project in France, has a much lower carbon footprint despite being of a similar size as the ChatGPT-3 model.

With the Government of India's stated goal of making India energy independent by 2047, there is already an appreciation of the policy to shift towards renewables. In this regard, at the Raisina Dialogue 2024 conference last week, the former CEO of NITI Aayog Amitabh Kant made a strong pitch for renewables, especially green hydrogen. Green hydrogen, wind energy, solar energy, or scheduling the timing of running models based on the availability of renewable energy at the time of day — no policy measure must go unexplored while tackling this sustainability challenge. This challenge will keep on demanding more and more attention as we build bigger, better, more intelligible AI models.

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DEPARTMENT OF COMPUTER ENGINEERING

Shape the future with Machine Learning and Pattern Recognition

Dr. Sudarshan S. Sonawane

Assistant Professor
Computer Department

You set an alarm by simply saying, "Hey Google, wake me up at 6:00 AM," and open your eyes to your favourite song. You glance at your phone, and it unlocks, recognizing your face instantly. You make secure online purchases without a second thought. These seamless experiences are powered by Machine Learning and Pattern Recognition (MLPR), technologies that integrate effortlessly into our everyday lives.

The everyday impact of Machine Learning and Pattern Recognition:

The two core fields or technologies are now integral to our daily lives, driving countless innovations.

Machine Learning is behind the chatbots you interact with, predictive text on your phone, and personalized show recommendations on Netflix. It tailors your social media feed to your interests, powers self-driving cars, and even enables medical machines to diagnose conditions by analyzing images.

Pattern Recognition forms the foundation of biometric systems like facial recognition, powers voice assistants that understand and respond to you, and even helps improve earthquake prediction models.

Visualizing the new anchors of technology:

As MLPR continues to advance, these technologies are rapidly becoming the anchors of modern technology. With the power to analyze enormous amounts of data, they not only identify trends but also predict future outcomes with remarkable accuracy. This revolution is transforming industries like healthcare, finance, and automation, driving innovation at an unprecedented pace.

Personalized medicine:

Tailoring treatments to individual patients based on genetic data patterns, improving healthcare outcomes.

Recommendation systems: Enhancing user experience on platforms like Netflix, Amazon, and Spotify by suggesting content based on user preferences and behavior.
Image and speech recognition: Advancing technologies like facial recognition, voice assistants, and smart home devices.
Cybersecurity:
Strengthening defenses by recognizing and responding to patterns that indicate potential cyber threats.
These innovations are not just shaping our present - they are paving the way for a future filled with exciting and dynamic careers.
Understanding MLPR in simple words:
Machine Learning is a subfield of artificial intelligence, defined by MIT Sloan School of Management as the capability of a machine to imitate intelligent human behavior.
Pattern Recognition is the ability of machines to identify patterns in data and use those patterns to make decisions or predictions through computer algorithms.
The key difference: While Pattern Recognition focuses on identifying patterns in data, Machine Learning involves teaching computers to learn from data and improve over time.
Careers in MLPR:
Machine Learning is perhaps the most vibrant area of engineering research today, offering some of the most lucrative career opportunities.

Here are a few options you could consider while choosing a path:
Machine Learning Engineer: Design and implement models that recognize patterns in data, improving automation and predictive capabilities.
Computer Vision Engineer: Develop systems that interpret visual data, such as facial recognition, image classification, and object detection
Natural Language Processing Specialist: Work on algorithms that recognize patterns in text and speech, driving advancements in language translation, sentiment analysis, and chatbots.
Cybersecurity Analyst: Use pattern recognition to detect anomalies and potential threats in network traffic, preventing cyber attacks and fraud
Data Scientist: Analyze large datasets to identify patterns and trends, enabling data-driven decision-making across various industries.

DEPARTMENT OF COMPUTER ENGINEERING

Cybersecurity Challenges in the Digital Era

Mr. Vishal Sharad Thakare

Assistant Professor
Computer Department

In the present digital era, rapid advancements in information and communication technologies have transformed the way individuals, organizations, and governments operate. While digitalization has brought efficiency, connectivity, and innovation, it has also introduced significant cybersecurity challenges. Cybersecurity has become a critical concern due to the increasing dependence on digital platforms, cloud services, smart devices, and data-driven systems.

The growth of the internet, mobile computing, cloud infrastructure, and the Internet of Things (IoT) has expanded the attack surface for cyber threats. Cyberattacks such as malware, ransomware, phishing, denial-of-service attacks, and data breaches have become more frequent and sophisticated. These attacks not only result in financial losses but also compromise sensitive personal and organizational data, affecting trust and privacy.

One of the major cybersecurity challenges is the exponential growth of data. Organizations collect and store massive volumes of data, ncluding personal, financial, and intellectual property information. Protecting this data from unauthorized access, misuse and breaches is a complex task. Weak authentication mechanisms, poor security configurations, and lack of awareness among users further increase vulnerability to cyber threats.

Another significant challenge arises from the widespread adoption of cloud computing. While cloud platforms offer scalability and cost-effectiveness, they also introduce security risks related to data storage, access control, and shared responsibility models. Misconfigured cloud services and insecure APIs often lead to data exposure and unauthorized access. Ensuring robust encryption, identity management, and compliance with security standards is essential in cloud environments.

