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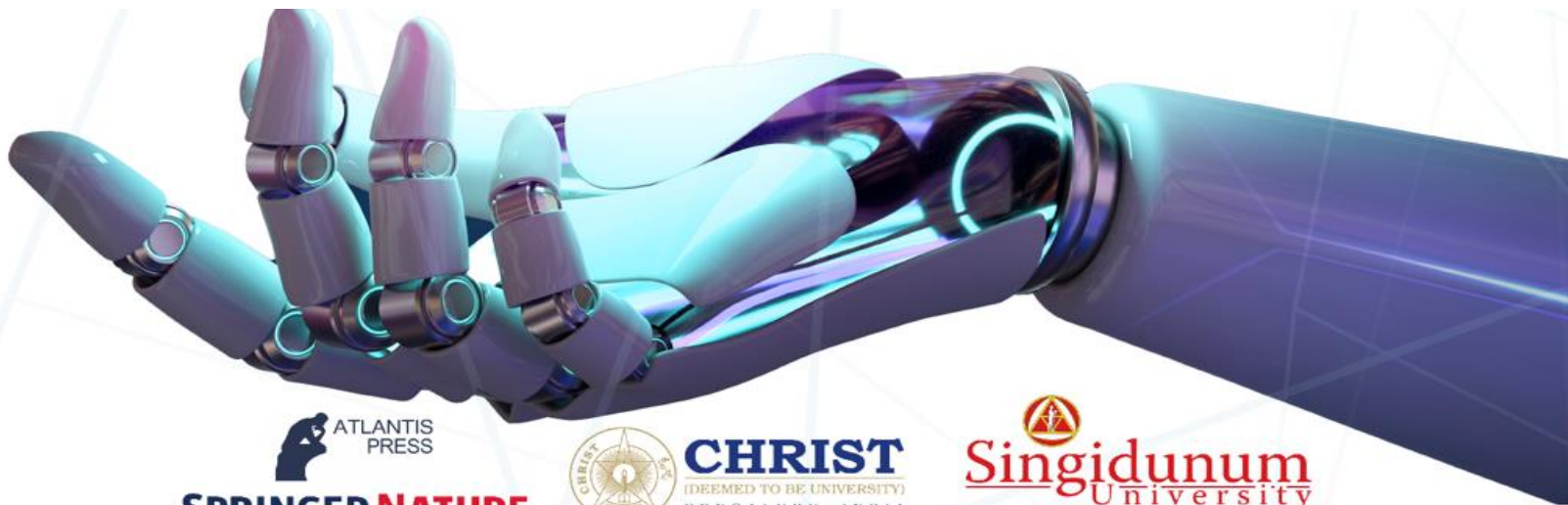


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**PAPER ABSTRACTS**



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# Technological Skills in Higher Education: A Bibliometric Analysis

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**Abstract:** The development of technological skills is a key concern within a nation's educational and social programs. Throughout their academic journey, ranging from basic through secondary education and afterward in higher education, students are allowed to cultivate and enhance a diverse range of abilities, encompassing technology proficiencies. Information technology has changed the way businesses work and the strategies they use. This phenomenon is additionally seen in higher education. Colleges and universities worldwide are spending a lot of money on IT resources for students and faculty. Hence, this study investigates the trend of studies conducted in the field from 2000–2023 using bibliometric analysis. The bibliometric data generated contains 831 documents and was analyzed using the VIOSViewer software. Highlights of the findings revealed the most published documents in 2020–2023, mostly sourced from journals, and top publications from USA, Australia, Israel, England, and Mexico. Antonella Nuzzaci was the top author, and the top journals were the Interdisciplinary Journal of e-Skills and Lifelong Learning Education, and Information Technologies. Results of co-occurrences based on TLS revealed keywords such as universities, internet, online learning, technology, curriculum, and others. Most cited documents were published from 2000-2005, and the top cited journals are Education and Information Technologies, Small Business Economics, and Techtrends. The trend of research from 2000-2023 serves as reliable data to consider for further studies related to the field and for references and literature. Findings add value to current studies or topics of interest.

**Keywords:** Technological skills; Higher education, Information technology, e-learning, Bibliometric analysis.



## **Exploring the Impact of Artificial Intelligence on Tax Fraud Detection in Oman**

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**Abstract** - Tax is considered a key economic factor contributing to developing countries' economy and an essential source of income that cannot be underestimated. Moreover, the taxation vision set by countries is often not realized due to the problem of tax fraud, which has caused huge losses to governments around the world (Farooq, 2020). Countries have developed many solutions to confront the issue of tax fraud, but so far, no permanent solution has been found to eliminate it in an integrated manner. This paper examines the role of Artificial Intelligence (AI) and Machine Learning (ML) in finding ways to effectively eliminate tax fraud in the Sultanate of Oman. To achieve this goal, some of the methods of tax fraud around the world and the strategies of countries to eliminate this type of fraud are discussed. The paper discusses AI and ML's role in developing tax fraud detection as a major factor in improving eradication mechanisms. The issue of tax fraud was considered in this research from several perspectives, in order to develop a system based on ML linked to the government and companies imposed on the tax system, and this system is linked to several algorithms and mechanisms that will be described in detail. The research ends by providing the mechanisms underpinning how the program works, the resources used, and the proposed implementation cost in organizations.

**Keywords:** Tax fraud, ML, Detection, Optimization, TD system.

# **Integrating Blynk Mobile App and Google Home Voice Commands for Efficient Smart Home Management**

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**Abstract.** This study presents a comprehensive framework for smart home automation using Blynk and voice commands through Google Home. The smart home automates various household devices, including the fan, lighting, spiral lock, and smoke sensor. This study highlights the convenience and efficiency offered by this integrated system, and how users can benefit from the seamless integration between the app and voice commands to enhance home management and improve daily life experience. The Wemos D1 mini serves as the central controller, orchestrating the interconnected devices through the 2-channel relay. The solenoid lock, 12V fan, and 12V 3W LED are manipulated through this system, offering functionalities such as door locking, climate control, and lighting automation. The inclusion of the smoke sensor MQ2 enhances safety by detecting potential hazards. The project further integrates with Blynk, allowing for remote monitoring and control via a smartphone application. IFTTT enables the creation of custom automation rules, while Google Home integration provides voice control capabilities. The Arduino IDE serves as the programming environment for developing firmware that enables seamless interaction between the hardware components and the software platforms. This comprehensive approach aims to create a smart home system that is both accessible and customizable, catering to individuals ranging from beginners to enthusiasts in the field of home automation.

**Keywords:** Smart home · Sensors · Blynk · Google Assistant

## Early Prediction of Alzheimer's Disease Using Machine Learning Models

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**Abstract.** In the usage of Machine Learning techniques, the research that we're studying is addressing the importance and urgent need for a more accurate and timely diagnosis of Alzheimer's Disease. The main focus and purpose of this research is to enhance the diagnostic abilities for the benefit of patients and enable better targeting of interventions for the patients. There is still a lack of knowledge regarding the difficulties, moral issues, and public health effects of Alzheimer's prediction models, even with advances in predictive analytics. By analyzing challenges, assessing privacy risks, and investigating ethical frameworks in the context of machine learning for Alzheimer's prediction, the research seeks to close this gap. To create reliable predictive models, our study uses a multimodal approach that combines feature selection, model interpretability, and dataset algorithms. The main takeaway from this study is that machine learning holds great potential for improving Alzheimer's prediction, but it also highlights the significance of ethical implementation in healthcare environments. With implications for early diagnosis and treatment, our results show how well machine learning models perform in accurately classifying Alzheimer's disease stages based on MRI images. Our research adds to the responsible integration of predictive analytics in clinical practice, in the end serving the interests of patients and society, by addressing ethical concerns and placing a high priority on patient confidentiality.

