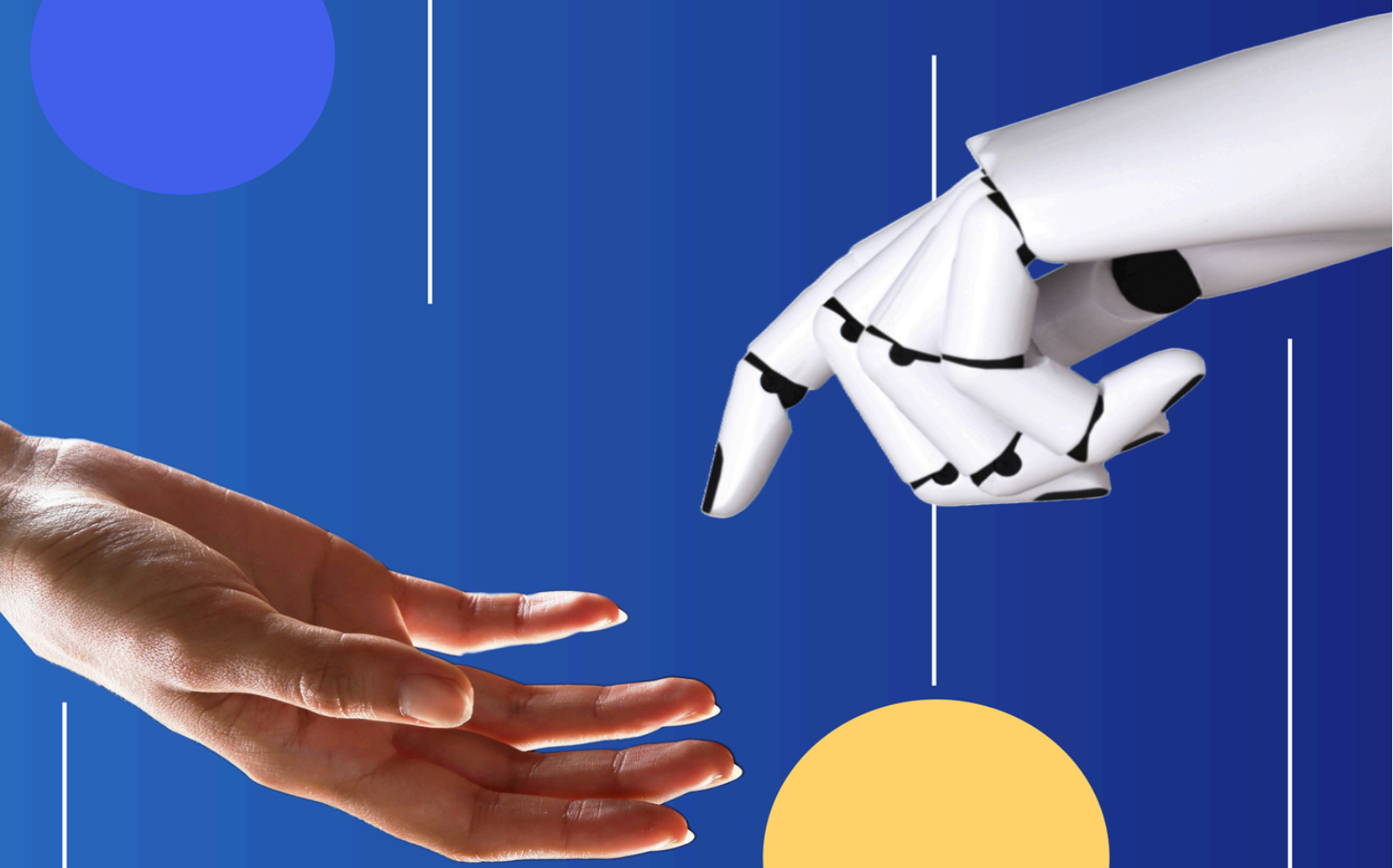
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ACCREDITED WITH GRADE A NAAC

R. C. PATEL
INSTITUTE OF TECHNOLOGY

An Autonomous Institute

Department of Computer Engineering



The TechnoVerse

Technical Magazine for A.Y. Sep 2022 - May 2023

www.rcpit.ac.in

DEPARTMENT OF COMPUTER ENGINEERING

R. C. PATEL
INSTITUTE OF TECHNOLOGY
An Autonomous Institute

Department of Computer Engineering

Vision of the Institute

To become a leading Institute in Technical education fostering innovation, research, ethical values, and sustainable development for the betterment of society.

Mission of the Institute

To impart high quality Technical Education through:

M1. Innovative and Interactive learning process and high quality, globally recognized instructional programs.

M2. Fostering a collaborative scientific temper among students with ethical responsibility towards the society.

M3. Preparing students from diverse backgrounds to have aptitude for employment, entrepreneurship and research with a spirit of Professionalism.

M4. To contribute to nation's sustainable development.

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.

PEO 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

MESSAGE BY DIRECTOR



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

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 HOD'S DESK



Prof.Dr. Nitin N. Patil
HOD (Computer Engineering)

I am pleased and privileged to be able to share a few words with you while you read through the magazine's pages "TechnoVerse". The computer department works hard to help students to get the most out of their environment. The information gathered thus serves as a stepping stone for them to rise to greater heights. The group efforts frequently lead to the discovery and realization of dreams.