The emergence of IoT devices has added a new dimension to cybersecurity concerns. Many IoT devices operate with limited computational resources and lack adequate security mechanisms. This makes them easy targets for attackers, leading to large-scale cyber incidents such as botnet attacks. Securing IoT ecosystems requires device authentication, secure communication protocols, and regular firmware updates.

Human factors also play a crucial role in cybersecurity challenges. Social engineering attacks, particularly phishing, exploit human behavior rather than technical vulnerabilities. Lack of cybersecurity awareness and training among users often leads to accidental disclosure of credentials or sensitive information. Therefore, building a strong cybersecurity culture through education and awareness programs is as important as deploying technical solutions.

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DEPARTMENT OF COMPUTER ENGINEERING

Cloud Computing and Secure Data Management

Mr. Manohar Bhika Patil

Assistant Professor
Computer Department

Cloud computing has revolutionized the way organizations store, process, and manage data by providing on-demand access to computing resources over the internet. In the digital era, cloud platforms have become an integral part of information systems in industries, educational institutions, and government organizations. While cloud computing offers scalability, flexibility, and cost efficiency, it also introduces significant challenges related to data security and privacy.

The cloud computing model enables users to access services such as Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS). These service models eliminate the need for extensive physical infrastructure and allow organizations to focus on core activities. However, as data is stored and processed in remote data centers, ensuring secure data management becomes a critical concern, remote data centers, ensuring secure data management becomes a critical concern.

Encryption techniques play a vital role in securing data both at rest and in transit. Strong encryption algorithm , combined with secure key management practices, help prevent data leakage and cyberattacks.

Access control and identity management are equally important aspects of secure data management in the cloud. Implementing robust authentication mechanisms such as multi-factor authentication and role-based access control ensures that only authorized users can access cloud resources. Improper access control policies often lead to data breaches and insider threats, making identity management a cornerstone of cloud security.

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Data Privacy

Rohit Wagh
B. Tech CE II-Year

Data privacy, sometimes also referred to as information privacy, is an area of data protection that concerns the proper handling of sensitive data such as certain financial data and intellectual property data, to meet regulatory requirements as well as protecting the confidentiality and immutability of the data.

Roughly speaking, data protection spans three broad categories, namely, traditional data protection (such as backup and restore copies), data security, and data privacy . Ensuring the privacy of sensitive and personal data can be considered an outcome of best practice in data protection and security with the overall goal of achieving the continual availability and immutability of critical business data.

What are some of the most important technologies for data privacy? Encryption is a way to conceal information by scrambling it so that it appears to be random data. Only parties with the encryption key can unscramble the information. With the increase in dependency on electronic devices, it becomes important to teach people the proper 'netiquettes'. Parents have an important role to play in monitoring their child's behaviour and activity on the internet. It is also important for Access control ensures that only authorized parties access systems and data. Access control can be combined with data loss prevention (DLP) to stop sensitive data from leaving the network. Two-factor authentication is one of the most important technologies for regular users, as it makes it far harder for attackers to gain unauthorized access to personal accounts.

These are just some of the technologies available today that can protect user privacy and keep data more secure.

However, technology alone is not sufficient to protect data privacy.

1. **What are the laws that govern data privacy?**

- As technological advances have improved data collection and surveillance capabilities, governments around the world have started passing laws regulating what kind of data can be collected about users, how that data can be used, and how data should be stored and protected. Some of the most important regulatory privacy frameworks to know include:
- **General Data Protection Regulation (GDPR):** Regulates how the personal data of European Union (EU) data subjects, meaning individuals, can be collected, stored, and processed, and gives data subjects rights to control their personal data (including a right to be forgotten).
- **National data protection laws:** Many countries, such as Canada, Japan, Australia, Singapore, and others, have comprehensive data protection laws in some form. Some, like Brazil's General Law for the Protection of Personal Data and the UK's Data Protection Act, are quite similar to the GDPR
- **California Consumer Privacy Act (CCPA):** Requires that consumers be made aware of what personal data is collected and gives consumers control over their personal data, including a right to tell organizations not to sell their personal data. There are also industry-specific privacy guidelines in some countries: for instance, in the United States, the Health Insurance Portability and Accountability Act (HIPAA) governs how personal healthcare data should be handled. However, many privacy advocates argue that individuals still do not have sufficient control over what happens to their personal data. Governments around the world may pass additional data privacy laws in the future.

2. W**hat are some of the challenges users face when protecting their online privacy?**

- **Online tracking:** User behavior is regularly tracked online. Cookies often record a user's activities, and while most countries require websites to alert users of cookie usage, users may not be aware of to what degree cookies are recording their activities.
- **Losing control of data:** With so many online services in common use, individuals may not be aware of how their data is being shared beyond the websites with which they interact online, and they may not have a say over what happens to their data.
- **Lack of transparency:** To use web applications, users often have to provide personal data like their name, email, phone number, or location; meanwhile, the privacy policies associated with those applications may be dense and difficult to understand.

- **Social media:** Social media posts may reveal more personal information than users realize.
- **Cyber crime:** Many attackers try to steal user data in order to commit fraud, compromise secure systems, or sell it on underground markets to parties who will use the data for malicious purposes. Some attackers use phishing attacks.

