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GARDEN CITY UNIVERSITY
EMPHASIS ON LIFE

Proceedings of

International Conference on Innovation, Engineering & Management (ICIEM-2026)

Organized by

School of Computational Sciences and IT, Department of Computer Science, Garden City University, Bengaluru, India.

Editors

Dr.Surendar M
Dr.Jincy C Mathew
Ms.Jansirani E

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GARDEN CITY UNIVERSITY
EMPHASIS ON LIFE

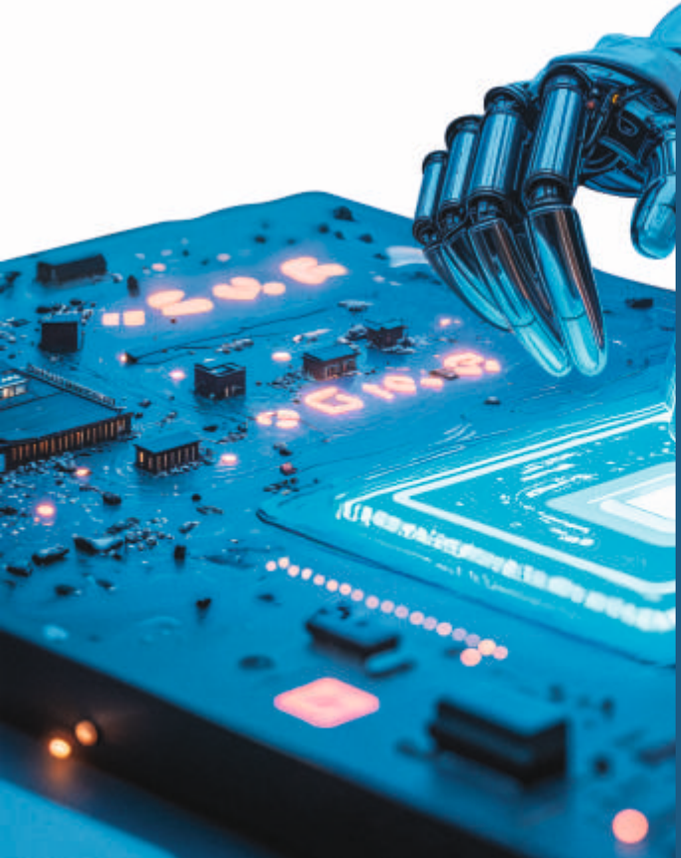
Department of Computer Science
organises

INTERNATIONAL CONFERENCE ON

INNOVATION, ENGINEERING & MANAGEMENT
ICIEM–2026

Wednesday & Thursday, 8–9 April 2026

Venue: GCU Auditorium,
Garden City University Campus,
Old Madras Road, K R Puram, Bengaluru



ABOUT THE CONFERENCE:

ICIEM-2026 provides a global platform for researchers, academicians, and industry experts to exchange ideas, present innovative research, and discuss future trends in intelligent, resilient, and secure technologies across Innovation, Engineering, and Management.

CONFERENCE THEMES:

- Artificial Intelligence & Machine Learning Innovations
- IoT, Cyber-Physical Systems & Smart Automation
- Blockchain & Distributed Trust Technologies
- Quantum Computing
- Sustainable Engineering & Green Energy Technologies
- Robotics, Industry 4.0 & Additive Manufacturing
- Data Analytics, Cloud & Edge Computing
- Innovation Management

GARDEN CITY UNIVERSITY

Overview

Garden City Education Trust was established in 1992 by **Dr. Joseph V.G**. with the support of like-minded educationists like Prof. Shivarudrappa – former Dean, Karnataka University, Dr. Hanumanthappa – former Vice Chancellor, Bangalore University, Prof V.B. Coutinho – former Vice Chancellor, Gulbarga University and Prof. Rame Gowda – former Vice Chancellor of the Karnataka State Open University. The Trust was established to set up centres for educational excellence that would accept only qualitative practices nurturing students with value based education. The Trust began its operations with Garden City College of Science and Management Studies which has an "A – Grade", the highest conferred to an educational institution, when assessed by the National Assessment and Accreditation Council (NAAC) – the premier accreditation body under the UGC consecutively in three cycles of accreditation. The legacy of Garden City University comes from the Garden City Group of Institutions established in 1992. In 2013, the Government of Karnataka passed the "Garden City University Act", taking into consideration the merits of the Garden City Education Trust. The Garden City University Act received the assent of the Governor of Karnataka on 26th March 2013 and was published in the Karnataka Gazette on 12th April 2013. A new university campus is being developed in a lush green area spread over 50 acres of land, adjacent to the Volvo manufacturing plant. This is a part of the 180 acres township envisaged by Dr Joseph V G which would have Knowledge Parks, IT and BT Parks, Hotels and Convention Halls, Shopping Malls and Residential areas. Our vision and belief that social development is an avenue for nation building, is inculcated through our approach and our policies.

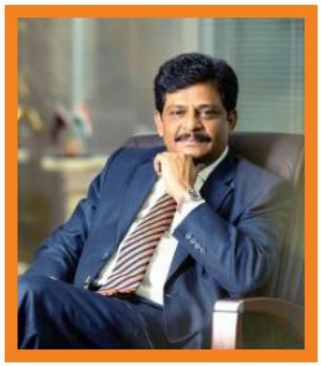
VISION

To be an institution that will offer affordable world-class education to all classes of students in order to uplift the society we serve, by nurturing human values and ethics and by imparting knowledge which emphasizes on life skills.

MISSION

To evolve, synthesize and spread the power of knowledge to arm generations to come through world-class initiatives and academic practices that focuses on overall development of students.

Message



Dr. Joseph V G
Chancellor

I am immensely pleased to note that the Department of Computer Science is organizing the International Conference on Innovation, Engineering and Management ICIEM-2026 on 9th April 2026 exclusively for faculty members, research scholars, and students to bring out their inherent potential and novel ideas. This International Conference will serve as an excellent platform for participants to explore their technical talents in the world of information science and engineering, while also enhancing their technical knowledge, communication skills, research aptitude, and creativity.

The conference is expected to provide opportunities for participants to interact with academicians, industry experts, and researchers from various fields. It will encourage the exchange of innovative ideas, promote collaborative research, and inspire young minds to contribute effectively to the advancement of science, technology, and management. Such events play a vital role in bridging the gap between theoretical knowledge and practical applications.

The efforts of the Head of the Department, the Convener, and the members of various committees in making this event a grand success are sincerely appreciated. Their dedication, hard work, and commitment towards organizing this conference deserve special recognition and praise.

Message

Dr. M Ramachandra Gowda
Vice Chancellor

I am glad to see that the International Conference on Innovation, Engineering and Management ICIEM-2026 is being organized on 9th April 2026 on our University campus. I understand that several eminent personalities from academic institutions, industries, and young research scholars are participating in the conference from all over the country. This conference will serve as an excellent platform for the exchange of innovative ideas, recent research findings, and practical experiences in the fields of engineering, technology, and management.

The conference will also provide a valuable opportunity for participants to interact with experts, share their knowledge, and build professional networks. Such interactions will encourage interdisciplinary collaboration and inspire researchers and students to explore new areas of innovation and development. It will further help in enhancing awareness about current trends, challenges, and advancements in science, technology, and management.

On this occasion, I appreciate the efforts made by the Head of the Department, Convener, and members of various committees to make this event a grand success. Their dedication, planning, and continuous support in organizing such a meaningful academic event are highly commendable and deserve sincere appreciation.

PREFACE

It is with great pleasure that we present the Abstract Book of the Proceedings of the International Conference on Innovation, Engineering & Management (ICIEM-2026), organized by the Department of Computer Science, Garden City University, Bangalore. The ICIEM-2026 conference serves as a vibrant platform for researchers, academicians, industry professionals, and students to exchange ideas, present innovative research, and discuss emerging trends across the domains of innovation, engineering, and management. The conference reflects the growing interdisciplinary nature of modern research and emphasizes the integration of advanced technologies with practical applications to address real-world challenges. This abstract book comprises a diverse collection of research contributions covering cutting-edge areas such as Artificial Intelligence, Machine Learning, Cybersecurity, Cloud Computing, Data Analytics, Healthcare Informatics, and Smart Systems. The wide spectrum of topics presented in these abstracts highlights the enthusiasm and commitment of young researchers and scholars toward advancing knowledge and technological development. The editors sincerely acknowledge all the authors for their valuable contributions and for choosing ICIEM-2026 as a platform to showcase their work. We extend our gratitude to the organizing committee, reviewers, and faculty members whose efforts and dedication ensured the successful compilation of this volume. Special appreciation is also extended to Garden City University for providing continuous support in fostering academic excellence and research innovation. We hope that this collection of abstracts will inspire further research, collaboration, and innovation among the academic and professional communities. It is our belief that the ideas presented herein will contribute meaningfully to the advancement of science, technology, and management practices.

Dr.Surendar M

Dr.Jincy C Mathew

Ms.Jansirani E

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Proceedings of International Conference on
"Innovation, Engineering & Management (ICIEM- 2026)"
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An Intelligent AI-Driven Framework for Dynamic Resource Allocation in Cloud Computing

[1]Philip Pereira *

[1] PG Student, Department of Computer Science,
Garden City University,
Bengaluru, India.

Abstract: Cloud computing is really important for supporting digital applications in many different industries. These days organizations are using cloud infrastructures more and more to process a lot of data and host services that are spread out. So, it has become very important to manage computing resources in a way. The old ways of allocating resources usually rely on fixed rules or mechanisms that use predefined limits, which often do not work well with changing workloads and unpredictable user demand. Because of this cloud environments can have problems like using resources spending more money on operations and potentially having poor performance. Recently there have been advancements in artificial intelligence and machine learning that can help improve how resources are managed in cloud computing systems. By looking at patterns of workload and how the system is performing smart algorithms can predict what resources will be needed in the future and change how resources are allocated in real time. This way of predicting what will be needed helps cloud platforms keep performing while using infrastructure in the best way possible. This paper is proposing a framework that uses artificial intelligence to allocate resources dynamically in cloud computing environments. The framework we are proposing combines real-time monitoring of the system using machine learning to predict workloads and automatic mechanisms to scale resources up or down to make the system more efficient and able to handle more. The architecture of the framework is designed to make decisions, about cloud resource management in a way that adapts to changing needs with the goal of reducing costs. Also the study talks about how to measure the performance of the proposed approach and what improvements it could bring.

Keywords: Cloud Computing, Artificial Intelligence, Machine learning, Framework

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Fake News Detection Using Natural Language Processing Techniques

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Bengaluru, India.

Abstract: The internet and social media have pretty much flipped the script on how we get and share information. Now, it's easier than ever to find what you're looking for, but at the same time, it's just as easy for fake news and misinformation to spread like wildfire. Fake news isn't just sloppy reporting, it's when someone actually creates or shares stuff that's made up or meant to mislead, all while making it look like real news. This isn't just annoying; it can mess with politics, shake up economies, and even put people's health at risk. Traditional fact-checking eats up a lot of time because experts have to go through everything by hand. With the flood of digital info out there, that just doesn't cut it anymore. So, researchers in computer science and data science have started focusing on ways to automate fake news detection. That's where Natural Language Processing, or NLP, comes in. It gives machines the tools to actually make sense of human language, which makes it a game changer for spotting fake news.This paper looks at how Natural Language Processing helps spot fake news online. It digs into the text of news articles, using tools like tokenization, stop word removal, stemming, and lemmatization to clean things up. Then, it pulls out features with methods like TF-IDF and word embeddings, turning the words into numbers that machine learning models can actually work with. The study tests out different algorithms, Logistic Regression, Naïve Bayes, Support Vector Machines, and even deep learning models like LSTMs, to see how well they can tell real news from fake. The experiments show that NLP models do a great job telling fake news apart from the real stuff. When you bring in advanced deep learning models like those fancy transformer architectures, they push the accuracy even higher, thanks to their knack for picking up on context in the text. All of this really drives home how crucial automated fake news detection is if we want to fight misinformation.

Keywords: Natural Language Processing, Fake News Detection, Deep Learning

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Dermatonet: Deep Transfer Learning for Accurate Classification of Dermoscopic Skin Lesions Using the Augmented ISIC Dataset

[1] G R, Poornima*

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Garden City University,
Bengaluru, India.

Abstract: Skin cancer ranks among the most prevalent cancers worldwide, highlighting the necessity for swift and dependable diagnostic methods. While dermoscopy provides a detailed view of skin lesions, its manual analysis is both time-consuming and heavily reliant on the operator's expertise. To address these issues, this research presents DermatoNet, a framework based on deep transfer learning for the automatic classification of dermoscopic skin lesions, utilizing the Augmented ISIC Skin Cancer Dataset. To enhance the model's generalization capabilities, various image augmentation techniques—such as rotation, flipping, and scaling—are employed to effectively enlarge the training dataset. By applying knowledge acquired from extensive natural image datasets through transfer learning, DermatoNet improves classification accuracy even with a limited amount of labeled medical data, in line with recent progress in CNN-based skin lesion analysis.

Keywords: Skin cancer, dermoscopy, Deep Transfer Learning

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Artificial Intelligence in Cybersecurity

[1] Aquib Khan *

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Bengaluru, India.

Abstract: Cybersecurity is being transformed by Artificial Intelligence (AI), which helps address the rapidly changing nature and increasing number of advanced cyber threats. Signature-based detection and predefined rules that are used in traditional security systems do not have the ability to detect new types of cyber-attacks (Zero-Day, Advanced Persistent Threats (APTs) and/or Polymorphic Malware). However, AI systems utilize Machine Learning (ML), Deep Learning (DL) and Natural Language Processing (NLP) to provide adaptive, intelligent, real-time detection and response capabilities for threats. This work will analyse how AI is being applied to enhance Threat Intelligence, Automate Security Operations and Improve Anomaly Detection in networks, endpoints and cloud environments. The major areas of focus will include, Intrusion Detection Systems (IDS), Malware Classification, Phishing Detection, Behavioural Analysis and Fraud Prevention. The research will also assess how AI Models work on large amounts of structured and unstructured data to identify patterns of attack and to predict potential security breaches before they occur.