I am delighted to be a part in shaping careers of the young engineers. In the Computer Department, we strive to shape every aspect of a student's personality. I would like to take this opportunity to thank the entire faculty members and supporting staff for their consistent and scrupulous efforts in producing this edition.

DEPARTMENT OF COMPUTER ENGINEERING

MESSAGE BY EDITORIAL BOARD MEMBER

It gives me immense pleasure to present the Department Magazine of Computer Engineering for the academic year 2022–23. This magazine serves as a creative and technical platform for our students to express their ideas, showcase their knowledge, and enhance their professional communication skills.

During the academic year, the department emphasized outcome-based education, student-centric learning, and hands-on exposure through projects, technical activities, and collaborative learning practices. The articles and project highlights included in this magazine reflect the enthusiasm and dedication of our students toward learning emerging technologies and applying theoretical concepts to real-world problems.

I sincerely appreciate the efforts of the student editorial team and faculty members for their commitment and teamwork in bringing out this publication. I am confident that this magazine will inspire students to continue learning, innovating, and contributing positively to the profession and society.



Prof. Dr. Dharmaraj R. Patil
Editor
Professor
Department of Computer Engineering

DEPARTMENT OF COMPUTER ENGINEERING

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DEPARTMENT OF COMPUTER ENGINEERING

FACULTY ARTICLES

Data Structures and Algorithms: Foundation of Efficient Software Development



Mr. Manoj Sakharam Ishi

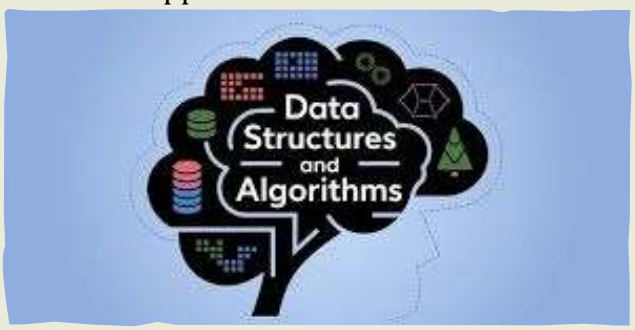
Associate Professor
Computer Department

Software systems today handle massive volumes of data and perform complex computations in real time. From mobile applications and enterprise software to artificial intelligence and cloud-based systems, efficient processing is a fundamental requirement. Data Structures and Algorithms provide systematic ways to organize data and design step-by-step procedures to solve computational problems efficiently.

A data structure is a method of organizing, storing, and managing data so that it can be accessed and modified efficiently. Choosing the appropriate data structure significantly affects the performance of software applications.

Commonly used data structures include:

- Arrays and Strings
- Linked Lists
- Stacks and Queues
- Trees and Graphs
- Hash Tables and Heaps



Each data structure has specific use cases. For example, stacks are widely used in expression evaluation and function calls, while trees and graphs are essential for hierarchical data representation and network-based applications.

Data Structures and Algorithms are not limited to academic learning; they are actively applied in real-world software systems.

Some major application areas include:

Web Applications: Efficient data handling for search engines and content management systems

Artificial Intelligence: Data processing, decision trees, and graph-based learning models

Operating Systems: Process scheduling, memory management, and file systems

Computer Networks: Routing algorithms and network optimization

Database Systems: Indexing, hashing, and query optimization.

From an academic perspective, Data Structures and Algorithms strengthen analytical thinking and problem-solving skills among students. They serve as a foundation for advanced subjects such as machine learning, data science, and distributed systems. Industries emphasize DSA skills during recruitment processes, technical interviews, and coding assessments. Graduates with strong DSA knowledge are better equipped to design efficient solutions and adapt to new technologies.

DEPARTMENT OF COMPUTER ENGINEERING

Computer Graphics and Image Processing Applications



Mr. Mahesh Madhukar Mahajan

Assistant Professor
Computer Department

Computer Graphics deals with the creation and manipulation of images using hardware and software techniques. It includes both two-dimensional (2D) and three-dimensional (3D) graphics.

Key concepts of computer graphics include:

- Graphics primitives such as points, lines, and polygons
- Transformations (translation, rotation, scaling)
- Viewing and projection techniques
- Rendering and shading models
- Animation and visualization

Computer graphics systems are widely used to design user interfaces, simulate real-world environments, and create interactive visual experiences. Advances in graphics hardware and APIs have significantly improved rendering speed and realism.

Image Processing involves operations performed on digital images to improve their quality or extract useful information. It converts raw image data into a form suitable for further analysis or interpretation.

Major image processing operations include:

- Image enhancement and filtering
- Noise reduction
- Image segmentation
- Edge detection
- Feature extraction

Image processing techniques are essential for handling images captured from cameras, scanners, medical equipment, and satellites.



Computer Graphics has widespread applications across various domains:

- Entertainment and Gaming: Realistic 3D models, animations, and visual effects.
- Education and Training: Simulations, virtual labs, and interactive learning tools.
- Computer-Aided Design (CAD): Engineering drawings, architectural models, and product design.
- Virtual Reality and Augmented Reality: Immersive environments for training and visualization.
- Scientific Visualization: Graphical representation of complex scientific data.