3. **What are some of the challenges businesses face when protecting user privacy?**

- **Communication:** Organizations sometimes struggle to communicate clearly to their users what personal data they are collecting and how they use it.
- **Cyber crime**: Attackers target both individual users and organizations that collect and store data about those users. In addition, as more aspects of a business
  become Internet-connected, the attack surface increases.
- **Data breaches:** A data breach can lead to a massive violation of user privacy if personal details are leaked, and attackers continue to refine the techniques they use to cause these breaches.
- **Insider threats:** Internal employees or contractors might inappropriately access data if it is not adequately protected.

4. **Why is Data Privacy important?**

- In many jurisdictions, privacy is considered a fundamental human right, and data protection laws exist to guard that right. Data privacy is also important because in order for individuals to be willing to engage online, they have to trust that their personal data will be handled with care. Organizations use data protection practices to demonstrate to their customers and users that they can be trusted with their personal data.
- **Business Asset Management:** Data is perhaps the most important asset a business owns. We live in a data economy where companies find enormous value in collecting, sharing and using data about customers or users, especially from social media
- **Regulatory Compliance:** Managing data to ensure regulatory compliance is arguably even more important. A business may have to meet legal responsibilities about how they collect, store, and process personal data, and non-compliance could lead to a huge fine. If the business becomes the victim to a hack or ransomware, the consequences in terms of lost revenue and lost customer trust could be even worse.

Personal data can be misused in a number of ways if it is not kept private or if people don't have the ability to control how their information is used.

Entities may sell personal data to advertisers or other outside parties without user consent, which can result in users receiving unwanted marketing or advertising.

When a person's activities are tracked and monitored, this may restrict their ability to express themselves freely, especially under repressive governments.

For individuals, any of these outcomes can be harmful. For a business, these outcomes can irreparably harm their reputation, as well as result in fines, sanctions, and other legal consequences. In addition to the real-world implications of privacy infringements, many people and countries hold that privacy has intrinsic value: that privacy is a human right fundamental to a free society, like the right to free speech.

DEPARTMENT OF COMPUTER ENGINEERING

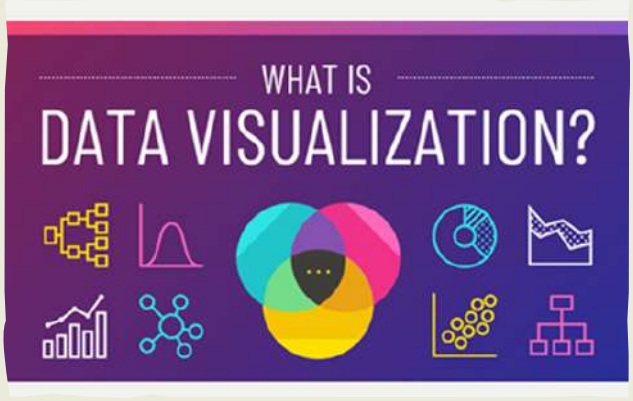
DATA VISUALIZATION AND POWER BUSINESS INTELLIGENCE

Nandini Patil

B. Tech CE II-Year

Every day a huge amount of data is generated. This data can even vary in nature and structure. A business, for example, can have data on sales revenue, marketing performance, customer interactions, inventory levels, production metrics, staffing levels, costs, etc. But with so much data to sift through, it can be difficult for people to see the story it tells.

Data visualization helps you turn all that granular data into easily understood, visually compelling—and useful—business information. Data visualization is the graphical representation of information and data. By using visual elements like charts, graphs, and maps, data visualization tools provide an accessible way to see and understand trends, outliers, and patterns in data. In the world of Big Data, data visualization tools and technologies are essential to analyse massive amounts of information and make data-driven decisions.



Hidden within your data lie important insights that can help drive the business forward. But the challenge is that you can't always connect the dots by looking at raw numbers alone. When you look at your data presented in a visual format, patterns, connections, and other insights emerge that would otherwise remain out of sight.

Our eyes are drawn to colours and patterns. We can quickly identify red from blue, and a square from a circle. Our culture is visual, including everything from art and advertisements to TV and movies. Data visualization is another form of visual art that grabs our interest and keeps our eyes on the message. When we see a chart, we quickly see trends and outliers. If we can see something, we internalize it quickly.

It's storytelling with a purpose. If you've ever stared at a massive spreadsheet of data and couldn't see a trend, you know how much more effective a visualization can be.

It's hard to think of a professional industry that doesn't benefit from making data more understandable. Every STEM field benefits from understanding data —and so do fields in government, finance, marketing, history, consumer goods, service industries, education, sports, and so on. While we always increasing talk about data visualization there are practical, real-life applications that are undeniable. And, since visualization is so prolific, it's also one of the most useful professional skills to develop. The better you can convey your points visually, whether in a dashboard or a slide deck, the better you can leverage that information. Skill sets are changing to accommodate a data-driven world. It is increasingly valuable for professionals to be able to use data to make decisions and use visuals to tell stories of when data informs the who, what, when, where, and how. While traditional education typically draws a distinct line

between creative storytelling and technical analysis, the modern professional world also values those who can cross between the two.

Today, data visualization tools run the gamut from free versions you can access with a browser to feature-rich platforms that integrate with a wide variety of mainstream business applications. One such tool is Power BI, an interactive data visualization software product developed by Microsoft with a primary focus on business intelligence (BI). Power BI offers cloud-based services for interactive visualizations with a simple interface for end-users to create their own reports and dashboards.