Keywords: *Cybersecurity, cyber-attacks, Deep Learning, Artificial Intelligence*

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Early Detection of Cardiovascular Disease Using Machine Learning

[1]K R, Santhosh *

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Garden City University,
Bengaluru, India.

Abstract: However, cardiovascular disease is one of the main causes of homicide across the world. Early detection of cardiovascular disease is useful to take early action to avoid the possibility of developing various health problems like heart attacks, strokes, etc. In the present study, the researcher reveals the approach of early detection of cardiovascular disease using the health information of patients. In the approach, the researcher uses various health parameters like the age of the patient, blood pressure of the patient, cholesterol levels of the patient, heart rates of the patient, etc., to detect the cardiovascular disease. Various machine learning algorithms like Logistic Regression, Decision Tree, Random Forest, etc., are used in classification algorithms. Various public health data sets are considered for testing the approach. The research findings prove the possibility of forecasting cardiovascular disease using various machine learning algorithms. The proposed approach is useful for healers.

Keywords: *cardiovascular, disease, machine learning*

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Safety Gear Identification Using Object Detection Feature of YOLO AI Models: A Comparative Study

[1]P K, Vinod*, [2] Jincy Mathew

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Garden City University,
Bengaluru, India.

[2]Assistant Professor, Department of Computer Science,
Garden City University,
Bengaluru, India.

Abstract: Construction and industrial workplaces remain among the most hazardous work environments globally, with not wearing of personal protective equipment (PPE) contributing significantly to workplace injuries and deaths. This research presents a comparative analysis of YOLO (You Only Look Once) object detection models, specifically YOLOv8, YOLOv11 and YOLOv26, for automated identification in real-time of whether designated personnel are wearing safety gear or not. The study evaluates the performance of these models in detecting critical PPE items like hard hats and safety vests in different environmental conditions. Through extensive experimentation on benchmark datasets, this research demonstrates that YOLO26n achieves superior detection accuracy with a mean Average Precision (mAP) of 40.9% compared to YOLO11n's 39.5% and YOLOv8n's 37.3%, while maintaining competitive inference speeds. The findings reveal that YOLO26 model family achieves higher accuracy on small objects and runs up to 43% faster on CPUs, making YOLO26 one of the most practical and deployable YOLO models to date for resource-constrained environments, particularly effective for small object detection in complex construction environments. This study contributes to the development of intelligent safety monitoring systems that can automatically identify personnel not wearing PPE, trigger real-time alerts and ultimately reduce workplace accidents by up to 50% through proactive safety enforcement.

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Keywords: *Object Detection, YOLO, personal protective equipment*

Machine Learning-Based Defect Prediction for Software Quality Assurance

[1]Rabindra Rai *

[1] PG Student, Department of Computer Science,
Garden City University,
Bengaluru, India.

Abstract: Software defect prediction is a critical component of Software Quality Assurance (SQA), enabling the identification of fault-prone modules prior to deployment. Traditional testing approaches are predominantly reactive, leading to increased maintenance cost and reduced system reliability. This study proposes a data-driven machine learning framework for early defect prediction using the NASA KC1 dataset. The dataset is preprocessed through normalization and feature selection to enhance model performance and reduce noise. Three supervised classification algorithms Decision Tree, Random Forest, and Naive Bayes are implemented and comparatively evaluated using performance metrics including accuracy, precision, recall, and F1-score. Experimental results indicate that the Random Forest classifier outperforms other models, achieving an accuracy of 90% along with superior generalization capability. The findings demonstrate that ensemble learning techniques significantly improve prediction accuracy and robustness. The proposed approach facilitates proactive defect management, optimizes testing resources, and enhances software reliability. This research contributes to the advancement of intelligent software testing by integrating machine learning techniques into quality assurance processes, with potential applicability in large-scale and real-time software development environments.

Keywords: *Machine Learning, Software Quality Assurance, Defect Prediction*

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DermatoNet: A Transfer-Learning Framework for Automated Skin Lesion Classification.

[1]S. Preethu*

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Garden City University,
Bengaluru, India.

Abstract: Skin cancer is one of the most common kinds of cancer in the world, and the early detection of this cancer plays a major part in the improvement of patient survival rates. Automated skin lesion classification with the help of deep learning has proved to be a promising decision support tool, which may help a dermatologist to identify a potentially malignant lesion from a dermoscopic image. DermatoNet, a deep learning framework, has been developed based on transfer learning, which classifies images of skin lesions based on a dataset. The images used in the dataset are of seven pigmented skin lesions: Melanocytic Nevus (Benign Mole), Melanoma (Malignant Skin Cancer), Benign Keratosis, Basal Cell Carcinoma, Actinic Keratoses/Intraepithelial Carcinoma, Vascular Lesions, and Dermatofibroma. Most of the dermatology datasets contain a limited number of samples, which results in an imbalanced dataset, which in turn reduces the accuracy of classification. This may be achieved with the help of transfer learning, which enables the effective training of a model even with a limited number of samples in the medical images.

Keywords: Transfer-Learning , Automated, Classification, Skin cancer

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Heart Attack Prediction Using Machine Learning

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Abstract: Heart disease is one of the major causes of death globally. Therefore, it is critical to make early predictions and diagnoses to improve the outcomes of patients. Current diagnostic techniques involve the use of expertise and lab tests, which are often time-consuming and expensive. However, the emergence of Machine Learning (ML) provides a faster and efficient method of making predictions and diagnoses. This study focuses on the creation of a machine learning system for the prediction of heart disease based on health parameters such as the patient's age, blood pressure, cholesterol, and heart rate. Several ML algorithms, including logistic regression, decision tree, random forest, and support vector machines, are implemented and compared to assess their performance. Additionally, the study utilizes normalization and feature selection techniques to improve the accuracy of the system. The study shows the effectiveness of ML models in the prediction of heart disease. The system can be useful in the early detection and diagnosis of the disease, hence improving the outcomes of patients. It also provides a glimpse into the efficient and effective integration of intelligent predictive models in modern medicine.

Keywords: *Heart disease, Prediction, Machine Learning, diagnostic techniques*

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Transfer Learning for Efficient Image Classification in Deep Learning

[1]S C, Erriswamy*

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Bengaluru, India.

Abstract: Image classification is a basic task in computer vision with numerous practical applications in various fields, including medicine, agriculture, transportation, and security. Deep learning models, particularly convolutional neural networks (CNNs), have shown promising results in image classification tasks. However, they often require a large amount of training data and substantial computational power, which cannot be satisfied in real-world scenarios. In this study, a transfer learning-based method is presented to overcome the problems associated with image classification tasks, as mentioned above. The method utilizes pre-trained models, including VGG16, ResNet50, and EfficientNet, to improve the accuracy of image classification tasks with limited training data. The overall methodology of the proposed method involves various image preprocessing techniques, followed by transfer learning, feature extraction, and fine-tuning. The experimental results of the proposed method reveal that transfer learning improves the accuracy of image classification tasks, particularly with limited training data. The results also indicate that EfficientNet has a good balance of accuracy and efficiency, whereas ResNet50 offers good feature representation. Fine-tuning improves the accuracy of the models; however, model optimization must be performed to avoid overfitting. The overall method presented in this study is efficient and thus suitable for practical implementation.

Keywords*: image, classification, tasks, accuracy, learning, convolutional neural networks*

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A Comparative Study of Machine Learning Algorithms for Customer Segmentation Using RFM Analysis

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Bengaluru, India.

Abstract: Customer segmentation is essential for understanding customer purchasing behavior and developing effective business strategies. This study presents a comparative analysis of three unsupervised machine learning algorithms—K-Means, Hierarchical Clustering, and DBSCAN—for customer segmentation using the RFM (Recency, Frequency, Monetary) model. Transaction data is processed to extract RFM features, followed by data cleaning and normalization to ensure accurate clustering results. The performance of the algorithms is evaluated using standard clustering metrics such as Silhouette Score and Davies–Bouldin Index. The main objective of this study is to identify which clustering algorithm produces better and more meaningful customer segments based on consistent evaluation criteria. The study also aims to understand the strengths and limitations of each algorithm to support better decision-making in customer analysis.

Keywords*: Customer segmentation, Machine Learning, RFM Analysis, clustering algorithm*

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An Intelligent Fraud Detection System for Banking Transactions Using Python And Ai

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Garden City University,
Bengaluru, India.

Abstract: Due to the rapid growth of digital banking, the occurrence of fraudulent transactions has increased. The traditional rule-based system does not efficiently handle complex fraudulent patterns. This paper aims to propose an intelligent system for detecting fraudulent transactions, which will be implemented using the Python programming language with the help of machine learning algorithms. In this research, three algorithms will be used: Logistic Regression, Random Forest, and XGBoost. The performance of the algorithms will be checked based on accuracy, precision, recall, and F1 score. The proposed system will efficiently detect fraudulent transactions with a high degree of accuracy, which will result in a low latency of the system, making it a viable solution for the security of digital banking systems.

Keywords*: Intelligent Fraud Detection, Banking Transactions, XGBoost.*

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Student Performance Prediction Using Machine Learning

[1]Toijam Prenita Devi*

[1] PG Student, Department of Computer Science,
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Bengaluru, India.

Abstract: Predicting student academic performance is a critical challenge in educational institutions worldwide. Early identification of at-risk students enables timely interventions and improves overall educational outcomes. This paper presents a comprehensive comparative study of machine learning algorithms such as Decision Tree, Naive Bayes, Random Forest, and Artificial Neural Network (ANN), applied to the UCI Student Performance Dataset to predict student pass or fail outcomes. The dataset comprises 649 student records with 30 features, including academic, demographic, and behavioral attributes. Data preprocessing techniques such as label encoding, feature selection using correlation analysis, and SMOTE for class balancing were employed. Experimental results demonstrate that Random Forest achieves the highest accuracy of 92.4%, followed by ANN at 89.7%, Decision Tree at 85.3%, and Naive Bayes at 81.6%. The proposed system incorporates a visual dashboard for educators to monitor at-risk students in real time. This work contributes a robust, interpretable model with practical applicability in educational data mining.

Keywords: Student Performance, Artificial Neural Network, Prediction, Machine Learning

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Intelligent Consumer Sentiment Analytics Using Ai-Driven Natural Language Processing

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Bengaluru, India.

Abstract: Understanding consumer sentiment is essential for businesses to improve products, services, and customer satisfaction in today's digital era. Traditional sentiment analysis methods often fail to capture contextual meaning and complex language patterns present in user-generated content. This paper presents an intelligent consumer sentiment analytics system leveraging advanced Natural Language Processing (NLP) and deep learning techniques. The proposed system employs a pre-trained Bidirectional Encoder Representations from Transformers (BERT) model hybridized with a Bidirectional Long Short-Term Memory (BiLSTM) network to analyze textual data collected from social media, product reviews, and customer feedback. A comprehensive preprocessing pipeline handles noise reduction, emoji normalization, sarcasm detection, and negation handling. The ensemble model is evaluated on a dataset of 120,000 records across accuracy, precision, recall, and F1-score metrics, achieving 93.7% accuracy - outperforming standalone BERT (90.3%) and RoBERTa (91.0%) baselines. The system is scalable and suitable for real-time business analytics applications.

Keywords*:* Intelligent Consumer Sentiment Analytics, Natural Language Processing (NLP), Long Short-Term Memory

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Predictive analytics

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Abstract: Predictive analytics, which is an integral part of advanced data analytics, uses past information, statistical techniques, and machine learning techniques to forecast future trends and behaviours. This enables organizations to shift from reactive to proactive decision-making. In this paper, the revolutionary role of predictive analytics in the broader context of the data analytics framework will be discussed, along with its integration with descriptive analytics, diagnostic analytics, and prescriptive analytics to offer complete solutions. Some of the major techniques include regression analysis, decision trees, random forests, neural nets, time series analysis such as Auto Regressive Integrated Moving Average, which deal with both structured and unstructured data from various systems such as Enterprise Resource Planning systems, sensors, and Customer Relationship Management systems. The major processes include data collection, data preprocessing such as cleaning and normalization, model development, validation, and deployment, along with monitoring to overcome challenges such as model drift.

Keywords: *Predictive analytics, data analytics, Customer Relationship Management systems.*

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An intelligent Hybrid Framework

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Abstract: An Intelligent Hybrid Framework for Real-Time Decision Support Using Machine Learning and Edge Computing in Smart Environments. The rapid expansion of smart environments, driven by the convergence of the Internet of Things (IoT), artificial intelligence, and distributed computing, has necessitated efficient and scalable decision-making systems. This paper proposes an intelligent hybrid framework that integrates machine learning techniques with edge computing to enable real-time decision support in dynamic environments such as smart cities, healthcare monitoring systems, and intelligent transportation networks. The proposed model leverages edge devices to perform preliminary data processing and filtering, thereby reducing latency and bandwidth consumption, while cloud-based machine learning models are employed for advanced analytics and predictive decision-making. A combination of supervised learning algorithms and lightweight neural networks is utilized to optimize response accuracy and computational efficiency. The framework is evaluated using real-time sensor datasets, demonstrating improved system performance in terms of response time, accuracy, and resource utilization compared to traditional cloud-centric architectures. Furthermore, the study highlights the interdisciplinary applicability of the framework by addressing challenges across domains such as urban infrastructure management, remote healthcare diagnostics, and environmental monitoring. The results indicate that the integration of edge intelligence with machine learning significantly enhances system adaptability and reliability in real-time scenarios. This research contributes to the growing field of intelligent systems by providing a scalable, cost-effective, and robust solution for real-time decision support, aligning with the evolving demands of next-generation smart technologies.