**Keywords:** Alzheimer's disease prediction, Machine learning, Diagnosis, Predictive analytics, Ethical considerations, Data privacy, public health impact.

# Mapping and Visualization of Blockchain Security Research: A Bibliometric Approach

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**Abstract:** Blockchain is a revolutionary technology that is transforming the way society trades and interacts with each other. It has gained widespread recognition due to its potential to change the face of secure data management. One of the primary reasons behind the popularity of blockchain security is its role in enabling the emergence of virtual currencies. Additionally, blockchain technology offers decentralized storage that is almost unchangeable, making it highly secure. It is an ideal solution to address the security flaws that are typically associated with traditional data management systems.

This research aims to identify the latest trends in blockchain security by conducting a bibliometric analysis of the research conducted in the last five years. To achieve this, 773 publications written in English were analyzed through a thorough and systematic search of the Oman Virtual Science Library, also known as the Masader-Oman database in IEEE Xplore. A co-word analysis using a VOS viewer was used to determine the changing research trends in blockchain security. The analysis included highly cited papers, citations, and references to provide a comprehensive understanding of the research profile of blockchain security.

**Keywords:** Blockchain, Security, Privacy, Internet of things, Bibliometric Analysis, VOS viewer

## Design of Heart Rate Monitoring System Using Visual Simulation Tool

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**Abstract.** In this project, a wireless heart rate and temperature monitoring system using Packet Tracer is designed and put into operation. A wearable bracelet with sensors that can track temperature and heart rate in real time is integrated into the system. The patient and the attending physician receive the gathered data wirelessly for in-depth health monitoring and analysis. This system is used to provide a practical and effective way to track vital signs in real-time, especially temperature and heart rate. The main tool for gathering data is a wearable bracelet with sensors that can precisely measure and identify physiological parameters. These sensors guarantee ongoing, non-intrusive patient health status monitoring. To simulate data transmission between the wearable bracelet, patient interface, and doctor interface, a virtual network environment is created using Packet Tracer. The system's functionality and performance can be thoroughly tested and validated in a controlled environment thanks to this simulation. Additionally, the system includes functions for data analysis and visualization to help medical professionals make well-informed decisions. Patients can take charge of their health by managing it proactively thanks to the patient interface, which presents real-time monitoring data in an easy-to-understand format. In the meantime, the physician interface facilitates prompt intervention when needed and offers thorough insights into the patient's health trends.

**Keywords:** Heart Rate Sensor, Temperature Sensor, IOT, Packet Tracer, SBC, Router, Security, Firewall

# Blockchain Technology in Higher Education: Opportunities, Applications, and Network Security Challenges

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**Abstract.** Blockchain is a trustworthy and cutting-edge technology that enables training and education using digital technologies. However, managing block-chain access rights and keeping track of academic success for students and graduates has remained a challenge. The official educational records do not provide specific information on academic performance during a certain time frame (semester). Due to the use of intermediaries, academic accomplishment papers produced by universities are not protected against unauthorized alterations. Due to the recent advancement of digital technologies, it is now imperative to verify legitimate educational papers.

**Keywords:** Blockchain, Smart contracts, assurance of intellectual property, blockchain learning management system, higher education.

## **Hedging Effectiveness of Gold ETFs against green and non-green ETFs**

### **Dr. Muhammad Naeem**

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**Abstract:** In this research we have tested gold ETFs against both green and non-green Energy ETFs. To explore dependence, we have utilized GARCH-Copula Methodology. First, we filter the margins through GARCH models and then we use different upper and tail copula to explore the dependence structure. In this study, time varying SJC copula provides more useful insight to capture both upper and lower tail dependence. We have found that for gold ETFs and Energy ETFs pairs both upper and lower tail dependence existed which indicate that gold EFTs cannot be Hedge or safe-haven asset as it is correlated both in time of stress and booms with Energy ETFs (both green and non-green Energy ETFs).

# **Examining the Influence of Corporate Governance in Countering Money Laundering**

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**ABSTRACT:** The technological developments and the existence of administrative and financial corruption have greatly made it difficult to control money laundering crime within companies. This paper aimed to evaluate the impact of corporate governance on combating the crime of money laundering depending on the data obtained from the listed financial institutions in Oman, Kingdom of Saudi Arabia, and United Arab Emirates. This research paper was based on secondary source of data that was collected from different online websites and it was based on cause-and-effect relationship. It was found out that there were Four main measures used by the GCC countries specifically the countries stated above which were the implementation of anti-money laundering policies and procedures, establishment of auditing systems within companies, conducting training programs for the company's employees, and imposing penalties against money launders. The outcomes obtained from this study show that anti-money laundering policies, auditing systems, training programs, and penalties have a significant impact on decreasing the number of money laundering crimes in the GCC countries. Moreover, the results show that there is a strong relationship between corporate governance and money laundering. Also, it shows that there are slight differences between the three jurisdictions regarding the ways used to combat money laundering within companies. Furthermore, this research helps investors who invest in obtaining more information about the companies' status and their operations to make sure that their shares and interests are protected.

**Keywords:** corporate governance, money laundering, corporate performance, sustainability



## **Data Protection in the Digital Era: Legal Insights and AI Integration**

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**Abstract:** Serious matter has been raised with the massive digital revolution, and with the involvement of Artificial intelligence systems in our daily lives it became an urge to study this field. In addition, the issuance of the recent Omani Personal Data Protection Law had brought the attention to explore it. This research stands on two main aspects: one is the data economy, which is to be the driven motive for international economies. The second aspect is the concept of artificial intelligence, which includes its history, definition, applications, and the regulations that are meant to preserve the ethical and legal use of these systems. The paper highlighted common concept that are associated with these aspects, such as individual behavioral insights and AI applications in the Omani industry.

**Keywords:** Data privacy, Artificial Intelligence, Personal data, Data economy

# Navigating the Digital Frontier: A Proposed Framework for Android Mobile Forensics

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**Abstract:** The Android Mobile Forensic Guideline Framework, outlined in this document, offers a comprehensive roadmap for professionals engaged in digital investigation. This framework systematically addresses the critical stages of the mobile forensic process, encompassing legal and ethical considerations, environment security, evidence handling, data collection, examination and analysis, reconstruction, documentation, presentation, and data retention. Covering Android data storage, file systems, tools, and techniques, it also delves into pertinent laws and regulations governing data privacy. The framework underscores the significance of adhering to ethical standards, implementing robust security measures, and following a structured approach when dealing with Android devices. This resource-rich guide equips practitioners with insights and strategies necessary for effective Android mobile forensic practices.

**Keywords:** Android Mobile Forensics, Guideline Framework, Digital Investigation.

## Sentiment Analysis of Harassment in the Social Media Tweets

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**Abstract:** Despite concerted attempts to stop and regulate online harassment, there are still serious hazards and obstacles associated with it in cyberspace. A huge volume of data is published on these social networks daily. Therefore, sentiment analysis is an essential objective to determine the level of criticism or appreciation that is qualified in social media as comments, tweets, or blogs. The sentiment analysis power is useful for detecting cyber harassment instances on Twitter (X). There are a few previous works on using sentiment analysis to detect cyber-harassment or cyber-bullying instances. These harassments are formed as sexual, racial, appearance-related, intellectual, and political harassment. All these types are led to humiliates and embarrasses the victims. This paper primarily concentrates on sentiment analysis techniques in the contextual types of cyber harassment and uses the Twitter corpus to distinguish and detect these types of harassment.

