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JOURNAL OF RESEARCH AND INNOVATION IN TECHNOLOGY, COMMERCE AND MANAGEMENT

Proceedings of the International Conference on

"AI, ML, and Emerging Technologies: Transforming Industries and Society"

AMIEE
Empowering Innovation. Shaping Futures

COMMERCE AND MANAGEMENT ASSOCIATION OF INDIA
Nurturing Leadership Excellence

Proceedings of the International Conference on

"AI, ML, and Emerging Technologies: Transforming Industries and Society"

First Volume

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Preface

The rapid advancements in **Artificial Intelligence (AI) and Financial Technology (FinTech)** have revolutionized the global business landscape, creating new opportunities and challenges for industry professionals, academicians, and researchers. Recognizing the significance of these evolving technologies, the **Proceedings of the International Conference on "AI, ML, and Emerging Technologies: Transforming Industries and Society"** was organized on **April 11th – 13th& 18th – 19th 2025**, as a platform to facilitate **knowledge exchange, research collaboration, and industryacademia engagement**.

The conference, hosted by the **CMAOI Association in collaboration with and AMIEE Association**, aimed to explore the **transformative role of AI in financial services, predictive analytics, cybersecurity, blockchain, and digital transformation**.

This **Conference Proceedings** is a compilation of **selected research papers**, each presenting valuable insights, case studies, and empirical findings that contribute to the growing body of knowledge in AI and FinTech. The contributions from **renowned academicians, researchers, and industry experts** reflect the conference's success in fostering **intellectual discussions and technological innovations**.

We extend our gratitude to all **authors, presenters, keynote speakers, session chairs, and participants** who contributed to the success of this event. We hope that this publication serves as a **valuable resource for researchers, academicians, and professionals** striving to navigate the rapidly evolving AI, ML, and Emerging Technologies landscape.

Happy reading!

Dr. Aamir Junaid Ahmad
Conference Chair
Secretary, CMAOI Association

Proceedings of the International Conference on “AI, ML, and Emerging Technologies: Transforming Industries and Society”

An International Conference on "AI, ML, and Emerging Technologies: Transforming Industries and Society" was held on April 11th – 13th& 18th – 19th, 2025. The conference was organized by the CMAOI Association in Collaboration with and AMIEE Association.

Commerce and Management Association of India (CMAOI)

A revered organization of commerce, management, and technology professionals, CMAOI is a junction of intellectual higbrow with revolutinizing industry trends. With over 500 illustrious members from academia and industry, the association is a resourceful platform for industry alliance and partnership. The association's initiatives are geared towards shaping the future of commerce and management practices in India, ensuring that members are well-equipped to navigate the evolving business landscape.

AI-ML Innovative Entrepreneurs and Engineers Association (AMIEE)

AMIEE is a distinguished syndicate committed to augmenting Artificial Intelligence, Machine Learning, and entrepreneurial inventiveness. AMIEE is the heart of India's technological resurrection, having a dynamic nexus of around 500 academicians and industry leaders across the board who perform excellent networking, knowledge exchange, and collaboration, aiming to drive progress and innovation in the millennial domain.

Proceedings of the International Conference on "AI, ML, and Emerging Technologies: Transforming Industries and Society"

Innovation is the foundation of progress, and collaboration is the force that drives it forward. The Proceedings of the *International Conference on **"AI, ML, and Emerging Technologies: Transforming Industries and Society"***, organized in association with **CMAOI** and **AMIEE**, brought together thought leaders, researchers, and professionals from around the globe. The event witnessed an impressive collection of **research submissions and presentations**, including

contributions from international institutions like the a from across India The participation of experts from **top NIRF-ranked institutions** further highlighted the global relevance and academic depth of the conference.

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About AMIEE Association

The Artificial Intelligence, Machine Learning, Innovative Entrepreneurs and Engineers Association **(AMIEE)** is an eminent nonprofit professional body that plays a pivotal role in the advancement of Artificial Intelligence **(AI)**, Machine Learning **(ML)**, innovation, engineering, and entrepreneurship. With a strong focus on interdisciplinary collaboration and societal transformation, **AMIEE** brings together a diverse community of researchers, academicians, technologists, engineers, industry professionals, and aspiring entrepreneurs committed to leveraging technology for the greater good.

AMIEE's foundational objective is to bridge the gap between cutting-edge technological innovation and societal application. The association actively promotes the research, development, and ethical use of **AI** and **ML** across a wide range of sectors, including but not limited to healthcare, education, scientific research, agriculture, environmental sustainability, arts, commerce, and social welfare. By fostering the responsible deployment of these technologies, **AMIEE** seeks to create inclusive solutions that address complex real-world problems and contribute to sustainable development.

The association serves as a dynamic platform for knowledge exchange, skill development, and collaborative engagement. It regularly organizes international conferences, research symposiums, innovation challenges, technical workshops, and capacity-building programs that empower individuals to excel in their respective fields. **AMIEE** also supports scholarly research by facilitating publications, research collaborations, and interdisciplinary dialogues that span academic institutions and industry networks globally.

At its core, **AMIEE** is deeply committed to social equity and inclusive growth. Through targeted initiatives and community outreach programs, the association prioritizes the empowerment of underprivileged and marginalized populations, especially in rural and semi-urban regions of India. These efforts include providing access to quality education, digital literacy, technical training, and entrepreneurship support to children, youth, women, and disadvantaged groups. **AMIEE** believes that technology should serve as a tool for social inclusion, not division, and works relentlessly to ensure that the benefits of **AI** and **ML** are equitably distributed.

As a nonprofit entity, **AMIEE** adheres to a principle of reinvestment—allocating all revenue and resources toward the advancement of its objectives. The organization does not distribute profits or dividends to its members. Instead, it channels funding into the development of impactful programs, research support, community empowerment projects, and capacity enhancement strategies aimed at building a better, more equitable society.

Through its holistic and visionary approach, **AMIEE** positions itself as a key enabler of innovation-led development. It is not only a hub for professional excellence but also a movement towards creating a society where technological progress is inclusive, ethical, and human-centric. The association's long-term vision is to be a catalyst in shaping a future where every individual, regardless of socio-economic background, has the opportunity to learn, grow, innovate, and contribute meaningfully to the advancement of humanity.

Conference Highlights

With the harmony of wit and its delibration, the conference spotlighted keynote addresses, panel discourses, and research orientation, with an intermix of Artificial Intelligence and Fintech. The discussions and ruminations uncovered the evolving and revolutionizing ramifications of AI in financial services, providing the future scope of emerging trends, limitations, and upcoming prospects. Therefore, the conference assimilated the beautiful encounter of tomorrow's reality with today's discernment.

"Join us. Shape the future". A big shout-out to the budding scholars.

About CMAOI Association

The Commerce and Management Association of India (CMAOI) is a distinguished, nonprofit professional organization committed to the advancement

of education, research, and ethical practices in the domains of commerce, management, and allied disciplines across India. Incorporated with a vision of catalyzing systemic transformation in the academic and professional landscape, CMAOI serves as a national platform for scholars, educators, institutional leaders, researchers, and industry practitioners who are collectively working toward academic excellence, innovation, and social upliftment.

With an active and growing membership of over 650 professionals, including Heads of Departments, senior academicians from prestigious universities and colleges, and influential figures from the industry, CMAOI represents a powerful consortium of thought leaders and change-makers. The association fosters a collaborative and interdisciplinary environment where ideas, research findings, and pedagogical advancements are shared freely to elevate the standards of commerce and management education in India.

CMAOI's mission is to empower individuals and institutions through opportunities for continuous learning, professional development, knowledge dissemination, and collaborative research. The association plays an instrumental role in organizing conferences, faculty development programs (FDPs), workshops, and seminars at regional, national, and international levels. These initiatives are designed to enhance the skill sets of educators and practitioners, promote cutting-edge research, and encourage knowledge-sharing that contributes to sustainable business practices and ethical leadership.

The vision of CMAOI is to be a leading catalyst for transformative advancements in commerce and management education, fostering excellence, integrity, and innovation. The organization envisions a future where Indian professionals and institutions lead global conversations in business, entrepreneurship, corporate governance, and economic development. Through strategic alliances and community-driven programs, CMAOI actively promotes inclusive practices and strives to bridge the gap between academic research and practical business solutions.

Aligned with its nonprofit mandate, CMAOI is deeply committed to societal development. The organization reinvests all revenue and resources into programs that support underprivileged communities through education, skill-building, healthcare access, and awareness campaigns. Special emphasis is placed on empowering children, youth, women, and marginalized groups by integrating them into mainstream society through inclusive policies and collaborative outreach. This social vision aligns with national developmental goals and positions

CMAOI as a socially responsible body working toward an equitable and progressive India.

Furthermore, the organization extends its objectives beyond academia into areas such as art, science, sports, environmental protection, social welfare, and charity, reflecting a comprehensive commitment to national development. The association is strictly non-dividend-paying and functions with the sole purpose of societal betterment, capacity-building, and the dissemination of knowledge.

In essence, the Commerce and Management Association of India stands as a beacon of academic and professional excellence. It is a vibrant intellectual ecosystem that not only advances commerce and management education but also drives impactful change at the grassroots level. CMAOI continues to contribute to India's vision of inclusive growth by equipping professionals and institutions with the tools they need to lead responsibly and effectively in a rapidly evolving global economy.

A Glimpse into the Knowledge Exchange at the "AI, ML, and Emerging Technologies: Transforming Industries and Society"


COMMERCE AND MANAGEMENT ASSOCIATION OF INDIA
&
AMIEE
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INTERNATIONAL CONFERENCE
ON
AI, ML, AND EMERGING TECHNOLOGIES: TRANSFORMING INDUSTRIES AND SOCIETY
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REGISTER
11TH - 13TH APRIL
11 AM - 3 PM
International Conference 2025 | Research Papers Presented | AI ML & Emerging Tech High...
WHAT IS A.I.?
1)The study of computer systems that attempt to model and apply the intelligence of the human mind.
2) A branch of computer science dealing with the simulation of intelligent behaviour in computers.
3) The capability of a machine to imitate intelligent human behaviour.
13:10 / 1:46:10
Scroll for details


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25:41 / 1:46:10
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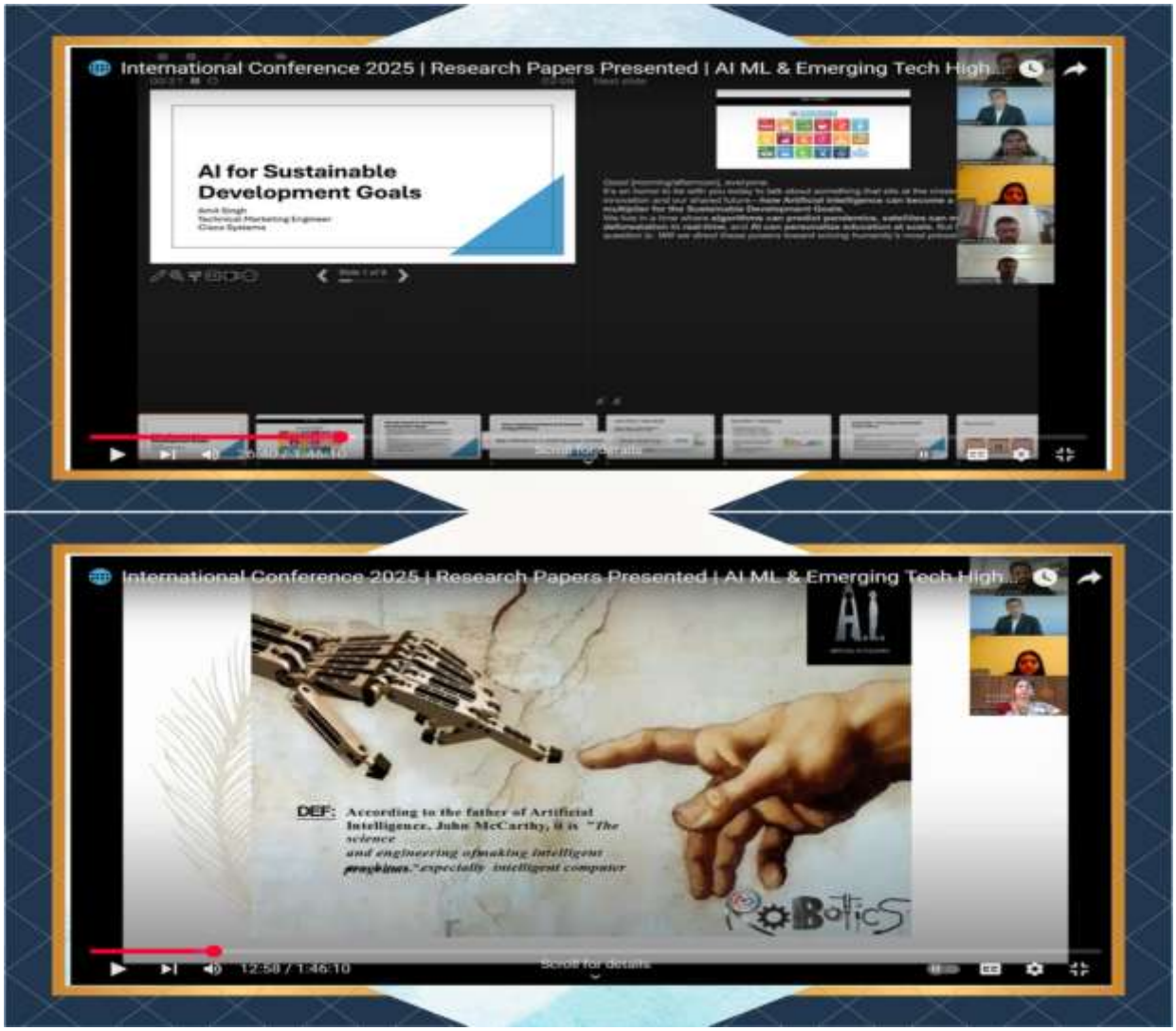
International Conference 2025 | Research Papers Presented | AI ML & Emerging Tech High...
1:01:58 / 1:46:10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AI for Sustainable Development Goals
International Conference 2025 | Research Papers Presented | AI ML & Emerging Tech High...
DEF: According to the father of Artificial Intelligence, John McCarthy, it is "The science and engineering of making intelligent machines, especially intelligent computer
12:58 / 1:46:10


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Your insights and expertise have greatly enriched the learning experience and inspired participants to explore the potential of AIML in Industries and Society.
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Director, AMIEE Association

Acknowledgement

The **Proceedings of the International Conference on *"AI, ML, and Emerging Technologies: Transforming Industries and Society"*** was a resounding success, made possible through the collective efforts of academicians, researchers, industry professionals, and institutional collaborators. We take this opportunity to express our sincere gratitude to everyone who contributed to the successful realization of this academic endeavor.