Keywords*:* Intelligent Hybrid Framework, Real-Time Decision Support, Machine Learning, Edge Computing, Internet of Things (IoT)

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Sentiment Analysis of Social Media Data Using Machine Learning

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Abstract: Social media platform that are Facebook, Twitter, and Instagram they produce a large amount of the user created content every day and their actions and behavior over that content. This data contains opinions, emotions, and feedback about products, services, events, and social issues. Analyzing and segregating such large volumes of textual data manually is difficult and time-consuming. So, for this sentiment analysis techniques are widely used to automatically identify and interpret user opinions from social media content. The research mainly focuses on the analyzing of social media data to determine the sentimental or emotion that is expressed by users using machine learning techniques. The collected data is processed through several processing steps to clean and prepare the text for analysis. Machine learning models are then applied to classify the sentiments into three main categories: positive, negative, and neutral. Performance of these models is evaluated using common metrics such as accuracy, precision, recall, and F1-score. These metrics help measure how effectively the models can identify and classify sentiments within large datasets. The results of this study aim to demonstrate the usefulness of machine learning approaches in extracting meaningful insights from social media data. Such analysis can be valuable for businesses, researchers, and organizations in understanding public opinion and making informed decisions.

Keywords: *Social media, Machine Learning, Sentiment Analysis, social media*

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CustomerSense: Predictive Analytics for Customer Behavior

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Abstract: In the current competitive business landscape, grasping customer behavior is crucial for organizations seeking to enhance engagement and foster growth. CustomerSense introduces a predictive analytics system based on machine learning, aimed at examining customer data to predict future actions. This system utilizes historical data, including purchase habits, browsing activities, and demographic details, to uncover hidden trends and behavioral patterns. The model employs supervised learning algorithms to forecast significant outcomes such as customer churn, product preferences, and the likelihood of purchases. To ensure precision and dependability, data preprocessing methods like cleaning, normalization, and feature selection are implemented. The model undergoes training and evaluation using suitable performance metrics to achieve the best prediction outcomes. CustomerSense offers valuable insights that assist businesses in making informed decisions, tailoring marketing strategies, and boosting customer satisfaction. By predicting customer needs and behaviors, organizations can proactively tackle potential issues and enhance retention rates. This project illustrates how machine learning can convert raw data into meaningful insights, facilitating smarter and more efficient business operations. Overall, CustomerSense underscores the practical application of predictive analytics in creating customer-focused solutions in today's digital world.

Keywords: Predictive Analytics, Customer Behaviour, Customer Sense, predict future

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Ancient AI Robots and AI Robotic Weapons

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Abstract: Nowadays, modern artificial intelligence is used in weapons such as drone missiles, loitering munitions, and so-called suicide drones. Many of these systems can operate automatically, while others still require human control. Interestingly, ancient Hindu scriptures describe various divine weapons that some modern readers compare to advanced technologies like drones or robotic weapons. These descriptions can seem almost unimaginable today. However, historians generally interpret them as mythological, symbolic, or poetic representations rather than literal machines like modern AI. In epics such as the Mahabharata and Ramayana, highly advanced weapons known as astra are mentioned. These weapons could be activated through specific mantras and were believed to strike targets at distant locations without direct physical handling. Some accounts even describe them returning to the user after completing their task, almost like reusable missiles. While these ideas sound similar to modern technological concepts, they are best understood within their spiritual and literary context rather than as evidence of ancient robotics or artificial intelligence.

Keywords: *AI Robots, weapons, modern, artificial, intelligence*, *missiles*

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A Comparative Study of Quantization and Pruning Techniques for Efficient Deep Learning Models

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Abstract: This study proposes a comparative analysis of two major model compression techniques, namely quantization and pruning, to enhance the efficiency of deep learning models without compromising their performance significantly. Deep learning models are increasingly becoming more complex and bigger in size. Deploying such models on devices such as mobile phones is a major challenge. Quantization is a technique to compress models by reducing the number of bits required to represent the parameters of a model. Typically, models use 32-bit floating-point data types. Quantization converts these data types into 8-bit integer data types. Pruning is a technique to remove redundant or insignificant weights and neurons in a network In this work, both techniques are comprehensively evaluated in terms of various parameters such as size, inference time, computation cost, and accuracy. The experiments are performed on standard benchmark datasets using popular architectures to ensure the generality of the results. The results demonstrate trade-offs between compression rate and model performance, where quantization results in faster inference with negligible hardware cost, and pruning results in better compression rates along with possible degradation in accuracy depending on pruning techniques. Additionally, the research delves into the application of hybrid techniques that utilize the advantages of quantization and pruning techniques. The results of the research offer valuable knowledge on the selection of optimization techniques depending on the application requirements. This comparative research acts as a guide for deep learning systems that are efficient, scalable, and perform highly.

Keywords*: Quantization, Pruning Techniques, deep learning models*

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Mitigating RAG Leakage in Local-First AI Systems Using Context-Aware Access Control

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Abstract: On-device artificial intelligence (AI) models are transforming laptops, and this trend is rapidly extending to mobile devices. Initially, AI systems were limited to simple tasks, such as setting reminders, making calls, predicting the next word, and handling basic queries. Over time, the role of AI in daily activities has expanded significantly. However, many AI models rely on pre-trained data, which can lead to outdated or inaccurate responses. To address this limitation, Retrieval-Augmented Generation (RAG) was introduced. A local-first AI system on modern devices enables RAG models to access sensitive data, thereby reducing latency and ensuring that data remain on the device rather than being transmitted to the cloud. Despite these advantages, this approach introduces the risk of RAG leakage, where sensitive or critical information may be unintentionally exposed in the generated outputs. With the rapid advancement of generative AI capabilities, including text-to-speech and text-to-image, ensuring robustness against data leakage and adversarial attacks has become critical. To mitigate these risks, this study proposes a context-aware access control (CAAC) framework. In this approach, the RAG model evaluates the user intent and cross-references it with predefined data sensitivity labels. Data are categorized into classes such as "Public," "Private," and "Sensitive," enabling controlled and context-appropriate access. Additionally, the framework incorporates preprocessing techniques, such as removing sensitive information before passing documents to the model, limiting context size, and filtering phrases that may override security constraints. A combination of rule-based filters and lightweight classifiers was employed to ensure efficient and secure operation.

Keywords*:* On-device, local-first, Retrieval-Augmented Generation(RAG), RAG leakage, Context-Aware Access Control(CAAC), Prompt Injection

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Cross-Function Context Blindness in LLM-Based Coding Agents: Detection and Impact on Multi-File Codebase Understanding

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Abstract: Large Language Model (LLM) coding agents excel in single-file, isolated tasks but fail to perform well on complex and realistic software systems, which involve multiple files and interdependent functions. Currently available benchmarks such as HumanEval and SWE-bench fail to capture this complexity and create a critical gap in assessing the performance of coding agents. In this paper, we propose a new failure mode of LLM-based coding agents, which we call 'cross-function context blindness,' where the agent starts reasoning about functions whose source code is not retrieved and provides confidently incorrect outputs with no error or uncertainty signal. To quantify this, we propose a new metric called the Context Coverage Score (CCS), which is calculated as the ratio of dependency-relevant files read by the agent to the total files needed to produce an accurate output. A set of 30 multi-file code understanding tasks is created as a benchmark using open-source Python repositories like Flask and FastAPI, each with the requirement to trace the execution path through 3 to 5 files. The LangChain ReAct agent with GPT-4o is evaluated with ground truth answers verified manually, with file read traces logged programmatically to calculate the CCS value. In the present study, a correlation is shown between low context coverage and incorrect agent output, thereby providing a reproducible benchmark and evaluation metric to advance the reliability of agentic code understanding systems in software engineering research.

Keywords: *Large Language Model (LLM), Cross-Function, Multi-File Codebase, Context Coverage Score*

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Flipper Zero a Comprehensive Study of a Multi-Pentesting Tool

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Abstract: The Flipper Zero is a compact, open-source multi-tool device designed for security researchers, penetration testers, and cybersecurity enthusiasts. Released in 2022 after a widely successful crowdfunding campaign, the Flipper Zero integrates a wide array of wireless communication protocols and hardware interaction capabilities into a single portable device. This research paper provides a detailed examination of the Flipper Zero's architecture, features, supported protocols, practical applications in cybersecurity, ethical implications, and its growing relevance in both academic and professional security assessment contexts. The paper also discusses the legal and ethical challenges posed by the device's misuse potential, alongside its enormous value as an educational and research tool.

Keywords*: flipper, zero, device, security, cybersecurity, Multi-pentesting Tool*

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An In-Depth Look at Quantum Computing: Challenges, Advances, Future Possibilities

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Abstract: Quantum computing is rapidly transforming the computing paradigm by controlling the power of quantum mechanics for solving complex problems that cannot be solved by classical computers. Tremendous advancements have been made in the past few years in the accuracy of the gates and processors and achieving quantum supremacy. However, at the same time, the challenges of quantum computing have also been realized. This paper aims at providing a comprehensive overview of the challenges of the field of quantum computing, along with tremendous advancements made in the field of quantum computing up to 2024-2025. In addition, the solutions to the challenges of quantum computing are also discussed.

Keywords*: Quantum Computing, challenges, Tremendous, Advancements*

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Explainable AI for Medical Decision Support

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Abstract: The medical decision-making process is one of the important processes that require precision, transparency, and trust. With the advent of modern machine learning technologies, artificial intelligence systems have gained widespread use in disease prediction and diagnosis. However, the artificial intelligence systems being used in disease prediction and diagnosis have a major flaw: they are a black box, i.e., predictions are made without any explanation of the predictions or decisions made by the AI model. This is one of the major problems associated with the use of artificial intelligence systems in the medical field. In the study, a new Explainable Artificial Intelligence (XAI) method has been proposed for the development of medical decision-making systems. In the proposed system, the patient's health data, such as age, blood pressure, cholesterol levels, etc., are taken as input to predict the occurrence of diseases. The machine learning algorithms, i.e., Random Forest and Logistic Regression, are used as classification algorithms. To enhance the transparency of the proposed system, XAI techniques such as LIME and SHAP are also integrated into the proposed system, which would provide a meaningful explanation of the predictions made by the proposed system.

Keywords*: Artificial Intelligence, Random Forest and Logistic Regression, Medical Decision Support*

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Design and Development of a Scalable Digital Business Card System Using MERN Stack

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Abstract: In today's digital world, traditional business cards are gradually becoming less effective due to their fixed nature, limited accessibility, and inability to be updated once printed. This research focuses on the design and development of a scalable Digital Business Card System using the MERN stack, which includes MongoDB, Express.js, React.js, and Node.js. The proposed system allows users to create and manage their digital business profiles through an easy-to-use web interface. Users can enter their personal and professional details, such as contact information and social media links, and generate a unique digital card that can be accessed through a personalized URL. To enhance usability, the system integrates QR code generation, enabling users to quickly share their digital profiles by simply scanning the code. The application is built using a modular and scalable architecture, ensuring efficient data management, smooth content rendering, and reliable performance. It also provides template-based customization options, allowing users to personalize the appearance of their digital cards. The developed system offers significant advantages over traditional business cards, including easy accessibility, real-time updates, and improved user experience. This study demonstrates how MERN stack technologies can be effectively used to build scalable and user-friendly web applications, providing a modern solution for digital identity and professional networking.

Keywords*:* Digital Business Card, MERN Stack, Web Application, QR Code, Scalable System, MongoDB, React.js, Node.js, Express.js, Digital Identity

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An Analytical Study of Client-Side and Server-Side Technologies in Web Development

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Abstract: Web development has evolved significantly with the advancement of client-side and server-side technologies, enabling the creation of dynamic, interactive, and scalable web applications. This study presents an analytical overview of client-side and server-side technologies used in modern web development. The research focuses on understanding the roles and functionalities of client-side technologies such as HTML, CSS, and JavaScript, which are responsible for designing and enhancing user interfaces. It also examines server-side technologies, including Node.js and backend frameworks, which handle data processing, business logic, and database interactions. Furthermore, the study highlights the integration of both sides in full-stack development, emphasizing performance, scalability, and user experience. Various factors such as response time, data handling efficiency, and security considerations are analysed to understand their impact on modern web applications.
This research provides insights into how client-side and server-side technologies work together to build efficient and scalable systems. The findings can guide developers in selecting appropriate technologies and improving the overall performance of web applications.

Keywords: *CLIENT-SIDE, SERVER-SIDE, Web development, HTML, CSS, and JavaScript*

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Performance Benchmarking of Real-Time Data Analytics Pipelines on AWS and Azure: A Comparative Empirical Study

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Abstract: Cloud computing platforms are at the center of modern real-time data analysis, helping organizations handle high-velocity data at scale. Among the top cloud computing platforms, Amazon Web Services (AWS) and Microsoft Azure are the most popular choices, but independent and recent academic analysis of real-time data analysis capabilities of these platforms is still rare. Existing analysis of these platforms is often vendor-centric, outdated, or limited in nature, thereby calling for standardized analysis. The research aims to design and implement a unified analytics pipeline for both AWS and Azure, utilizing analogous managed services. The research aims to evaluate AWS services, which include Kinesis Data Streams, Lambda, S3, and Athena, in comparison to Azure services, which include Event Hubs, Stream Analytics, Blob Storage, and Synapse Analytics. The research aims to use a synthetic event stream, which will be generated from a public IoT dataset. The rate of ingestion will vary from 100 to 10,000 events per second. The research aims to evaluate four major performance aspects, which include end-to-end latency, throughput under different loads, cost per event, and cold start latency for serverless platforms. The research aims to use CloudWatch and Azure Monitor to collect the necessary data, followed by utilizing Python-based statistical analysis.