Power BI was first conceptualized by Ruler and Dhers Netz of the SQL server coverage services team at Microsoft. It was further designed by West Chadic George in the year 2010 and named Project Crescent. In 2011, It was bundled with SQL Server Codenamed Mount McKinley. Microsoft unveiled the first preview to Power BI in September 2014. And finally, the first version of Power BI was released on 24 July 2015. It was based on Excel Based Add-ins like Power Query, Pivot, view, and Map.

Today Power BI comes across as one of the most powerful and efficient data visualization and analytical tool. Some of the many advantages it offers include pre-built dashboards, real-time updates, secure and reliable connection to your data sources in the cloud or on-premises, integration with both Python and R coding, etc. Moreover, it is backed by artificial intelligence and machine learning.

This tool, however, currently has some disadvantages in terms of sharing the reports made and certain types not being compatible with it. These are likely to be overcome in the future as Power BI is further developed.

DEPARTMENT OF COMPUTER ENGINEERING

EARNING THROUGH COMPUTER

Dishant Mahajan

B. Tech CE III-Year

Today, it is impossible to start earning without investing but I am bringing forward to you a variety of ways by which you can earn and you also do not have to make a big investment. You can make money at your own pace, on your own time whether you are looking for a full-time income or part time, there are ways to make your own investment free money from your computer.

As the use of technology is rising the possibility of making money from your computer also increases. They are directly proportional to each other. You can do jobs online which didn't even exist a few years ago. While there are several scams out there but we are going to highlight the best ways to make online money.

The options vary, whether you want to earn a few bucks while watching your favourite television show or you want to start an online business. There are easy and difficult ways to start this journey. Some work may only require a few hours a month while the other may require a few days and the rest a few months.

Earning a significant amount of money online takes time, commitment, hard work and dedication. But with will there are endless possibilities to earn.

You can start by selling items online. You can start by selling your old furniture, clothing, kitchen appliances, or tools online which might be of no use to you but there are millions of people who are in search of such products. It hardly takes a few minutes you need to click good pictures of the item and upload it with a description on a suitable platform like OLX, eBay etc. and find a good bid amount for it.

There is another very famous way which is becoming popular these days that is

Taking surveys and being paid for it all it takes is a few minutes for each survey and money is yours. While it won't make you rich or anything but you can earn quickly from it. Many brands and companies are looking for individuals to gather information about consuming habits and preferences of their customers. Hence, the longer you take the survey the more you are paid. A few such sites are PineCone Research, Lifepoints Panel, Survey Junkie etc. and you might also earn a few Vouchers from the same.

The most prominent way of earning through the computer is blogging. Its popularity is increasing day by day and there is a great potential to make money if you start a blog. All you need to do is be consistent and if you truly enjoy blogging then its perfect for you. There are many ways to make money through blogging like advertising, sponsored content and affiliate networks. There are many people who leverage their blog to get freelance writing jobs, paid speaking gigs and book deals.

You can also become a Virtual Assistant. It is not only a great way to earn money from your own computer, but it has the opportunity to become a full time job.

The Virtual assistant helps a person or a business online. It is similar to an executive assistant, but all online. Jobs vary but common tasks are scheduling meetings, proofing content, sharing content on social media and other administrative tasks.

Creating a course is another most fun way of earning through computer. If you feel you have a skill or have a knowledge that you can share with others then you can start taking online classes. These days the online classes have become really popular especially during covid and all you need is a good Wi-Fi connection and teaching skills.

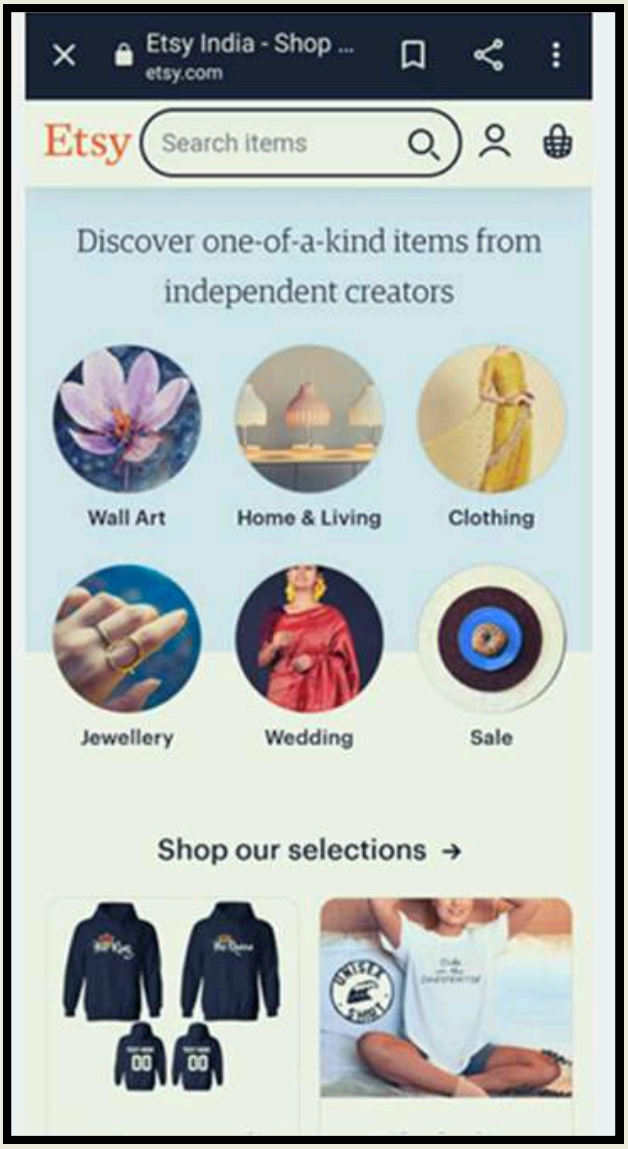
You can also earn by selling stock photos if you are skilled in photography. You can sell quality photos online to be used as stock photos. These are the photos which others pay to download and use in their own marketing and websites. You can sell these photos on websites like istockphotos. The most interesting fact about selling stock photos is that once you click and upload it, the rest is passive income. You are paid everytime once someone downloads it.