We extend our heartfelt thanks to our primary collaborator, the **CMAOI Association**, for their visionary leadership and active involvement in organizing the conference. We also gratefully acknowledge the **AMIEE Association**, whose partnership with CMAOI significantly enhanced the quality and reach of the event.

A special note of appreciation goes to:

- Our esteemed **keynote speakers and panelists** for generously sharing their expertise and offering deep insights into the latest developments in AI, ML, and emerging technologies.
- The **authors and presenters** for their original research contributions, which enriched the academic dialogue and stimulated meaningful discussion.
- The **organizing and technical committees** for their detailed planning, coordination, and flawless execution of the event.
- The **reviewers and editorial board members** for their critical evaluation and unwavering commitment to upholding the scholarly standards of the conference proceedings.

Finally, we thank all **participants and attendees** for their enthusiastic engagement and valuable interactions. It is through such academic collaboration and knowledge-sharing that we can collectively foster innovation and contribute to transformative advancements across industries and society.

We look forward to continuing this spirit of collaboration and academic excellence in future events.

Contents

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THE ROLE OF ARTIFICIAL INTELLIGENCE IN DIGITAL MARKETING

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Abstract

In today's lightning-paced digital landscape, technology is rapidly evolving. This is especially true in the world of digital marketing, with the rise of artificial intelligence (AI) and its revolutionizing impact on the industry. AI has been powering digital marketing technologies for decades in the form of machine learning. The emergence of the internet and e-commerce created new opportunities for gathering and analyzing data. They also allowed for a novel type of advertising and targeting. Early AI tools such as content recommendation algorithms and email marketing software enabled digital marketers and webmasters to utilize this data and engage customers online. Developments such as cloud computing, natural language processing, and deep learning paved the way for an emerging era of AI implementation. Marketers now use AI to create content, craft campaigns, improve conversion rates, forecast results, enhance the customer experience, and more. AI is radically changing the way brands and consumers interact and communicate with each other. Over the years, AI has become recognized as the most influential technology for business. And it all feels like just the beginning. In this paper the researcher tries to identify the key areas of the impact of AI in digital Marketing.

Keywords: AI, Digital Marketing, Deep learning.

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THE EVOLUTION OF FEMALE ENTREPRENEURS: A HISTORICAL PERSPECTIVE

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Abstract

This paper explores the evolution of female entrepreneurs throughout history, highlighting their contributions, challenges, and achievements. Through a historical perspective, this research examines the transformation of women's roles in entrepreneurship, from traditional home-based businesses to modern-day innovators. Case studies of pioneering female entrepreneurs, such as Madam C.J. Walker, Coco Chanel, and Oprah Winfrey, demonstrate the progress made and the obstacles overcome.

A STUDY ON EFFECTIVENESS OF TRAINING AND DEVELOPMENT ON EMPLOYEE'S PERFORMANCE IN THE IT SECTOR

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Abstract

In the ever-evolving landscape of the Information Technology (IT) sector, where innovation is paramount and competition is fierce, the performance of employees stands as a pivotal factor in organizational success. As technology continues to advance at an unprecedented pace, organizations must ensure that their workforce remains equipped with the requisite knowledge and skills to adapt and thrive in this dynamic environment. In this context, training and development programs emerge as indispensable tools for nurturing talent and enhancing employee performance.

This study aims to delve into the intricate relationship between training and development initiatives and employee performance within the IT sector. By examining the various dimensions of training programs, including their design, implementation, and effectiveness, alongside the resulting impact on employee performance metrics, this paper we have to analyze primary data using ANOVA and testing the hypothesis, and secondary data like magazines, periodical journals, etc. This research seeks to provide valuable insights into optimizing human capital management strategies in IT organizations.

IMPACT OF AI RECOMMENDATIONS ON IMPULSE BUYING BEHAVIOUR: A CONSUMER PSYCHOLOGY PERSPECTIVE

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Abstract

AI-based recommendations are revolutionising the digital marketplace by impacting the impulse buying behaviour. This research addresses the psychological effect of AI-based recommendations by examining certain pivotal variables, which include perceived urgency, emotional engagement, relevance, and trust. A mixed-methods approach with 200 respondents was employed to investigate the power of these factors for spontaneous purchasing intention. It shows that urgency, emotional engagement, and perceived relevance are the strongest drivers of impulse buying; whereas, the role of trust is significantly reduced. The regression model explains the variance in impulse buying ehaviour is 58%, highlighting that how powerful the psychological triggers utilised through AI-enabled personalisation are. Theoretical contributions can be found in the emerging research on ethics related to AI while practical implications make this study important for marketers to develop AI systems and recommendations ethically as well as for promoting awareness amongst consumers and protecting data privacy. The article also contributes to critical discussions about responsible AI use and the ethics of behavioural targeting.

Keywords: Artificial Intelligence, Recommendation Systems, Impulse Buying, Consumer Psychology, Emotional Engagement, Cognitive Biases, Personalization, Consumer Autonomy.

THE ROLE OF ARTIFICIAL INTELLIGENCE IN ENHANCING FINANCIAL SERVICES: OPPORTUNITIES AND CHALLENGES

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Abstract

The application of Artificial Intelligence (AI) in financial services is reconfiguring the sector's architecture by streamlining processes, augmenting decision-making, and enhancing customer experiences. This paper discusses the multiple applications of AI in financial services, ranging from fraud detection and credit risk assessment to algorithmic trading, robo-advisory, customer service, and regulatory compliance. Based on a careful review of existing technologies and practical applications, the study identifies the enormous advantages of AI in enhancing operational efficiency, personalization, and cost

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savings. Nevertheless, the paper also discusses major issues, such as data privacy issues, ethical considerations, algorithmic bias, regulatory ambiguity, and the requirement for human intervention. The study concludes that although AI has immense potential to transform the financial sector, its transparent and responsible use is imperative to ensure trust, fairness, and long-term sustainability. This paper is a guide for financial institutions, policymakers, and technology experts to effectively navigate the new AI-finance landscape.

Keywords: Artificial Intelligence (AI), Financial Services, Risk Assessment, Credit Risk Assessment, Fraud Detection, Digital Transformation, Robo-Advisors.

MAPPING THE RESEARCH LANDSCAPE OF AI AND ML APPLICATIONS IN FINANCIAL SERVICES: INSIGHTS FROM A BIBLIOMETRIC STUDY

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Abstract

This study maps the global research landscape of Artificial Intelligence (AI) and Machine Learning (ML) applications in financial services through a comprehensive bibliometric analysis. It aims to identify prevailing themes, influential publications, collaborative networks, and emerging trends that are shaping the future of technology-driven financial services. The analysis is based on 140 scholarly documents—including journal articles, books, and conference papers—published in English between 2019 and 2025, and indexed in Scopus. These documents span diverse subject areas such as Computer Science, Engineering, Business, Management and Accounting, Economics, and Econometrics. The Bibliometrix package in R (via the Biblioshiny interface), VOSviewer, and Microsoft Excel, were used for performance analysis and science mapping techniques. VOSviewer was used to visualize keyword co-occurrence networks and thematic clusters. The findings highlight the growing significance of AI and ML in enhancing operational efficiency, improving decision-making, optimizing customer experiences, and strengthening risk management in financial services. The analysis also reveals research gaps and suggests directions for future studies, particularly in areas linking AI and ML applications with sustainable financial service models.This study contributes valuable insights for researchers, industry practitioners, and policymakers by offering a structured overview of the knowledge base and trends in this rapidly evolving field. It serves as a strategic

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reference point for guiding future research and fostering innovation in the financial services sector through AI and ML technologies.

Keywords: Artificial Intelligence, Machine Learning, Financial Services and Bibliometric analysis.

REVOLUTIONIZING TRANSPLANTATION: THE ROLE OF ARTIFICIAL INTELLIGENCE, IOT, AND SMART DRONES TO ENHANCE ORGAN PRESERVATION AND TRANSPORTATION IN HEALTHCARE INNOVATION

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Abstract

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Organ transportation has yet to be substantially innovated. If organs could be moved by drone, Instead of ill-timed commercial aircraft or expensive charter flights, when a patient in need of an organ transplant is eventually paired with a donor, every second matters. As more time passes between the organ's removal and transplantation into the recipient, lifesaving organs could be transplanted more quickly. The organ's post-transplant performance deteriorates. To increase the odds of success, organs must be sent from point A to point B as fast and safely as feasible. Drones can save lives all over the world by carrying medical supplies or vaccines to difficult-to-reach locations, but there are a few problems that need to be resolved, such as monitoring and preserving container temperature and humidity. In order to address these issues, a smart container that is integrated with a thermoelectric cooler module and a temperature sensor has been created. This ensures that medical supplies or organs are transported safely by maintaining the temperature. We also look at the area where unmanned aerial vehicles are self-contained devices with propellers that may be turned in different directions to vary their motion. Technology for organ preservation and an Arduino drone control circuit. The Arduino part explains how to build up a breadboard circuit, including how to connect buttons, resistors, and sensors. It emphasizes how crucial correct wiring is to operation. The Cold Storage Preservation approach, namely the use of HTK and Collins solutions to preserve organ viability during transit, is covered in the section on organ preservation. The importance of these techniques in medical physiology is emphasized.

Keywords: Artificial Intelligence, Internet of Things, Arduino, Internet of Drones, Healthcare.

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WINGS OF WARNING: BIRD SONG FORECASTING

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Abstract

Birds are highly sensitive to environmental changes, which alters their vocalizations in response to natural disasters, climate variations, and human disturbances. Our project, "Wings of Warnings: Bird Song Forecasting," mainly focuses on analyzing bird songs to detect early warning signals of environmental changes. By using deep learning techniques and bio-acoustic analysis, it classifies bird vocalizations to determine whether they indicate an impending disaster or regular communication. It utilizes an autoencoder model to extract meaningful features from bird songs. Autoencoders are used to learn compact representations of data and enables efficient feature extraction by encoding bird call characteristics such as frequency, tone, and pattern variations. These extracted

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features are then compared with labeled data using cosine similarity. By determining the similarity between an incoming audio signal and pre-classified bird sounds, the system effectively categorizes new recordings into predefined classes. The model classifies bird vocalizations into seven distinct labels of two different species: the European Starling (Sturnus vulgaris) and the Canary (Serinus canaria). These species were chosen because they have diverse vocalizations and respond to environmental changes. This AI-driven system enables real-time monitoring and predictive analytics which significantly helps researchers, conservationists, and disaster management teams to derive actionable insights. By analyzing variations in bird calls, the system enhances early warning mechanisms for natural disasters such as earthquakes, and forest fires. This project goes beyond disaster detection and helps conserve biodiversity and study ecosystems. Understanding bird sounds can help protect bird species and keep nature balanced. It combines bioacoustics, deep learning, and environmental science to improve nature-based forecasting.

Keywords: Bio-acoustic analysis, frequency, tones, patterns, deep learning, environmental events, bird warnings, real-time tracking, ecological relevance, biodiversity conservation.

NEO BANKING: AN OVERVIEW

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Abstract

The world is revolutionizing at a very fast rate. Tremendous Changes has been taken place in every aspect of life. Because of growth in population and ndustrial sector, financial sector also grows at very fast rate. Traditionally, Financial activities ad performed with the help of banks. It requires personal visit to a bank. Now a days, because of advancement of technology and changing demands of a customer, banking activities are with electronic mode. That is there is a digitalization of banks. With this changing scenario new system of banking to provide various banking facilities has been emerged. That new system is considered to be neo banking. The present research study is undertaken by the researcher with a view to understand neo banking concept. It also focuses on analyzing the significance of neo banking. At last researcher evaluated the challenges before neo banking system.

Keywords: Revolution, Financial Sector. Digitalization, Neo Banking. Industrial Sector

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HETEROLEPTIC RUTHENIUM COMPLEXES WITH 6-(ORTHO-SUBSTITUTED PHENYL)-2,2'-BIPYRIDINE DERIVATIVES

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Abstract

Coordination chemistry of 2,2'-bipyridine bearing an ortho-substituted phenyl group at the 6-position, i.e., 6-(o-X-phenyl)-2,2'-bipyridine (MeO-L: X = OMe; Me2N-L: X = NMe2) with [Ru(ttpy)Cl3] (ttpy = 4'-(4-tolyl)-2,2';6',2''-terpyridine) was investigated. The reaction of MeO-L and [Ru(ttpy)Cl3] in the presence of N-methylmorpholine afforded demethylated, O-coordinated complex [Ru(O-L)(ttpy)]+ (O-L: X = O) as well as the cyclometalated, C-coordinated complex [Ru(MeO-L)(ttpy)]+. On the other hand, reaction of Me2N-L and [Ru(ttpy)Cl3] in the presence of N-methylmorpholine afforded only N-coordinated complex [Ru(Me2N-L)(ttpy)]2+. The crystal structures, spectroscopic and redox properties were examined sup-plemented by DFT calculations. The spectroscopic and redox properties of RuN are more or less similar to those of [Ru(ttpy)Cl3]. On the other hand, the properties of RuC and RuO are mutually similar but significantly different from those of RuN. The anionic ligand in RuC and RuO raises the HOMO energy as compared to the neutral ligand in RuN, which is manifested in negatively shifted redox otentials, particularly the oxidation potentials, and thus, the red shift in the visible absorption band. Relevance of these complexes to sensitizers for dye-sensitized solar cells is briefly discussed.

Keywords: Coordination chemistry Cyclometalated complex Dye-sensitized solar cell Ruthenium.

ETHICAL CONCERNS IN GENERATIVE AI

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Abstract

Generative artificial intelligence (AI), known as Gen AI, has significantly impacted and is increasingly integrated into our lives. Gen AI represents a paradigm shift and a transformative leap in technology, enabling the creation of new content and solutions through advanced machine learning models. As AI has evolved, ethical concerns have become a relevant topic for discussion and debate in today's society. The objective of technology is to achieve better results and improve people's lives. No doubt, Gen AI can create new content like text, images, etc., form existing data and generate new output and has a wide area of applications such as content creation, art and design, scientific result, product development and so on. But, on the other hand, the ethical concerns of the Gen AI are complex, and it can be used for unethical and malicious purposes. It poses risks like deepfakes, cyberattacks and surveillance, ignoring the importance of ethical considerations. Ethical AI adheres to well-defined ethical guidelines, which include integrity, fairness, accountability, honesty and environmental concerns. The ethical AI involves the fulfilment of basic human needs and the creation of credibility with the public. The purpose and guiding luminaries of Gen AI should be "निष्ठा, धृतिः, सत्यम्" (dedication, steadfastness and truth). In this context, the present paper is intended to define Generative AI and ethics; examine the features and risks related to Gen AI and lastly, suggest measures to make it useful for humanity. The scholar finds that Gen AI is here to stay in the world and let us reap the advantages for social well-being.