Keywords: *Cloud computing, Amazon Web Services, AWS, Azure, statistical analysis.*

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Personalized Recommendation System for Tourism and Food Services Using Hybrid Filtering

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Abstract: Personalization plays a key role in improving user satisfaction in digital platforms, especially within the tourism and food service sectors. Traditional recommendation systems often operate within a single domain, limiting their ability to provide comprehensive suggestions that match diverse user preferences. This paper proposes a personalized recommendation system for tourism and food services using a hybrid filtering approach that integrates collaborative filtering and content-based filtering techniques. The model analyzes user behavior, historical preferences, item attributes, and contextual factors such as location and time to generate accurate and relevant recommendations. The hybrid filtering method overcomes the limitations of individual techniques by combining similarity-based user patterns with feature-driven item analysis. Experimental results demonstrate enhanced precision and relevance in recommendations when compared with standalone models. The proposed system can be effectively implemented in travel platforms, food delivery applications, and tourism service aggregators to deliver a rich, personalized user experience.

Keywords: *Recommendation System, Tourism, Food Services, Hybrid Filtering*

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Fuzzy and Neural Network Techniques

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Abstract: Fuzzy logic and neural network techniques have emerged as powerful tools for handling uncertainty, imprecision, and complex nonlinear relationships in modern computational systems. Fuzzy logic, introduced by Lotfi A. Zadeh, enables approximate reasoning by incorporating human-like decision-making through linguistic variables and membership functions. In contrast, neural networks, significantly advanced by researchers such as Geoffrey Hinton, provide adaptive learning capabilities by modeling interconnected neuron-like structures that learn from data. This paper presents a comprehensive analysis of fuzzy systems and artificial neural networks, highlighting their architectures, methodologies, and practical applications. It further explores the limitations of individual approaches, such as rule dependency in fuzzy systems and high data requirements in neural networks. To address these challenges, hybrid models like neuro-fuzzy systems are examined, combining the interpretability of fuzzy logic with the learning ability of neural networks. The study demonstrates that the integration of these techniques enhances system performance in areas such as pattern recognition, control systems, and decision support. The results suggest that hybrid intelligent systems offer a promising direction for future research in artificial intelligence, enabling more robust, accurate, and interpretable solutions in complex real-world problems.

Keywords: *Fuzzy logic, Neural Network, pattern recognition, control systems*

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AI-Based Chatbot for Enhancing Student Support in Open and Distance Learning (ODL) Systems

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Abstract: Artificial Intelligence (AI) is transforming the education sector by enabling intelligent automation and improving digital learning environments. In Open and Distance Learning (ODL) institutions, effective communication and timely support services are essential for student engagement and academic success. However, traditional support systems such as manual e-ticketing often suffer from delayed responses, inadequate feedback, and inefficiency, leading to learner frustration and increased attrition rates. This study proposes an AI-based chatbot system designed to provide real-time, automated, and efficient support to students. The chatbot is developed using Python and Natural Language Processing (NLP) techniques to handle student queries effectively. The system is trained using relevant datasets to improve response accuracy and user interaction. The evaluation results show that the chatbot significantly improves response time, enhances communication, and provides better support services to learners. The study concludes that AI chatbots can improve learner engagement and reduce dropout rates in ODL systems, although challenges such as scalability and data privacy need to be addressed.

Keywords: *Artificial Intelligence (AI), Chatbot, Natural Language Processing (NLP)*

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Predictive Cybersecurity Using Artificial Intelligence: A Proactive Approach to Digital Threat Management

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Abstract: The concentrated growth of digital technologies, cloud computing and interconnected systems has led to more complex and increased incidents of cyber threats. Traditional methods such as signature-based and manual checks are not in the same league as dynamic and sophisticated attacks in modern times. Kill-joys are now employing zero-day exploits, automated attacks and multi stage attacks. This requires new and important security: intelligent and proactive. Artificial Intelligence has therefore become a game-changing tool, evolving cybersecurity from being reactive and predictive to adaptive. This paper takes a look at predictive cybersecurity, where AI can predict threats before they occur. Taking into view volumes of historical and live information, AI identifies the patterns, picks up on anomalies and forecasts attack scenarios. Some of the key technologies are machine learning, deep learning and behavioural analytics. They allow systems to be able to learn, adapt to changes in the environment and become more accurate over time. We examine how AI is enabling a predictive cybersecurity in aspects of early threat detection, fraud prevention, network monitoring and automated incident response. Predictive models provide early warnings as well as risk scores, allowing better and faster decisions. Organizations can therefore reduce the likelihood of, and impact caused by, cyber-attacks. The paper also points to benefits such as increased efficiency, faster response, scalability and increased resilience. Still, challenges remain. We need to tackle issues of data privacy, ethical use of AI, and transparency of our systems in order to use them responsibly. The concluding point of the study is that AI-powered predictive cybersecurity has a major potential in the creation of autonomous security systems, to help organizations be in front of these evolving threats and have their digital ecosystems safe and resilient.

Keywords: *predictive, systems, attacks, cybersecurity, Digital Threat Management*

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AI-Powered Personalized Educational Assistant to Guide Students Toward Their Career Goals

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Abstract: Online learning is busy and the education system is now being modelled on the same learning tracks that simply fail to cater to all persons at individual level because there are no sufficient placeholders in academic performance to preparation ability to take career-wise. The proposed study involves an artificial intelligence engine-based learning assistant operating on a personal approach to studying to maximize the level of learning and become a successful professional. The system combines different modules, including personal learning pathways made possible with the help of AI, course-specific quizzes and active tests to maintain a clear understanding of the material, weekly contests and project homework that promotes the need to work in groups, apply the material in practice, and prepare them to be professionals, like aptitude training, virtual interviews, and a career search engine that will help learners match the opportunities offered. There is also an native chatbot and voice assistant, which is more accessible by offering immediate feedback and breaking a complex idea down. It is judged that the assistant improved academic interest, developed conceptual knowledge, improved and sharpened problem solving skills, acquired technical, analytic and soft skills required in the work environment. By bridging the education and employment gap the proposed assistant will help in establishment of organic learning environment that encourages not only to ensure they excel in school system but also help to prepare them to excel in various career opportunities in the working population.

Keywords*: E*ducation system, Artificial intelligence, Employment, Course-specific quizzes

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Smart AI City Explorer

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Abstract: Rapid urbanization in metropolitan cities such as Bangalore, Delhi, and Mumbai has led to a significant increase in the number of recreational activities, events, and points of interest. Despite this abundance, individuals often face difficulty in identifying suitable activities that align with their personal preferences, time constraints, and real-time contextual factors. Existing city guide applications largely provide generic recommendations and lack intelligent personalization, resulting in inefficient decision-making and reduced user satisfaction.
This research proposes a Smart AI City Explorer, an intelligent and context-aware recommendation system designed to deliver personalized suggestions for urban activities, places, and events. The system leverages machine learning techniques,, to analyze user preferences and behavioral patterns. In addition, contextual parameters such as location, time, budget, weather conditions, and crowd density are incorporated to improve recommendation relevance and accuracy. To enhance user interaction, the system integrates a natural language processing (NLP)-based conversational interface, enabling users to query the platform using intuitive, human-like language. A predictive analytics module is also employed to estimate crowd levels and determine optimal visiting times using regression and time-series models. The system further utilizes real-time data from external APIs, including maps, weather, and event sources, to ensure up-to-date and dynamic recommendations. The proposed approach aims to improve urban exploration by generating personalized itineraries and identifying both popular and lesser-known destinations. Experimental results indicate improved recommendation accuracy, higher user engagement, and better decision efficiency compared to traditional systems. This work demonstrates the potential of AI-driven, context-aware solutions in enhancing smart city experiences.

Keywords: Smart AI, City Explorer, urbanization, behavioral patterns.

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Application of Artificial Intelligence in E-Commerce for Enhanced Customer Services

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Abstract: This paper examines the use of Artificial Intelligence to enhance customer service in e-commercial activities by providing intelligent and data-driven solutions. As the growth of digital commerce continues to progress, companies continue to use AI to create faster, personalized and efficient experiences for shoppers. The study explores AI technologies such as conversational chatbots, recommendation engines, sentiment analysis and predictive analytics and their impact on changing customer interactions on online platforms. Utilisation of AI-powered chatbots for providing 24/7 support in real-time with minimal, fast response times and greater satisfaction to the users. Recommendation systems make use of customer data such as customer browsing habits, purchase history and provide highly personalized suggestions to the customer automatically, which increases engagement and conversion rates. Sentiment analysis tools search through the reviews as well as feedback and identify service gaps to help them make informed decisions. Predictive analytics is the other step in enhancing service quality by predicting customer needs, optimizing inventory, and proactive customer assistance. A unique aspect of this research is its introduction of adaptive systems capable of AI-based learning that continually interprets from interactions with the user how to better plan for personalization over time itself. The paper also describes the role of AI in dynamic pricing, voice-assisted shopping and visual search - all features that make the shopping experience more interactive and convenient. The challenges of data privacy, ethical concerns, as well as implementation complexity are also examined. The results suggest that e-shopping marketplace utilizing AI solutions significantly improves customer satisfaction, efficiencies, and business performance, making AI one of the core elements in the future of customer-centric digital commerce.

Keywords*:* *customer, service, Artificial Intelligence, E-Commerce, customer-centric digital commerce*

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AI-Based Early Detection of Chronic Diseases Using Patient Health Data

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Abstract: The chronic diseases, which include cardiovascular diseases, diabetes, and renal diseases, are major contributors to mortality rates. The detection of diseases at the early stages is important to avoid health risks. The objective of this paper is to propose a method for detecting diseases at the early stages using artificial intelligence. The medical data of patients play a significant role in detecting diseases. The health factors, which include age, blood pressure, glucose levels, cholesterol levels, and lifestyle, are considered while detecting diseases. The classification of diseases can be done using machine learning algorithms, which include Logistic Regression, Decision Tree, Random Forest, Support Vector Machine, etc. The proposed method is tested using healthcare datasets. The proposed system can be considered efficient from the study, as it can detect individuals who are at potential health risks. The proposed method can be useful for making decisions by medical professionals.

Keywords: *Early Detection, Chronic Diseases, Patient Health Data*

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Artificial Intelligence and the Illusion of Foresight

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Abstract: In today's world artificial intelligence has significant capabilities and it will for certain have more capabilities with the rapid development of powerful computational machines in the future. It is used in almost in all domains; which leads to have a perception that it can anticipate (predict) the future event accurately. The notion that AI can achieve perfect foresight by accessing future data remains a theoretical and philosophical question rather than a scientific reality. This paper critically examines the perception as illusion of foresight. It argues that, though AI have the capabilities of anticipating the future based on the past historical data, patterns or with the ongoing situation it cannot certainly determined the future because the future does not exist as data yet. Anomalies invalidate the illusion of foresight. Even if the accuracy is very high the outcome is not guaranteed. We can say this due the uncertain nature of the real word system. Though AI prediction sometimes can be highly accurate, it's only a probability. With this study it that artificial intelligence should only be understood as a tool for making estimation with reason rather than a determined foresight. Artificial intelligence does not have capabilities to access the future; it constructs statistically informed expectations based on incomplete representations of the past.

Keywords*: Future, Capabilities, Foresight, Artificial, intelligence*

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Early Dropout Risk Prediction in Higher Education Using Machine Learning Models

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Abstract: Student dropout is a huge challenge for higher education institutions. It undermines academic performance and tarnishes a given institution's reputation, as well as strains resources. Identification of at-risk students at an early stage allows educators to determine to intervene prior to dropouts occurring. This research approach is based on the use of machine learning techniques for predicting the risk of drop out based on academic records, demographic facts, and patterns of behaviour. We tested several supervised models - Decision Trees, Logistic Regression and Random Forest and compared the power of prediction between models to get the best model. The data were pre-processed to remove the missing data, and to increase the accuracy of the model, some feature selection techniques were applied. Model performance was measured using standard classification accuracy: accuracy, precision, recall and F1 - score. The experiments show that machine learned models can identify students at high risk with significant accuracy. These findings are important to schools taking data-driven approaches to reducing dropout rates and increasing retention. Future research will examine data feeds with a real-time component and deep learning capabilities to make further improvements in predictions.

Keywords*: Accuracy, Models, Dropout, Academic, Students*

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Retrieval-Augmented Generation (RAG) Systems

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Abstract: Large Language Models (LLMs) are powerful AI systems that can answer questions and generate text, but they have two major problems — they cannot update their knowledge after training, and they sometimes make up wrong information. To fix these problems, researchers use two main approaches: Retrieval-Augmented Generation (RAG) and fine-tuning. This paper compares both approaches from a theoretical perspective. Fine-tuning teaches the model new knowledge by retraining it, but this knowledge becomes outdated over time and is expensive to update. RAG, on the other hand, lets the model search and fetch relevant information from an external database at the time of answering, keeping responses accurate and current. We compare both methods on factors like cost, accuracy, and flexibility. Our analysis concludes that RAG is a better choice when up-to-date and factually correct answers are needed, while fine-tuning works better when the model needs to learn a specific writing style or tone.

Keywords*: Large Language Models, Knowledge, Problems, Update, Information, Approaches*

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AI in Cybersecurity: Threat Detection using Deep Learning

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Abstract: With the rapid growth of digital infrastructure and interconnected systems, cybersecurity threats have become increasingly sophisticated, dynamic, and difficult to detect using traditional security mechanisms. Conventional rule-based and signature-based detection systems often fail to identify zero-day attacks and evolving malicious patterns. This research focuses on the application of deep learning techniques to enhance threat detection capabilities in modern cybersecurity environments. The study proposes a deep learning-based framework that leverages advanced neural network architectures such as Convolutional Neural Networks (CNN), Recurrent Neural Networks (RNN), and Long Short-Term Memory (LSTM) models to analyse large-scale network traffic data and system logs. These models are capable of automatically extracting complex features and identifying anomalous behaviors indicative of cyber threats, including malware, phishing, and intrusion attempts.
The research involves training and evaluating the proposed models using benchmark cybersecurity datasets, with performance measured in terms of accuracy, precision, recall, and F1-score. Comparative analysis with traditional machine learning techniques is also conducted to demonstrate the superiority of deep learning approaches in detecting both known and unknown threats. The expected outcome of this study is the development of an intelligent, scalable, and adaptive threat detection system that can significantly improve real-time security monitoring and reduce false positives. This work contributes to the advancement of AI-driven cybersecurity solutions and highlights the potential of deep learning in safeguarding critical digital assets against emerging cyber threats.