**Keywords:** Sentiment Analysis, Twitter(X), Social Media, Cyber Harassment, Cyber Bullying

# Signals Intelligence Based Drone Detection Using YOLOv8 Models

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**Abstract:** The reduced costs associated with deploying and utilizing Unmanned Aerial Vehicles (UAVs) have spurred their widespread adoption across various industries, including aerial photography, information gathering, and search and rescue operations. However, this rapid uptake has also raised concerns regarding safety and privacy, particularly due to instances of misuse and potential hazards posed by convertible drone technology. Addressing these concerns, this study investigates the application of emerging Artificial Intelligence (AI) techniques in computer vision for the detection and classification of ISM band transmissions, distinguishing between conventional Bluetooth signals and those used for drone control. Several YOLOv8 architectures, optimized for lighter hardware, are evaluated using a publicly available ISM band visual dataset. Results demonstrate that even lighter models, such as nano and small architectures, can achieve significant precision rates, with the best-performing models reaching a peak precision of 90%. However, medium-sized architectures are recommended for optimal performance.

**Keywords:** Unmanned Aerial Vehicles · Signals Intelligence · YOLOv8 Computer vision · Radio frequency spectrum

# **Design and Development of an Advanced Cybersecurity Framework and Blueprint: A Contemporary Approach to Counter Hacking through Reverse Engineering Techniques**

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**Abstract:** Recently many of the world's most secure networks have been breached by hackers, resulting in damage, information theft, data corruption, and threats to both national and international security. Protection experts are now doubting the dependability and efficacy of the current protection measures against hacking assaults in light of this dire situation. To try to identify the issue at an early stage and stop the attacks, I will be presenting a new framework and blueprint for hacking countermeasures. This will direct the solution at the hacker activity itself. The goals centre on establishing a baseline design in order to create the suggested framework and blueprint for hacking countermeasures using reverse engineering hacking techniques, utilizing countermeasures for the primary source issue that enabled the real Hacking to occur. Accordingly, nine hacking techniques were used in this study: 1) foot printing; 2) scanning; 3) enumeration; 4) gaining access; 5) escalating privileges; 6) pilfering; 7) hiding tracks; 8) establishing backdoors; and 9) denial of service. Utilizing information security frameworks, best practices, and countermeasures from over 650 resources, the research has introduced hacking risks, improved defense-In-Depth (DID), Event handling, incident management, and defense-in-breadth (DIB); applied the concept of hiding and deception; audited and penetration tested; and mapped the product with specific information security standards and compliances. This research will use a variety of accepted practice models, global standards, information security frameworks, and best practices to achieve this goal of developing a framework and blueprint for a specialized hacking countermeasure. A wide range of relevant technical journals, textbooks, research publications, and data sources were used to compile the information. Additionally, at various stages of the research process, the views of relevant experts were gathered to validate and support the work. The deliverable outcome is a technical and administrative hacking countermeasure framework and blueprint because the study will concentrate on technological management practices in addition to hacking countermeasure techniques and tools. The framework and the blueprint were validated and authorized, and the effectiveness and reliability of the study deliverable outcome were confirmed using questionnaire and interview surveys, finding that it fully met the established objectives and scope of work.

Furthermore, the validation has demonstrated that the introduced solutions for the Defense-in-Breadth and the deception and concealment strategies, can further improve the hacker countermeasure and the development of SNORT rules, the construction of a prototype, and the execution of live testing with the ultimate goal of closing the security gap created by hacker countermeasures in the present defense-in-depth based security models.

**Keywords:** Hacking, Framework, Reverse engineering

# Advancing Digital Forensics: A Collaborative Model for Cybersecurity in Oman

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**Abstract.** In recent years, our society has witnessed a surge in cybercrime, which has become a growing concern as our reliance on digital media and e-services continues to evolve. The transition to this highly interconnected Cyber-Physical-Natural (CPN) world has redefined many aspects of our lives, including the realm of cybercrime itself, which now primarily unfolds in the digital landscape of cyberspace. Consequently, there is an urgent need for Automated Forensic Investigations (DFI) as part of a comprehensive Incident Response (IR) strategy that adheres to legal, technical, and ethical standards.

To meet these standards, digital forensic investigations must follow well-structured and formalized procedures. This paper discusses the necessity for a structured collaborative model to ensure effective digital forensic investigations in Oman. We propose the Collaborative Digital Forensics and Incident Response (CDFIR) model to address the risks associated with the often-inconsistent methodologies used based on the individual expertise of local personnel. Additionally, we introduce an online portal designed to streamline the investigative process, providing the Public Prosecution and the Judiciary with a powerful tool for efficient case management.

**Keywords:** Cybercrime, Automated Forensic Investigations, Incident Response, Digital Forensics, Collaborative Digital Forensics, and Incident Response (CDFIR) model, Digital Landscape, Cyberspace.

## PrivFED-A Framework for Privacy-Preserving Federated Learning in Enhanced Breast Cancer Diagnosis.

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**Abstract:** In the day-to-day operations of healthcare institutions, a multitude of Personally Identifiable Information (PII) data exchanges occur, exposing the data to a spectrum of cybersecurity threats. This study introduces a federated learning framework, trained on the Wisconsin dataset, to mitigate challenges such as data scarcity and imbalance. Techniques like the Synthetic Minority Over-sampling Technique (SMOTE) are incorporated to bolster robustness, while isolation forests are employed to fortify the model against outliers. Catboost serves as the classification tool across all devices. The identification of optimal features for heightened accuracy is pursued through Principal Component Analysis (PCA), accentuating the significance of hyperparameter tuning, as underscored in a comparative analysis. The model exhibits an average accuracy of 99.95% on edge devices and 98% on the central server.

**Keywords:** Federated-Learning, Isolation Forests, Breast Cancer Classification, PCA, SMOTE, Cat boost.



# Innovations in Machine Learning for Enhanced Parkinson's Disease Diagnosis: A Review of Recent Literature

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**Abstract:** Machine Learning has proven to be a useful tool that can aid in the diagnosis and management of diseases. Parkinson's disease (PD) a debilitating condition that affects mostly the elderly. Over the years, a considerable amount of ML research has focused on better diagnosis and management of PD. In this concise review, we cover most of the peer reviewed literature that has been published within the last year. We have excluded all non-peer-reviewed literature and review articles. Only those articles that were present IEEEXplore, Scopus, and Pubmed databases have been included in this review. First, we will cover the publicly available datasets, followed by a concise review of the recently published literature. It was observed that data from many different kinds of modalities such as speech, MRI data, EEG signals, and sensor data has been used for the design of predictive models. All the studies have reported positive results in the early detection of PS, and some of the studies have reported an accuracy of as high as 100%.

# Sign Language Translation And Communication System Using Machine Learning Model

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**Abstract.** In this time of advanced technologies, the communication barriers faced by the Deaf and Hard of Hearing community still need to be addressed. Through the development of a Convolutional Neural Network (CNN)-based Sign Language Communication and Translation System, we can accurately interpreting signs in American and Arabic Sign Language. This paper aims to tackle these challenges by focusing on the main objectives of (1) Developing a robust CNN-based system capable of accurately recognizing and translating sign language gestures into text or spoken language, and (2) Creating a user-friendly interface for seamless sign language communication and translation. Anticipated outcomes include the establishment of a real-time sign language recognition and translation system, thereby significantly improving communication accessibility for the target community. The expected benefits encompass enhanced communication accessibility, improved recognition accuracy, real-time functionality, and increased usability, thereby contributing to the technological advancement for individuals with hearing impairments within the community.