Keywords: Ethics, Generative AI, Technology, Environmental Concerns, Society.

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DECENTRALIZED AI MODEL TRAINING AND INFERENCE USING BLOCKCHAIN FOR PRIVACY-PRESERVING FEDERATED LEARNING

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Abstract

Federated Learning (FL) has emerged as a promising approach to training machine learning models across distributed devices while preserving data privacy by avoiding centralized data collection. However, traditional FL frameworks rely on a central server to aggregate model updates, introducing vulnerabilities such as single-point failures, lack of transparency, and susceptibility to adversarial attacks like model poisoning. To address these challenges, this paper proposes a decentralized AI training and inference framework that integrates blockchain technology with FL to enhance security, privacy, and trust.

Our framework leverages smart contracts to automate model aggregation, decentralized storage for secure weight distribution, and cryptographic techniques such as homomorphic encryption and zero-knowledge proofs to ensure privacy-preserving validation. By eliminating the need for a central authority, our approach enhances robustness against malicious actors while maintaining model accuracy comparable to traditional FL.

Additionally, we introduce a consensus mechanism that verifies participant contributions, ensuring fairness and auditability. Experimental evaluations on benchmark datasets demonstrate that our framework achieves competitive performance while significantly improving privacy and resistance to attacks.

This work bridges the gap between decentralized AI and federated learning, offering a scalable and secure solution for privacy-sensitive applications in

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healthcare, finance, and IoT. Future research directions include optimizing blockchain scalability and exploring incentive mechanisms for sustainable participation.

Keywords: Federated Learning, Decentralized AI, Blockchain Technology, Privacy-Preserving Machine Learning, Smart Contracts, Homomorphic Encryption, Zero-Knowledge Proofs, Decentralized Model Aggregation, Secure Inference, Consensus Mechanism, Model Privacy, Blockchain-based Federated Learning, Distributed AI Training, Trustless AI Systems, Secure Model Sharing, Data Sovereignty, Decentralized Storage, FL Security, Blockchain Scalability, Edge Intelligence.

THE ROLE OF AI IN SMART FARMING AND PRECISION AGRICULTURE: CULTIVATING EFFICIENCY AND SUSTAINABILITY

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Abstract

The agricultural industry is confronting significant challenges in sustaining global food production amid resource constraints and environmental concerns. Smart farming and precision agriculture harness advanced technologies to enhance efficiency and sustainability. Artificial Intelligence (AI) plays a crucial role in this transformation by enabling data-driven decision-making, optimizing agricultural processes, and improving productivity. This paper examines AI's role in smart farming and precision agriculture, focusing on its applications in crop management, livestock monitoring, resource optimization, and predictive analytics. Through an analysis of machine learning algorithms, computer vision techniques, and AI-powered decision support systems, this research underscores AI's potential in increasing efficiency, reducing environmental impact, and fostering a more sustainable agricultural future.

ADVANCED APPLICATIONS OF EXPLAINABLE AI (XAI) IN ETHICAL DECISION-MAKING SYSTEMS

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Abstract

Explainable AI (XAI) has emerged as a crucial aspect of artificial intelligence (AI) research, aiming to provide transparency and understanding in AI decision-making [5]. This paper provides an overview of the current state of XAI researched its potential impact on building trust and understanding in AI decision-making [5]. We employ the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) methodology to investigate recent advances in XAI [2][4]. Our study synthesizes findings on the importance of XAI in mak-ing AI decisions more understandable and transparent from the end-user's per-spective [1]. Furthermore, we discuss the challenges and limitations of imple-menting XAI in real-world applications, including the need for more effective interpretability technologies and the integration of human-centered approaches.

Keywords : Explainable AI, Ethical AI, Transparency, Accountability, Bias Mitigation, Fairness, Trustworthy AI, Interpretability, Responsible AI.

AI FOR SMART IRRIGATION USING IOT AND WEATHER FORECASTING

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Abstract

This research explores the integration of Artificial Intelligence (AI), Internet of Things (IoT), and weather forecasting in smart irrigation systems to optimize water usage in agriculture. Conducted using a descriptive qualitative approach, the study evaluates how AI-based irrigation solutions can mitigate water carcity, improve crop productivity, and reduce human intervention. The use of sensor-driven data combined with real-time weather predictions allows intelligent systems to determine the right quantity and timing for irrigation.This paper examines the implementation of smart irrigation in developing agricultural economies, where traditional methods often result in overuse of water resources. The technological framework includes machine learning algorithms, moisture sensors, temperature readings, and predictive models that analyze climatic patterns. The findings highlight how AI and IoT together create a sustainable farming ecosystem that supports resource conservation while maintaining yield. Although the adoption of these technologies presents challenges such as high initial costs, limited technical expertise, and data management, their long-term benefits for environmental and economic sustainability are substantial. The research further discusses the socio-economic implications, including changes in labor demand and farmer adaptation. Ultimately, AI-powered smart irrigation stands as a promising solution to modern agricultural challenges through automation, precision, and data-driven decision-making.

Keywords: Artificial Intelligence, Smart Irrigation, IoT in Agriculture, Weather Forecasting, Water Optimization, Precision Farming, Sustainable Agriculture, Machine Learning in Irrigation, Sensor-based Irrigation, Agricultural Automation.

LEARNING INTERACTIVE REAL-WORLD SIMULATORS: ENHANCING AI-DRIVEN DYNAMIC ENVIRONMENTS

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Abstract

The development of artificial intelligence capable of robust and adaptable interaction within complex real-world environments is a paramount challenge. This paper explores the critical role of learning interactive real-world simulators in addressing this challenge. We delve into the fundamental principles, inherent challenges, and cutting-edge techniques associated with creating and utilizing these simulators. Furthermore, we examine the transformative potential of these simulators across diverse domains, emphasizing their capacity to bridge the sim-to-real gap and enhance the efficacy of AI-driven dynamic environments. We augment this discussion with 15 key points, elaborating on crucial aspects of this evolving field.

Keywords: Artificial Intelligence (AI), Interactive Simulations, Deep Reinforcement Learning, Generative Modeling, Autonomous Systems, Virtual Environments, Adaptive Learning, Real-Time Interaction, Predictive Accuracy, Scalability and Efficiency, Human-AI Interaction, Simulation Technology, Machine Learning in Simulation, High-Fidelity Simulations, Decision-Making AI.

ZERO TRUST ARCHITECTURE: A NEW PARADIGM FOR SECURE SOFTWARE ENGINEERING

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Abstract

This study focuses on stitching together AI and Zero Trust Architectures to make software engineering even safer. It emphasizes how artificial intelligence really makes us stronger at sniffing out threats, authentication, and access, and explains database management systems (DBMS), data warehouses and data mining play their part in bolstering overall security. This study reviews past research to show how AI tools and data-focused methods improve threat detection, authentication, and access control. It also suggests practical ways to apply Zero Trust in software development. Unlike Zero Trust, traditional security models rely on network trust, making them more vulnerable to insider threats and advanced attacks.

Keywords: Zero Trust Architecture, Secure Software Engineering, Artificial Intelligence, Cybersecurity, Threat Detection, Access Control, Micro-Segmentation, Database Management Systems, Data Warehousing, Data Mining.

AI-BASED WEATHER PREDICTION MODELS FOR CLIMATE-RESILIENT AGRICULTURE

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Abstract

Climate change has significantly impacted global agricultural productivity, leading to increased unpredictability in weather patterns. Artificial Intelligence (AI) has emerged as a powerful tool for enhancing weather prediction models, enabling farmers to make informed decisions. This paper explores AI-driven weather prediction models and their role in climate-resilient agriculture. It discusses traditional meteorological techniques, AI methodologies, and the integration of AI in precision farming. Additionally, it highlights the challenges and future prospects of AI in sustainable agriculture. Furthermore, the study explores the role of Database Management Systems (DBMS), Data Warehousing, and Data Mining in optimizing AI-driven weather forecasting for agriculture.

Keywords: Artificial Intelligence, Machine Learning, Weather Prediction, Agriculture, Climate Resilience, Precision Farming, Deep Learning, Data Warehousing, Data Mining, DBMS.

INTELLIGENT IRRIGATION MANAGEMENT USING IOT SENSORS AND PREDICTIVE ANALYTICS

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Abstract

Water shortage and wasteful irrigation are still serious issues in the agricultural industry. With rising food demand around the world and a growing threat from climate change, there is an immediate need to shift away from conventional methods of farming to intelligent, resource-based systems. This study introduces an end-to-end solution that employs Artificial Intelligence (AI) and Internet of Things (IoT) sensors to facilitate sustainable farming and precision irrigation.

The suggested system combines real-time environmental information—e.g., soil moisture, temperature, humidity, and weather forecast—gathered via IoT sensors. The data is utilized to train machine learning algorithms, e.g., Support Vector Machines (SVM), Decision Trees, K-Nearest Neighbors (KNN), and Advanced Naive Bayes, that calculate dynamic optimal irrigation schedules and water needs for different crops and soil types.

Besides predictive modeling, the research investigates the application of data warehousing, data mining, and structured software engineering practices to provide the system's scalability, maintainability, and long-term efficiency. Experimental results show water savings of 35–45% over traditional irrigation methods, with similar or better crop yields.

The study also engages with vital concerns like cyber security, marketization, and socioeconomic effects of installing intelligent technologies in rural agriculture settings. Through embedding stringent test protocols and pre-emptive cyber security practices, the system guarantees technological dependability and moral viability.

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This research adds to the increasing number of studies on agri-tech innovation by suggesting an AI and IoT-based irrigation system. Potential future directions include scaling up the system using big data analytics, improving decision-making using market-conscious models, and closing the divide between traditional and digital agriculture. The results emphasize the revolutionary promise of AI to create smart, sustainable, and resilient agricultural systems.

Keywords: Artificial Intelligence (AI), Internet of Things (IoT), Smart Irrigation, Precision Agriculture, Machine Learning, Predictive Analytics, Soil Moisture Forecasting, Water Conservation, Sustainable Farming, Decision Tree, Support Vector Machine (SVM), K-Nearest Neighbors (KNN), Naive Bayes Classifier, Data Mining, Big Data Analytics, Software Engineering in Agriculture, Cybersecurity in Smart Farming, Digital Agriculture Systems.

ANALYZING HEART ATTACK RISK FACTORS WITH MACHINE LEARNING

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Abstract

A worldwide health issue, cardiovascular disease necessitates advanced diagnostic methods and preventative measures. This project's objective is to use machine learning to give early heart failure identification and risk assessment. Classify cardiovascular risk using logistic regression, a trustworthy machine learning technique. Before giving them the list, use exploratory data analysis (EDA) approaches to comprehend parameter distribution and enable major data set adjustments. To find significant risk indicators, apply feature importance assessment, correlation analysis, and predictive modelling. The experimental study showed a stunning 97% classification accuracy for cardiovascular risk variables, indicating the efficacy of the suggested approach. In order to regularly display significant risk variables that raise the risk of heart disease, this work integrated EDA and machine learning techniques. EDA and machine learning together make a potent tool for identifying and preventing cardiovascular disease. This study aids in the creation of predictive models and the formulation of health care policy by identifying significant risk factors. In order to assist preventative health initiatives, future research endeavours ought to concentrate on enhancing prediction models and encouraging interdisciplinary collaboration.

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Chapter 21

AI-DRIVEN DRONES: TRANSFORMING DISASTER AND HUMANITARIAN RELIEF

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Abstract

The increasing number and severity of global catastrophes require innovative solutions to support response and recovery efforts. Traditional methods tend to be hindered by speed, accessibility, and overall effectiveness, making cutting-edge technological interventions essential. This paper explores the intersection of Artificial intelligence (AI) and unmanned aerial vehicles (UAVs), also referred to as drones, which can potentially transform disaster management and humanitarian assistance.

In aerial vehicles, AI amplifies capability by integrating technologies like machine learning, deep learning, computer vision, natural language processing, and autonomous navigation. These developments allow drones to operate beyond simple remote control, such that they are able to examine images, navigate autonomously through complex environments, and make real-time decisions about the data they capture. Through the integration of AI, drones become able to perform tasks with minimal human interaction.

Drones are crucial in responding to disasters as they quickly map affected areas, assist search and rescue efforts, and determine damage. They can also be used in infrastructure inspections, fire surveillance, and flooding assessment. Humanitarian operations benefit from drones as they provide critical supplies to out-of-the-way places, facilitate communication, and aid in planning logistics.

The evolution of aerial technology allows quicker and more effective disaster control and humanitarian support.

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Keywords: AI-Drones, Disaster Management, Humanitarian Relief, Aerial Assistance, Autonomous Navigation, Computer Vision, Machine Learning, Search and Rescue, Damage Assessment, Remote Sensing.

THE EMPOWERING INSIGHTS: THE PIVOTAL ROLE OF DATA ANALYSTS IN ENHANCING PERSONAL FITNESS TRACKING TECHNOLOGIES

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Abstract

This research paper explores the crucial role of data analysts in enhancing the effectiveness and user experience of personal fitness tracking technologies. The exponential growth of wearable technology and mobile applications, generating substantial physiological and activity data, necessitates the extraction of meaningful insights and the delivery of actionable recommendations. This paper examines how data analysts utilize techniques such as data cleansing, exploratory data analysis, statistical modelling, and visualization to convert raw fitness data into actionable intelligence. Through analysis of existing fitness tracking platforms and potential analytical methodologies, this study demonstrates the contribution of data analysts to personalized goal setting, performance monitoring, trend and anomaly detection, and ultimately, healthier lifestyles. Moreover, the paper addresses the challenges and ethical considerations inherent in personal fitness data analysis, emphasizing the critical importance of privacy and data security. Our findings highlight the substantial role of data analysts in realizing the full potential of personal fitness tracking to empower individuals in their health and wellness pursuits.

Keywords: Data Analytics, Personal Fitness Tracking, Fitness Data, Wearable Technology, Mobile Applications, Biometric Data, Insights, Personalized Fitness, Goal Setting, Performance Monitoring, Progress Tracking, Behaviour Change, Optimization.