Keywords*: Cybersecurity*, *Threats*, *Deep*, *Learning*, *Detection*

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AI in Marketing- Indian Perspective

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Abstract: This study seeks to analyse the influence of AI-driven marketing strategies on consumer behaviour, particularly regarding customer trust, satisfaction, and purchasing decisions in the Indian market. A quantitative research methodology is employed, utilizing a structured survey questionnaire to gather primary data from consumers who actively participate in digital platforms, including e-commerce and online service applications. The study utilizes a descriptive research design, and data is gathered via convenience sampling through online tools. Descriptive statistical methods are used to look for patterns in how people think and act as consumers in the responses.

Keywords*: Keywords:* *AI , Consumers, Online, Descriptive, Seeks, Analyse*

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AI Chatbots and Future of Work

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Abstract: The rapid proliferation of Artificial Intelligence (AI) chatbots and conversational agents has initiated a significant structural transformation across global labour markets. As organizations increasingly integrate AI-driven automation into their operational workflows, concerns regarding large-scale job displacement and workforce redundancy have become subjects of critical academic inquiry. This paper theoretically examines the impact of AI chatbots on the future of work, with particular emphasis on occupational vulnerability, task automation potential, and the erosion of routine cognitive labour. We analyse how roles cantered on repetitive communication, data processing, and customer interaction face the highest risk of substitution. Furthermore, we explore the socioeconomic implications of this transition, including widening skill gaps and inequitable displacement across income brackets. Our analysis concludes that without proactive policy intervention, workforce reskilling programs, and ethical deployment frameworks, AI-driven automation poses a substantial threat to employment stability across both developing and developed economies.

Keywords: *AI Chatbots , automation, chatbots, labor, displacement*

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Comparative Analysis of Machine Learning Models for Battery Remaining Useful Life Estimation with Automated CI/CD Deployment

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Abstract: Accurate Remaining Useful Life (RUL) estimation for Lithium-ion batteries is vital for the operational safety of electric vehicles and smart grid energy storage systems. While various predictive techniques exist, selecting the optimal model requires a rigorous comparative analysis. This paper evaluates the performance of four distinct algorithms—Linear Regression, Random Forest, XGBoost, and Long Short-Term Memory (LSTM) networks—using multi-sensor degradation data, including voltage, current, and temperature profiles. The study extracts key health indicators to capture both linear and non-linear capacity fade characteristics across different operating conditions. To transition these models from experimental research to industrial application, a robust Continuous Integration and Continuous Deployment (CI/CD) pipeline is implemented. This pipeline automates the model training, validation, and containerization processes, ensuring that the most accurate model is seamlessly deployed to cloud-native environments. Experimental results, validated against standard NASA and CALCE battery datasets, demonstrate that while ensemble methods like XGBoost provide high efficiency, LSTM architectures excel in capturing long-term temporal dependencies. This integrated framework provides a scalable solution for real-time battery health monitoring and facilitates rapid model updates through automated DevOps workflows, ensuring reliable predictive maintenance in mission-critical applications.

Keywords*: Accurate, Predictive, Linear, Xgboost, Lstm*

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Artificial Intelligence and the Illusion of Foresight: Why Future Data Cannot Be Accessed in the Present

[1]Kaman , Suman *; [2]Upadhyay, Saurabh; [3]Mushahary , Gibeon

In today's world artificial intelligence has significant capabilities and it will for certain have more capabilities with the rapid development of powerful computational machines in the future. It is used in almost in all domains; which leads to have a perception that it can anticipate (predict) the future event accurately. The notion that AI can achieve perfect foresight by accessing future data remains a theoretical and philosophical question rather than a scientific reality. This paper critically examines the perception as illusion of foresight. It argues that, though AI have the capabilities of anticipating the future based on the past historical data, patterns or with the ongoing situation it cannot certainly determined the future because the future does not exist as data yet. Anomalies invalidate the illusion of foresight. Even if the accuracy is very high the outcome is not guaranteed. We can say this due the uncertain nature of the real word system. Though AI prediction sometimes can be highly accurate, it's only a probability. With this study it that artificial intelligence should only be understood as a tool for making estimation with reason rather than a determined foresight. Artificial intelligence does not have capabilities to access the future; it constructs statistically informed expectations based on incomplete representations of the past.

Keywords: *Artificial Intelligence, Future, Capabilities, Artificial, Intelligence, Foresight*

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Star-Galaxy Classification Using Deep Convolutional Neural Networks

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Abstract: The rapid advancement of astronomical surveys, such as the Sloan Digital Sky Survey (SDSS), has generated unprecedented volumes of imaging data. As the size of these datasets grows into the petabyte scale, the manual morphological classification of objects into stars and galaxies has become practically impossible. While traditional machine learning algorithms have been employed to automate this process, they heavily rely on manual feature extraction, which can be computationally expensive and prone to human bias. To address this challenge, this research proposes an automated classification pipeline utilizing Deep Convolutional Neural Networks (CNNs). By leveraging the ability of CNNs to automatically learn hierarchical spatial features directly from raw pixel data, this study aims to improve both the speed and accuracy of astronomical object classification. The proposed methodology involves acquiring photometric image data from publicly available surveys, performing necessary image preprocessing (e.g., normalization and noise reduction), and training a deep learning architecture to distinguish between stellar point sources and extended galactic structures. The performance of the model will be evaluated using standard classification metrics, including accuracy, precision, recall, and F1-score. Ultimately, this research seeks to demonstrate the efficacy and scalability of deep learning frameworks in processing big data within the domain of astrophysics, providing a robust computational tool for future astronomical research.

Keywords*: classification, astronomical, learning, deep, surveys*

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Artificial Intelligence and the Illusion of Foresight: Why Future Data Cannot Be Accessed in the Present

[1]**Upadhyay, Saurabh ,**[2] **Mushahary, Gibeon ,**[3] **Kaman, Suman**

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Garden City University,
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Abstract: In today's world artificial intelligence has significant capabilities and it will for certain have more capabilities with the rapid development of powerful computational machines in the future. It is used in almost in all domains; which leads to have a perception that it can anticipate (predict) the future event accurately. The notion that AI can achieve perfect foresight by accessing future data remains a theoretical and philosophical question rather than a scientific reality. This paper critically examines the perception as illusion of foresight. It argues that, though AI have the capabilities of anticipating the future based on the past historical data, patterns or with the ongoing situation it cannot certainly determined the future because the future does not exist as data yet. Anomalies invalidate the illusion of foresight. Even if the accuracy is very high the outcome is not guaranteed. We can say this due the uncertain nature of the real word system. Though AI prediction sometimes can be highly accurate, it's only a probability. With this study it that artificial intelligence should only be understood as a tool for making estimation with reason rather than a determined foresight. Artificial intelligence does not have capabilities to access the future; it constructs statistically informed expectations based on incomplete representations of the past.

Keywords*: Future, capabilities, foresight, artificial, intelligence*

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The Effect of Artificial Intelligence in Business

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Abstract: Fast change comes. Artificial intelligence pushes businesses forward more quickly than many can follow. Machines now handle repetitive tasks instead of people while improving how customers feel about services. Decisions grow sharper when guided by facts found in numbers rather than guesses. New ways to earn money appear where none existed before because systems learn patterns once invisible. Still, problems arise, too. Some lose jobs when machines take their work. Choices made without human hands raise moral questions. Personal information faces greater danger as more gets collected and used silently. Big companies pull ahead using smart tools that small ones can't reach. Studies show these trends play out across industries today. Stories from real life show which choices succeed, while some risks remain obvious. Yet one route weighs expansion against caution, keeping advances from breaking faith. Still, it upholds balance, awareness, and steady tech use when speed is demanded. AI changes how businesses work using learning machines and automated tasks.

Keywords: *Machines, businesses, tasks, still, choices*

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Next-Generation Cyber Crime Reporting System with Secure Complaint Management

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Abstract: Security plays an important role in human life, where securing information has been a critical challenge in the present day. The paper tells the tracking the evolution of cyber enforcement policy in India and the institutional vacuum that preceded I4C. It then provides a functional analysis of I4C's multi-tiered components, such as the National Cybercrime Reporting Portal (NCRP), National Cybercrime Threat Analytics Unit (NCTAU), and National Cybercrime Training Centre (NCTC) and how they enable policy. Victims and witnesses of cybercrime often hesitate to report incidents due to concerns over privacy, fear and trust among society to address these challenges, the paper introduces a voice-based cybercrime reporting system that allows victims and witnesses to submit complaints through audio recordings. Leveraging speech recognition transformers, a recent language model, and encryption, the system processes real-time multilingual voice inputs, extracts meaningful content, and classifies reports with high precision using a hybrid voting mechanism. This paper recommends Institutional and peoples should place on development and employees to be trained on regular updates of software to protect and use strong password with data backup and information to produce strong cybersecurity policy and install antivirus soft and security surveillance (CCTV) in offices in order to safeguard its employees and properties from being hacked Experimental evaluations on synthetically generated and human-validated datasets confirm the system's ability to accurately transcribe, classify, and securely process audio complaints while preserving user anonymity. The paper justifies the objectives of 14C transformation and analysis operational with cybercrime in the Indian context.

Keywords*: cybercrime, policy, national, security, information*

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Performance Optimization of Spatial Indexing for Real-Time Fleet Management in High-Density Urban Areas

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Abstract: Hybrid Spatial Indexing for Urban Logistics, this research addresses the performance bottlenecks in real-time urban delivery networks, where traditional database indexing fails to balance rapid data updates with complex spatial queries. While R-Tree structures are ideal for static geographic boundaries, they suffer from high computational costs during frequent updates. Conversely, Quadtree indexes handle high-speed data ingestion well but lose efficiency when traffic congestion causes data to "skew" or cluster in specific areas.
To resolve this, we propose a hybrid indexing architecture implemented in a PostgreSQL/PostGIS environment. The system decouples database operations by using a localized Quadtree for high-velocity GPS point ingestion and an asynchronous, top-level R-Tree for broader spatial intersections.

Keywords: *spatial, indexing, hybrid, urban, database*

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VehicleVault: A Smart Digital Platform for Vehicle Document Management

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Abstract: The rapid growth in personal vehicle ownership has increased the need for efficient management of vehicle-related documents such as registration certificates, insurance policies, and pollution certificates. Traditional methods of storing these documents—either physically or in scattered digital formats—often lead to misplacement, difficulty in retrieval, and lack of timely updates regarding expiry dates. This research presents the design and development of a web-based Vehicle Document Management System (VDMS) aimed at providing a centralized, user-friendly platform for storing, accessing, and managing vehicle information and associated documents. The proposed system is developed using modern front-end technologies, specifically React.js, to ensure a responsive and interactive user interface. It incorporates features such as user authentication, vehicle registration, document upload and download, and dynamic navigation between vehicle profiles. Each vehicle entry allows users to store multiple documents, view them in an organized manner, and access them instantly. The application leverages local storage for persistent data management in the initial phase, ensuring that user data is retained across sessions without requiring a backend server. The system emphasizes modular architecture, scalability, and ease of use, making it adaptable for future enhancements such as cloud storage integration, real-time notifications for document expiry, and backend database support. By digitizing and centralizing vehicle-related documentation, the proposed solution aims to reduce manual effort, improve accessibility, and enhance overall efficiency in document management. This project demonstrates the practical application of modern web development frameworks in solving real-world organizational challenges.

Keywords: *vehicle, management, documents, document, user*

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An AI-Assisted Task Recommendation System for Elderly Engagement and Accessibility

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Abstract: This paper is based on a simple but practical idea. As the population ages, a large number of elderly individuals are left out of digital work opportunities, not because they lack ability, but because most systems are not designed with their needs in mind. This paper explores a simple but practical idea: what if we could match elderly individuals with small, manageable tasks based on what they are still comfortable and capable of doing? We propose an AI-assisted task recommendation system that focuses on ability rather than limitation. Instead of complex implementation, the system is explained through its working logic, how it considers factors such as vision, mobility, and familiarity with technology to suggest suitable micro-work. Accessibility is treated as a core requirement, with support for voice interaction and Braille-friendly outputs to ensure inclusivity. To make the idea concrete, a small simulated scenario is used to show how different users can be matched with appropriate tasks. The goal is not just technical efficiency, but meaningful engagement, helping elderly individuals stay active, independent, and connected. This work presents a design-focused approach that highlights how thoughtful system design can make AI more inclusive and socially impactful. More than just a technical solution, this work focuses on creating meaningful engagement for elderly individuals, helping them stay active, independent, and connected in a world that often overlooks their capabilities.

Keywords*: Elderly, individuals, idea, simple, practical*

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Applying Deep Learning Algorithms for Enhanced Speech Recognition in Speech Impaired Children

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Abstract: Deep learning has pushed ASR technology to impressive new heights. Despite this, a major gap remains: current systems still struggle to accurately decode the unique, non-standard speech patterns found in children with impairments". These users have unique challenges such as inconsistent pronunciation, varying speech rates, and excessive auditory processing variability. Current models, which are generally trained on uninhibited adult speech, can't understand these correctly. This study aims to develop a deep learning framework specifically optimized for the visual characteristics of children with speech impairments. Its primary goal is to reduce word error rates and improve the understanding ability of automated systems. The goal of this study is to create a better communication and digital inclusion environment for children with speech impairments.