**Keywords:** Sign Language, Machine Learning, CNN

# Insights into the Structural and Functional Brain Alterations in Parkinsons Disease

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**Abstract:** This study utilized Voxel-Based Morphometry (VBM) and resting-state functional MRI analysis to explore structural and functional brain changes in Parkinson's Disease (PD). Structural analysis, conducted using the Computational Anatomy Toolbox (CAT12) and Statistical Parametric Mapping (SPM12) in MATLAB, identified significant gray matter (GM) differences. These differences indicated atrophy in left frontal, temporal, and occipital regions, as well as compensatory increases in right frontal, temporal, and cingulate regions. White matter (WM) analysis demonstrated more subtle changes, with no significant findings surviving family-wise error correction. Functional connectivity analysis across 32 regions of interest (ROIs) revealed disrupted connectivity within the default mode network and between motor, visual, sensorimotor, and cerebellar networks. Conversely, increased connectivity was observed within the dorsal attention, salience, and language networks. The findings indicate an intricate relationship between brain atrophy, compensatory mechanisms, and altered functional connectivity in PD. This reflects the motor and cognitive impairments associated with the condition. The results may suggest maladaptive brain plasticity or increased cognitive control demands in PD patients.

**Keywords:** Parkinson's Disease, Grey Matter, Functional Connectivity, VBM, RSN

# A Deep Dive into Cloud-Specific Cyber Threats Patterns, Predictions, and Protections

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**Abstract:** Cloud computing has revolutionized information technology, offering on-demand access to scalable and cost-effective computing resources. However, this paradigm shift introduces unique security challenges due to the distributed nature of cloud infrastructure and the shared responsibility model between service providers and users. This abstract delves into the complexities of cloud security, exploring prevalent threats, emerging trends, and best practices for ensuring robust protection in the digital age. The most common security challenges can include but are not limited to the following. Shared accountability, cloud computing hinges on a shared responsibility model, where providers secure the underlying infrastructure, but users are responsible for their data and applications. This distributed responsibility can present challenges in maintaining a consistent security posture across the entire ecosystem, multi-tenancy, cloud environments host data and applications from multiple users, increasing the attack surface and potential for vulnerabilities. Malicious actors can exploit weaknesses in one tenant to gain access to data or resources of others, Data breaches can occur due to misconfigurations, insider threats, or compromised service providers, as exemplified by the Capital One breach of 2019. Evolving threat landscape, the cloud threat landscape is constantly evolving, with cybercriminals adopting sophisticated techniques and targeting emerging vulnerabilities. Sectors like healthcare, heavily reliant on cloud services due to the pandemic, are becoming prime targets., hybrid and multi-cloud environments, managing and securing cloud resources in complex hybrid and multi-cloud environments presents additional challenges, as organizations need to ensure consistent security practices across diverse platforms. This research paper delves into the complexities of cloud security, exploring prevalent threats, trends, and best practices for ensuring robust protection in the digital age by surveying and interviewing Oman experts and professionals in information technologies, telecom and cybersecurity to get more relevant results to Oman's security challenges and best practices in the Cloud computing.

**Keywords:** Cloud infrastructure, Data security concerns, public cloud services, Cloud-specific cyber threats, Data breaches, Regulatory compliance, Flexibility and scalability, Digital forensics.

# Optimizing SQL injection detection using BERT encoding and AdaBoost Classification

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**Abstract.** SQL injection attacks are still a considerable threat to the web applications and organizations security in general, giving the attackers the opportunity to cause execution of arbitrary SQL queries sent through user input fields. Traditional defensive mechanisms to mitigate these threats often rely on static rules that may not adapt efficiently to the ever-evolving attack patterns. Recently, machine learning models are regarded as very promising to detect and prevent these attacks by enhancing the strength of data-driven methods. This research proposes AdaBoost classifier to mitigate SQL threats. An altered variant of whale optimization algorithm has been introduced and employed to optimize the hyperparameters of the AdaBoost for this challenging problem. The outcomes were compared to the scores attained by other powerful optimizers. The suggested method achieved supreme results, with the highest obtained accuracy of slightly over 98.9%, exhibiting exciting potential in this field.

**Keywords:** SQL injection · BERT · AdaBoost · Metaheuristics optimization · Swarm intelligence · WOA.

## Memory Forensics for Detecting Virus and Worm Infections in Computer Primary Storage

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**Abstract.** Memory forensics is an effective technique for detecting and analyzing malware infections. When a malware program executes, it leaves artefacts in the system memory that can reveal details about its behavior and activities. By analyzing these memory artefacts, security researchers can gain insights into the malware's functionality and develop detection methods. The Cridex worm is a widespread and persistent malware that has infected many systems. It utilizes social engineering techniques to deceive users into taking actions that may compromise their security. Enabling malicious macros that download and execute the worm. Once installed, it attempts to steal banking credentials and financial information from the infected system. Our memory forensics analysis reveals critical details that allow us to detect the presence of the Cridex worm in an infected system's memory image. The same memory forensics techniques and detection approach can be applied to analyze and see other malware programs exhibiting similar behaviors.

**Keywords:** Memory Forensics, Cyber Security, Malware Detection, Indicators of compromise, Volatility

## **Enhancing Student Academic Experience through the Implementation of a Student Planning and Advisory System (SPAS)**

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**Abstract:** This research paper delves into the design, development, and implementation of a Student Planning and Advisory System (SPAS) mobile application developed to enhance the university student experience with a specific focus on good planning and excellent academic advice. The paper Using Flutter in Building SPAS Application presents Android Studio as the main integrated development environment and explores the core of using this programming language in building the SPAS application. More explicitly, the main components that will have been integrated into the application include a friendly dashboard, a specialty selection page, a real-time chat interface, and advisor profile management. Security measures and the related protocols in the communication of data highlight the smooth interaction of users. Testing procedures and feedback mechanisms are robust to ensure functionality, reliability, and user experience in firm development. From project kick-off to project closure, every project is delivered as a quality mobile application by sticking to the best practices of the industry and structured development methodologies. SPAS Project, the aim of the project is to use the latest technology in the university by providing the most flexible and efficient student-advisor communication platform as a guarantee towards the students' academic success and satisfaction of their stay in the university. The paper concludes by discussing the possible benefits the SPAS application will bring to the institution and what it implies for the student.

## **EduProgress: Student Performance Indicator**

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**Abstract:** In this research project, the development of an innovative data analytics-based system known as “EduProgress” is discussed to investigate its implementation in Oman’s education sector. Oman is one of the countries struggling to better educational performance and has global challenges in achieving optimal results from learning objectives. Current educational frameworks in general cannot adequately address individual learner requirements, especially within a multicultural and multi-lingual society such as Oman. “EduProgress” appears as a solution targeted at recognizing various types of learning styles and individual academic strengths and weaknesses. We use data analytics to transform teaching methods and help educators provide better support and interventions. In Oman’s context, this system can be very significant, and it will go hand-in-hand with its objective of quality education delivery. By integrating predictive analytics, “EduProgress” enables teachers to take a proactive approach in meeting the needs of students and thus creates an even more supportive learning environment. Oman is aiming at a vision for an educated country and this research uses the potential of big data analysis to transform education as well as other industries. Introducing “EduProgress” is appropriate because it measures current educational issues and enormous contributes to the success rate of Omani students’ academic performance that moves forward in developing further on nation levels.

**Keywords:** Education, Big Data Analysis, Academic strengths and weaknesses, and Performance Indicator.



## OmanClinicPro: A Mobile application Private healthcare Providers

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**Abstract:** Healthcare services witness massive changes through the constantly changing digital environment. "OmanClinicPro" establishes itself as a pioneering Android application targeted at refining health care management in the Sultanate of Oman. It features innovative solutions including search-based services for private healthcare providers including scheduling, and booking appointments, as well as managing digital health records. It is intended to improve the accessibility and efficiency of services provided to the final users by avoiding chaos related to time limitations or information management in health care. The main goal of the research is to increase patient engagement, decreasing administrative burden on the healthcare providers and have a positive impact to the healthcare system in Oman. OmanClinicPro is designed around comprehensive market analysis and around its user. Such kind of an application is to have a proper development approach plus collaboration between tech developers, healthcare professionals and end-users as well, thus ensuring a not only technologically advanced but also attuned product to the real needs of its users. This research paper addresses the origins of the idea, development process, its features, and future implications of OmanClinicPro as a transformative tool in the private health care sector in Oman.