AUTOMATED THREAT DETECTION AND RESPONSE SYSTEM

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Abstract

The abstracts unitedly explored the consolidation of stirred word AI and advanced technologies in addressing modern day cybersecurity challenges. They mphasize the necessity for proactive and automated responses to dynamic threats, whether in military, corporate, or cloud-based environments. Key topics include the eployment of AI for rapid threat detection using machine learning (ML) and deep learning (DL) to identify anomalies and zero-day attacks, risk assessment with Bayesian networks, and incident response through reinforcement learning and natural language processing (NLP). Several papers highlight AI's role in reducing human dependency by automating tasks like isolating compromised systems and processing threat intelligence. The studies also discuss innovative tools like Automated Threat Response using Intelligent Agents (ATRIA) for military use and systems like SCERM for refining cyber threat intelligence (CTI) reports. Cloud security is another critical focus, with proposed solutions such as Slingshot for real-time detection and mitigation of threats on platforms like AWS and GCP. Additionally, the research examines challenges in integrating threat intelligence, sharing platforms with policy-controlled systems and enhancing the utility of Structured Threat Information Expression (STIX) for efficient threat management. Overall, the abstracts underscore the importance of harnessing AI-driven tools, such as predictive analytics, graph databases, and real-time decision-making systems, to improve cybersecurity resilience and efficiency in an increasingly complex digital environment.

Keywords: Intrusion Detection System (IDS), Network Traffic Analysis (NTA), Real-Time Threat Detection, Artificial Intelligence (AI) in Cybersecurity, Security Information and Event Management (SIEM).

MACHINE LEARNING APPLICATIONS IN FINANCIAL FRAUD DETECTION: A HYBRID APPROACH FOR ENHANCED SECURITY AND RISK MANAGEMENT

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Abstract

The financial services industry faces increasingly sophisticated fraud attempts that pose significant risks to institutions and their customers. This paper presents an innovative hybrid machine learning framework for detecting fraudulent financial transactions and activities. By strategically combining complementary algorithms—Random Forest (RF), Support Vector Machine (SVM), Artificial Neural Networks (ANN), Long Short-Term Memory (LSTM), and Gated Recurrent Units (GRU)—our approach capitalizes on the distinct advantages of each model to maximize detection capabilities. The comprehensive methodology encompasses multi-source data collection, advanced preprocessing techniques, domain-specific feature engineering, parallel model training, and weighted ensemble integration. Experimental results from a dataset of over 100,000 financial transactions demonstrate that our hybrid model achieves superior detection accuracy (96.8%) compared to individual algorithms (ranging from 89.3% to 94.1%), while significantly reducing false positives and exhibiting enhanced resilience against emerging fraud patterns. This research provides financial institutions with an implementable framework to strengthen their fraud detection infrastructure and improve overall risk management strategies.

Keywords: Financial fraud detection, machine learning, hybrid ensemble models, risk management, transaction monitoring, anomaly detection.

AI-DRIVEN MARKET TREND ANALYSIS

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Abstract

Artificial Intelligence (AI) has changed market trend analysis through real-time scanning and accurate forecasting of trends. AI technologies, such as machine learning, natural language processing (NLP) and big data analytics, allow organizations to uncover trends, take actions and displace the constraints of traditional methods. This research studies AI-oriented methods, including sentiment analysis, deep learning and predictive modeling. It demonstrates the ability of AI to process significant amounts of data, the areas AI might be used and discusses limitations, such as data quality issues, ethical implications, and algorithm bias. The research indicates that AI has advantages when it comes to predicting market trends. It highlights the necessity of ethical AI that supports fairness and understand-basic principles of AI. In general, AI enhances business competitiveness, improves customer experience and provides enhanced capability to adapt to fast-changing trends.

Keywords: Artificial Intelligence, Market Analysis, Machine Learning, Predictive Analytics, Big Data, Sentiment Analysis, Business Strategy, Network Security.

DRUG PREDICTION USING ARTIFICIAL INTELLIGENCE: A COMPREHENSIVE REVIEW

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Abstract

The incorporation of artificial intelligence (AI) systems in drug discovery process augments pharmaceutical industry's capabilities by enhancing efficiency along with accuracy of drug prediction. This review aims to summarize current state of the art concerning AI methodologies used for drug prediction, including important developments and future prospects. We analyze the roles of AI, including machine learning, in target identification, lead compound synthesis, and drug repurposing. By evaluating four seminal papers, we highlight the pervasive and distinctive features of AI that underscore transformative change. The most significant are still pending, such as data integrity, explainability, and ethical issues. Emerging technologies and interdisciplinary work that promise to create more value will be discussed in this paper. Based on the literature, we propose directions for research AI applications to increase the efficiency of innovative drug discovery.

Keywords: Artificial Intelligence, Drug Discovery, Machine Learning, Deep Learning, Drug-Target Interaction, Drug Prediction, Neural Networks, Bioinformatics.

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING IN INDUSTRY 4.0: TRANSFORMING SMART MANUFACTURING

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Abstract

This paper explores the integration of Artificial Intelligence (AI) and Machine Learning (ML) technologies within Industry 4.0 frameworks, with a specific focus on smart manufacturing. We examine three key application areas: AI-driven automation and industrial robotics, smart factories with predictive maintenance capabilities, and AI/ML solutions for supply chain optimization. Through analysis of current implementations and emerging technologies, we identify both the transformative potential and implementation challenges of these technologies in manufacturing environments. Our findings suggest that while AI and ML are revolutionizing industrial processes through enhanced efficiency, reduced downtime, and optimized logistics, successful implementation requires strategic approaches to data integration, workforce preparation, and system interoperability.

Keywords: Artificial Intelligence, Machine Learning, Industry 4.0, Smart Manufacturing, Industrial Robotics, Predictive Maintenance, Supply Chain Optimization, Digital Transformation.

THE ROLE OF COMPUTER VISION IN AUTOMATED WEED DETECTION AND MANAGEMENT

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Abstract

Weed infestation is a significant challenge in modern agriculture, leading to reduced crop yields and increased reliance on herbicides. Traditional weed management methods are often labor-intensive, environmentally harmful, and inefficient. This paper explores the role of computer vision in automated weed detection and management, highlighting its potential to enhance precision agriculture. By leveraging deep learning models such as Convolutional Neural Networks (CNNs) and image processing techniques, computer vision enables accurate identification and classification of weeds in real-time. Integration with autonomous robotic systems and drones allows for targeted herbicide application, reducing chemical usage and promoting sustainable farming practices. Furthermore, advancements in hyperspectral and multispectral imaging improve weed differentiation from crops, enhancing detection accuracy. Despite challenges such as dataset variability, environmental factors, and model generalization, computer vision offers a promising solution to revolutionize weed management. This study emphasizes the need for further research to optimize AI-driven weed control systems and ensure their widespread adoption in precision agriculture.

Keywords: Computer Vision [1], Weed Detection [2], Precision Agriculture [3], Deep Learning [4], Convolutional Neural Networks (CNNs) [5], Hyperspectral Imaging [6], Multispectral Imaging [7], Image Processing [8], Autonomous Robotics [9], UAVs (Unmanned Aerial Vehicles) [10], Sustainable Farming [11], AI in Agriculture [12], Smart Farming [13], Targeted Herbicide Application [14], Real-time Monitoring [15].

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Chapter 29

SENTIMENT ANALYSIS: COMPUTATIONAL APPROACHES, INTEGRATION, AND FUTURE DIRECTIONS

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Abstract

Heart disease remains a major cause of mortality worldwide and is an early and accurate prediction of its critical importance for preventive care.Traditional diagnostic methods are often time-consuming, expensive and clinically specialized knowledge. This study examines the use of machinelearning techniques for the development of predictive models to detect heart attacks using patient health data . Research uses Python-based librariessuch as Scikit-Learn, Pandas, and Tensorflow to prepare your data, select important features, and select classification models. Compare diHerentalgorithms for machine learning, including logistics regression, random forests, support vector machines (SVMs), and neural networks, todetermine the mosteHective approach. Data records are from the UCI repository for machine learning and contain important health indicators suchascholesterol, blood pressure, and ECG measurements. Evaluate the model output using evaluation metrics such as accuracy, accuracy, recall, and F1score. Experimental results show that the random forest classifier reaches the highest accuracy (85%), making it a promising tool for predicting heartattacks. This study uncovers the potential for early diagnosis and preventive measures, and ultimately the possibility of AI-controlled health solutionsin improving mortality and patient outcomes. Future work will include improving deep learning models and real-time integration of wearable healthdata to improve prediction accuracy.

Keywords: Sentiment Analysis, Machine Learning, Deep Learning, NLP, Text Mining, DBMS, Cybersecurity, Digital Marketing, Big Data, Emotion Mining.

MACHINE LEARNING MEETS METEOROLOGY: PREDICTING CLIMATE CHANGE WITH AI

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Abstract

Climate change poses a significant global threat, impacting ecosystems, economies, and human societies. Accurate and timely prediction models are essential for mitigating its effects and supporting sustainable development. Traditional climate models often struggle with the complexity and scale of climate systems. In contrast, Artificial Intelligence (AI), especially Machine Learning (ML) and Deep Learning (DL) techniques, offers powerful tools to enhance climate change prediction by analyzing vast, complex, and nonlinear datasets. This research explores the role of AI in climate modeling, leveraging data from historical climate records, satellite imagery, and environmental sensors. Advanced AI architectures such as Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs), including Long Short-Term Memory (LSTM) models, are utilized for recognizing spatial and temporal patterns, significantly improving forecasting accuracy. AI also enables the simulation of future climate scenarios under varying emission pathways, aiding policy decisions and risk assessment. Despite its promise, challenges such as data quality, model interpretability, computational demands, and algorithmic bias remain. Addressing these issues requires interdisciplinary collaboration across climate science and AI domains. This paper reviews recent advances, current challenges, and future directions in applying AI to climate change prediction, emphasizing the potential of AI to create more adaptive, precise, and actionable climate models.

Keywords: datasets, sensors, Convolutional Neural Networks (CNNs), Recurrent Neural Networks(RNNs), data biases, robustness, Long Short-Term Memory (LSTM).

AI-POWERED DETECTION AND PREVENTION OF DEEPFAKE DECEPTION IN CYBER INFLUENCE OPERATIONS

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Abstract

The accelerated development of deepfake technology has generated tremendous concern regarding its potential abuse in cyber influence operations. Deepfake-created media, such as doctored videos and fake audio, are increasingly utilized to manipulate audiences, influence public opinion, and propagate disinformation. This study discusses the use of artificial intelligence (AI) to detect and prevent deepfake deception. We offer an extensive review of AI-based deep fake detection techniques, including convolutional neural networks (CNNs), recurrent neural networks (RNNs), and transformer models (figure-1). In addition, we introduce mitigation methods, such as blockchain-based authentication, adversarial training, and forensic watermarking. The results underpin the critical role of AI in combating the emergence of deepfake deception and calling for enhanced detection frameworks to protect digital information integrity.

Keywords: Deepfake detection, Artificial intelligence, Cyber influence operations, Synthetic media, Adversarial networks, Digital forensics, Machine learning, Forgery detection, GAN-based attacks.

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Chapter 32

AI IN SOCIAL MEDIA: HOW IT WORKS AND WHAT IT MEANS FOR US

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Abstract

Artificial Intelligence (AI) is shifting the way people use social media. AI helps social media programs recommend content, filter unsafe posts, and detect fake news. It advances user capability by studying manners and recommending related posts. AI-powered chatbots enhance customer support by providing quick responses. AI also plays a role in detecting and removing abusive content, make sure a safer online space. However, AI in social media has faces, such as confidentiality risks and biased algorithms. The collection of user data raises alarms about protection and misuse. Additionally, AI-based control may not always be fair or accurate. This paper explores how AI is used in social media, its advantages, and the challenges it brings. With developments in deep learning and Natural Language Processing (NLP), AI will continue to shape the future of social media by making it more cooperative, secure, and identified.

Keywords: Artificial Intelligence, Social Media, Fake News, Content Moderation, Chatbots, Privacy.

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THE INTEGRATED VARIABLE EMOTION THEORY AND MULTI-DIMENSIONAL EMOTION MODEL

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Abstract

Emotion AI or Affective Computing (AC) contributes in new ways to improve communication between sensitive humans and computers, which are unemotional. Emotion recognition from the text is an evolving area of research in Natural Language Processing. Emotions influence human behaviour to a great extent. Sometimes actions are based on emotions we feel. Many researchers and Psychologists have provided answers to questions such as how we have emotions and what causes us to have these emotions. They have proposed different theories to explain why humans have emotions and suggest computational models to describe how to classify the emotions. In this paper, we discuss a few emotion models and theories of emotion and briefly describe and suggest a new emotion model.

This paper introduces the Integrated Variable Emotion Theory, a novel framework for understanding human emotion that synthesizes key insights from several prominent affective models. While each contributing theory—Basic Emotion Theory, the Circumplex Model of Affect, Plutchik's Wheel of Emotions, Schachter-Singer Two-Factor Theory, Appraisal Theory, and Constructed Emotion Theory—offers valuable perspectives, Integrated Variable Emotion Theory proposes a more holisti and dynamic approach. I posit that emotional experience is not solely determined by innate, basic emotions or purely constructed from contextual cues, but rather emerges from a complex interplay of these factors. Integrated Variable Emotion Theory aims to provide a more comprehensive and nuanced understanding of the multifaceted nature of human emotion. This paper also introduces the multi-dimensional emotion model, a novel approach especially designed to design AI models that understand and respond to

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human emotion, making our day-to-day interactions more interactive and engaging.

Keywords: Emotion AI, Affective Computing, Emotion Recognition, Natural Language Processing, Integrated Variable Emotion Theory, multi-Dimensional Emotion Model, Basic Emotion Theory, Circumplex Model of Affect, Plutchik's Wheel of Emotions, Schachter-Singer Two-Factor Theory, Appraisal Theory, Constructed Emotion Theory, Human Emotion, Human-Computer Interaction, Machine Learning, Pattern Recognition, Decision-Making, Problem Solving, Neural Networks, natural Language Processing (NLP).