If you have a knack for graphic designing then you can start Designing logos and selling them to companies and individuals. All you need to have is a creative mind and then this is your future. There are free softwares and applications to do such designing like Canva, Sketch Up which you can use to design logos.

It is said that a pen is mightier than a sword. Well, it is well said the ability to write a resume well is rare and a strong resume- writing skills are in demand as everyone in the world are in search of good resumes. Best of all, there are a myriad of ways to work from home while correcting resumes. You can work for a resume writing company or even start your own business. You can start by building your own resume and provide it as a sample to others.

People these days are also earning by translating documents. The demands for translators is increasing as companies and individuals interact with each other around the globe. Hence, you can earn by working for a translating company or by your own.

If you enjoy crafting like making jewellery, art or sewing then you can open an Etsy shop to sell your items. Etsy is an online marketplace for people looking for handmade goods. You open your own shop with your own handmade products and consumers can search and buy their own items. Etsy is great because you don't have to go searching foryour own customers infact consumers will come looking for you.



DEPARTMENT OF COMPUTER ENGINEERING

ETHICAL HACKING

Devendra Bari
B. Tech CE III-Year

The term ‘hacking’ has a very negative connotation attached to it. It refers to gaining unauthorized access to data in a computer or system. It is the unlawful use of another’s resources. However, hacking when done with permission is not only legal but has several advantages to organizations and companies.

What kind of vulnerabilities does a hacker see? What information might be targeted by a hacker? What will the attacker do with the information and how many people notice the attempt? What can be done to fix the vulnerabilities in the system? All these questions can be answered by an ethical hacker. Ethical hacking is the act of identifying vulnerabilities in an application, system, or organization's infrastructure that can be exploited by an attacker. By lawfully hacking into networks and looking for weak places, ethical hackers (also known as the white hats) try to avoid cyber attacks and security breaches. Ethical hacking has great importance in today’s times. Finding vulnerabilities from the perspective of an attacker, addressing weak areas in a system and putting in place a secure network to avoid security breaches are some such examples. Ethical hacking can also be necessary to earn the trust of customers and investors by assuring the security of the products and data. It prevents people with malicious intentions to gain access to sensitive or confidential information.

One major use of ethical hacking is to protect the national security of a country. Any breach or loophole in the information or defence databases of the country can put the safety of its citizens at great risk. Thus, impenetrable defences need to be forged and erected so that no enemy nation or terrorist organisation can obtain official,

classified government data. Using ethical hackers is one such way to ensure cyber security. They can identify the vulnerabilities and help protect data from cyber attacks and breaches. For example, in the United States of America, the “Hack the Pentagon” event, led by the Defense Digital Service, kick-started the partnership between the Department Of Defense and the white hat community. In addition to finding 138 vulnerabilities, they also uncovered the need to have an enduring open door for hackers to report the vulnerabilities they find. Later, they also started the ‘Vulnerability Disclosure Policy’ which has become one of the largest disclosure programmes in the world.

Ethical hacking has five major phases. Reconnaissance is the preparatory phase where the hacker collects preliminary information about the target prior to the attack. Through scanning, the hacker identifies a quick way to gain access to the network by exploiting the vulnerabilities of the system. After gaining access to the network, the user privileges are escalated to control the systems connected to it. Having gained the access, the hacker tries to maintain it by securing access to the organization’s Rootkits and Trojans. These are used to launch additional attacks on the network.

STUDENT ARTICLES

EMERGING TECHNOLOGIES

Ankita Patil

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CRISPR, Quantum, Graphene, Smart Dust, Digital Twins, the Metaverse… You've heard about it all. Seen it all. Read it all. These technologies no longer hold any secrets for you. Hell, you've probably mentioned them over dinner or at work and have become the go-to person for questions about future innovations.

Yet, technology is ever-changing, and this precious knowledge must be both managed and updated regularly. With this in mind, I've put together a list of the top future technologies that are not on the public's radar as of today but are likely to make big waves in the future.

1.Femtosecond Projection Two-Photon Lithography.