**Keywords:** Healthcare Providers, Clinics, Android Application, Booking, Medical Record.

## Enhancing Maritime Security in Seaports through IoT Risk Mitigation

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**Abstract:** The widespread adoption of Internet of Things (IoT) technology has significantly improved seaport efficiency globally. However, the increased integration of connected devices in seaport operations has given rise to substantial security concerns. These concerns encompass potential vulnerabilities in information control, the theft of sensitive data, and unauthorized access. This research emphasizes the vital importance of robust system design and continuous monitoring to effectively mitigate security threats in the maritime domain. Moreover, the study advocates for the implementation of remote data backups as a crucial component of IoT system security measures. Additionally, the paper delves into the specific security requirements and challenges associated with diverse IoT services in seaports. By providing a comprehensive overview of prevalent security threats experienced in seaports, along with the resulting damages and economic losses, this study aims to equip researchers with the knowledge needed to stay informed and vigilant regarding the risks associated with the integration of IoT in seaport environments.

**Keywords:** Sea ports, Vulnerability, Internet of things, IoT Security, Security Systems.

## Analysis of Stock Market Price Prediction using Machine Learning

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**Abstract:** This research explores the utilization of Machine (ML), specifically with emphasis on Recurrent Neural Networks (RNNs) and Long Short-Term Memory (LSTMs) for forecasting the prices of the stock market. In addressing the difficulty of precise stock price prediction, the study considers stock data as a time series, integrating past prices alongside other relevant factors. The study examines the significance of both recent and historical data, taking into consideration the main involving factors that impact the pricing of “current” and “next day”. The result illustrates that machine learning can assign weights to numerous market indicators, helping in effective anticipation of predicting future stock values. To further include, the research depicts the importance of predictive models indulged in machine learning as beneficial tools for predicting stock prices. The insights garnered from these models have the potential to provide investors with valuable information, enabling them to make informed decisions in the realm of investing.

**Keywords:** tock price prediction, machine learning, time series, Recurrent Neural Networks, LSTMs, market features, investment decisions.

## **Developments in Network Security: An In-Depth Analysis of Encryption Methods, Limitations, and Emerging Trends**

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**Abstract.** This review comprehensively explores encryption and network security in rapidly evolving technical landscapes, emphasizing the heightened significance of robust security measures in our interconnected world. It delves into the fundamentals of encryption, spotlighting its role in safeguarding data during online transmission, particularly in cloud computing and wireless security. The article scrutinizes network security by defining its parameters, applications, and associated risks, such as data theft and denial-of-service attacks. It thoroughly examines encryption, detailing symmetric and asymmetric methods while addressing challenges like quantum computing threats and fundamental management complexities. The paper offers insights into emerging solutions like quantum key distribution and postquantum cryptography. Case studies illustrate the practical effectiveness of encryption techniques, employing examples such as Field Programmable Gate Arrays (FPGAs), Pretty Good Privacy (PGPs), Data Encryption Standards (DESSs), and RC5 selective encryption. The conclusion explores future developments in network security, incorporating blockchain, machine learning, quantum resistant encryption, zero-knowledge proofs, and privacy-centric efforts, underscoring the ongoing evolution of cybersecurity and the imperative to stay abreast of emerging threats for adequate digital infrastructure protection.

**Keywords:** Encryption, Security, Technology, Blockchain, Protection.

# The Role of Digital Transformation in Enhancing Operational Excellence and Sustainability in Organizations

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**Abstract:** Digital Transformation has significantly impacted the operational performance and sustainability of business organizations. In today's competitive landscape, organizations are under pressure to meet customer expectations amidst the ongoing digital transformation initiatives. This research aims to investigate the integration between digital transformation, operational excellence, and sustainability within business organizations. By examining existing literature and synthesizing insights from diverse sources, the study seeks to explain the transformative potential of digital technologies in reshaping operational processes and driving sustainability initiatives. The study adopts a comprehensive methodology, relying on a review of published literature and critical analysis of secondary sources. Findings reveal that digital transformation serves as a strategic enabler for achieving operational excellence within organizations. Through process automation, data-driven decision-making, seamless integration, customer-centricity, and agile operations, businesses can optimize processes, enhance productivity, and deliver superior customer experiences. Additionally, digital transformation facilitates sustainability initiatives by promoting resource efficiency, enabling remote work practices, fostering green technologies, ensuring supply chain transparency, and implementing circular economy principles. By leveraging digital technologies strategically, businesses can enhance competitiveness, navigate market complexities, and contribute to environmental stewardship. This study highlights the need for organizations to integrate digital transformation initiatives into their core business practices achieving long-term success in today's dynamic business landscape.

**Keywords:** Digital Transformation, Innovation, Operational Excellence, Sustainability, Supply Chain, Data Analytics.

# EXPLORING THE BENEFITS OF INTEGRATING MACHINE LEARNING AND TOOL CONDITION MONITORING FOR MANUFACTURING APPLICATIONS

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**Abstract:** This review article explores the potential benefits of integrating machine learning and tool condition monitoring for manufacturing applications. It first reviews the current state of machine learning and tool condition monitoring and their respective applications in manufacturing. It then discusses the potential benefits of combining the two, including improved process control and reduced downtime, as well as the challenges associated with integrating the two technologies. Finally, the review article provides an overview of existing approaches to integrating machine learning and tool condition monitoring, examining the advantages and drawbacks of each. The article concludes with a summary of the key findings and implications for the future of integrating machine learning and tool condition monitoring in manufacturing. The article provides a comprehensive overview of the benefits and challenges associated with integrating machine learning and tool condition monitoring, as well as a review of existing approaches and future implications.

**Keywords:** Machine Learning, Tool Condition Monitoring, Manufacturing Applications, Process Control, Downtime, Integration

# CacheBoost: Harnessing Machine Learning for Peak Cache Performance

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**Abstract:** This research investigates the integration of machine learning (ML) models into cache management systems to enhance overall performance. Two distinct strategies, the Block Cache model, and Vector Cache model, are implemented, each incorporating widely used cache replacement policies [Least Recently Used (LRU) and Least Frequently Used (LFU)]. Furthermore, three ML models - Logistic Regression, K- Nearest Neighbors (KNN), and Neural Network| are integrated into these cache systems. The primary goal is to improve the cache hit rate by combining ML models with Belady's Optimal algorithm. The performance of the five cache models is assessed using key metrics such as cache hit rate, miss rate, and eviction rate. A comparative analysis is undertaken to gauge the effectiveness of each approach and the influence of various ML models on cache performance. This study aims to provide valuable insights into the complex interaction between traditional cache replacement policies and advanced ML techniques, offering a nuanced understanding of the potential enhancements in cache hit rates achieved through machine learning integration. The findings and observations contribute to the ongoing exploration of cache optimization, guiding future developments to enhance system performance.

**Keywords:** Block cache model, vector Cache model, Beladys optimal algorithm, KNN, logistic regression

# USING SMART BLACKBOX TO MONITOR ACCIDENTS OF MOTOR VEHICLES IN OMAN

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**Abstract:** Smart blackbox technology, also known as Event Data Recorder (EDR), has gained attention in recent years as a tool for accident monitoring and reconstruction in motor vehicles. This study aims to evaluate the effectiveness of smart blackbox technology in monitoring accidents of motor vehicles in Oman. The study employed a mixed-methods approach, including a survey of 200 drivers and an analysis of 50 accident cases recorded by smart blackboxes. The survey aimed to assess drivers' perceptions of the technology and its impact on their driving behaviour, while analysing accidents to evaluate the accuracy and usefulness of the recorded data for accident reconstruction. The survey results showed that the majority of drivers (68%) knew about the technology, and 82% agreed that it could improve road safety. However, only 26% had installed the technology, citing concerns about data privacy and cost. The analysis showed that smart blackboxes provided accurate and reliable data on vehicle speed, acceleration, and braking, before and during accidents. The data helped in reconstructing the accident scenarios and identifying the causes of the accidents, like driver error, mechanical failure, or road conditions. Overall, the technology is an effective tool for accident monitoring and reconstruction in motor vehicles in Oman. However, concerns about data privacy and cost may limit its widespread adoption. The study recommends addressing these concerns through public awareness campaigns and incentives for installing smart blackboxes in vehicles.