Keywords*: speech, children, impairments, deep, learning*

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The Future of Multimodal AI Systems

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Abstract: Multimodal artificial intelligence (AI) systems represent a paradigm shift in machine learning by integrating multiple data modalities text, images, video, audio, and sensor data to achieve more comprehensive understanding and reasoning capabilities. This paper provides an extensive survey of the current state and future trajectory of multimodal AI systems as of March 2026, examining the evolution of architectural designs from early heterogeneous encoders to unified token-based transformers, analyzing leading models including GPT-5, Gemini 3, and Llama 4, and exploring critical applications in healthcare, autonomous systems, and embodied AI. Key challenges such as computational complexity, data alignment bottlenecks, bias amplification, and explainability are systematically addressed, with projections toward future directions like edge agentic systems, bio-digital hybrids, and omni modal platforms, highlighting the market growth trajectory toward $20.5 billion by 2032.

Keywords*: systems, multimodal, future, trajectory, toward*

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Evolution of AI Models

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Abstract: The evolution of AI models traces a transformative journey from rule-based symbolic systems in the 1950s to today's generative multimodal architectures, marked by paradigm shifts driven by computational advances and data abundance. Early expert systems like Logic Theorist (1956) relied on handcrafted logic, giving way to statistical machine learning in the 1990s, deep neural networks post-2012 ImageNet breakthroughs, and large language models (LLMs) like GPT-3 (2020) that scaled transformer architectures for emergent reasoning capabilities. Recent developments including GPT-5, Gemini 3, and agentic multimodal systems as of 2026 integrate vision, audio, and action modalities, addressing challenges in reasoning, efficiency, and real-world deployment while projecting toward omnimodal AI and bio-digital hybrids.

Keywords*: Bio digital hybrids, ImageNet,* large language models (LLMs), *Omnimodal AI*

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Role of Data Engineering in Big Data Systems

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Abstract: In the modern digital era, a massive amount of data is generated every second from various sources such as social media, online transactions, and Internet of Things (IoT) devices. Managing and processing this large volume of data efficiently is a major challenge for organizations. Data engineering plays a crucial role in designing, building, and maintaining systems that handle big data. This paper focuses on key processes such as data collection, data transformation, data storage, and data processing. It also highlights important technologies like Hadoop, Apache Spark, and cloud computing platforms that support scalable data solutions. The study emphasizes how data engineering ensures data quality, reliability, and accessibility, helping organizations make better and faster decisions.

Keywords*: Cloud computing, Data engineering, Hadoop, Internet of Things (IoT)*

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Online Payment Apps and Security Concerns

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Abstract: Online payment apps have made life very convenient. Today, people can send money, pay bills, shop, and even recharge their phones within seconds using apps like Google Pay, PhonePe, and Paytm. These apps save time and reduce the need to carry cash. Especially during busy days or emergencies, they make transactions quick and easy. However, along with convenience, there are also security concerns. Many users are not fully aware of online frauds and scams. Hackers can try to steal personal information such as OTPs, passwords, or bank details through fake messages or links. Sometimes, people accidentally share sensitive information, which leads to financial loss. Public Wi-Fi networks can also be unsafe for making payments. To stay safe, users should be careful while using these apps. It is important to never share OTPs or passwords with anyone. Using strong passwords, enabling app locks, and checking transaction details regularly can help prevent fraud. Also, downloading apps only from trusted sources is important. In conclusion, online payment apps are very useful, but users must stay alert and follow basic safety measures to protect their money and personal information.

Keywords*:* Google Pay, Wi-Fi networks, Paytm

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Chatbots using Natural Language Processing (NLP)

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Abstract: Chatbots are intelligent software applications designed to simulate human conversation through text or voice interactions. With the rapid advancement of Natural Language Processing (NLP). This paper explores the design, development, and implementation of NLP-based chatbots, focusing on their architecture, key components, and working principles. Modern chatbots leverage advanced machine learning and deep learning models, including transformers like BERT and GPT, to improve accuracy, context understanding, and conversational flow. The study also highlights different types of chatbots, including rule-based chatbots, retrieval-based chatbots, and generative chatbots. Each type has its own advantages and limitations in terms of scalability, flexibility, and performance. NLP-based chatbots are widely used in various domains such as customer service, healthcare, education, and e-commerce to provide instant support, automate repetitive tasks, and enhance user experience. In conclusion, NLP-driven chatbots represent a significant advancement in human-computer interaction, offering scalable and intelligent communication solutions across multiple industries.

Keywords*: Natural Language Processing (NLP), Chatbots, Artificial Intelligence, Human-Computer Interaction (HCI), Conversational Agents.*

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Enhancing Software Development and Automation through AI Agents

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Abstract: In today's world, building software takes a lot of time and effort. Developers have to write code, fix errors, test applications, and handle many tasks every day. AI agents are smart computer programs that help make this work easier by doing many of these tasks automatically. They can understand simple instructions, write code, find and fix bugs, create test cases, and even help with documentation, which saves a lot of time and effort. This paper explains how AI agents are improving software development and automation in real-world use. It focuses on important tasks such as writing code, debugging, testing, deployment, and documentation. It also discusses popular tools like GitHub Copilot, Amazon Code Whisperer, which are widely used by developers today. Studies show that AI agents help developers' complete tasks faster, fix problems more quickly, and build better-quality software. However, these tools are not perfect. Sometimes they can make mistakes or may not fully understand complex problems. This paper also discusses these challenges and explains how developers, students, and organisations can use AI agents in a smart and careful way. Overall, AI agents are helping to make software development faster, easier, and more efficient.

Keywords*: Amazon Code Whisperer, AI agents, GitHub Copilot*

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Mini AI clones

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Abstract: The concept of artificial intelligence is changing the way we think about automation, personalization, and distributed systems. One of the most interesting concepts of artificial intelligence is the "AI Mini Clone Mechanism," in which the main intelligent system creates small clones of itself to perform specific tasks. This paper will briefly discuss the basic concept, design, and working of the AI Mini Clone Mechanism in a simple manner. It will also briefly discuss the pros and cons of the concept. The concept of AI Mini Clone Mechanism has many advantages, including efficiency, speed, and flexibility in solving problems. However, it also has some limitations, including resource management, security, and the complexity of the system. The concept of AI Mini Clone Mechanism can be applied in many fields, including healthcare, finance, education, and smart technologies. The AI Mini Clone Mechanism has a great potential as a new concept of artificial intelligence systems.

Keywords*: AI Mini Clone Mechanism, distributed systems, resource management*

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Handwritten Digit Recognition Using Neural Networks

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Abstract: Handwritten digit recognition is an important application in image processing and pattern recognition, widely used in banking, postal services, and automated data entry systems. Accurate recognition of handwritten digits helps reduce manual effort and improves efficiency. In the present study, the researcher proposes an approach for recognizing handwritten digits using image data. The system uses features such as pixel intensity and structural patterns to classify digits. A neural network model, specifically a Convolutional Neural Network (CNN), is applied for classification. The model is trained and tested using standard datasets, with preprocessing techniques like normalization to improve performance. Various machine learning approaches are analyzed, and the neural network model achieves higher accuracy compared to traditional methods. The findings demonstrate that neural networks provide an effective and reliable solution for handwritten digit recognition tasks.

Keywords*: Accurate recognition, Convolutional Neural Network (CNN), Handwritten digit recognition*

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The Role of Generative Al in Modern Classrooms

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Abstract: Ahead of schedule, tools such as ChatGPT and Google Gemini shift school routines in ways few expected. Because they run on advanced language patterns, these platforms unlock value but bring challenges too. Lessons can now adjust to individual progress, offering learners more freedom, whereas help reaches further for students dealing with obstacles. As routine chores ease up, educators gain room to connect more fully with pupils. Still, confidence in genuine work slips when responses appear without struggle. Still, not everyone gets the same chance - where you live or how much you earn can shut doors. Too much dependence might soften minds, especially if habits go unexamined. When private facts slip into artificial systems lacking strong guardrails, unease grows. Hidden slants in code sometimes echo old injustices, almost unnoticed. Grounded in recent studies and actual teaching moments, the discussion finds steady ground - a way forward where tools serve wisely, evenly, and with purpose in learning spaces. Generative AI and ChatGPT reshape personalised learning amid concerns on academic integrity digital divide large language models educational technology algorithmic bias.

Keywords: *ChatGPT, Google Gemini ,large language models*

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Artificial Intelligence for Early Disease Detection

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Abstract: Artificial Intelligence (AI) has emerged as a transformative force in healthcare, enabling early disease detection through advanced data-driven approaches. This paper presents a systematic literature review and meta-analysis of AI techniques applied across major disease domains, including cardiovascular diseases, chronic kidney disease, retinal disorders, and infectious diseases. The study critically evaluates machine learning, deep learning, ensemble learning, and explainable AI (XAI) models in terms of their performance, interpretability, and clinical applicability. The meta-analysis of selected studies reveals that deep learning models achieve the highest predictive accuracy (90–96%), particularly in image-based and time-series diagnostics. In contrast, traditional machine learning models demonstrate moderate performance (80–85%) but offer advantages in interpretability and computational efficiency. Ensemble learning approaches exhibit strong robustness, with Area Under the Curve (AUC) values exceeding 89%. Based on these findings, a novel hybrid AI framework integrating XAI, Edge AI, and multi-modal data fusion is proposed to address current limitations. The paper further identifies key challenges, including data scarcity, lack of model transparency, and difficulties in real-world clinical integration. Overall, the study highlights the potential of AI to enable proactive, reliable, and patient-centric healthcare systems.

Keywords*: Artificial Intelligence (AI), Area Under the Curve (AUC),* ***E****xplainable AI (XAI) models*

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AI Chatbots in Education: A Review

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Abstract: The rapid transition from traditional rule-based pedagogical agents to generative artificial intelligence has outpaced the development of standardized evaluation protocols. Current implementations are marked by fragmented terminology, inconsistent assessment methods, and a lack of structured pedagogical grounding across academic contexts. This study synthesizes twenty-four recent empirical works to organize the domain and establish conceptual clarity for both researchers and practitioners. A three-dimensional taxonomy is proposed to classify educational chatbots based on pedagogical role, interaction model, and educational context. This framework systematically categorizes systems ranging from administrative tools to generative tutoring agents, clarifying their functional roles within learning environments. To address inconsistencies in evaluation, this study introduces a unified framework built on four key pillars: technical performance, pedagogical effectiveness, user experience, and ethical safety. It aligns engineering metrics—such as hallucination rates and context retention—with educational outcomes, including knowledge gain, scaffolding quality, and bias mitigation. The analysis identifies a significant research gap in longitudinal cognitive impact and the effectiveness of multimodal systems in K–12 education. Existing studies largely emphasize short-term engagement and self-reported outcomes in higher education, often lacking rigorous behavioral validation. By bridging the gap between technical capabilities and educational practice, this work provides a structured foundation for the responsible development and deployment of AI-driven tutoring systems.

Keywords*: AI-driven tutoring systems, K–12 education, pedagogical grounding*

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Deep Learning – Based on Image Recognition for Virtual Boundary Monitoring in Home Security

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Abstract: Traditional home surveillance systems are frequently plagued by high false-alarm rates caused by environmental factors such as sudden changes in light,The trees are swaying in the wind, or domestic animals. This paper proposes an (Drawing a line on the camera feed and monitoring if anyone crosses it and detect line-crossing events) intelligent Virtual Boundary Monitoring (VBM) system that leverages deep learning-based object detection and analying an object's location instantly and accurately to improve the home security. The proposed architecture utilizes a Convolutional Neural Network (CNN)—specifically the You Only Look Once (YOLO) framework-to perform concurrent (on time) Identifying what the object is,e.g. human/car and localization (finding exactly where the object is). By integrating a centroid tracking algorithm (following the center point of the object), the system monitored the path of movement of detected entities relative to user-defined digital "tripwires" (Virtual lines on the screen) or polygonal zones(direction). Unlike standard motion detection, this system employs context-aware logic (smart thinking based on the situation) to filter alerts based on object class (e.g., human vs. animal) and direction of movement. Experimental results indicate that the integration of deep learning significantly reduces false positives by up to 90% compared to traditional PIR-based systems. Furthermore, by utilizing edge computing hardware, the system ensures low-latency processing and enhanced data privacy by analyzing video streams locally. This research demonstrates that deep learning-based boundary monitoring provides a robust, scalable, and cost-effective solution for modern autonomous home defense.

Keywords*: Convolutional Neural Network (CNN), Virtual Boundary Monitoring (VBM)*

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Impact of Responsive Web Design on User Experience

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Abstract: Responsive design has become important for users to increasingly access websites Responsive design has become important for users to increasingly access websites through devices of different screen sizes, including laptops and smartphones. The Paper shows how Responsive Web Design affects the way people engage with websites. It checks things like how easy it is to use the website and to check if people are comfortable browsing through it. Compared to websites that use Responsive Web Design, it makes websites easier to use and more accessible. It also makes people more likely to engage and use the website for much longer. Developers test responsive and fixed-layout websites on laptops and mobile devices. Quantitative results show that responsive websites improved task completion time is 32%, and users rated them significantly higher in usability and readability. Heatmap and click-path analyses state reduced cognitive load and fewer navigation errors on responsive interfaces. Qualitative interviews revealed that users saw responsive designs as modern, smooth, and easy to use, whereas fixed layouts were described as tiring and frustrating. Overall, the findings indicate that responsive design enhances both functional and emotional aspects of user experience. The study recommends combining responsive layout practices with accessibility guidelines to ensure inclusive interaction across devices. The research states that using Responsive Web Design is very important for making websites in the present times with the latest technology. It makes the website work efficiently without having to worry about the layout breakups and disoriented placements of objects.