Researchers have developed a method that uses lasers to project millions of points simultaneously onto 3D-printing material, instead of using one point at a time. And because they're bad at branding, they called it Femtosecond projection TPL.

bad at branding, they called it Femtosecond projection TPL. To easily understand FP-TPL, simply imagine using a million heated needles to strategically melt a block of wax versus using a single needle. This means that incredibly tiny structures can be 3D-printed much, much faster (a thousand times faster, give or take), while still ensuring a good quality of the build.

How will it change the world.....

Quick discoveries around materials have led researchers to think that they will be able to build small but imagination-baffling structures in the near future. Once the quality can be controlled over large scales, one could easily imagine this technology

being used for the creation of healthcare-related nanorobots, allowing for the treatment of a multitude of diseases on the molecular level.

2.LiFi

What is it?

LiFi aims to use light to transmit information from point A to point B. The technology works by encoding digital data and turning LED bulbs on and off faster than humans can notice to transfer it. The light then travels to a photoreceptor, which can decode and translate the data to a more classic radio frequency (WiFi, 4G, 5G…). There are a lot of advantages to doing things this way. What with light being used, the speed at which the information is transmitted is very, very high—up to 100 Gbit/s, in theory; 5 times faster than 5G. Furthermore, the sheer number of LED bulbs already around us hints at a potential future wherein (cheap) access points to receive data are everywhere. Finally, the light waves used as the basis for LiFi do not pass through walls (but can however be reflected off of them). The risk of hacking is therefore much lower than with WiFi, though this seriously limits indoor use cases. On the other hand, the use of LiFi requires one to be near an operating light source. Its range is thus very limited, and interference is possible with other light sources such as natural sunlight.

How will it change the world .....

As of today, this future technology is very much of a niche, despite having been hyped in some circles for half a decade now. One obstacle to popular adoption is the size and price of photoreceptors. As such, key use cases are within areas that are particularly sensitive to hacking and/or electromagnetic interference, such as hospitals, aircraft, military operations…

3. Energy-storing Bricks

For these bricks to store and then release energy, researchers heat them to 160 degrees and vaporize their surface with hydrochloric acid mixed with an organic compound called EDOT. When in contact with hematite, this mix causes a chemical reaction, creating a new plastic nanofiber coating called PEDOT.

The amount of energy these bricks can store is still low, but the proof of concept is a staggering success. It's possible to power a small lamp for 50 minutes with 60 bricks, which doesn't sound like much until you realise it only takes 13 minutes for these bricks to recharge. This future technology also has a long lifespan, since even after 10,000 storage and retrieval cycles, the bricks still retain 90% of their original capacity, without altering the rate of charge and discharge.

How will it change the world.....

The main benefit of this technology of the future would come about when used at a house equipped with solar panels. The bricks could then store unused electricity and thus compensate for the intermittence of this renewable energy. This would make our homes more self-sufficient in energy and less dependent on electric cables and/or the

likes of lithium batteries. Discussions are currently underway with several companies in Europe and the United States to consider its commercialisation and know that the next generation of bricks will be able to increase its energy capacity by 50%. Enough to charge a laptop? Only time will tell.

4. Robotic

Bees Details are scarce, but most researchers estimate that the bees would work by attaching horse hair coated with ionic liquid gel to a tiny drone. The hair picks up pollen from one flower, and moves it to the next. Researchers at Harvard have long been working on "RoboBees" using such techniques. What Walmart offers on top is a wide array of sensors, cameras, artificial intelligence… to locate the relevant crops and pollinate them as needed.

How will it change the world…..

If the costs of operating such future technology continues to decrease, we could see autonomous insect pollinate large fields in the coming years, which could save thousands of farmers from ruin, and ensure we can still have almond milk on the superstores' shelves.

5. Unnamed Dynamic Neural Networks Technology

Neural network uses hidden layers to break down information (the input images, audio, videos, handwritten text…) into tiny pieces of easily understandable components, allowing a computer to inform a prediction about the nature of said input. It does this thanks to a wide array of training data and mathematical models. In doing so, it works "similarly" to our brain, hence the technology's name. This is far from new, but the world of data science has been on the lookout for faster and more efficient ways of using neural networks to serve the upcoming IoT revolution.

How will it change the world…..

First and foremost, the technology reduces computing resources required of the host CPU and cuts back on costs of running data centres, something which seems benign compared to all the issues discussed in this article, but is nevertheless incredibly important at scale. It also reduces the environmental costs of these centres, which is always a plus.

6. Seawater fuel

What is it?

When it comes to energy, the sea remains a massive untapped resource; it's not like we're going to run out of it anytime soon, what with the North Pole melting. And according to researchers, it could soon be put to good use as fuel for ships.

Bear with me: the process uses a potassium-promoted molybdenum carbide catalyst to extract carbon dioxide from seawater, turning it into carbon monoxide via the reverse water-gas shift (RWGS) reaction. The carbon monoxide can in turn

be converted into a hydrocarbon via the Fischer-Tropsch synthesis. Ships can then use this hydrocarbon instead of pre-onboarded fuel which, as we know, carries many risks.

How will it change the world.....

The fuel currently used to power the thousands of ships that cross the seas and oceans daily is very polluting. The conversion of CO2 into chemicals and value-added fuels could significantly reduce the greenhouse gases they emit over the long term.