**Keywords:** Smart blackbox, event data recorder, traffic accident solution, vehicle monitoring



# A Comparative Evaluation of Network Analysis and Visualization Software

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**Abstract.** Network analysis and visualization have become indispensable tools for uncovering complex relationships across diverse fields. This paper presents a comprehensive evaluation of prominent network analysis and visualization tools, empowering researchers to select the optimal approach for their specific needs. We evaluate the functionalities, strengths, and limitations of prominent tools like Gephi, Cytoscape, D3.js, Tableau, NodeXL, igraph, and Pajek, our analysis delves into their strengths, weaknesses, functionalities, and suitability for various use cases. Key considerations for tool selection are highlighted, including data size, analysis requirements, desired level of customization, and user expertise. The paper emphasizes the importance of aligning the tool with project-specific characteristics. We showcase the versatility of Gephi and Cytoscape for advanced analysis and visualization. The user-friendliness of D3.js and Tableau makes them ideal for interactive exploration. NodeXL stands out for social network analysis within the familiar Excel environment. Performance considerations for large networks are addressed, highlighting the efficiency of Pajek and NetMiner. The paper acknowledges the trade-off between tool complexity and user experience. This comparative analysis equips researchers with the knowledge to harness the power of network analysis and visualization tools, fostering effective knowledge extraction from network data.

**Keywords:** Network analysis software, Network visualization, Comparative analysis, Customization

## Academic Advising: The AI Panorama

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**Abstract:** Academic advising is a service intended to provide students with the needed information and support for crafting academic plans attuned with their individual, educational, and professional goalmouths; meeting institutional and graduation requirements; and getting ready for a life of change. Higher Educational Institutions (HEIs) world over are emphasizing academic advising as a tool to familiarize students' with the possible learning opportunities as well as for meeting the challenges of student retention. In fact, the teams that deal with student affairs and the academic advisors face a myriad of student queries across different channels on a regular basis which cannot be instantly responded to, prompting in dissatisfaction with regard to the offered services. To commendably handle this challenge, it is essential to embrace pioneering systems and procedures. This study proposes an integration to the existing ad track system with AI technologies to serve as an intuitive user interface in answering the advisees' Frequently Asked Questions (FAQs) round the clock. Further the planned study leverages Artificial Intelligence and Natural Language processing technologies to build a bilingual chatbot that interacts with students in the English and Arabic languages thereby encouraging and guiding them to accomplish their realistic academic goals.

## Predictive Correlation Modeling for Unveiling CPU and Synergizing System Call

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**Abstract:** In our computational system, the dynamic interplay between program execution and system resource allocation, mediated by a multitude of Operating System (OS) calls, presents a complex landscape that significantly influences CPU execution time. To unravel this intricate relationship, we employ a sophisticated hybrid predictive model that seamlessly integrates the powerful algorithms of LightGBM and CatBoost. This research endeavors to comprehensively understand and quantify the impact of system calls on CPU execution time through meticulous data collection, processing, and model training. The foundation of our investigation lies in the execution of diverse programs under the watchful lens of Strace, a powerful tool for tracing system calls. The study encompasses 377 Python code samples, carefully curated from various GitHub repositories, ensuring a representative and diverse set of scenarios. By capturing detailed data on system calls and corresponding CPU execution times, we establish a robust dataset that serves as the cornerstone of our analytical endeavors. The data preprocessing phase is a crucial component of our methodology, involving the judicious application of regular expressions (regex) and advanced data conversion techniques. This meticulous cleansing and formatting process culminated in the creation of a structured and refined CSV file, which serves as the input for our predictive model. This process not only ensures the elimination of noise but also enhances the model's ability to discern meaningful patterns within the data. The subsequent phase of our research involves the training of our hybrid predictive model using the carefully curated and formatted dataset. The amalgamation of LightGBM and CatBoost algorithms allows us to harness the strengths of both, leveraging the unique capabilities to capture nuanced relationships within the data. This training process is a pivotal step in our quest to uncover the hidden correlations between system calls

and CPU execution time. As we traverse the landscape of our findings, our primary aim is to provide a quantitative assessment of the correlation between system calls and CPU execution time post-training. The hybrid predictive model serves as a powerful instrument, enabling us to not only predict CPU execution times based on observed system calls but also to gain insights into the intricate dynamics that govern program behavior in relation to system resource allocation. In summary, our research represents a comprehensive exploration of the interplay between system calls and CPU execution time, utilizing a state-of-the-art hybrid predictive model. Through meticulous data collection, preprocessing, and model training, we aim to contribute valuable insights into the complex relationship between program execution and system resource allocation in computational systems.

**Keywords:** LightGBM, CatBoost, Space Polynomial Regression, Predictive modelling, correlation

# AI-Driven Machine Learning Model for Branch Prediction Simulator

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**Abstract.** In today's computer systems, predicting which way a program will go at decision points (conditional branches) is crucial for making processors work faster. This paper introduces a new way of doing this using machine learning tools, specifically Support Vector Machine (SVM) and Decision Tree algorithms. The goal of our approach is to improve how accurately we predict these branches by letting these algorithms learn from past patterns in how programs run. This method involves training the SVM and Decision Tree models with data about how branches behaved in the past. This helps the models understand the relationships between the instructions in a program and the outcomes of decision points. We use SVM for handling complex, non-linear patterns and Decision Tree for simpler ones. By combining these two algorithms, our simulator becomes adaptable to different types of programs and how they run. To see how well THE simulator works, it is tested it with dataset, measuring how accurate its predictions were, how often it made mistakes, and how quickly it processed instructions. Comparing it to traditional methods of branch prediction, our machine learning approach showed benefits, especially when dealing with complicated and non-linear patterns in branches. The results indicate that using SVM and Decision Tree can lead to better predictions, ultimately making processors perform better. The new machine learning-based simulator is a significant step forward in predicting the outcomes of decision points, highlighting the potential of using advanced algorithms in computer architecture. The insights from this research contribute to the ongoing efforts to make processors work more efficiently by trying out new and creative ways to predict branches in programs.

**Keywords:** Support Vector Machine, Decision Tree, Branch Predictor, CPU, simulator

# Towards an SDG-Enabled E-government: Redefining Public Service Delivery with Artificial Intelligence

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**Abstract:** The burgeoning potential of e-government, empowered by artificial intelligence (AI), offers a pivotal opportunity to accelerate progress towards the UN Sustainable Development Goals (SDGs). This paper explores the intricate interplay between e-government, AI, and the pursuit of the SDGs, highlighting how technology can be harnessed to tackle a spectrum of global challenges, from equitable access to education and healthcare to sustainable cities and responsible governance. Drawing on examples from across the globe, we analyze how AI-powered tools can personalize public services, streamline administrative processes, enhance decision-making, and ensure inclusivity and accountability. However, navigating this terrain necessitates addressing ethical concerns like bias, privacy, and job displacement. By advocating for responsible innovation and human-centric design, we can ensure that AI catalyzes a more equitable, sustainable, and prosperous future for all. This paper concludes by calling for international collaboration, robust governance frameworks, and continuous research to unlock the full potential of AI in e-government and pave the way for an SDG-enabled world.