Image Processing is widely used in systems that require automated visual analysis:

- Medical Imaging: Diagnosis using X-rays, MRI, and CT scan images
- Security and Surveillance: Face recognition and object detection
- Remote Sensing: Satellite image analysis for environmental monitoring
- Industrial Automation: Quality inspection and defect detection
- Document Processing: Optical character recognition (OCR) and digitization

These applications demonstrate how image processing enables computers to assist or replace manual visual inspection tasks.

From an academic perspective, computer graphics and image processing strengthen students' understanding of mathematical modeling, algorithms, and system design. These subjects support advanced learning in areas such as computer vision, artificial intelligence, and multimedia systems.

DEPARTMENT OF COMPUTER ENGINEERING

Computer Networks: Evolution from Traditional Networks to Software-Defined Networks



Mr. Sandip Ravindra Sonawane

Associate Professor
Computer Department

Computer networks form the backbone of modern digital communication. Over the years, networking technologies have evolved from traditional, hardware-centric architectures to flexible, software-driven models. One of the most significant advancements in this evolution is Software-Defined Networking (SDN).

The rapid growth of the internet, cloud services, and data-intensive applications has significantly increased the complexity of computer networks. Traditional network architectures, which rely heavily on hardware-based configurations, often struggle to meet modern performance and scalability requirements.

To address these challenges, networking paradigms have evolved toward more programmable and centralized models. Software-Defined Networking represents a major shift in network design by separating the control logic from the underlying hardware, enabling dynamic and efficient network management.



Traditional networks are built using routers, switches, and firewalls, each configured individually using device-specific commands. In this model, the control plane and data plane reside within the same networking device.

Key characteristics of traditional networks include:

- Hardware-centric network management
- Manual configuration of network devices
- Limited scalability and flexibility
- Complex troubleshooting and maintenance

As network size and complexity increase, traditional networking approaches exhibit several limitations:

- Difficulty in managing large networks
- Increased configuration errors due to manual processes

- Limited adaptability to changing traffic patterns
- High operational and maintenance costs

These limitations led to the development of more flexible and automated networking solutions capable of meeting modern computing demands.

Software-Defined Networking is an innovative networking architecture that separates the control plane from the data plane. The control logic is centralized in an SDN controller, while the network devices focus solely on forwarding data packets.

Key components of SDN include:

- **SDN Controller**: Centralized network intelligence
- **Southbound Interfaces:** Communication between controller and devices
- **Northbound Interfaces:** APIs for network applications

By providing a global view of the network, SDN enables dynamic configuration, efficient resource utilization, and automated network management.

Software-Defined Networking offers several advantages over traditional networks:

- Centralized control and simplified management
- Improved scalability and flexibility
- Faster deployment of network services
- Better support for virtualization and cloud environments
- Enhanced network security through programmable policies

DN is widely used in various computing environments:

- **Cloud Computing:** Dynamic resource allocation and traffic management
- **Data Centers:** Automated provisioning and load balancing
- **Network Virtualization:** Creation of multiple virtual networks on shared infrastructure
- **Internet of Things (IoT):** Efficient handling of large numbers of connected devices
- **Network Security:** Centralized monitoring and policy enforcement.

These applications demonstrate how SDN addresses the limitations of traditional networking models.

DEPARTMENT OF COMPUTER ENGINEERING

Cloud Computing Architecture and Virtualization Techniques



Ms. Puja Dipak Saraf

Assistant Professor
Computer Department

Cloud Computing has emerged as a transformative paradigm in modern computing by enabling on-demand access to shared computing resources such as servers, storage, and applications. A key enabling technology behind cloud computing is virtualization, which allows efficient resource utilization and scalability.

The rapid growth of internet-based services and data-intensive applications has led to an increased demand for scalable and cost-effective computing solutions. Traditional computing infrastructures often face challenges related to resource underutilization, high maintenance costs, and limited scalability.

Cloud computing addresses these challenges by providing computing resources as services over the internet. Virtualization plays a crucial role in cloud environments by enabling multiple virtual machines to run on a single physical system.



Cloud computing architecture refers to the components and subcomponents required to deliver cloud services. It consists of two major parts: the front end and the back end.

- **Front End:** Includes client devices and applications used to access cloud services through web browsers or APIs.
- **Back End:** Comprises cloud servers, storage systems, databases, and management software.

Cloud architecture ensures high availability, fault tolerance, and scalability through distributed computing and load balancing techniques.

Cloud computing offers services through different models based on user requirements:

- **Infrastructure as a Service (IaaS):** Provides virtualized computing resources such as virtual machines and storage.

- **Platform as a Service (PaaS):** Offers platforms for application development and deployment.
- **Software as a Service (SaaS):** Delivers complete software applications over the internet.

These service models gained widespread adoption during 2022–2023 due to their flexibility and cost efficiency.

Cloud services can be deployed using various models:

- **Public Cloud:** Services offered over the public internet and shared among users.
- **Private Cloud:** Dedicated cloud infrastructure for a single organization.
- Hybrid Cloud: Combination of public and private clouds.
- **Community Cloud:** Shared infrastructure for organizations with common concerns.