There are however a handful of issues that need fixing before we get to greener maritime routes. Firstly, carbon dioxide concentration in seawater is about 100 milligrams per litre. That's not much. To put it into perspective, you'd need to process close to 45 million cubic meters of water to power a cruise ship for about a week. And the more water you process, the more sea life you remove from the food chain, with

potentially catastrophic long-term results. Secondly, you're still releasing carbon into the air at the end of the day, even if it's waterbased carbon. You could argue that it's a net neutral as it will get back to the sea eventually, but if you're at all ecologically conscious, you know this is a slippery slope.

7. 20-minute Water

What is it?

The recipe was concocted especially for developing countries—remote areas where people don't have access to chemical treatments such as chlorine. It could save some of the 300,000 children under 5 who die worldwide every year of waterborne diseases such as the cholera, typhoid and hepatitis. It could also help some of the 2.2 billion people who don't have a wastewater treatment system

How will it change the world.....

Unlike other innovations in this article, this one hardly has any downsides. It's very cheap: the amount of silver used for the nanowires is so small the cost is negligible, and the electricity needed can be easily supplied by a small solar panel or a couple of 12-volt car batteries. Since the filter doesn't trap bacteria (killing them instead), it can have much larger pores, allowing water to speed through at a more rapid rate. More than 80,000 times faster than existing filters, to be exact. And it does so without clogging, an issue that plagues existing solutions.

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BEST PROJECT ABSTRACT

Large-Scale Sentiment Analysis in the Cloud: A System for Real-time Public Opinion Monitoring

Prof. Jayshri S. Sonawane, Prof. Vishal S. Thakare
Computer Engineering

In today's interconnected world, monitoring public opinion has become increasingly important for businesses, governments, and organisations. With the rise of social media and online forums, large-scale sentiment analysis has become a crucial tool for understanding public sentiment on various issues and topics. In this paper, we present a system for real-time public opinion monitoring in the cloud. Our system leverages cloud computing technologies to process vast amounts of text data in real-time and extract meaningful insights into public sentiment. The system is designed to handle large-scale data processing while maintaining high accuracy and robustness. The system includes modules for data collection, data pre-processing, sentiment analysis, and visualization of results. To evaluate the effectiveness of our system, we conduct extensive experiments on real-world datasets, demonstrating its ability to capture public sentiment on a variety of topics accurately. Our system provides a scalable, efficient solution for real-time public opinion monitoring, offering valuable insights for businesses, governments, and organisations.

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Applying Ensemble Machine Learning Techniques for Fake News Identification

Prof. Vipul Devendra Punjabi, Dr. Rajesh Kumar Shukla

Computer Engineering

The sharing of information has entered an unprecedented era in human history due to emergence of the Internet With the wide spread use of social media sites like Facebook and Twitter. As these platforms enjoy extensive use, users are generating and disseminating a wealth of information, some of which is inaccurate and devoid of factual basis. Detecting false or misleading information within textual content poses a significant challenge. Before arriving at a judgment regarding the accuracy of an article, it is imperative to consider various factors within a specific domain. This paper proposes an Ensemble method for the identification of fraudulent news stories. We leverage different textual features found in both authentic and fake news articles. Our dataset comprises 72,134 news articles, with 35,028 being genuine and 37,106 being false, categorized as binary 0s and 1s. To evaluate our approach, we employed well-known machine learning classifiers including Logistic Regression (LR), Decision Tree, AdaBoost, XGBoost, Random Forest, Extra Trees, SGD, SVM, and Naive Bayes.To enhance the precision of our findings, we devised a multi-model system for identifying fake news the Ensemble approach and the aforementioned classifiers. Experimental analysis conclusively demonstrates that our suggested ensemble learning technique surpasses the performance of individual learners.

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System Evaluation of Team and Winner Prediction in One Day International Matches With Scenario Based Questionnaire

Dr. Manoj Ishi, Prof. J. B. Patil, Prof. Nitin Patil.
Computer Engineering

Cricket is unquestionably among the utmost widespread sports in the world. Team prediction, winner prediction, umpire decision review system, and fantasy cricket league are common fundamental problems in cricket. Many researchers are working on the issue of team and winner prediction in cricket. They are trying to predict match or tournament outcomes. The researchers also try to predict player performance during a match or team selection based on current form, statistics, and player fitness. The existing work done by researchers has considered a limited time for players and team performance evaluation maximum of five years. The parameters for evaluation are also limited to a few in numbers. In this paper, we have used all the possible parameters and derived more with appropriate weights to the existing ones. We also used a longer time of 10 years for team and player consistency evaluation. Our extermination has performed team and winner prediction based on the scenario-based questionnaire. The questionnaire has been prepared and shared with the people for results and team prediction. People's opinions are compared with the actual outcome of that match and the player selected. The maximum accuracy of 94.91% is obtained for winner prediction from the responses received. In team prediction, for batters, bowlers, all-rounders (batting and bowling), and wicketkeeper selection the accuracy of 93.95%, 96.18%, 91.09%, 91.41%, and 89.81% are obtained, respectively.