**Keywords:** E-government, Artificial Intelligence (AI), Sustainable Development Goals (SDGs), Public Service Delivery, Ethical Innovation

## Employee reviews sentiment classification using BERT encoding and AdaBoost classifier tuned by modified PSO algorithm.

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**Abstract:** Sentiment analysis of the employee reviews is very important to understand the satisfaction in the company, predict the engagement of the employees, identify the risk of employee retention, and improve general productivity of the company. Proper analysis of these reviews may provide valuable insight into the satisfaction and moral levels among employees, and identify the potential areas where improvement is possible. Moreover, employee analysis can help in detecting the risks of employee retention and a drop in satisfaction within the company prior to their escalation. Companies can then intervene to mitigate identified problems, and boost morale among employees. This manuscript suggests application of the AdaBoost classification model to execute the classification of the employee reviews sentiment. To select the appropriate values of the AdaBoost hyperparameters, an enhanced version of the particle swarm optimization algorithm was developed and applied. The simulation results were put into comparisons to the outcomes achieved by several contenting potent optimizers. The overall findings suggest that the presented model obtained accuracy of 87.2%. was superior to other regarded methods, showing considerable potential for further applications in this domain.

**Keywords:** Sentiment analysis · Employee reviews · BERT · AdaBoost Stochastic optimization · Swarm intelligence · PSO.

# Hybrid Model Optimization with Modified Metaheuristics for Parkinson's Disease Detection

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**Abstract:** Parkinson's disease, a progressive neurological disorder primarily affecting elderly males, stems from dysregulation within the extrapyramidal tracts, notably the substantia nigra, lentiform nucleus, caudate nucleus, and ruber nucleus. This condition manifests as heightened cholinergic activity in the brain, correlating with cognitive decline, gait disturbances, sleep disorders, psychiatric symptoms, and olfactory dysfunction. Early detection is crucial for enhancing patient prognosis. Although neurological damage cannot be reversed, treatment can mitigate progression. However, patients often delay seeking treatment until symptoms significantly impair daily functioning, underscoring the importance of early detection. This study investigates the fusion of long short-term memory and extreme gradient boosting classifiers to develop an early detection system utilizing noninvasive shoe-mounted sensor data for observing patient gait. A tailored optimizer is introduced to enhance classification accuracy, achieving a notable accuracy of 0.896370, surpassing other contemporary optimizers in identical conditions.

**Keywords:** Parkinson's disease, Medical Data, Diagnosis, Optimization, Sinh cosh Optimizer



## Ultrasound Image Despeckling using Pixel Wise Fusion Approach

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**Abstract:** Ultrasound images are widely used in medical image analysis. These images are normally corrupted by multiplicative speckle noise. This study proposes a simple pixel level fusion based despeckling methods for ultrasound images. The scope of different filters like median, min, max and Kuwahara filters as fusion rules are also tested in this work. The performance of the proposed pixel wise fusion is evaluated using evaluation parameters such as Peak Signal to Noise Ratio (PSNR), Structural Similarity Index (SSIM) and Universal Image Quality Index (UIQI). The result displays the effectiveness of proposed pixel level fusion in ultrasound despeckling.

**Keywords:** ultrasound image; Despeckling; pixel wise fusion; Kuwahara filter; Median filter, Min-Max filter

## The Role of Sustainable Development in Supporting ICT SMEs in Developing Countries

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**Abstract:** In developing countries, Small and Medium Enterprises (SMEs) in the Information and Communication Technology (ICT) sector face various challenges - leadership gaps, inadequate market search, underestimating external factors, and many more. The main objective of this research is to determine whether ICT SMEs can leverage a strategic approach that includes sustainability factors to achieve a competitive edge. Based on the reviewed literature, the challenges are defined, and a solution proposed through exploring SD paradigms, specifically triple bottom line (TBL) and sustainable development goals (SDGs). Financial considerations are addressed, with a focus on how sustainable practices can lead to cost savings and improved financial performance; the function of non-financial reporting is also explored. Finally, examining the above as well as the role of stakeholder engagement and support in driving sustainable practices within ICT SMEs, a matrix with solutions benchmarked with SDGs and TBL elements is proposed and tested through a case study within one digital SME in a developing country, Oman. The gaps in the literature regarding tech startups' strategies are identified, future research priorities recommended and a new framework containing five pillars presented.

**Keywords:** ICT SMEs, Sustainable Development, Competitive Advantage, Developing Economies

# Impact of Basic Psychological Needs Satisfaction on Employees' Expectations and Intentions to Support Digital Transformation in the Workplace: Applied to the Financial Services Sector.

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**Abstract:** The digital revolution in the workplace has far-reaching effects on workplace redesign, going beyond simple technological adoption or non-adoption. Digital work may call for adjustments to operational and organizational aspects in addition to the tools utilized in organizational activities. In this context, it is critical to meet workers' psychological needs, such as their need for autonomy, for relationships with others, and for digital self-efficacy, all of which affect their willingness to accept a work environment that is digital. More precisely, employees are supposed to be more in favor of workplace digital transformation if they believe that the digital environment will improve performance and well-being.

The current study, which builds on Self-Determination Theory, attempts to investigate how workers' basic psychological needs affect their expectations for performance, well-being, and intentions to support workplace digital transformation. 195 valid and statistically testable responses were obtained from a sample of 370 people employed in the financial services industry in the Dakahlia Governorate for this study. Based on an inductive methodology, analytical descriptive methodology was used in the study. The findings show that worker autonomy, interpersonal connections, and digital self-efficacy have a major positive influence on workers' expected performance and well-being in the digital workplace.

Their intentions to support the digital transformation of the workplace are subsequently strengthened as a result. Lastly, it is hoped that the research findings will push pre-digital organizations to face the challenges of digital transformation and help them reevaluate their strategies considering employee engagement.

**Keywords:** Basic Psychological needs satisfaction, Digital transformation in the workplace, employee expectations, intentions, financial services sector.

# Examining the Interplay of CSR, Governance, Ethics, and Sustainability: A Comprehensive Analysis Across Industries

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**ABSTRACT:** In today's globalized corporate environment, the interplay between Corporate Social Responsibility (CSR), Governance, Ethics, and Sustainability has become increasingly complex and significant across various industries. Corporate social responsibility is a powerful tool for fostering long-term economic growth and improving public well-being in general. However, significant differences have been found in the research studies on how corporate social responsibility affects business performance. Because of the new, modern idea that sustainability is essential for a company's long-term performance and survival, CSR has steadily gained scholarly attention. Based on the priority of corporations and business leaders who want to build long-term competitive advantages, the research article focuses on the exploration of the relationships and interactions among the key components and the impact on corporate performance and long-term sustainability.

**Keywords:** corporate governance, corporate social responsibility, corporate performance, sustainability

## Online harassment detection on online data science platforms optimized by metaheuristic.

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**Abstract:** Cyberbullying denotes one of the recent pervasive problems, mostly found on social networks, that poses a considerable challenge to keep safe and inclusive environment. It can lead to serious psychological problems for the victim. As one of possible responses, artificial intelligence emerged as a powerful option to identify cases of cyberbullying, and it has garnered considerable attention. This paper suggests using a combination of natural language processing, paired with machine learning XGBoost classifier tuned by an altered variant of the sine cosine metaheuristics to classify and identify the cases of cyberbullying in data collected from a variety of social networks including Kaggle, Twitter and Youtube. The obtained simulation outcomes suggest considerable potential of machine learning models to address this problem.

**Keywords:** Cyberbullying · Harassment detection · Machine learning · XGBoost · Swarm intelligence · metaheuristics optimization · sine cosine algorithm.