Keywords*: Responsive Web Design ,Quantitative results, smartphones*

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Explainable AI for Detecting Deepfakes in Social Media Content

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Abstract: The rapid advancement of artificial intelligence has led to the emergence of deepfake technology, enabling the creation of highly realistic yet manipulated audio-visual content. While deepfakes offer creative and entertainment applications, they pose significant threats to information integrity, cybersecurity, and public trust. This paper proposes an explainable AI-based framework for detecting deepfake content in social media platforms. The study explores the use of deep learning models, including convolutional neural networks (CNNs) and transformer-based architectures, for identifying inconsistencies in facial expressions, lip synchronization, and temporal patterns in videos. To address the black-box nature of these models, explainable AI (XAI) techniques such as Grad-CAM and SHAP are integrated to provide visual and feature-level explanations for model predictions. The proposed approach enhances detection accuracy while improving transparency, enabling users and analysts to understand the reasoning behind classification decisions. Comparative analysis demonstrates that combining deep learning with explainability techniques significantly improves trust and reliability in deepfake detection systems. This research highlights the importance of integrating interpretability into AI-driven cybersecurity solutions and provides a foundation for developing robust, scalable, and trustworthy systems for combating misinformation in digital ecosystems.

Keywords*: Cybersecurity, digital ecosystems, Grad-CAM and SHAP*

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A Survey on Cybersecurity Threats and Countermeasures in Smart Cities

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Abstract: Smart cities are revolutionizing the way people live through the use of technology like the Internet of Things (IoT), cloud computing, and data analytics to deliver services efficiently to their citizens. However, the risk of cyber-attacks is also rising with the use of such technologies. With the rise of the use of technology like the IoT, cloud computing, and data analytics, the risk of cyber-attacks is also on the rise with the digitization of critical city infrastructures like transportation systems, healthcare services, and energy production. In the present study, the different types of cyber-attacks faced by smart cities around the world have been discussed along with the different countermeasures to be adopted to overcome such attacks. In the present study, the different types of cyber-attacks like Distributed Denial of Service (DDoS) attacks, malware attacks, ransomware attacks, and data breaches have been discussed along with the use of data analytics to understand the different types of cyber-attacks faced by the city. In the present study, the different types of solutions to be adopted to overcome the different types of cyber-attacks faced by the city have also been discussed. The present study highlights the significance of strengthening the cybersecurity system to ensure the development of smart cities safely and sustainably in the future.

Keywords*: cyber-attacks, Internet of Things (IoT), cloud computing, data analytics*

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Deepfake Detection Using Machine Learning Techniques

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Abstract: Deepfake technology utilizes the most recent innovations in artificial intelligence to generate realistic synthetic media, including images, videos, and audio tracks. The synthetic media are created using deep learning models, including Generative Adversarial Network (GAN) and autoencoder. Although deepfakes are used in various legitimate activities, including film production, gaming, and entertainment, deepfake technology also offers various security challenges, including misinformation, identity thefts, political manipulation, and internet frauds. Due to the high quality of deepfakes, traditional detection approaches cannot be relied upon to address the security challenges associated with deepfakes. This research paper is aimed at exploring the various machine learning approaches that can be utilized to address the security challenges associated with deepfakes. The research will explore various detection approaches, including CNNs, deep learning models, feature detection models, as well as the various datasets that can be utilized to develop the detection models. Additionally, the research will explore the various challenges that can be addressed to enhance the detection models in addressing the security challenges associated with deepfakes. The research indicates that machine learning approaches play a critical role in the war against deepfake security threats.

Keywords: *Deepfake technology, Generative Adversarial Network (GAN)*

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Web Application Vulnerability Scanner

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Abstract: Web applications have become an essential part of modern digital systems, supporting services such as online banking, e-commerce, education platforms, and social networking. However, the increasing use of web applications has also led to a rise in security vulnerabilities and cyberattacks. Common threats such as SQL Injection (SQLi), Cross-Site Scripting (XSS), and Cross-Site Request Forgery (CSRF) can compromise sensitive user data and system integrity. Traditional security methods, including manual testing and rule-based detection systems, often fail to detect complex and emerging vulnerabilities. This research focuses on the development of a Web Application Vulnerability Scanner that helps identify security weaknesses in web applications automatically. The proposed system uses a hybrid approach that combines static analysis and dynamic testing techniques. Static analysis examines the application code to detect insecure coding practices, while dynamic testing simulates real-time attacks to evaluate system behavior. The scanner includes modules such as URL crawler, payload generator, response analyzer, and reporting system. It scans web applications, injects test inputs, and analyzes responses to detect vulnerabilities. The system also categorizes vulnerabilities based on severity levels such as low, medium, and high. The main objective of this research is to provide a simple, efficient, and cost-effective security solution for developers and organizations. The results show that the scanner can effectively detect common vulnerabilities and improve overall web security.

Keywords*: SQL Injection (SQLi), Cross-Site Scripting (XSS), and Cross-Site Request Forgery (CSRF)*

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Detection of AI-Generated Deepfake Voices in Voice-Based Banking Authentication Systems

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Abstract: The advancement of artificial intelligence has significantly improved voice synthesis technologies, making it possible to generate highly realistic deepfake voices. While these technologies offer useful applications in areas such as virtual assistants and accessibility, they also introduce serious security risks, especially in voice-based banking authentication systems. These systems rely on voice biometrics to verify users, but deepfake voices can imitate legitimate users and potentially bypass security measures. This research focuses on detecting AI-generated deepfake voices to prevent unauthorized access to banking services. It explores different detection methods, including acoustic feature analysis, machine learning models, and deep learning techniques, to distinguish between real and synthetic speech. The study also evaluates how these methods perform in practical banking scenarios, where attackers may attempt to exploit voice authentication systems. The results highlight that traditional voice-based authentication alone is not sufficient to handle advanced deepfake threats. Therefore, the research emphasizes the need for stronger, multi-layered security approaches. Overall, this work aims to improve the reliability and security of voice-based banking systems by introducing effective deepfake voice detection strategies.

Keywords*: Authentication systems, unauthorized access, synthetic speech*

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Advantages of Cloud Computing in Education Systems

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Abstract: Cloud computing has become an important technology in modern education systems by providing flexible, scalable, and cost-effective digital solutions for institutions, teachers, and students. It allows educational organizations to store, manage, and access data through internet-based services instead of relying only on local computer systems. One of the major advantages of cloud computing in education is easy access to learning resources from any location and at any time, which supports online learning and remote education. Students can use cloud platforms to access study materials, submit assignments, and collaborate on projects efficiently. Cloud computing also reduces infrastructure costs for educational institutions because there is less need for expensive hardware, software installation, and maintenance. Educational organizations can use cloud-based tools for virtual classrooms, attendance management, examination systems, and academic record storage. Teachers benefit from cloud services through easier content sharing, online assessments, and communication with students. Another important advantage is data security and backup, as cloud providers offer secure storage and recovery options that protect important academic information. Cloud computing also improves collaboration by enabling multiple users to work on shared documents and projects in real time. It supports innovation in teaching methods through digital applications and smart learning environments. Despite these benefits, challenges such as internet dependency, privacy concerns, and data protection policies must be managed carefully. Overall, cloud computing plays a significant role in improving the quality, accessibility, and efficiency of education systems, making it an essential technology for modern academic environments.

Keywords*:* Cloud computing, online assessments, educational organizations

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An AI-Based Resume Analyzer for Semantic Job Matching and Selection Probability Prediction

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Abstract: This paper presents a resume analysis platform that uses artificial intelligence (AI) to check the suitability of the resume and the job description of a specific job and predicts the chance of being hired. Conventional Applicant Tracking systems (ATS) use much of their abilities in matching applicants using keywords and then derive little to no semantic sense meaning and they fail to convey some form of meaningful feedback to the candidates. To overcome these limitations, the proposed system will follow the hybrid strategy, combining the methods of Natural Language Processing (NLP), Machine Learning (ML), and rule-based scoring methods. The system identifies the structured features which include skill overlap, experience match, and educational levels as well as contextual resemblance between resumes and job descriptions. An XGBoost-based binary classification model is used to classify candidates to be suitable or not suitable. The model is backed by a hybrid scoring mechanism which improves reliability and interpretability by leveraging the limited availability of labeled data and class imbalance support by machine learning predictions and heuristic rules. Along with the prediction, the system offers a user-focused analysis, detecting the skill gaps and providing the practical recommendations to enhance the quality of resumes and occupation fit. The findings prove that the suggested solution produces similar and interpretable results, which qualifies it as a viable tool that can help job seekers analyze their chances of success and determine the ways to enhance them. With a focus on transparency, usability, and guidance, the system has emerged as an efficient AI-based decision support system in the current recruitment processes.

Keywords*: Resume Analysis, Natural Language Processing (NLP), XGBoost, Skill Gap Analysis, Hybrid Scoring, AI Recruitment Systems*

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Machine Learning-Based Phishing Detection System for Enhancing Cybersecurity

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Abstract: This research paper focuses on the development of a Machine Learning-Based Phishing Detection System aimed at improving cybersecurity and protecting users from online threats. Phishing attacks are increasing rapidly in today's digital environment, and traditional security approaches often fail to detect newly generated malicious websites. To overcome this challenge, the proposed system applies machine learning techniques to examine various website and URL characteristics in order to accurately distinguish between legitimate and phishing sites. By using trained models, the system can automatically identify suspicious patterns associated with phishing activities. In the future, such detection systems can be incorporated into web browsers, email platforms, and other security tools to enable real-time identification of phishing attempts. Additionally, machine learning models can continuously improve their performance by learning from newly available data, which helps them adapt to evolving cyber-attack strategies. This study contributes to the advancement of intelligent security mechanisms capable of protecting personal information, financial records, and organizational data. Overall, the research supports the development of more effective cybersecurity frameworks and opens opportunities for further studies using artificial intelligence and advanced machine learning methods for phishing detection and prevention.

Keywords*: phishing, machine, learning, detection, security*

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An Intelligent Machine Learning Framework for Automated Soft Tissue Tumor Diagnosis

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Abstract: Soft tissue tumors present a significant diagnostic challenge due to their diverse histological patterns and overlapping imaging characteristics. Early and accurate identification is critical for effective treatment planning and improved patient outcomes. This study proposes an intelligent machine learning framework designed to automate the diagnosis of soft tissue tumors using medical imaging data. The framework integrates advanced preprocessing techniques, feature extraction methods, and classification algorithms to enhance diagnostic accuracy while reducing manual intervention. The proposed system leverages deep learning models to analyze complex patterns within imaging datasets, enabling precise differentiation between benign and malignant tumors. By incorporating a robust training mechanism and validation process, the model demonstrates improved performance compared to conventional diagnostic approaches. Additionally, the framework is designed to be scalable and adaptable to various imaging modalities, making it suitable for real-world clinical applications. Experimental results indicate that the system achieves high accuracy, sensitivity, and specificity, highlighting its potential as a reliable decision-support tool for healthcare professionals. This approach not only minimizes diagnostic errors but also reduces the workload on radiologists, ultimately contributing to faster and more efficient patient care.

Keywords*: diagnostic, imaging, tumors, preprocessing techniques*

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Bias and Fairness in AI Systems: Challenges and Implications

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Abstract: Artificial Intelligence (AI) systems are increasingly being integrated into critical domains such as healthcare, finance, education, and governance. While these systems offer significant advantages in automation and decision-making, concerns related to bias and fairness have emerged as major challenges in their widespread adoption. Bias in AI systems can arise from imbalanced datasets, flawed data collection processes, or inherent limitations in model design, leading to unequal and potentially discriminatory outcomes. This paper examines the concept of bias in AI systems and its impact on fairness in automated decision-making. It discusses different types of bias, including data bias, algorithmic bias, and societal bias, and how these factors influence the behavior of machine learning models. The study further highlights the implications of biased AI systems in real-world applications, particularly in high-stakes environments where fairness and transparency are critical. Additionally, the paper explores key challenges in identifying and mitigating bias, including the lack of standardised evaluation metrics, limited interpret-ability of complex models, and trade-offs between accuracy and fairness. The discussion also emphasises the importance of ethical considerations, responsible data practices, and the need for developing more transparent and accountable AI systems. The paper aims to provide a structured understanding of bias and fairness in AI and highlights the importance of designing systems that are not only accurate but also equitable and trustworthy.

Keywords*:* Artificial Intelligence (AI), *systems, fairness,* accountable AI systems

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NavMe: An AI-Driven Real-Time Indoor Navigation and Emergency Evacuation System

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Abstract: In emergency situations such as fires, earthquakes, or hazardous incidents, the lack of clear and adaptive navigation significantly increases the risk to human life. Traditional evacuation systems rely on static exit plans that fail to respond to dynamic environmental changes. This paper proposes an AI-driven real-time indoor navigation and emergency evacuation system designed to enhance safety and decision-making during critical situations. The system integrates real-time data from sensors, surveillance systems, and administrative controls to dynamically analyze environmental conditions and identify safe evacuation routes. Unsafe zones are automatically restricted, while optimal paths are continuously recalculated using intelligent algorithms. The proposed solution also provides user-friendly visual guidance through mobile and dashboard interfaces, ensuring clear direction and minimal confusion. Additionally, administrators can manually intervene to block hazardous areas and guide occupants effectively. The system leverages route optimization techniques and AI-based decision-making to ensure rapid and safe evacuation. Experimental analysis demonstrates improved evacuation efficiency, reduced response time, and enhanced situational awareness compared to traditional methods. This research contributes to the development of smart building safety systems by combining artificial intelligence, real-time data processing, and interactive navigation technologies to create a reliable and scalable emergency response solution.