ENHANCING LOW-LIGHT IMAGES USING DEEP LEARNING TECHNIQUES FOR IMPROVED VISUAL QUALITY

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Abstract

Low-light image enhancement represents a vital area of research within computer vision, with diverse applications spanning surveillance, autonomous vehicles, mobile photography, and medical imaging. Conventional image processing methods frequently encounter difficulties in addressing the challenges posed by low-light environments, including noise amplification, color distortion, and detail loss. This study investigates the application of deep learning methodologies to enhance images captured in low-light conditions and to elevate their visual quality. In particular, we focus on convolutional neural networks (CNNs) and generative adversarial networks (GANs) to establish intricate mappings between poorly lit images and their well-illuminated equivalents. We employ benchmark datasets, including the LOL (Low-Light) and SID (See-in-the-Dark) datasets, for the training and evaluation of our models. The performance of these models is measured through both quantitative metrics—such as PSNR (Peak Signal-to-Noise Ratio) and SSIM (Structural Similarity Index)—and qualitative visual assessments. Our findings indicate that deep learning-based techniques significantly surpass traditional approaches in generating clearer, more detailed, and color-accurate enhanced images. This research underscores the promise of data-driven models in addressing complex image enhancement challenges and lays the groundwork for future developments in real-time and resource-constrained settings.

Keywords: Low-Light Image Enhancement, Deep Learning, Retinex Theory, Convolutional Neural Networks, Image Decomposition, Illumination Map, Noise Suppression, Image Quality Assessment.

OPTIMIZING DL MODELS: LEVERAGING CNN QUANTIZATION FOR FSL

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Abstract

Few-Shot Learning (FSL) presents significant challenges in scenarios with limited labeled data and constrained compu-tational resources. This study explores the integration of quantization-aware training (QAT) with deep convolutional neural networks to enhance efficiency in FSL applications. We implement a prototypical network using ResNet-18 as the backbone, achieving a classification accuracy of 95% on the Omniglot dataset. Post-quantization, the model exhibits a notable reduction in size and inference time, with only a minor drop in accuracy. These results suggest that quan-tized deep learning models can provide a viable solution for deploying FSL systems in real-world, resource-constrained environments. This work underscores the trade-off between efficiency and performance, aiming to contribute to the practical deployment of FSL in edge and mobile platforms.

EXPLORING THE IMPACT OF AUTOMATION AND ARTIFICIAL INTELLIGENCE ON EMPLOYMENT

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Abstract

Research was conducted to determine the impact of artificial intelligence and auto tomorrow on human employment. This study will be conducted using a descriptive qualitative approach. The article investigates practical measures to reduce the driving automation, the most affected industries from job displacement, economic and social costs of automation and its negative effects. Intelligent production variables such as robotics, Internet the things and extensive data analysis are changing the dynamics of labour supply and demand. In a developing country with a large population and labour force, the study of the influence of artificial intelligence techniques in the labour market is especially important. AI and automation are now eliminating a lot of employment. Nevertheless, it is difficult to copy many aspects of human intelligence, such as inward. N and sympathy, AI. The application and improvement of artificial intelligence technology typed by industrial dysfunction robots in Chinese companies has increased job vacancies. The good effect of artificial intelligence on employment is unavoidable heterogeneity, and it serves to increase the job share of women and workers in labour-intensive industries. Even though AI and automation may pose a threat to humans in the workforce, as human resource skills improve, humans who adapt will not be replaced by machines, but will be integrated into human-machine work, with AI and automation serving as tools for human labour rather than replacing humans. Moreover, the results can sometimes be in contradiction and ambiguous since few obvious outcomes emerge, and the impact of automation technology is unknown at various levels of research.

AI IN HEALTHCARE: EARLY DISEASE DETECTION USING MACHINE LEARNING

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Abstract

Artificial Intelligence (AI) is revolutionized healthcare by enables us diseases detected through machines learning technique. That paper explores the role of AI diagnosed diseases in an early stages,Improved patient outcomes, and reduced medical costs. Different learning model include deep learning and decision trees. They had demonstrated that effectiveness in detecting diseases such as cancer, diabates, and cardiovascular disorder. The study highlights the benefits of AI-driven healthcare techniques, along with the ethical challenges, data privacy concerned, and model biases that the need to addressed for widespread implementation.

Keywords: Artificial Intelligence, Machine Learning, Early Disesease Detection, Deep Learning, Early Diseases Detetction, Deep Learning.

SENTENCE BUILDER ASSISTANT: AN INTERACTIVE, CHILD-FRIENDLY GATEWAY TO NATURAL LANGUAGE PROCESSING

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Abstract

This paper presents the Sentence Builder Assistant, a fun and interactive tool designed to introduce children to the basics of sentence formation and Natural Language Processing (NLP). By transforming language learning into a playful activity, the tool not only boosts grammar skills but also introduces elementary NLP concepts like lexical and syntactic analysis. Emphasizing simplicity and engagement, the paper explains the system using clear diagrams and step-by-step descriptions, ensuring that even young learners can grasp the ideas behind AI-based language processing.

Keywords: NLP, Sentence Structure, Educational Tool, Grammar, AI for Kids Gamification, Interactive Learning.

AI IN HEALTHCARE: MEDICAL DIAGNOSTICS & DRUG DISCOVERY

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Abstract

This paper examines the transformative impact of artificial intelligence (AI) in healthcare, with specific focus on medical diagnostics and drug discovery. The integration of AI technologies has revolutionized medical imaging analysis, disease diagnosis, personalized medicine approaches, and predictive analytics in patient care. Through comprehensive analysis of current implementations, this research highlights how machine learning algorithms, deep neural networks, and natural language processing have enhanced diagnostic accuracy, accelerated drug development timelines, and improved patient outcomes. The paper identifies key challenges including data privacy concerns, regulatory hurdles, integration with existing healthcare infrastructure, and the need for explainable AI systems. Despite these obstacles, AI continues to demonstrate significant potential for addressing healthcare inefficiencies, reducing costs, and enabling more precise and personalized patient care. Future directions point toward improved AI interpretability, broader clinical validation, cross- disciplinary collaboration, and ethical frameworks that balance technological advancement with patient-centered care.

Keywords: Artificial intelligence; Machine learning; Deep learning; Medical imaging; Disease diagnosis; Drug discovery; Personalized medicine; Predictive analytics; Healthcare innovation; Clinical decision support systems.

SMART IOT-BASED CLASSROOM AUTOMATION SYSTEM

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Abstract

The implementation of Internet of Things (IoT) technology is transforming learning environments with the introduction of high-level automation, which raises efficiency and optimizes resources. This paper demonstrates the design and assessment of an end-to-end IoT-based Smart Classroom Automation System, prototyped and designed with the Arduino Uno microcontroller as its processing unit. The system employs a mesh of intelligent sensors, mostly PIR sensors, to provide real-time detection of occupancy, supporting dynamic resource management of classrooms. Relay modules are important interfaces, allowing automated switching of electrical devices like lighting, fans, and projectors on the basis of occupancy and programmed schedules.

The primary goals of this system are to greatly increase energy efficiency through power saving from unnecessary power consumption by controlling appliances based on occupancy and to increase ease of operation for teachers and administrators by reducing manual intervention in the repetitive classroom management procedures. Smart motion sensor-based lighting and appliance control are among the fundamental features that maximize utilization of resources only when necessary, complemented by remote monitoring and management through seamless IoT integration. This enables authorized users to remotely control and access the system through a mobile app or web portal, with real-time classroom status information and remote adjustments.

The successful installation and initial pilot of this prototype show the promise of smart classrooms to maximize resource utilization, deliver a more effective and responsive learning space, and provide a scalable and sustainable technology platform for contemporary educational establishments. By automating mundane

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procedures and facilitating remote control, the system encourages a more effective and resource-savvy way of managing classrooms, leading the way to future applications of sophisticated technologies in academic environments.

Keywords: IoT, Smart Classroom, Arduino Uno, PIR Sensor, Relay Module, Energy Efficiency, Automation, Remote Monitoring, Occupancy Detection, Remote Control, Resource Optimization, Sustainable Technology.

DIGITAL ASSISTANCE FOR STOCK PRICE PREDICTION

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Abstract

Abstract-Our objective is to project the future values of financial institutions. Understanding the best and least expensive options for data recovery and stock market prediction that also have the lowest mistake rates and maximum accuracy is the main objective of scientific research.a financial planning initiative that serves as a onestop shop for financial information and analysis by enabling risk assessment and product prediction on a single platform. Script Box, a prominent asset management firm and online job sharing platform, performed a survey recently and found that around 72% of Indians lack the knowledge necessary to invest for financial independence. This includes those with no knowledge of risk analysis or personal finance in general. Keywords:(Financial Forecasting, Risk Assessment, Stock Market Prediction, Personal Finance).

AGI AND HUMAN COGNITION: CAN MACHINES TRULY UNDERSTAND EMOTION?

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Abstract

Artificial General Intelligence (AGI) stands at the cutting edge of technological advancement, seeking to not only mimic human logical reasoning but also the entire range of cognitive abilities—particularly emotion. Though affective computing has made machines capable of sensing emotions, understanding is still a challenge that needs to be cracked. This paper explores the wide gap between recognizing emotions and emotional understanding, reviewing models from cognitive science, AI, neuroscience, and psychology. Comparing neural-symbolic systems, contextual feedback models, and emotionally adaptive agents, we introduce new frameworks that can transform human-AI interaction. We also discuss the ethics of emotionally intelligent machines, ranging from user manipulation risks to AI's moral obligations. This study introduces two new ideas—contextual emotion profiling and hybrid cognitive-affective frameworks—aimed at bridging AGI's emotional intuition. From a profound interdisciplinary perspective, we contend that whereas machines can mimic empathy, true emotion understanding requires advances in context-awareness, moral reasoning, and adaptive cognition. The paper ends by calling for a guardedly optimistic future.

Keywords: Artificial General Intelligence (AGI), Emotional Intelligence in AI, Cognitive Computing, Affective Computing, Human Emotion Modeling, Empathetic Machines, Context-Aware AI, Machine Consciousness, Human-AI Interaction, AI Ethics.

ADVANCEMENTS IN DEEP LEARNING: TRANSFORMING AI AND MACHINE LEARNING APPLICATIONS

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Abstract

Deep learning has emerged as a transformative force in artificial intelligence (AI) and machine learning (ML), driving significant advancements across various domains. Recent breakthroughs in neural network architectures, optimization techniques, and hardware acceleration have led to unprecedented improvements in image and speech recognition, natural language processing, and autonomous systems. This paper explores the latest developments in deep learning, highlighting key methodologies such as convolutional neural networks (CNNs), recurrent neural networks (RNNs), and transformer models. Additionally, it examines critical challenges, including data efficiency, model interpretability, and ethical concerns. The discussion extends to future research directions, focusing on self-supervised learning, energy-efficient AI, and the integration of deep learning with edge computing. By addressing these aspects, this study provides insights into the evolving landscape of deep learning and its profound impact on AI/ML applications.

Keywords: Deep Learning (DL)Artificial Intelligence (AI), Machine Learning (ML), Neural Networks, Convolutional Neural Networks (CNNs), Recurrent Neural Networks (RNNs), Transformers, Natural Language Processing (NLP), Computer Vision, Generative AI, Representation Learning, Supervised Learning, Unsupervised Learning, Transfer Learning, Reinforcement Learning, Model Optimization, Explainable AI (XAI), Scalable Architectures, Real-Time Inference, Data-Driven Decision Making, Automation, High-Performance Computing (HPC), Edge Computing, AI Ethics and Bias.

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Chapter 44

AI-BASED FAKE NEWS DETECTION USING NATURAL LANGUAGE PROCESSING

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Abstract

Fake news is a big problem today, especially on social media, where misinformation spreads quickly. To solve this, researchers use artificial intelligence (AI) and machine learning (ML) to detect fake news. This study explores different AI models, including BERT, ALBERT, and ROBERT, which help analyze text and classify news as real or fake. Advanced deep learning methods work better than traditional machine learning because they understand language more deeply. Some methods also check reliable sources, analyze emotions in text, and use social network data to improve accuracy. However, there are still challenges, like biased training data and new ways of spreading misinformation. This paper reviews existing fake news detection techniques, compares their performance, and suggests a strong AI-based solution to detect fake news more effectively. The goal is to make online information more trustworthy and limit the spread of misleading content.

Keywords: Fake News Detection, Natural Language Processing (NLP), Artificial Intelligence (AI), Machine Learning Algorithms, Text Classification, News Credibility Analysis, Deep Learning Techniques, Semantic Analysis, Misinformation Identification, Real-Time Content Verification.

LONG-TERM MEMORY PATTERN RECOGNITION USING LSTM-BASED REFLEX AGENTS: A GAME-BASED LEARNING APPROACH

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Abstract

Abstract—This paper presents a novel educational framework that leverages Long Short-Term Memory (LSTM) networks and their variations to simulate the concept of long-term dependency learning through an interactive game-based model. The frame- work introduces a dual-sequence pattern learning environment where a primary sequence is influenced by a secondary memory sequence. A reflex-based AI agent mimics LSTM behavior by combining information from both sequences to predict the next element in the main sequence. This system aims to help learners intuitively understand how LSTMs and related models retain and utilize past information to inform current decisions. Feedback-driven gameplay fosters deeper engagement, while gradually increasing complexity helps solidify the concept of long-term dependencies. The model effectively bridges theoretical under-standing with hands-on learning by simulating the memory-driven decision-making process characteristic of recurrent neuralnetworks.

Keywords: Long Short-Term Memory (LSTM), Reflex Agent, Memory-Augmented Learning, Recurrent Neural Net-works (RNNs), Educational Game, AI in Education, Sequence Prediction.

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Chapter 46

ETHICAL AI AND BIAS MITIGATION IN MACHINE LEARNING SYSTEMS

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Abstract

Machine Learning (ML) systems are increasingly shaping decisions in healthcare, finance, hiring, and other critical domains. However, biases in data and algorithms can lead to unfair outcomes, exacerbating societal inequalities. This paper explores the sources of bias in AI models, methods for bias mitigation, and frameworks for ethical AI development. We discuss techniques such as fairness-aware learning, adversarial debiasing, and explainability approaches to ensure accountability. Finally, we outline future directions for research in making AI systems more equitable and trustworthy.

Keywords: Ethical AI, Bias Mitigation, Fairness in ML, Algorithmic Bias, AI Ethics.