Each deployment model offers different levels of control, security, and scalability.

Virtualization Techniques

Virtualization is the process of creating virtual versions of computing resources such as servers, storage, and networks. It enables efficient resource management in cloud environments.

Common virtualization techniques include:

- **Server Virtualization:** Multiple virtual machines running on a single physical server
- **Storage Virtualization:** Pooling physical storage from multiple devices
- **Network Virtualization:** Creation of virtual networks independent of physical hardware
- **Desktop Virtualization:** Remote access to desktop environments

Virtualization enhances resource utilization, reduces operational costs, and supports rapid provisioning of services.

Role of Virtualization in Cloud Computing

Virtualization acts as the backbone of cloud computing by enabling:

- Dynamic allocation of resources
- Isolation between applications
- Improved fault tolerance and reliability
- Scalability and elasticity

Cloud Computing Architecture and Virtualization Techniques have revolutionized the way computing resources are delivered and managed. By enabling scalability, flexibility, and cost efficiency, these technologies play a vital role in modern IT infrastructures.

DEPARTMENT OF COMPUTER ENGINEERING

STUDENT ARTICLES

Artificial Intelligence in Everyday Life



PATIL MANSI JITENDRA
B. Tech CE II-Year

Artificial Intelligence, commonly known as AI, is one of the most popular technologies in today's world. AI means making computers and machines smart so that they can think, learn, and make decisions like humans. Earlier, AI was used only in research and big industries, but now it has become a part of our daily life.

Artificial Intelligence is a branch of computer science that helps machines perform intelligent tasks. AI systems can learn from data, recognize patterns, and improve their performance over time.

Some common examples of AI include voice assistants, face recognition, recommendation systems, and chatbots. These systems make technology more user-friendly and efficient.



One of the most common uses of AI is in smartphones. Features such as face unlock, voice typing, and camera filters are based on AI.

Virtual assistants like Google Assistant and Siri help users by answering questions, setting alarms, and searching information using voice commands. AI also improves mobile cameras by automatically adjusting brightness and focus.

AI plays an important role in social media and entertainment platforms. It studies user interests and shows relevant content.

For example, YouTube suggests videos based on what we watch, and Netflix recommends movies and web series. This makes entertainment more personalized and enjoyable.

Online shopping websites use AI to improve customer experience. AI recommends products based on previous searches and purchases. Chatbots help customers by answering questions instantly.

Artificial Intelligence is also useful in education. Online learning platforms use AI to suggest courses, check assignments, and track student progress. AI-based tools help students learn at their own speed and understand difficult topics easily

DEPARTMENT OF COMPUTER ENGINEERING

Social Media Privacy: How to Protect Your Data



PATIL APURVA GAJANAN

B. Tech CE II-Year

Social media has become an important part of our daily life. Students use social media platforms to communicate with friends, share photos, watch videos, and get information. Popular platforms like Instagram, Facebook, and WhatsApp are used by millions of people every day.

Social media privacy means protecting our personal information such as name, phone number, photos, location, and login details from unauthorized access. When privacy settings are weak, strangers or hackers can misuse this information.

Personal data shared on social media can be used for advertisements, identity theft, or cybercrime. Therefore, understanding privacy is essential for safe use of social media platforms.



Common Privacy Risks on Social Media

- Sharing too much personal information publicly
- Accepting friend requests from unknown people
- Clicking on fake links or messages
- Using weak or same passwords for multiple apps.
- Logging in from public or unsafe networks

These small mistakes can lead to serious problems such as account hacking or data misuse.

How to Protect Your Data on Social Media

- **Use Strong Passwords**

Always use strong passwords with a mix of letters, numbers, and symbols. Avoid using the same password for all accounts.

- **Enable Privacy Settings**

Set your profile to private and control who can see your posts, photos, and personal details.

- **Be Careful While Sharing**

Do not share sensitive information such as OTPs, address, bank details, or live location on social media.

- **Avoid Unknown Links**

Do not click on suspicious links or messages, even if they appear to come from friends.

- **Enable Two-Factor Authentication**

Two-factor authentication adds extra security to your account by requiring a verification code during login.

As responsible digital users, students should be aware of online safety rules. They should regularly update apps, log out from shared devices, and report fake or abusive accounts

DEPARTMENT OF COMPUTER ENGINEERING

Blockchain Beyond Cryptocurrency



POTDAR DIPALI DHIRENDRA

B. Tech CE III-Year

Blockchain technology is often associated with cryptocurrencies like Bitcoin and Ethereum, but its potential stretches far beyond digital currencies. Blockchain is a decentralised ledger that ensures data is securely recorded, verified, and shared across a network. This feature of blockchain can transform various industries, including engineering, by enhancing transparency, security, and efficiency. In this article, we will explore the use cases of blockchain in engineering and how it is shaping the future of the industry.



At its core, blockchain is a digital ledger that records transactions across multiple computers in a way that the recorded data cannot be altered. This decentralised system ensures that all participants have access to the same information, making it transparent and tamper-proof. Each block in the chain contains data about transactions, and when one block is completed, it links to the next one, forming a chain of blocks. Blockchain's main advantages lie in its ability to provide transparency, security, and decentralisation, which are valuable in industries that require reliable and accurate data sharing.