Keywords*: hazardous incidents, evacuation, navigation, systems*

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AI Meal Planner

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Abstract: The increasing demand for personalized nutrition and healthy eating habits has led to the integration of Artificial Intelligence (AI) in dietary planning. This research presents the design and development of an AI-based meal planner that generates customized meal plans based on individual preferences, nutritional requirements, health conditions, and lifestyle factors. The proposed system utilizes machine learning algorithms and optimization techniques to analyze user data, including age, weight, activity level, and dietary restrictions, to recommend balanced and adaptive meal schedules. The model incorporates a dynamic feedback mechanism that continuously improves recommendations by learning from user behavior and preferences over time. Additionally, the system leverages nutritional databases to ensure that generated meal plans meet daily macro- and micronutrient requirements. Experimental results demonstrate that the AI-driven approach provides more accurate, flexible, and user-centric meal recommendations compared to traditional static diet plans. This research highlights the potential of AI in promoting healthier eating habits, improving user engagement, and supporting preventive healthcare. The proposed solution can be extended to integrate with wearable devices and health monitoring systems, enabling real-time dietary adjustments and long-term health optimization.

Keywords*: Artificial Intelligence (AI) in dietary, macro- and micronutrient requirements*

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Internet of Things

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Abstract: The Internet of Things (IoT) has enabled the development of smart environments that enhance convenience and energy efficiency. This paper presents a smart home automation system that allows users to control appliances remotely via a mobile application. The system integrates sensors, microcontrollers, and cloud platforms to monitor and manage home devices. Security features such as authentication and data encryption are incorporated to prevent unauthorized access. Experimental results show improved energy efficiency and user convenience, demonstrating the practicality of IoT-based home automation systems.

Keywords*: smart home, automation system, energy efficiency*

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Emotion-Aware Music Recommendation System

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Abstract: The Emotion-Aware Music Recommendation System is designed to enhance the music listening experience by understanding and responding to a user's emotional state. In today's fast-paced digital world, people often use music to manage their emotions, reduce stress, improve mood, or stay motivated. Traditional music recommendation systems mainly rely on listening history, popular trends, or user ratings, which may not always reflect a user's current mood. To address this limitation, the proposed system focuses on detecting emotions in real time and recommending music that aligns with the user's feelings. This system uses artificial intelligence and machine learning techniques to analyze emotional cues from different sources such as facial expressions, voice tone, or text input. For example, a user's facial expression captured through a camera or mood-related text entered by the user can help determine whether they are happy, sad, stressed, or relaxed. Once the emotion is identified, the system matches the detected mood with an appropriate playlist from a structured music database. This personalized recommendation approach improves user satisfaction and creates a more engaging listening experience. The Emotion-Aware Music Recommendation System also aims to support users in emotional regulation by suggesting calming music during stressful moments or energetic songs when motivation is needed. By combining emotion detection with intelligent music recommendation, the system provides a more human-centered and adaptive solution. This research highlights the potential of integrating emotional intelligence into music platforms, making them more responsive, personalized, and beneficial for users' mental well-being and overall listening experience.

Keywords: *Emotion-Aware, fast-paced digital world, facial expressions*

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AI BASED "FOCUS TRAKER" USING SCREEN BEHAVIOR

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Abstract: Today's technology-driven environment, the extensive use of digital devices has significantly affected individuals' ability to maintain consistent focus. Frequent interruptions from social media, notifications, and multitasking behaviors often reduce productivity and increase cognitive overload. This creates a strong need for intelligent systems that can automatically observe user activity and assist in improving attention without requiring manual effort. This research introduces an Artificial Intelligence-based Focus Tracker designed to evaluate user engagement through screen behavior analysis. The system continuously records parameters such as active applications, duration of usage, and task-switching frequency to capture behavioral patterns. These inputs are processed using machine learning techniques to determine whether a user is maintaining focus or experiencing distraction, enabling accurate and dynamic assessment of productivity levels. Based on the identified patterns, the system delivers real-time insights, notifications, and performance summaries to guide users toward better work habits. The proposed solution is intended to support students, professionals, and remote workers in optimizing their time and minimizing unnecessary distractions. This study emphasizes the role of AI-driven analysis in fostering improved concentration and promoting efficient digital work practices.

Keywords*: Artificial Intelligence, cognitive overload, focus Tracker*

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AI THAT EXPLAINS CODE LIKE A HUMAN TEACHER

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Abstract: The increasing complexity of programming languages and concepts presents significant challenges for beginners in understanding source code effectively. Traditional learning resources often provide either overly technical explanations or insufficient contextual guidance, making it difficult for learners to grasp underlying logic. This paper proposes an artificial intelligence-based system designed to explain code in a manner similar to a human teacher. The system focuses on generating step-by-step, context-aware explanations that simplify complex programming constructs into understandable natural language. The proposed approach integrates natural language processing and machine learning techniques to analyze source code, identify its structure, and produce explanations that include logical flow, purpose, and real-world analogies where applicable. Unlike conventional code documentation tools, the system adapts its explanations based on the learner's level of understanding, thereby enhancing personalized learning. A prototype model is developed to demonstrate the system's capability in explaining code snippets across multiple programming scenarios. Experimental evaluation highlights the effectiveness of the system in improving code comprehension, particularly among novice programmers. The results indicate that human-like explanatory approaches can significantly enhance learning outcomes and reduce the cognitive load associated with programming education. This research contributes to the development of intelligent educational tools that bridge the gap between automated code analysis and human-centric teaching methods.

Keywords: *Experimental evaluation, human teacher, human-centric teaching methods*

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AI SYSTEM TO PREDICT GYM STREGTH PROGRESSION

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Abstract: Accurate prediction of strength progression is a critical aspect of fitness training, yet most individuals rely on generalized programs that do not account for personal variability. Factors such as workout consistency, recovery patterns, and individual performance trends significantly influence strength development, making it difficult to estimate progress using traditional methods. This paper proposes an artificial intelligence-based system designed to predict gym strength progression using personalized data-driven analysis. The proposed system leverages machine learning techniques to analyze historical workout data, including exercise type, repetitions, weight lifted, frequency, and rest intervals. By identifying patterns in user performance, the system generates predictive insights into future strength levels and suggests optimized training adjustments. Unlike conventional fitness tracking applications, the model emphasizes individualized progression forecasting and adaptive recommendations tailored to each user's performance profile. A prototype system is developed to simulate real-world usage, and experimental evaluation demonstrates the model's ability to provide reliable predictions with improved accuracy over baseline estimation methods. The findings highlight the potential of AI-driven systems in enhancing training efficiency, reducing injury, and supporting goal-oriented fitness planning. This research contributes to the advancement of intelligent fitness technologies by integrating predictive analytics into personalized strength.

Keywords*: Intelligence-based system, machine learning techniques, data-driven analysis*

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AI-Based Misinformation & Deepfake Detection System

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Abstract: In today's digital era, the rapid spread of misinformation and the rise of deepfake technology have become serious threats to public trust, social stability, and information authenticity. With the increasing use of social media and AI-generated content, it has become extremely difficult for individuals to distinguish between real and manipulated information. This paper presents an AI-based system designed to detect and mitigate misinformation and deepfake content effectively. The proposed system combines natural language processing (NLP) and deep learning techniques to analyze both textual and visual data. For misinformation detection, the model evaluates linguistic patterns, sentiment inconsistencies, and source credibility. For deepfake detection, convolutional neural networks (CNNs) and computer vision techniques are used to identify visual artifacts, facial inconsistencies, and temporal anomalies in videos. The system is trained on diverse datasets to improve accuracy and adaptability across different types of content. Additionally, the system incorporates a real-time verification mechanism that provides users with credibility scores and alerts, helping them make informed decisions about the content they consume. The goal is not only to detect fake content but also to build awareness and promote responsible information sharing. Experimental results show that the proposed model achieves high accuracy and robustness in identifying manipulated content, making it a valuable tool in combating digital misinformation. This research contributes to the development of safer online environments by leveraging AI to enhance trust and transparency in digital communication.

Keywords*: Deepfake content, convolutional neural networks (CNNs) and computer vision techniques*

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Explainable Multi-Modal AI for Early Disease Diagnosis and Prediction

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Abstract: Early and accurate diagnosis of diseases remains a critical challenge in healthcare, particularly when clinical decisions rely on heterogeneous data sources such as medical imaging, electronic health records (EHRs), genomic data, and patient history. This research proposes an Explainable Multi-Modal Artificial Intelligence (XAI-MM) framework that integrates diverse data modalities to enhance early disease detection and predictive accuracy while ensuring model transparency and interpretability. The proposed system leverages deep learning architectures, including convolutional neural networks for imaging data and transformer-based models for sequential and textual clinical data, to learn complementary representations across modalities. A key contribution of this work is the incorporation of explainability techniques, such as attention mechanisms, feature attribution methods, and model-agnostic interpretability tools, to provide clinically meaningful insights into the decision-making process. This enables healthcare professionals to understand, validate, and trust AI-driven predictions. The framework is evaluated on benchmark medical datasets for diseases such as cancer, cardiovascular disorders, and neurological conditions, demonstrating improved diagnostic performance compared to unimodal approaches [1][3]. Furthermore, the study addresses challenges related to data fusion, missing modalities, and model generalization. Experimental results highlight the potential of explainable multimodal AI systems to support early intervention, reduce diagnostic errors, and facilitate personalized treatment strategies. This research underscores the importance of combining predictive power with interpretability to bridge the gap between advanced AI systems and real-world clinical adoption.

Keywords*: Explainable AI, Multi-Modal Learning, Early Disease Diagnosis, Disease Prediction*

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A Systematic Review and Analysis of Ethical Concern in Generative AI's Growth

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Abstract: Generative AI has expanded rapidly, driving innovation in healthcare, education, business, and creative industries, which makes it a vital area of research. However, this growth raises serious ethical challenges such as misinformation, bias, privacy risks, copyright disputes, and loss of public trust, highlighting a critical gap that requires attention. The objective of this study is to systematically review and analyse these ethical concerns while proposing strategies for responsible AI development. The methodology applies a structured literature review and analytical evaluation of frameworks, practices, and case studies relevant to ethical AI. The findings reveal that fairness, transparency, accountability, and privacy protection are the most pressing issues requiring focus. These results are significant because they connect generative AI's expansion directly to ethical, social, and regulatory responsibilities. Finally, the study suggests global governance, stronger datasets, and clear ethical guidelines as directions for future research.

Keywords*: Generative AI ,healthcare, ethical challenges*

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An Overview of Recent Advances in Medical Image Analysis Using Deep Learning Models

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Abstract: Deep learning models have shown remarkable performance in various medical image analysis tasks, but their black-box nature poses challenges in understanding their decisions. In clinical settings, interpretability is crucial for gaining trust and acceptance among healthcare professionals. This paper aims to address this challenge by providing an overview to enhance the interpretability of deep learning models in real-time applications of medical image analysis. Medical image analysis plays a crucial role in modern healthcare, aiding in diagnosis, treatment planning, and disease monitoring and aiming to improve their interpretability and trustworthiness in clinical setting explainability of deep learning models is crucial of their acceptance and trust in medical image analysis application. This paper proposes an overview of the techniques to enhance the explainability of deep learning models is crucial for their acceptance and trust in medical image analysis applications. This paper proposes an overview of the techniques to enhance the explainability applications. This paper proposes an overview of the techniques to enhance the explainability of deep learning models specifically tailored for medical image analysis tasks. It demonstrates the effectiveness of the approarches on diverse medical image datasets, showcasing improved interpretability for predictive performance.

Keywords*: Deep learning, AI techniques, medical processing, interpretation, image analysis*

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About the Editors

Dr. Madhawa Surendar is a Professor in the Department of Computer Science at Garden City University, Bengaluru. He holds a Ph.D., M.Tech., and B.E. in Computer Science and Engineering, and is an IEEE Senior Member. He brings over 17 years of industry experience along with more than 7 years in academia and research. His expertise spans Artificial Intelligence, Internet of Things (IoT), Embedded Systems, and Applied Machine Learning, with a strong focus on real-world and industry-driven applications. His research interests include healthcare analytics, smart systems, digital twins, and edge intelligence. He has contributed to interdisciplinary research areas such as federated learning and intelligent monitoring systems. He actively mentors postgraduate students and supervises research in emerging technology domains. Dr. Surendar has published and reviewed research papers in reputed journals and conferences and serves as a certified peer reviewer. He is actively involved in academic collaborations, conference organization, and curriculum development aligned with current technological advancements. His teaching philosophy emphasizes experiential learning, innovation, and industry integration.

Dr. Jincy C. Mathew is having over 17 years of teaching experience in Computer Science. She holds a Ph.D. in Image Processing, Machine Learning, and Deep Learning from Visvesvaraya Technological University, completed in 2025. She has served as a Senior Assistant Professor at New Horizon College of Engineering, Bengaluru, and has extensive experience teaching both undergraduate and postgraduate students. Her areas of expertise include Machine Learning, Computer Networks, Computer Vision, Cryptography, and Big Data. Dr. Jincy has strong experience in curriculum development, lesson planning, and student engagement strategies. Her research contributions are significant, with multiple publications in Scopus-indexed journals and reputed international conferences. She has worked on diverse topics including healthcare analytics, cybersecurity, and deep learning applications. She also holds patents in areas like fire detection systems and stock prediction models. She has been actively involved in organizing academic activities such as guest lectures, alumni meets, and workshops. She is a dedicated educator, researcher, and mentor contributing significantly to the field of Computer Science.

Ms. E. Jansirani is currently working as a Professor in the Department of Computer Science at Garden City University. With a strong academic foundation, holding M.Sc. and M.Phil. in Computer Science, she is presently pursuing her Ph.D. in the field of Cryptography. She has more than 12 years of teaching experience in higher education and has been actively involved in academic, research, and curriculum development activities. Her research focuses on developing secure and efficient cryptographic algorithms and protocols, particularly for applications in cloud computing and network security. Over the years, she has published several research papers in reputed national and international journals, including Scopus-indexed journals, as well as papers presented at various national and international conferences. Her areas of interest include Cryptography, Cloud Computing, Network Security, and various programming languages, where she integrates theoretical knowledge with practical implementation.

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