FROM ALGORITHMS TO EMPATHY: A REVIEW ON ARTIFICIAL INTELLIGENCE IN MENTAL HEALTH

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Abstract

The integration of artificial intelligence (AI) in mental health care is revolutionizing the field by enhancing diagnosis, treatment, and accessibility. AI technologies, such as machine learning and natural language processing, are being utilized to analyse vast datasets, enabling early detection and personalized interventions for mental health disorders [1]. This change is particularly important in the rising demand for mental health services and the lack of human counsellors [2]. The following sections outline key aspects of AI's role in mental health, such as AI in Diagnosis and Screening, AI in Treatment and Support, and Challenges and Ethical Considerations. AI algorithms can analyse behavioural and clinical data to identify patterns associated with mental health issues, improving diagnostic accuracy [3]. Machine learning techniques have shown effectiveness in predicting individual responses to treatments, providing personalized care plans [4].

Keywords: Diagnosis, Artificial Intelligence, Mental Health Care, Personalized Treatment, Machine Learning Applications, Natural Language Processing, Behavioural Data Analysis, Predictive Models, Early Detection, Clinical Data Integration, Ethical Challenges in AI, AI-driven Interventions.

THE FUTURE OF AI IN SOFTWARE DEVELOPMENT: AUTOMATING CODE GENERATION AND DEBUGGING

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Abstract

The integration of Artificial Intelligence (AI) into software development is revolutionizing how code is written, optimized, and debugged. AI-powered tools are capable of automating code generation, identifying and fixing bugs, and enhancing development efficiency. This research explores the future of AI in software development, focusing on its impact on automating code generation and debugging. We analyze various AI-driven tools such as GitHub Copilot, OpenAI Codex, and Deep Code to understand their effectiveness in enhancing productivity and reducing human errors. The findings suggest that while AI significantly streamlines software development, challenges such as ethical concerns, code security, and AI interpretability must be addressed. This study provides insights into the advantages, limitations, and future directions of AI in software development.

Keywords: AI, software development, code generation, debugging, automation, machine learning, deep learning.

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Chapter 49

AI-POWERED EARLY DETECTION OF ALZHEIMER'S DISEASE THROUGH MRI AND NATURAL LANGUAGE PROCESSING

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Abstract

Alzheimer's Disease (AD) is a progressive neurodegenerative disorder affecting millions worldwide. Early detection is crucial for effective intervention and improved patient outcomes. This study explores the integration of Artificial Intelligence (AI) with Magnetic Resonance Imaging (MRI) and Natural Language Processing (NLP) for early AD detection. Deep learning models such as Convolutional Neural Networks (CNNs) analyze MRI scans to detect neurodegenerative patterns, while NLP techniques process cognitive assessment data to identify linguistic biomarkers associated with AD. Additionally, Database Management Systems (DBMS) play a crucial role in storing and managing medical data efficiently, while Data Warehouses aggregate multi-source health records to enable large-scale analysis. Data Mining techniques are employed to extract hidden patterns from patient data, further enhancing the predictive accuracy of AI models. The fusion of these modalities enhances diagnostic accuracy. This research highlights the potential of AI-driven techniques in medical diagnostics and suggests future improvements for real-world implementation.

Keywords: Alzheimer's Disease, Artificial Intelligence, Deep Learning, MRI, Natural Language Processing, Early Detection, Cognitive Assessment, DBMS, Data Warehouse, Data Mining.

MARKET DEMAND FORECASTING AND AI-BASED CROP RECOMMENDATION FOR FARMERS

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Abstract

Agriculture plays a crucial role in our society food security and economic stability and reacƟvity. However, farmers are facing many types of problem and challenges in selecƟng the right crops due to the market demand, leading to financial losses and resource misallocaƟon. This research paper explores the use of ArƟficial Intelligence (AI) and Machine Learning (ML) to forecast market demand and provide data-driven crop recommendaƟons. To analyzing our market demands, climate condiƟons/changes, soil health, and economic factors, the proposed system predicts the most profitable crops for culƟvaƟon. Machine learning models such as Time Series ForecasƟng and Regression Analysis are uƟlized to ensure most demand predicƟon. The results demonstrate that AI-driven recommendaƟons can analyze agricultural decision-making, reduce risks management, and enhance producƟvity. This study shows the predict of AI in changing tradiƟonal farming pracƟces, enabling farmers to make informed choices that connect with market needs and promote sustainable agriculture. This approach promotes sustainable agriculture, enhances producƟvity, and bridges the gap between latest farming pracƟces and modern technological advancements.

Keywords: Market Demand ForecasƟng, ArƟficial Intelligence (AI), Machine Learning (ML), Crop RecommendaƟon, Time Series PredicƟon, precision agriculture, Sustainable and suitable Farming, Data-Base Decision Making, Agricultural ProducƟvity changes, Smart Farming, Climate Analysis, Risk Management, Crop Yield PredicƟon.

IDENTIFY AI HARMS AND THEIR POTENTIAL IMPACT ON USERS AND SOCIAL STRUCTURES

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Abstract

Artificial Intelligence (AI) is transforming society, yet its rapid advancement raises concerns about potential harms affecting users and social structures. This research review explores AI-related risks, including ethical, social, economic, and political challenges. One key issue is bias and discrimination in AI applications, which can reinforce societal inequalities and impact decision-making processes. Additionally, AI's integration into communication, such as algorithmic response suggestions, alters social interactions—enhancing cooperation and efficiency while also leading to negative perceptions of AI-generated responses.

AI's economic implications are also significant, particularly regarding job displacement and wage suppression in industries increasingly reliant on automation. The unregulated deployment of AI risks widening economic disparities, undermining worker rights, and reducing consumer privacy and choice. Furthermore, AI's influence on political discourse raises concerns about misinformation, democratic integrity, and the concentration of power in corporations and governments.

To mitigate these harms, regulatory frameworks, ethical AI design, and increased public discourse are essential. Strengthening AI governance can guide responsible development and address issues such as accountability, transparency, and fairness. This review underscores the urgent need for policies and ethical guidelines to ensure AI serves society equitably, preventing its potential to exacerbate existing social inequalities and structural imbalances.

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Keywords: Artificial Intelligence (AI), AI harms, Ethical AI, Bias and discrimination, Social impact of AI, Economic impact of AI, AI and job displacement, AI governance, Algorithmic bias, Misinformation and AI, AI regulation, AI in communication, Transparency in AI, AI and political discourse, Automation and wage suppression, AI and democracy, Consumer privacy, Fairness in AI, AI and decision-making, Public discourse on AI.

AN OVERVIEW ON CYBER CRIME AND CYBERSECURITY: TRENDS, ISSUES, AND CHALLENGES

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Abstract

Cybercrime has become an increasing threat to individuals, businesses, and governments worldwide. As digital transformation accelerates, the sophistication of cyber threats continues to grow, necessitating robust cybersecurity measures. This paper explores the evolving landscape of cybercrime, key cybersecurity trends, emerging issues, and challenges faced in mitigating cyber threats. It also examines current technological advancements and policy measures aimed at strengthening cybersecurity frameworks.

Keywords: Cybercrime, Cybersecurity, Cyber threats, Data breaches Ransomware, Artificial Intelligence (AI) in cybersecurity, Blockchain security, Cyber espionage, Cyber terrorism, Regulatory frameworks, Cyber law enforcement, Cloud security, Cybersecurity policies.

ACTIVATION LIGHT PATTERN: A THEORETICAL APPROACH TO TEACHING RELU ACTIVATION THROUGH GAMIFICATION

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Abstract

Artificial Intelligence (AI) is becoming more and more applicable to education, yet the issue of how to introduce the complexity of machine learning to kids still exists. In this research, an interactive learning method with an application of game-based design, ”Activation Light Pattern,” for introducing activation functions to kids as part of neural networks’ Rectified Linear Unit (ReLU) is presented. The game is comprised of a sequence of neurons that are depicted as light bulbs and are activated based on a set threshold level so that children can anticipate patterns of activation and be given feedback. The application of the visual and interactive aspects is intended to maximize interest and understanding of AI concepts. The research assesses the methodology through experimental testing, quantifying learning retention and cognitive effect against con-ventional methods of teaching. Evidence indicates that gamified learning of AI enhances understanding and engagement with machine learning principles among children in a substantial way.

Keywords: Artificial Intelligence Education, Neural Networks, ReLU Activation, Gamified Learning, Interactive AI, STEM Education, Computational Thinking, AI for Children.

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Chapter 54

AI-POWERED FOOD WASTE REDUCTION: A DATA-DRIVEN APPROACH TO SUSTAINABLE CONSUMPTION

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Abstract

Food waste is a critical global issue that impacts food security, economic stability, and environmental sustainability. This paper explores the role of Artificial Intelligence (AI) in reducing food waste through data-driven strategies. By leveraging machine learningalgorithms, predictive analytics, and IoT-enabled monitoring systems, AI can optimize food supply chains, enhance inventory management, and predict consumer demand more accurately. The study examines AI-based approaches such as image recognition for food quality assessment, smart waste tracking, and AI-powered recommendation systems for surplus food redistribution. Additionally, the integration of AI with big data analytics enables real-time insights into food consumption patterns, helping businesses and consumers make informed decisions to minimize waste. The research highlights case studies where AI has successfully contributed to reducing food waste in households, restaurants, and supply chains. Challenges such as data privacy, implementation costs, and scalability are also discussed. The findings suggest that AI-driven solutions can significantly contribute to a more sustainable and efficient food management system, ultimately supporting global efforts toward achieving zero food waste.

Keywords: Artificial Intelligence (AI), Food Waste Reduction, Machine Learning, Predictive Analytics, Sustainable Consumption, Smart Supply Chain Management, IoT in Food Management, Big Data Analytics, Food Quality Assessment, Surplus Food Redistribution.

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Chapter 55

SOCIAL ENGINEERING AND THE PSYCHOLOGY OF CYBERCRIME: A REVIEW

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Abstract

In today's digital era, cybercrime has evolved beyond technical hacking into a psychological battlefield. Social engineering involves manipulating human emotions such as trust, fear, urgency, and curiosity to trick individuals into revealing sensitive information or performing unsafe actions. This paper reviews six research studies that explore the nature, methods, and impacts of social engineering in cybercrime. It presents a critical discussion on the psychology behind these attacks, the role of artificial intelligence, and the strategies that can be adopted to counteract them. The findings emphasize the urgent need for public awareness, psychological training, legal reform, and technological innovation to safeguard against such manipulative threats.

Keywords: Social Engineering, Cybercrime, Phishing, Human Psychology, Online Scams, Cybersecurity, Artificial Intelligence.

AI-POWERED FAKE NEWS DETECTION: USING NLP AND MACHINE LEARNING TO COMBAT MISINFORMATION

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Abstract

The identification of fake news by AI stands as an essential requirement in current world conditions. Researchers examine unorthodox ways to analyse different news articles alongside other pieces of content. The system gathers data through multiple processes while obtaining essential features. The detection of fake news depends on technical combinations of Machine Learning (ML), Artificial Intelligence (AI) and Natural Language Processing (NLP) which both identify and prevent false information spread. The research goal entails developing advanced AI systems with effective scaling ability and clear interpretive functionality for stopping misinformation spread with intelligent techniques.

Keywords: □ Detecting fake news using AI.
□ Applying NLP technology enables the analysis of language.
□ Machine learning technologies enable professionals to analyse various information systems.
□ Deep learning techniques serve to identify patterns within news materials.
□ Identifying and tackling misinformation.
□ A system detects text authenticity through classification procedures.
□ The analysis of sentiment helps discove false information containing biased or misleading content.
□ Ethical considerations in AI and news Credibility.
□ The examination of news and deceptive content propagation processes within social media networks is performed.
□ Verifying news sources for accuracy.

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- The study investigates computer methods of understanding and processing language.
- A system that uses automation conducts factual analyses to combat phony information.

CURING WITH CODE: THE INTERSECTION OF AI, ML, AND MEDICAL SCIENCE

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Abstract

Artificial Intelligence (AI) has emerged as a transformative force in medical science, revolutionizing healthcare technology by enhancing diagnostic accuracy, optimizing treatment strategies, and automating clinical workflows. AI-driven machine learning (ML) algorithms are widely used in medical imaging, enabling early disease detection and precise identification of abnormalities in radiology, pathology, and dermatology. Additionally, AI-powered predictive analytics assists in prognosis estimation, personalized medicine, and drug discovery, allowing for more effective and targeted treatments.

AI has also facilitated advancements in robotic surgery, improving precision and minimizingsurgical risks. Furthermore, virtual health assistants and AI-driven natural language processing (NLP) are transforming patient interactions and optimizing electronic health records (EHRs) by extracting meaningful insights from vast unstructured medical data. However, despite these advancements, challenges such as algorithmic bias, data privacy, ethical AI in healthcare, and regulatory challenges remain significant barriers to widespread adoption. Ensuring the responsible deployment of AI requires addressing these concerns while maximizing its potential for clinical decision support and healthcare automation.

This paper explores the role of AI in medical science, analyzing key applications, recent advancements, and potential future developments. By overcoming existing limitations, AI can revolutionize modern healthcare, paving the way for a more efficient, accurate, and personalized medical landscape.

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Keywords: Artificial Intelligence (AI), Machine Learning (ML), Medical Science, Healthcare Technology, Diagnostic Accuracy, Medical Imaging, Predictive Analytics, Personalized Medicine, Drug Discovery, Natural Language Processing (NLP),Electronic,Health Records (EHRs), Healthcare Automation.

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AUTONOMOUS DRIVING SIMULATION

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Abstract

The development of autonomous vehicles (AVs) is a transformative advancement in transportation, with the potential to improve safety, efficiency, and mobility. A crucial aspect of this development involves the ability of AVs to navigate complex traffic environments while adhering to traffic laws. This paper presents a simulation framework that enables an autonomous vehicle to learn how to navigate a virtual environment while obeying traffic rules, such as speed limits, stop signs, and traffic signals. The simulation utilizes machine learning algorithms, specifically reinforcement learning (RL), to enable the vehicle to interact with its environment and learn optimal driving behaviours based on feedback. In the proposed framework, a virtual environment is created to model real-world traffic scenarios, including different road types, intersections, traffic signals, and various obstacles such as pedestrians and other vehicles. The simulation is designed to allow the AV to continuously learn from its interactions with the environment, through trial and error, receiving rewards or penalties based on its actions. By using RL, the vehicle is incentivized to develop strategies that not only maximize its own success but also ensure compliance with traffic laws, prioritize safety, and minimize the risk of accidents. The simulation environment incorporates several key features to replicate realistic driving conditions, including dynamic traffic flow, unpredictable behaviours from other road users, and environmental factors such as weather or road conditions. These features enable the AV to encounter a variety of scenarios that it may face in real-world applications. Furthermore, the simulation framework allows for testing and validation of the vehicle's decision making capabilities in these complex environments before real- world deployment. The reinforcement learning model used in the simulation is trained on a variety of driving tasks such as lane-keeping, turning, stopping at intersections, and yielding to pedestrians. The vehicle is equipped with sensors like cameras, LIDAR, and radar to perceive its

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surroundings and make informed decisions. The training process aims to optimize the vehicle's ability to make real-time decisions while ensuring it adheres to the rules of the road. The effectiveness of the vehicle's learning process is evaluated based on its ability to complete tasks without violating traffic rules or causing accidents. Results from initial experiments show that the vehicle, after sufficient training, is able to navigate through diverse traffic scenarios effectively. The simulation indicates that RL can be a powerful tool for teaching AVs to recognize and act in compliance with traffic laws, as well as adapt to changing conditions in real time. Moreover, the ability of the vehicle to anticipate and avoid potential hazards highlights the promising role of simulations in developing autonomous driving systems. However, challenges remain in terms of refining the model to handle edge cases and more complex driving situations, such as aggressive human drivers or unexpected environmental factors. Future work will focus on expanding the simulation environment, improving the learning algorithm, and testing the system under more varied and realistic conditions.