In the engineering industry, collaboration between different teams and organisations is crucial. Blockchain can facilitate this by ensuring that all stakeholders have access to the same data in real-time. When engineers collaborate on a project, blockchain ensures that design changes are recorded and cannot be altered without the approval of the team. This helps prevent conflicts over intellectual property and design changes, offering a secure and transparent system.

By using blockchain, engineers can create a shared, immutable record of all design decisions, which is valuable in industries like construction, architecture, and automotive engineering. This record can be referred to at any stage of the project to ensure accountability and prevent errors.

The supply chain is a critical part of engineering projects. Whether it's sourcing raw materials, manufacturing parts, or delivering finished products, managing the supply chain can be complex. Blockchain can streamline this process by offering a transparent and secure platform for tracking goods from the manufacturer to the consumer.

Using blockchain, engineers can track the movement of materials in real-time, ensuring that products are delivered on time and meet quality standards. The transparency provided by blockchain ensures that all participants in the supply chain have access to the same information, reducing the risk of fraud or errors. This use of blockchain is already being explored in industries like aerospace, automotive, and electronics, where supply chain management is crucial to the success of engineering projects.

Smart contracts are self-executing contracts with the terms of the agreement directly written into code. These contracts automatically enforce the rules and regulations without the need for intermediaries. In engineering projects, smart contracts can simplify complex agreements between multiple parties, ensuring that tasks are completed according to predefined conditions.

For example, in construction projects, smart contracts can automate the release of payments based on the completion of specific milestones. If a contractor completes a specific task, the payment can be automatically released without the need for manual approval. This reduces delays, minimises disputes, and increases efficiency in project management.

Intellectual property (IP) protection is a major concern for engineers, especially when it comes to patents, designs, and blueprints. Blockchain can play a significant role in securing IP by providing a transparent and immutable record of ownership. Once an engineer creates a new design or invention, they can register it on the blockchain, creating a secure and permanent record of their work.

This record serves as proof of ownership and can be used to prevent unauthorised use of their ideas. It also makes it easier to prove the originality of a design if there is a dispute. This use case is particularly beneficial in fields like software development, mechanical engineering, and product design, where protecting innovative ideas is essential.

In engineering, asset management is essential for ensuring that tools, machinery, and equipment are properly maintained and utilized. Blockchain can help track the ownership, usage, and maintenance history of assets, providing engineers with a comprehensive view of asset conditions.

For example, in the automotive industry, blockchain can be used to track the history of vehicle components, such as engines or brakes, ensuring that they are properly maintained and comply with safety regulations. This not only improves the reliability

of assets but also helps reduce costs by extending the lifespan of equipment and minimizing the need for replacements. The construction industry can benefit significantly from blockchain technology. Construction projects often involve numerous stakeholders, including contractors, suppliers, architects, and clients. Blockchain can improve communication and coordination between these parties by providing a single, transparent platform for sharing information.

Blockchain can also help in reducing construction fraud, such as fake billing or substandard materials, by providing a verifiable record of all transactions. Furthermore, the transparency of blockchain ensures that all parties are held accountable for their actions, promoting trust and reducing disputes.

Environmental engineers can leverage blockchain technology to improve sustainability efforts. For example, blockchain can be used to track the environmental impact of construction projects, ensuring that projects meet sustainability goals. By using blockchain to record energy usage, waste disposal, and other environmental data, engineers can ensure that projects comply with environmental regulations and standards.

Additionally, blockchain can support carbon credit trading, where organisations can buy and sell carbon credits to offset their emissions. By using blockchain for this purpose, the entire process becomes more transparent and verifiable, ensuring that organizations are held accountable for their environmental impact.

While the potential uses of blockchain in engineering are vast, there are challenges that need to be addressed. One of the main challenges is the integration of blockchain with existing systems. Many engineering companies still rely on traditional methods for managing data and transactions, and transitioning to a blockchain-based system may require significant investment in technology and training.

Another challenge is the scalability of blockchain. As more data is added to the blockchain, it can become slow and inefficient, which could impact the performance of engineering projects. However, with ongoing advancements in blockchain technology, these issues are likely to be resolved in the near future.

DEPARTMENT OF COMPUTER ENGINEERING

Data Analytics in Sports and Games



LOKHANDE SARVESH RAJENDRA

B. Tech CE III-Year

Sports and games are no longer based only on physical strength and talent. Today, data analytics plays an important role in improving performance, planning strategies, and making accurate decisions. Data analytics means collecting data, analyzing it, and using the results to make better decisions.

Data analytics is the process of examining data to discover patterns, trends, and useful information. In sports, data is collected from matches, player performances, fitness trackers, and video recordings.

This data helps coaches, players, and analysts understand strengths, weaknesses, and areas for improvement.



1. **Use of Data Analytics in Sports**

- **Player Performance Analysis**

Data analytics helps measure player performance using statistics such as speed, accuracy, stamina, and consistency. Coaches can identify the best players and plan training programs accordingly.

- **Game Strategy and Planning**

Teams analyze past match data to create winning strategies. Data helps decide team combinations, batting orders, and defensive tactics.

- **Injury Prevention**

Fitness and health data are analyzed to predict injuries. This helps trainers take preventive actions and keep players fit.