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Text Summarisation Using Deep Learning Techniques: A Review

Prof. Mohmmadali Muzffarali Saiyyad, Dr Nitin N. Patil

Computer Engineering

The process of text summarisation is one of the applications of natural language processing that presents one of the most challenging obstacles. This is one of the most challenging duties since it demands an in-depth understanding of the information that is being retrieved from the text; as a result, it is one of the most time-consuming as well. Traditional methods of paraphrasing a text each come with their own individual set of restrictions; this is why it is vital to develop new methods in order to achieve better results in paraphrasing a text. Deep learning has been used, which has resulted in a paradigm shift in the way natural language processing is carried out. The tremendous progress that has been made in the fields of sentiment analysis, text translation, and text summarization can be attributed to the application of methodologies that are based on deep learning. The utilization of these various approaches, which resulted in the production of these advancements, is a primary cause of these breakthroughs. We have outlined a variety of deep learning procedures with the goals of summarising texts and analysing details to prepare these methods for possible applications in future research.

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TECH FEST GLIMPSE

Computer Literacy Program under "E-Builder" Initiative

Students of the Department of Computer Engineering successfully conducted a Computer Literacy Program as a social outreach activity under the "E-Builder" initiative at R. C. Patel Secondary & Higher Secondary School, Tekwade (Shirpur) on 14/03/2024.

The initiative was well received by the school students, who actively participated and showed keen interest in learning. The program not only enhanced their digital competence but also encouraged curiosity toward technology and computing.

Through this activity, Computer Engineering students demonstrated social responsibility and contributed meaningfully to community development.

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This outreach program under E-Builder successfully fulfilled its objective of empowering young learners with essential digital knowledge and reaffirmed the institute's commitment to inclusive and technology-driven education.

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One-Day Workshop on Git & GitHub

The Google Developer Student Clubs (GDSC), R. C. Patel Institute of Technology, Shirpur, in collaboration with Coding Club NMIMS, Shirpur, successfully organized a one-day workshop on “Git & GitHub” on 25th September 2023 at the Auditorium Hall, RCPIT.

The session was conducted from 3:00 PM to 7:00 PM and was attended by third and fourth-year students. The workshop was led by Mr. Daksh Gehlot, representing the Coding Club NMIMS, Shirpur, who provided insightful guidance on version control systems and collaborative development using Git and GitHub.

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The event aimed to build a strong foundation for students in managing code repositories and preparing them for future academic and industry-level projects. With an intake of 100 students, the workshop witnessed enthusiastic participation. Also become more engaging due to the collaborative effort between GDSC RCPIT and NMIMS.

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7-Day Bootcamp on Basics of Programming in C/Java

The Google Developer Student Clubs (GDSC), R. C. Patel Institute of Technology, Shirpur, successfully organized a 7-Day Bootcamp on Basics of Programming in C/Java, titled “GOOGLARS”, for First-Year students at the institute.

The bootcamp was conducted at the Auditorium Hall, RCPIT, with a participation capacity of 150 students. The primary objective of the program was to introduce beginners to the fundamentals of C programming concepts, thereby helping them build a strong foundation for learning advanced programming languages in the future.

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Throughout the seven days, students gained hands-on exposure to programming logic, syntax, and problem-solving techniques. The sessions were designed to be interactive and beginner-friendly, ensuring effective understanding among first-year students.

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HACKATHONS GLIMPSE

Internal Hackathon for Smart India Hackathon 2023

The Department of Computer Engineering, R. C. Patel Institute of Technology, Shirpur, organized an Internal Hackathon as a part of the Smart India Hackathon (SIH) 2023 selection process to encourage innovation, creativity, and problem-solving skills among students.

The hackathon was conducted in multiple phases on 16th and 18th September 2023 (Round I) and 23rd September 2023 (Round II) with active participation from students of various branches and academic years.

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Smart India Hackathon (SIH) 2023 is a prestigious nationwide initiative launched to provide students with an opportunity to solve some of the most pressing challenges faced by society, industry, and government organizations. The initiative aims to inculcate a strong culture of product innovation, critical thinking, and problem-solving among young technologists.

Previous editions of SIH witnessed participation from over five million students across the country at more than 65 locations, highlighting its scale and impact. In SIH 2023, students were presented with problem statements proposed by various Ministries, Government Departments, Public Sector Units (PSUs),

Industries, and Non-Governmental Organizations (NGOs). This exposure enabled participants to design world-class, scalable, and industry-relevant solutions, while gaining valuable real-world experience and insight into national-level problem-solving initiatives.

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CodeCraze 2024: A 24-Hour Hackathon of Innovation and Collaboration

CodeCraze 2024, the flagship technical event of Converges 2024, was successfully organized by the Google Developer Student Club (GDSC), R. C. Patel Institute of Technology, Shirpur, in collaboration with Fetch.ai. The event was conducted on 16th–17th February 2024 at the R. C. Patel Institute of Technology, Shirpur, and took the form of an intense 24-hour hackathon that brought together talented and enthusiastic students from various institutions across the region.

The primary objective of CodeCraze was to foster a culture of innovation, creativity, and problem-solving among aspiring technologists. Participants were encouraged to collaborate in teams, apply their technical knowledge, and develop innovative solutions to real-world problems using technology.

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Event Overview

CodeCraze was more than just a competition—it served as a platform for students to:

· Enhance hands-on experience in real-world problem-solving
· Promote teamwork, collaboration, and peer learning
· Showcase technical skills and innovative thinking
· Inspire and empower the next generation of technology leaders

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COMPUTER DEPARTMENT PLACEMENT 2023-2024

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JAPANESE LEVEL N5 SUCCESS

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