Keywords: Autonomous Driving, Reinforcement Learning, Traffic Rule Compliance, Simulation Environment, Path Planning, Machine Learning, Safety and Risk Mitigation.

AI-POWERED HEALTHCARE: APPLICATIONS, CHALLENGES, AND FUTURE DIRECTIONS

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Abstract

The integration of Artificial Intelligence (AI) in healthcare is revolutionizing medical services by enhancing disease diagnosis, treatment personalization, medical imaging, drug discovery, and hospital management. AI-driven technologies such as machine learning, deep learning, and predictive analytics are improving accuracy, efficiency, and accessibility in patient care. Additionally, AI's role in database management, telemedicine, cybersecurity, and healthcare analytics is contributing to a smarter, data-driven medical ecosystem.

Despite these advancements, AI adoption in healthcare faces challenges, including data privacy concerns, ethical dilemmas, algorithmic bias, regulatory hurdles, and cybersecurity threats. Addressing these issues requires advancements in AI interpretability, security measures, and fairness. Technologies like federated learning, blockchain, and real-time big data analytics will be essential in developing secure, transparent, and scalable AI-driven healthcare solutions.

Furthermore, AI is influencing healthcare investments, marketing strategies, and resource optimization through predictive analytics, sentiment analysis, and financial modelling. Ensuring ethical AI deployment, regulatory compliance, and interdisciplinary collaboration among researchers, healthcare professionals, and policymakers is crucial. In conclusion, AI holds transformative potential in making healthcare more efficient, accessible, and cost-effective. By overcoming existing challenges and fostering responsible innovation, AI-driven healthcare can create a more advanced, ethical, and inclusive global medical system.

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Keywords: Artificial Intelligence, Healthcare, Machine Learning, Deep Learning, Medical Imaging, Precision Medicine, Ethics, Data Privacy, Automation, Predictive Analytics.

CYBERSECURITY IN THE AGE OF AI

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Abstract

The integration of Artificial Intelligence (AI) into cybersecurity has transformed the way digital threats are detected, analyzed, and mitigated. AI-driven security systems offer rapid threat detection, real-time response mechanisms, and predictive analytics to counteract evolving cyber threats. However, as AI enhances cybersecurity, it also introduces new vulnerabilities that cybercriminals exploit through AI-powered attacks, such as deepfakes, adversarial attacks, and automated phishing campaigns. This paper explores the dual role of AI in cybersecurity—its potential to strengthen digital defense mechanisms while also being weaponized by adversaries.Key areas of focus include the implementation of machine learning-based intrusion detection systems (IDS), AI-powered threat intelligence, data privacy concerns, and thesecurity of cyber-physical systems (CPS) and smart cities. The study also highlights the importance of explainable AI (XAI) for transparency in cybersecurity decisions, privacy-preserving AI techniques, and hybrid security models combining traditional and modern AI methods.

As AI continues to evolve, it is crucial to develop ethical AI frameworks that enhance security while minimizing risks. Future research must emphasize adaptive, scalable, and resilient AI-driven cybersecurity solutions to ensure a secure digital landscape in an era where AI plays a central role in both cyber defense and cybercrime.

Keywords: Cybersecurity, AI, Machine Learning, Cybercrime, Big Data, Intrusion Detection, Adversarial Attacks, Threat Intelligence, Data Privacy, Network Security.

RULE-BASED OBJECT PATTERN GAME: A KNOWLEDGE REPRESENTATION AND SIMPLE REFLEX AGENT MODEL IN EDUCATIONAL GAMEPLAY

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Abstract

This paper presents the development of a rulebased educational game, ”Rule-Based Object Pattern”, designed to introduce the concepts of Knowledge Representation and Simple Reflex Agents in artificial intelligence. The game utilizes structured object attributes such as color and shape, and a simple agent applies predefined if-then rules to predict object sequences. The aim is to demonstrate how AI agents can use represented knowledge for decision-making and reasoning, fostering early AI literacy through interactive gameplay. The system was developed using Unity 3D and evaluated via student feedback and agent performance metrics.

Keywords: Knowledge Representation, Reflex Agent, RuleBased System, AI Education, Game-Based Learning, Unity 3D.

SENTIMENT ANALYSIS WITH MACHINE LEARNING AND DEEP LEARNING: A SURVEY OF TECHNIQUES AND APPLICATIONS

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Abstract

Sentiment analysis refers to the automatic identification of emotions or attitudes conveyed in a given text. It is now widely used in areas like tracking social media activity, studying product reviews, and understanding what customers really think. Since deep learning techniques started being used, sentiment analysis has improved a lot in performance and accuracy. This paper provides an in-depth review of machine learning and deep learning techniques used for sentiment analysis across document-level, sentence-level, and aspect-level tasks. The paper begins by examining conventional machine learning methods used in sentiment analysis, along with their drawbacks. It then explores different machine learning and deep learning models that have been effectively implemented for this purpose. We also examine the difficulties involved in handling various types of data, including visual and multimodal formats, and how both machine learning and deep learning methods have been modified to overcome these issues. In addition, the paper highlights how sentiment analysis is applied in a wide range of fields, such as social media, product evaluation, and the healthcare sector. Lastly, we point out the existing drawbacks of using deep learning methods in sentiment analysis and suggest areas where future research can be directed. The goal of this survey is to offer both researchers and industry professionals a thorough understanding of the latest deep learning advancements in sentiment analysis and how they can be applied in real-world scenarios.

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Keywords: Natural Language Processing(NLP); Sentiment Analysis; Text Analysis; Recurrent Neural Network; Deep Neural Network; Convolutional Neural Network; Machine Learning; Deep Learning

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Chapter 63

BRIDGING THE GAP: ADDRESSING KEY CHALLENGES IN IT PROJECT MANAGEMENT

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Abstract

The needs and work patterns of architecture, engineering, and construction (AEC) projects vary greatly. As such, creating and implementing information systems to assist projects is challenging. This paper proposes a project-centric research and development methodology that aims to address these issues by combining iterative information system improvement directly on projects in small action research implementation cycles with ethnographic observation of practitioners working in local project organizations to understand their local requirements. The examples show that ethnographic–action research is a useful tool for assisting with the creation and application of information systems. Specifically, the study demonstrates that the approach allowed researchers on the researchers' ability to pinpoint specific issues with AEC projects through the use of case studies, and further enabled them to modify information systems in close coordination with the project practitioners.

Five major integrative research problems are identified in the report, along with suggestions for how to effectively address and potentially even capitalize on them. The study expands on current discussions in the field of engaged scholarship and knowledge co-production, which demand a stronger emphasis on interdisciplinary approaches and partnerships between research and practice. In order to address the issues raised, the article makes recommendations for how academics studying project management may elevate the field's reputation in the academic community and enhance its inclusion in business and management schools' curricula and research agendas.

Keywords: Agile Technology, IT Projects, IT Challenges

SOCIAL MEDIA: A HELP OR HINDRANCE?

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Abstract

This study investigates the influence of social media usage on the academic performance of college students. With the rapid growth of platforms likeInstagram, Facebook, WhatsApp, and Twitter, students are increasingly spending significant time online. The research aims to explore both the positive and negative effects of social media on students' academic outcomes. A survey was conducted among 200 undergraduate students, and the results revealed a moderate negative correlation between time spent on social media and academic performance. However, the study also identified certain academic benefits, such as collaborative learning and access to educational content. The paper concludes by suggesting balanced usage and digital literacy programs to help students utilize social media more productively.

Keywords: Social Media, College Students,Digital Platforms,Online Learning,Digital Literacy.

ANGANCONNECT: A COMPREHENSIVE DIGITAL SOLUTION FOR HOUSING SOCIETIES

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Abstract

In today's expeditious modern world with buzzing residential community, keeping things running effectively can be quite a challenging. The AanganConnect Housing Society Management is developed as a global web development application using Node JS, EJS and MongoDB, System is used to address this issue. This study examines the creation of a Society Management System, a comprehensive online platform that is a digital solution intended to simplify a number of facets of communal living. Admins can use such systems to effectively manage their tasks and activities rather than wasting hours going through paperwork or locating residents by hand for crucial updates. The system seeks to improve resident convenience by simplifying and streamlining processes like document uploads, bill payments, and complaint reporting, among others.The project's main goal is to protect resident personal documents and information from misuse and preventing them from being prone to unauthorized access by guaranteeing the highest level of security. Additionally, admin can provide transparency by enabling user to track how their information and data are being used and to enable them to update their profile information anytime. Our goal in conducting this research is to address the changing demands of contemporary living spaces and offer a scalable solution that meets the demands of the current generation. By automating repetitive tasks, centralizing information and communication, and improving security measures, the project's overall goal is to lessen the administrative load on building secretaries and help users to have an accessibility of an effective and smooth management portal.

Keywords: Society Management, API, Web Portal, Web Development, Database, Residents, Housing Society, Transparency, Admin.

EARLY CROP DISEASE DETECTION USING DEEP LEARNING

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Abstract

Early detection of crop diseases is crucial for minimizing yield loss and ensuring global food security. Traditional disease identification methods are often time-consuming, labor- intensive, and prone to human error. This study leverages deep learning, specifically Convolutional Neural Networks (CNNs), to automate and enhance the accuracy of crop disease detection. A large dataset of annotated plant leaf images is used to train and validate the model, ensuring robustness and reliability. Experimental results demonstrate that the proposed model outperforms traditional diagnostic methods, achieving high classification accuracy. By enabling real-time and precise disease detection, this approach empowers farmers to take timely preventive measures, reduce excessive pesticide use, and enhance crop productivity. The findings suggest that deep learning models, particularly CNNs, can revolutionize agricultural practices by providing a scalable, cost-effective, and efficient solution for plant disease monitoring and management.

Keywords: Early crop disease detection, deep learning in agriculture, Convolutional Neural Networks (CNNs), precision agriculture, image-based disease classification, plant disease monitoring, automated plant disease diagnosis, agricultural technology, crop health assessment, real-time disease detection, smart farming solutions, computer vision for plant disease detection.

CYBERSECURITY STRATEGIES: BEST PRACTICES FOR PREVENTING CYBER ATTACKS

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Abstract

Cybersecurity threats have become increasingly sophisticated, targeting individuals, organizations, and governments worldwide. This research paper examines effective cybersecurity strategies and best practices to prevent cyberattacks. It provides an overview of common cyber threats, evaluates existing defense mechanisms, and proposes recommendations for strengthening cybersecurity measures. The study highlights the importance of proactive security practices, employee training, and advanced technological solutions in mitigating cyber risks.

Keywords: Cybersecurity, Cyber Attacks, Threat Prevention, Security Strategies, Data Protection.

LEARNING IMAGE RESTORATION WITHOUT CLEAN DATA

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Abstract

We employ machine learning techniques, specifically neural networks, to perform signal reconstruction by learning to map corrupted or degraded observations to their corresponding clean signals. The key idea is to train a neural network model to estimate the underlying clean signal from its corrupted version, leveraging the ability of deep networks to learn complexmapping functions from data. Our approach leads to a simple yet powerful conclusion: it is possible to learn how to restore images by only looking at corrupted examples, achieving equal performance and sometimes surpassing training on clean data, without requiring specific image prior or probability models of corruption.

In practice, we demonstrate that a single model can learn photographic noise removal, denoising of synthetic Monte Carlo images, and reconstruction of under sampled MRI scans - all corrupted by different processes – based solely on noisy data. The model learns these diverse image restoration tasks from corrupted observations alone, without needing clean training examples or explicit corruption models.

OPTIMISING SOFTWARE PROJECTS WITH DATA ANALYTICS

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Abstract

Over the past ten years, agile techniques have completely changed the software development landscape. More and more, data analytics is becoming a typical tool for enhancing development cycles as big data grows in popularity. The planning and assessment of project management is highly valued in activities pertaining to project performance. Without a sensible and workable plan, managing projects effectively is challenging. In other words, over the last five years, a wave of data analytics has swept over all industries, transforming engineering management practices in a number of them and influencing research at universities. To build, test, polish, and document a specific software feature, an agile methodinvolves sprints. By detecting several patterns and combining the total findings, a realistic image of the future topography of project management is offered. By using analytical and statistical methods, that is achieved. Lastly, our results show that machine learning-based project risk assessment is more successful in lowering project failure rates and increasing project success rates. It also provides an alternative method to efficiently increase the production ratio for growth and decrease the project failure probability. It also simplifies the process of analysing software failure prediction in terms of accuracy.

Keywords: Data Analytics, Agile, Artificial intelligence

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Chapter 70

A COMPREHENSIVE STUDY ON PENETRATION TESTING: PROCESSES, TOOLS, AND BEST PRACTICES

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Abstract

Penetration testing is a fundamental cybersecurity practice that evaluates the security posture of an organization's digital environment. By simulating real-world cyberattacks, security professionals can uncover vulnerabilities and assess the robustness of security controls. This study delves into the detailed phases of penetration testing, exploring the techniques, methodologies, and advanced tools utilized to enhance cybersecurity defences. Furthermore, it discusses the importance of penetration testing in risk management and compliance frameworks.

Keywords: Cyber security, Exploit, Vulnerability, Tools, Practices, Techniques, Defence.