- **Match Analysis**

Data from previous matches is used to study opponents' strengths and weaknesses, helping teams prepare better.

- **Data Analytics in Online Games and E-Sports**

Data analytics is also widely used in online games and e-sports. Game developers analyze player behavior to improve game design and user experience.

Platforms like Indian Premier League use analytics to study player performance, while e-sports games track player actions to balance gameplay and improve fairness.

- **Technologies Used in Sports Analytics**

Some common tools and technologies used in sports analytics include:

- Data visualization tools
- Statistical software
- Machine learning algorithms
- Wearable sensors and GPS devices

These technologies help convert raw data into meaningful insights.

Benefits of Data Analytics in Sports

Data analytics offers many advantages:

- Improves player and team performance
- Helps in better decision-making
- Reduces injury risks
- Enhances fan experience
- Supports fair and accurate results

DEPARTMENT OF COMPUTER ENGINEERING

STUDENT ARTICLES

Digital Cybersecurity in the Digital Age



DESALE BHAVESH RAJENDRA

B. Tech CE III-Year

The digital age has brought about technological advancements that were unimaginable just a few decades ago. From online banking and e-commerce to social media and smart homes, we live in an era where our personal and professional lives are deeply intertwined with technology. However, as digital infrastructure grows, so do its vulnerabilities.

In the good old days, robbers had to do it in person, but in the digital era, you get or may not even get the notice “You have been hacked”.



- **Types of Cyber Threats:**
- **Malware:** Malicious software designed to disrupt, damage, or gain unauthorized access to a computer system.
- **Phishing:** Fraudulent attempts to obtain sensitive information by disguising oneself as a trustworthy entity.
- **Ransomware:** A type of malware that locks users out of their systems until a ransom is paid.
- **DDoS Attacks:** Distributed denial-of-service attacks that flood a network with traffic, causing it to crash.
- **Real-World Examples**

The personally identifiable information of 815 million Indian individuals, including Aadhaar numbers and passport details, was reportedly being sold on the dark web in October, according to Resecurity, an American cyber security business.

Threat actors stated they had access to a 1.8 terabyte data leak affecting an unidentified "India internal law enforcement agency." However, they declined to say how they received the data, which is necessary to determine the source of the data leak.

- **The Role of Cybersecurity**

Cybersecurity is essential in today's ever-digital world to protect private data, secure sensitive information, and defend national infrastructure. Without strong cybersecurity defences, people, organizations, and governments would always be vulnerable to financial loss, bodily danger, and data theft.

DEPARTMENT OF COMPUTER ENGINEERING

BEST PROJECT ABSTRACT

Predicting Stock Market Trends with a Transfer Learning Model based on CNN-LSTM Architecture

Mr. Pankaj Rambhau Patil, Prof. Deepa Parasar, Prof. Shrikant Charhate
Computer Engineering

Forecasting stock market trends is an essential endeavor, garnering significant interest due to the potential for substantial profits hinging on well-informed investment decisions. The endeavor of predicting stock market behavior has grown increasingly complex in recent times, largely due to the presence of disorderly data, non-stationary data patterns, and the cacophony of data sources. Consequently, this complexity presents a formidable challenge to investors seeking lucrative returns on their investments. Numerous techniques have been devised to tackle the formidable task of stock market prediction, each tailored to specific timeframes and market conditions. This research study employs a novel
approach by harnessing a blended optimization algorithm to enhance the efficacy of Transfer Learning (TL) in the context of stock market prediction. Incorporating a CNN integrated with a LSTM (CNN-based LSTM), our Transfer Learning (TL) framework is adept at forecasting stock market trends by leveraging augmented data. The proposed approach utilizes time series data from three distinct companies' stock market datasets as our input. Subsequently, a multitude of features is extracted from this input dataset, and a judicious feature selection process is employed, guided by Motyka similarity metrics. To strengthen the dataset and enhance predictive accuracy, this study employs the Bootstrap method as a key component, facilitating robust data augmentation techniques. To
evaluate the effectiveness of the proposed model, its performance is assessed using three distinct metrics: Mean Squared Error (MSE), Root Mean Squared Error (RMSE), and Mean Absolute Percentage Error (MAPE).

DEPARTMENT OF COMPUTER ENGINEERING

Mobile Computing, Communications & Mobile Networks

Mr. Makarand Lotan Mali, Prof.Dr. Nitin N. Patil
Computer Engineering

The widespread availability of high-tech mobile devices has drastically altered people's daily routines. Individuals may want to consider including these gadgets in their set of must-haves. The widespread use of mobile devices has resulted in people becoming increasingly reliant on them. The significant consumer interest in mobile technology indicates a surge in the number of mobile phone users. There is a growing need for high-quality apps for mobile devices as the number of mobile users and mobile devices continues to rise. Developers are under too much pressure to fix users' problems with their mobile app in today's market. With this study, we hope to take stock of the many problems associated with mobile apps, both those encountered by consumers and those encountered by app creators. Weanalyzed the ways in which we fall short and the problems that our users and engineers encounter. We also provided a solution to reduce the gap between the mobile app users and developers.