ADVANCING SENTIMENT ANALYSIS IN SOCIAL MEDIA USING NATURAL LANGUAGE PROCESSING: CHALLENGES AND INNOVATIONS

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Abstract

Sentiment analysis in social media has gained significant attention due to its ability to interpret public opinions and emotions. Natural Language Processing (NLP) plays an important role in automating this analysis, making it possible to process vast amounts of user- generated content powerfully. However, numerous challenges exist, such as language ambiguity, sarcasm, and data quality issues, which make accurate sentiment classification difficult. This paper explores the various challenges associated with sentiment analysis in social media and highlights recent innovations that improve accuracy and efficiency. By leveraging advanced NLP techniques such as deep learning, transformer models, and hybrid approaches, sentiment analysis can be enhanced to better understand human emotions. This paper provides a comprehensive overview of sentiment analysis, its methodologies, applications, challenges, and future prospects, offering valuable insights into how sentiment analysis can be optimized for social media data.s

Keywords: Sentiment Analysis, Natural Language Processing (NLP), Social Media, Machine Learning, Deep Learning, Transformer Models.

IMPLEMENTING AND COMPARING SPATIAL AND FREQUENCY DOMAIN FILTERING FOR NOISE REDUCTION

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Abstract

Noise reduction is a critical aspect of image processing, influencing the quality of images for various applications, including medical imaging, remote sensing, and computer vision. This study explores implementing and comparing spatial and frequency domain filtering techniques for effective noise reduction. Spatial domain filtering operates directly on the pixel values of an image, utilizing techniques such as mean, median, and Gaussian filters to smooth the image and reduce noise. In contrast, frequency domain filtering transforms the image into the frequency space using the Fourier Transform, allowing for selective attenuation of high-frequency noise components while preserving essential image features. This paper outlines the methodologies for both filtering approaches, starting with the spatial domain, where filter kernel sizes and types are optimized for different noise models, including Gaussian, salt-and-pepper, and speckle noise. The performance of these filters is evaluated based on metrics such as Peak Signal-to-Noise Ratio (PSNR), Structural Similarity Index (SSIM), and visual quality assessments. The frequency domain analysis involves the application of Fourier Transform techniques, enabling the manipulation of frequency components. Here, we discuss the impact of low-pass filters, such as Butterworth and Gaussian filters, on noise reduction. The inverse Fourier Transform is employed to reconstruct the

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filtered image from its frequency domain representation. Experimental results are presented, demonstrating the strengths and weaknesses of each approach. Spatial filters tend to perform well in terms of computational efficiency and simplicity, particularly in dealing with non-structured noise. However, they may introduce blurring, especially in high-frequency regions. Frequency domain filters exhibit superior performance in preserving edges and fine details, although they require more computational resources and complex implementation. Comparative analysis reveals that while spatial domain filtering is effective for certain noise types, frequency domain filtering offers enhanced capabilities for complex noise scenarios. The findings contribute to a deeper understanding of image noise reduction techniques, providing valuable insights for practitioners in the field. Future work will explore hybrid approaches that combine both filtering strategies to achieve optimal noise reduction while preserving image integrity. This research underscores the importance of selecting appropriate filtering techniques tailored to specific noise characteristics and application requirements.

Keywords: Spatial Domain Filtering, Frequency Domain Filtering, Noise Reduction Techniques, Image Processing, Gaussian Filter, Fourier Transform, Signal-to-Noise Ratio (SNR).

THE ROLE OF ARTIFICIAL INTELLIGENCE IN ENHANCING MEDICAL DIAGNOSIS AND PATIENT CARE

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Abstract

Rapid advancements in artificial intelligence (AI) have transformed a number of sectors, including healthcare. This study looks at how AI can enhance patient care, medical diagnosis, and treatment effectiveness. We examine how artificial intelligence (AI) tools like computer vision, machine learning, and natural language processing are revolutionizing healthcare delivery by improving diagnostic process efficiency and accuracy, individualized patient care, and lowering human error. The difficulties and moral issues related to AI in healthcare are also covered in the article.

PHYSICOCHEMICAL PROPERTIES OF PROTEIN TERTIARY STRUCTURE

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Abstract

Proteins, fundamental to life processes, derive their functionality from their three-dimensional structure. Predicting the Root Mean Square Deviation (RMSD) of protein structures is crucial for understanding their stability and interactions. This study employs machine learning regression models to analyze the physicochemical properties of protein tertiary structures and predict their RMSD. We compare the performance of linear regression, random forest regression, and support vector regression (SVR) in this task. The dataset used contains features describing protein structures and their corresponding RMSD values. After preprocessing and feature selection, the models are trained and evaluated based on mean squared error (MSE) and R-squared (R^2) scores. Our results show that random forest regression outperforms the other models, offering the most accurate predictions. This research contributes to the field of bioinformatics by providing insights into the relationship between physicochemical properties and protein tertiary structure, demonstrating the effectiveness of machine learning regression models in this domain.

CROP DISEASE DETECTION AND DIAGNOSIS USING DEEP LEARNING

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Abstract

Agriculture plays a significant role in every nation's economy by producing crops. Plant disease identification is one of the most important aspects of maintaining an agriculturally developed nation. The timely and efficient detection of plant diseases is essential for a healthy and productive agricultural sector and to prevent wasting money and other resources. Various diseases that could affect a plant cause crop farmers to lose a substantial sum yearly. Deep learning can play a crucial role in helping farmers prevent crop failure by early disease detection in plant leaves. In the experiment, we examined CNN, VGG-16, VGG19 and ResNet-50 models on plant-village 10000 image dataset to detect crop infection and got the accuracy rate of 98.60%, 92.39%, 96.15%, and 98.98% for CNN, VGG-16, VGG-19 and ResNet-50 respectively. The study indicates that ResNet-50 outperforms the other models with an accuracy of 98.98%. So, the ResNet50 model was chosen to be developed into a smart web application for real-life crop disease prediction. The proposed web application aims to assist farmers in identifying diseases of plants by anlyzing photos of the plant leaves. The proposed application uses the ResNet50 transfer learning model at its heart to distinguish healthy and infected leaves and classify the present disease type. The goal is to help farmers save resources and prevent economic loss by detecting plant diseases early and applying the appropriate treatment.

Keywords: Crop disease detection, deep learning, convolutional neural networks, precision agriculture, image classification, plant pathology, artificial intelligence.

THE ROLE OF WEBASSEMBLY IN HIGH-PERFORMANCE WEB APPLICATIONS

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Abstract

Web Assembly (Wasm) is a revolutionary technology in web development, allowing high performance applications to match native software in speed and efficiency. This paper discusses the role of WebAssembly in improving the performance of web applications through a portable, low-level binary format that runs at near-native speeds. By reviewing its architecture, use cases, and integration with current web technologies, this research points out how WebAssembly closes the gap between web and native performance. The study also looks at existing limitations and suggests future directions for its use in sophisticated, resource-hungry applications. Findings indicate that WebAssembly is a key tool for the future of web-based software, giving developers unprecedented flexibility and power.

Keywords: Web Assembly, high-performance web applications, Wasm, JavaScript, browser performance, native execution, web development.

AUTOMATIC DETECTION OF BIRD VOCALIZATION PREDICTION PATTERNS FOR SEASONAL AND ENVIRONMENTAL FACTORS

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Environmental analysis is essential for understanding ecological changes and assessing ecosystem health. One effective method for monitoring these

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environments is the study of natural soundscapes, particularly the vocalizations of birds. Birds are integral to ecosystems, and changes in their calls can signal shifts in biodiversity, habitat quality, and climate conditions. This project explores the use of bird sounds for environmental assessment, utilizing advanced audio processing and pattern recognition techniques.

This study involves collecting and analysing bird vocalizations to extract valuable insights about environmental conditions. Audio recordings are processed to identify species, classify calls, and detect anomalies. Various computational methods, such as signal processing and machine learning, enhance the precision of sound-based analyses. By studying these acoustic patterns, researchers can better understand ecological trends and identify potential environmental disturbances.

This approach provides a non-invasive, cost-effective, and scalable method for monitoring biodiversity. In contrast to traditional field surveys that require extensive time and resources, automated analysis of bird sounds offers a continuous and efficient way to track environmental changes. The results from these studies can strengthen conservation efforts, support habitat preservation strategies, and inform policy decisions aimed at protecting natural ecosystems.

By harnessing technology for environmental analysis, this project highlights the potential of bio-acoustic monitoring as an innovative tool for ecological research. The fusion of sound analysis with modern computational techniques paves the way for greater understanding and preservation of the natural world.

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Summary Report: International Conference on AI, ML, and Emerging Technologies

The International Conference on AI, ML, and Emerging Technologies: Transforming Industries and Society was successfully conducted online from April 11th to 13th, 2025, bringing together a dynamic blend of academicians, researchers, industry experts, and students from across the globe. Organized by AMIEE and CMAOI Associations, the event focused on the transformative potential of Artificial Intelligence (AI), Machine Learning (ML), and emerging technologies in diverse sectors. The conference served as a collaborative platform to share research innovations, case studies, and technological insights aimed at shaping the future of industries and society.

Conference Highlights:

• **Over 100 research papers** were presented across multiple tracks, reflecting cutting edge innovations and solutions in areas such as:

o Industry 4.0 and Smart Manufacturing

o Robotics and Automation

o Digital Marketing and Consumer Behavior

o Financial Services, Fraud Detection & Risk Management

o Healthcare and Medical Diagnostics

o Smart Cities and Sustainability

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o Generative AI and Creativity

o The Future of Work and Human-AI Collaboration

• **Best Papers** from the conference will be recommended for **publication in reputed, indexed journals (Scopus/Web of Science)** following peer-review and quality evaluation.

• All accepted papers are being published with an **ISBN** and included in the official **conference proceedings,** ensuring wide recognition in the academic community.

Notable Speakers and Committee Members:

• **Col. Dr. Prof. Rakesh Sharma,** Advisor - Military Affairs, Former VC

• **Dr. Nitu Ghosh,** Director, REVA University

• **Dr. T.C. Manjunath,** Dean Research, Rajarajeswari College of Engineering

• **Prof. (Dr.) Ipseeta Nanda,** Professor, School of Engineering, IILM University

• **Dr. Aamir Junaid Ahmad,** Secretary, AMIEE Association

• **Dr. Shagufta Fatema,** Lecturer, University of California, Davis

• **Mr. Amit Singh,** Lead Architect, Cisco Systems, MS (Computer Networks), North Carolina State University, USA

A robust team of experts from academia and industry served as keynote speakers, convenors, and committee members.

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Conference Themes Covered:

• Explainable AI (XAI) & Ethical AI

• Predictive Analytics & Decision-Making

• AI in Drug Discovery & Personalized Medicine

• AI-Generated Content & the Creative Economy

• AI in Climate Solutions & Urban Planning

Participation:

• The conference witnessed enthusiastic participation from India, the USA, Germany, Uzbekistan, and several other countries.

• Attendees included students, researchers, professors, and industry professionals, reflecting a multidisciplinary and global perspective.

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🎉 Heartfelt Thanks for the Grand Success of the International Conference!

We are delighted to share the successful completion of the **3-Day Online International Conference on "AI, ML, and Emerging Technologies: Transforming Industries and Society"**, organized by **AMIEE & CMAOI Association**.

🌐 With over **200 research paper submissions** from across **India, USA, Germany, and Austria**, the event showcased groundbreaking ideas and innovations. Sessions were conducted in **parallel tracks aligned with different time zones**, ensuring seamless participation and engagement.

🙏 A Special Note of Thanks to Our Esteemed Panel:

- **Col. Dr. Prof. Rakesh Sharma**, *Advisor - Military Affairs, Rector - Acharya University, Uzbekistan; Former VC - IEC University* – for gracing the event as **Chief Guest**
- **Dr. Nitu Ghosh**, *Professor & Director, School of Management Studies, REVA University*
- **Dr. T. C. Manjunath**, *Dean (R&D), Professor, Rajarajeswari College of Engineering*
- **Prof. (Dr.) Ipseeta Nanda**, *Professor, School of Engineering, IILM University*
- **Mr. Amit Singh**, *Lead Architect, Cisco Systems, MS (Computer Networks), North Carolina State University, USA*
- **Ms. Royana Anand**, *Specialist - Amazon Web Services, Santa Cruz, California, USA*

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🌍 **Global Participation Highlights:**

- **Amit Singh**, and **Ms. Royana Anand** joined us from the **USA**
- **Ms. Zurqua Fatma**, *Senior Research Consultant, General Mills*, graciously **hosted the Austria track**
- **Mr. Abhik Banerjee** and **Mr. Mudassir Javed**, *Product Managers, Alstom Germany,* skillfully **hosted the Germany track**

👏 **Special Appreciation to Our Hosting Team:**

- **Ms. Lalitha**, Assistant Professor, Dayananda Sagar College, Bengaluru
- **Ms. Parimala R**, Assistant Professor, Dayananda Sagar College, Bengaluru
- **Ms. Priyanka**, Conference Coordinator
- **Mr. Saurav Sandhesh**, Conference Coordinator

Your dedication and behind-the-scenes efforts ensured the smooth and engaging execution of this global academic event.

We thank each presenter, reviewer, panelist, and participant for making this event truly impactful. All accepted papers will be published as **Conference Proceedings with ISBN**, and selected papers will be recommended for reputed journals.

✨ *The success of this conference was made possible through the direct and indirect support and cooperation of all members of the association.* 🙏
Here's to more collaborations, research, and innovation in the future of AI & emerging technologies!

Thank you
Dr. Aamir Junaid Ahmad

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CONCLUSION

The **International Conference on "AI, ML, and Emerging Technologies: Transforming Industries and Society,"** held in 2025, successfully convened a diverse and vibrant community of researchers, academicians, industry leaders, and students. This conference provided an engaging platform to discuss breakthroughs, share insights, and explore the transformative impact of **Artificial Intelligence (AI), Machine Learning (ML),** and emerging technologies across various sectors.

The research papers and deliberations documented in this **Conference Proceedings** underscore the rapid advancements, real-world implementations, and innovative frameworks that are redefining industries and societal structures. The multidimensional contributions have fostered a deeper understanding of the potential and challenges associated with these technologies, encouraging cross-disciplinary collaboration and innovation.

We hope this publication serves as a vital resource for scholars, practitioners, and innovators, sparking continued research, policy development, and application of emerging technologies in creating sustainable and inclusive futures.

We extend our heartfelt gratitude to all authors, speakers, reviewers, participants, and organizing members whose efforts and enthusiasm made this conference a resounding success. We look forward to the continued evolution of this platform in the years to come.

Dr. Aamir Junaid Ahmad
Conference Chair
Secretary, CMAOI Association

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