DEPARTMENT OF COMPUTER ENGINEERING

Plant Disease Detection using Machine Learning Approaches: A Review

Ms. Puja Dipak Saraf, Prof. Dr. Jayantrao Bhaurao Patil
Computer Engineering

Agriculture plays an important role in the country's development and it is the key source of food for the population of the world. But in developing countries like India, Pakistan and Nepal, the condition of the agriculture sector is getting worse day by day. There are many reasons behind it but one of the reasons is the degeneration of crops by pests and disease. Agriculture solely depends on the biological health of the seeds, crops, information on weather conditions soils and biotic features liable for the crop diseases. Robust diagnostic methods are accomplished of dispensation and scrutinizing large quantities of records near get additional consistent material and ample more accurate predictions remain vital. Deep learning, Image Processing, Soft Computing and Data Mining are likely to play a vital role in recognizing plant diseases. This paper aims to review existing studies and investigation using the recent practices to solve a variety of agricultural problems.

DEPARTMENT OF COMPUTER ENGINEERING

Emotion Recognition using Twitter Data: An Ensemble Machine Learning Technique

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Due to the expansion of world of the internet and the quick acceptance of platforms for social media, information is now able to exchange in ways never previously imagined in history of mankind. A social networking site like Twitter offers a forum where people may interact, discuss, as well as respond to specific issues via short entries, like tweets of 140 characters and fewer. Users may engage by utilizing the comment, like and share tabs on texts, videos, images and other content. Although platforms for social media are now so extensively utilized, individuals are creating as well as sharing so much information than shared before, which can be incorrect or unconnected to reality. It is difficult to identify erroneous or inaccurate statements in textual content autonomously and find emotions of people. In this paper, we suggest an Ensemble method for sentiment and emotion analysis. Different textual features of actual and Emotion and sentiment have been utilized. We used a publicly accessible dataset of twitter sentiment analysis that included total 48,247 authenticated tweets out of 23,947 of which were authentic positive texts labeled as binary 0s and 24,300 of which were negative texts labeled as binary 1s. In order to assess our approach, we used well-known (ML) machine learning models such as Logistic Regression (LR), Decision Tree (DT), AdaBoost, SGD, XG-Boost, and Naive Bayes. In order to get more accurate findings, we created a multi-model sentiment and emotion analyzing system utilizing the ensemble approach and the classifiers stated above. Our recommended ensemble learner method outperforms individual learners, according to an experimental study.

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A Review of Pre-processing Techniques for Weed-Plant Detection & Classification in Precision Agriculture

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Computer Engineering

Precision agriculture has recently gained significant importance in computer vision technologies. Various processes as a part of agricultural production cycle from planting to harvesting, can be carried out automatically and effectively by using computer vision. The lack of publicly available image datasets is a major obstacle to the rapid design and assessment of computer vision based applications and also to machine learning algorithms which support these applications. To reduce this bottleneck, numerous image dataset collections have been discovered and made publicly available since 2015. Inspite of this development, there is still a need to focus on survey of these datasets. Two most important concerns - choosing the right dataset and knowing how to pre-process and prepare the images in datasets are considerably challenging task in every application. This review paper gives a thorough analysis of the public image datasets and numerous pre-processing techniques carried out in the field of precision agriculture. This thorough study can lead to development of suitable methods for improved quality and productivity of the crop along with proper weed management.

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STUDY OF CLASSIFIERS FOR THE IDENTIFICATION OF FAKE NEWS

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A significant source of local and international news for millions of individuals, online social networking websites are rapidly growing. OSNs, on the contrary side, have two disadvantages. Despite the numerous benefits they provide, such as endless, simple communication and instant access to data and news, they can also come with a number of drawbacks and concerns. The spread of misleading information is one of their toughest obstacles. Fake news detection is a difficult & unsolved issue. Nevertheless, designing a solution is anything but straightforward given the unique characteristics and challenges of identifying bogus news on OSNs. Artificial intelligence (AI) techniques, on the other hand, are still incapable of overcoming this difficult obstacle. Even worse, by creating and disseminating false information, artificial intelligence (AI) systems like deep learning and machine learning are being abused to trick customers. Because the material is meant to closely mirror reality, it can occasionally be difficult to assess its reliability using AI alone and without support from outside sources. As a result, it's still very difficult to recognise bogus news automatically. This research seeks to offer a fundamental review of the methods currently used to recognise false news and prevent it from spreading over OSNs in addition to classifying fake news using several classifiers.

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TECH FEST GLIMPSE

Social Activity on Indian Constitution Day under “E-Builder”



The students of the Department of Computer Engineering at R. C. Patel Institute of Technology, Shirpur, organized a social awareness activity under “E-Builder” on 26 November 2022, marking the occasion of Indian Constitution Day.

The main objective of this activity was to enhance students’ soft skills such as communication, presentation, teamwork, and confidence, while spreading awareness about the Constitution of India. The event featured an engaging poster presentation, where each poster was prepared and presented by a group of two students, accompanied by a brief explanation.

The program was inaugurated by the Director of the Institute, Prof. Dr. J. B. Patil, who motivated students to understand and follow constitutional values in their personal and professional lives.

The event was attended by Head of the Computer Engineering Department Prof. Dr. Nitin Patil, Founder of the Student Welfare Department Prof. Dr. Amrita Bhandari, Event Coordinators Mr. Dushyant S. Potdar and Ms. Pallavi A. Agrawal, judges, faculty members, and non-teaching staff.

The activity proved to be a meaningful learning experience, combining social responsibility with skill development, and encouraged students to actively participate in nation-building initiatives.



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Cyber Security KAVACH-2023: Internal Hackathon



The Department of Computer Engineering at R. C. Patel Institute of Technology, Shirpur, organized the Cyber Security KAVACH-2023 Internal Hackathon on 11 April 2023.

The event was conducted to motivate students to propose innovative cyber security solutions and to prepare them for participation in the National Level Cyber Security KAVACH Hackathon-2023. The first round of the competition involved idea presentations, where student teams presented their concepts focusing on cyber threats, security challenges, and practical solutions.

A panel of judges evaluated all team presentations based on innovation, technical feasibility, clarity, and relevance. After careful assessment, the top 10 teams were shortlisted and recommended to represent the institute at the national-level final stage.

The internal hackathon provided an excellent platform for students to enhance their technical knowledge, problem-solving skills, teamwork, and presentation abilities. The Department of Computer Engineering appreciated the enthusiastic participation of students and wished the shortlisted teams success in the upcoming national competition.

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TECH HUNT–2022: Nurturing Technical Excellence



The Computer Engineering Department of R. C. Patel Institute of Technology organized TECH HUNT–2022 on 12 December 2022, aiming to provide a competitive platform for students to showcase their technical knowledge and practical skills.

The event received an enthusiastic response with 307 students forming 76 teams from various engineering branches. The competition was conducted in four well-structured rounds. It began with an objective multiple-choice test, followed by a Front-End and Back-End Development round to assess hands-on technical abilities. The Rapid Fire round tested quick thinking and conceptual clarity, while the final Option Round determined the winners.

The First Prize was won by Tanmay Chavan, Parth Rane, Gaurav Vani, and Kundan Patil. The Second Prize was secured by Reena Bhamre, Kajal Patil, Swati Chavan, and Chetan Chaudhary, and the Third Prize was awarded to Pranal Rokade, Ketan Khor, Manoj Chaudhary, and Prasannjit Jain.

TECH HUNT–2022 offered students an excellent opportunity to demonstrate their talents at the college level and encouraged teamwork, innovation, and healthy competition. The event was conducted under the guidance of Prof. Dr. Nitin Patil, Head of the Computer Engineering Department, with the coordination of Mr. Ashish Patil, faculty members, and student volunteers. The successful was appreciated by the college management, motivating students toward continuous technical growth.

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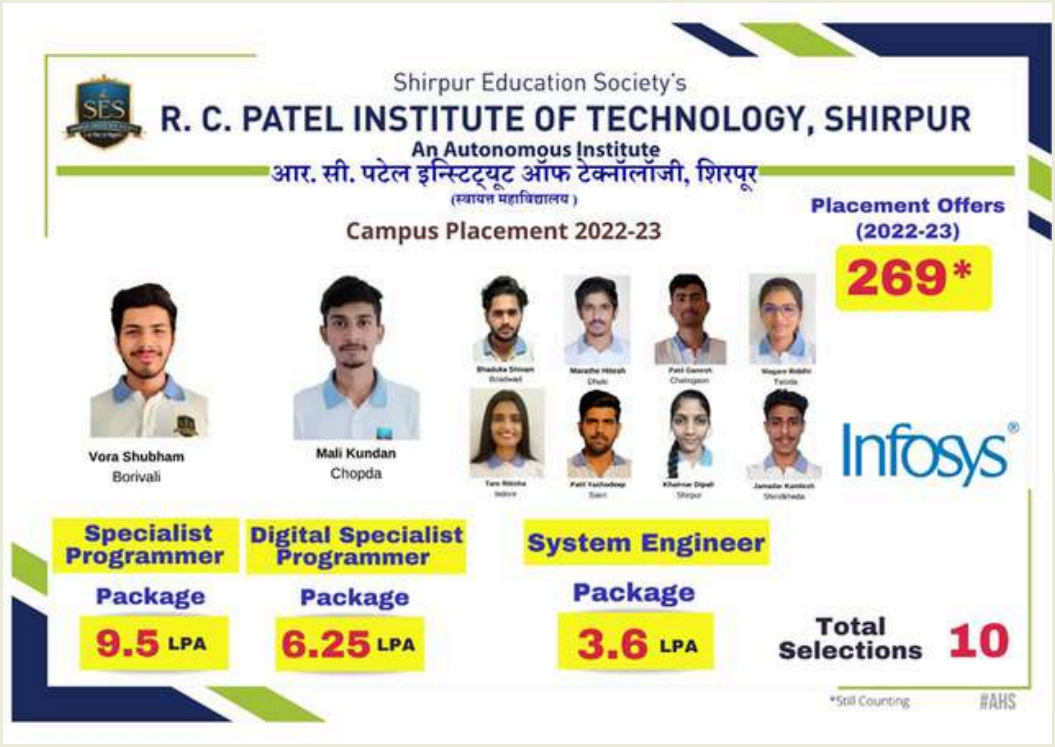






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COMPUTER DEPARTMENT PLACEMENT 2022-2023





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