## Reinforcement Learning and Gamification: a Framework for Integrating Intelligent Agents In Retro Video Games

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**Abstract:** This work explores the benefits that reinforcement learning (RL) and unsupervised learning (UL) have over supervised learning (SL). Using RL and Python simulations are produced that closely mimic those observed in the real world, and an agent is trained using a form of genetic algorithm. The system created can be used to simulate real-world scenarios and offer solutions. Simulations were performed upon a clone of the game “Pong”. The system successfully adapted to the game the more it played and improved its capability to successfully get high-scoring results. The system is flexible and dynamic, being able to adapt to different simulation environments. In the future, more complex examples will be tested on the system, with the goal of real-world scenario simulation.

**Keywords:** genetic algorithm · artificial intelligence · python · gaming · simulation · reinforcement learning

## Effective learning tools in teaching Mathematics

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**Abstract:** Recent advancements in Education shows that digital platforms are playing a crucial role in teaching and learning as well as in research. To make the classroom more interactive and collaborative, many Mathematicians are integrating their classrooms with technology. Teachers have the opportunity to benefit from the premise that technology might aid students in visualizing mathematical ideas and concepts. Technology may, however, be a very useful tool if teachers possess the skills needed to integrate technology into the teaching and learning of mathematics. A collection of few such innovative tools helps the students in engaging, creative, and enjoyable math lessons. There are few such top tools to be implemented to transform the Math class into interactive and fun based learning to create interest in Math.

In this paper we highlight some Innovative teaching tools such as Geogebra, EquatIO, Graph editor, Microsoft Math Solver, Class note-book, R-Programing, MATLAB, Kaizala which are very much helpful in teaching Mathematics in an innovative and interactive way. These innovative teaching tools will enhance the learning experience of students in Mathematics classrooms.

**Keywords:** Innovative teaching tools, Learning experience, Class note-book, R-Programing, Graph editor, MATLAB, Geo gebra, EquatiO

## Exploring YOLOv8 architecture applications for weed detection in crops.

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**Abstract:** This work has a goal to test a deep-learning approach to the problem of aerial weed detection in crops. The issue of this type of detection lies in plants and their life cycles. Crops as well as weeds change their appearance and can be similar in physical appearance. The use of advanced models like the You Only Look Once v8 (YOLOv8) allows for fast and accurate predictions. In this work, five different sizes of the YOLOv8 are applied to the same dataset consisting of aerial images of plants. The results, metrics, and actual predictions are provided for every of the five models. The modernization of the agricultural domain has begun, and the use of artificial intelligence (AI) is paramount to stay ahead of the competition. The experimental outcomes indicate significant potential of YOLO networks in this domain, and further possibility to integrate these networks with precision agriculture.

**Keywords:** YOLOv8 · aerial imagery · weed detection · deep-learning.



# Twitter toxic comment identification in digital media and advertising using NLP and optimized classifiers

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**Abstract:** Cyberbullying is a form of harassing, intimidating and harming other people through electronic media like social networks or messaging platforms. Typical forms of cyberbullying include messages containing harmful text, photos or videos that will embarrass the target, and excluding the individual from groups and chats. Unfortunately, it may lead to sincere psychological problems of the target, including disorders like depression, anxious behavior, lack of self-esteem, or even worse, suicidal thoughts and self-hurting. The research presented herein proposes a hybrid approach that includes natural language processing and machine learning XGBoost model optimized by an altered variant of Botox optimization metaheuristics for classification of toxic tweets on a real-world dataset. The experimental results have shown considerable prospect of application of machine learning models in solving this serious and important problem.

**Keywords:** Cyberbullying · Twitter · Toxic comments · Machine learning · XGBoost · Swarm intelligence · BOA metaheuristics.

# GEN AI in Healthcare: Harnessing Potential for Patient Care Solutions

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**Abstract:** The field of healthcare is quickly changing due to generative AI, or Gen AI. The enormous potential of Gen AI is examined in this article across a number of areas, such as drug research, medical imaging analysis, treatment planning, and patient care. We study how Gen AI can speed up medication development, enhance diagnostic accuracy, and customize treatment regimens. The review process was conducted from accessing the databases PubMed, Scopus and Web of Science. 96 articles were selected initially out of which irrelevant titles were taken out and articles with unsuitable abstracts were also deleted. Finally, twenty-one relevant articles were used in this study. The study explored how GEN AI was able to support Healthcare professionals and instances where the support fell short. The applications of GEN AI in Healthcare and the limitation that hinders its integration to mainstream treatment is discussed in detail. Absence of Regulations and ethical considerations needs to be the direction of future research in this field to enable implementation of these state of art technologies with the medical fraternity.

**Keywords:** Generative AI, Healthcare, LLM, Gemini.

# AI-Powered Threat Detection and Mitigation in 6G Networks: Opportunities and Risk

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**Abstract:** The arrival of 6G networks indicates a new era of transformative telecommunications capabilities, promising exponential increases in speed, connectivity, and support for advanced applications. However, the unprecedented complexity and massive scale of these next-generation systems present formidable security challenges that cannot be effectively addressed by traditional mechanisms alone. This research investigates the potential of Artificial Intelligence (AI) to revolutionize threat detection and mitigation strategies for 6G networks while critically examining the inherent risks accompanying AI implementation. Through a mixed-methods approach combining literature review, simulated 6G environments, and evaluation of AI algorithms, this study explores how AI can autonomously identify cyber threats via anomaly detection, predict potential incidents through predictive analytics, and enable automated real-time response and mitigation actions. Furthermore, AI integration offers opportunities for robust authentication mechanisms, privacy protection using federated learning, and dynamic data encryption, enhancing overall network security resilience. Conversely, the findings reveal risks associated with AI adoption, including vulnerability to adversarial attacks designed to deceive AI models, overreliance leading to automation bias, and concerns surrounding user privacy stemming from extensive data collection requirements for training AI systems. This research provides a balanced perspective, highlighting AI's transformative potential while emphasizing the critical need for strategic risk mitigation to address the dual-edged impact of this powerful technology. Ultimately, the insights derived from this analysis guide the secure implementation of AI, leveraging its capabilities to fortify 6G network security resilience against the evolving landscape of cyber threats. By proactively addressing the challenges, this work paves the way for realizing the full potential of AI-powered threat detection and mitigation in nextgeneration telecommunications infrastructure. Keywords— 6G Networks, Artificial Intelligence, Threat

Detection, Mitigation Strategies, Cybersecurity, Anomaly Detection, Predictive Analytics, Authentication, Federated Learning, Data Encryption, Adversarial Attacks, Automation Bias, Privacy

**Keywords:** 6G Networks, Artificial Intelligence, Threat Detection, Mitigation Strategies, Cybersecurity, Anomaly Detection, Predictive Analytics

# Structured query language injection detection with natural language processing techniques optimized by metaheuristics.

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**Abstract:** This research focuses on the detection of Structured Query Language (SQL) injection intrusion detection. This problem has gained significance due to the widespread use of SQL in different systems, as well as for the numerous versions of attacks that are performable by using this technique. This work aims to propose a robust solution for the detection of such attacks by applying artificial intelligence (AI). The data is preprocessed by a Bidirectional Encoder Representations from Transformers (BERT), while the predictions are made by the Extreme Gradient Boosting (XGBoost) algorithm. The XGBoost is a powerful predictor if optimized correctly. Hyperparameters are optimized by an improved version of the Crayfish Optimization Algorithm (COA) hybridized with the Genetic Algorithm (GA). The proposed solution is tested against highperforming metaheuristics in which it achieved favorable performance.

**Keywords:** sql injection · swarm intelligence · coa · natural language processing · BERT · XGBoost

# Clinical Manifestations of Hereditary Angioedema A Systematic Review of Treatment Options

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**Abstract:** Hereditary Angioedema (HAE), a rare genetic disorder characterized by unpredictable swelling, poses significant challenges for affected individuals. This study addresses the limitations in early detection and effective management of HAE attacks through the development of a groundbreaking solution – the HAE Attack Detector Bracelet. The bracelet combines advanced sensor technology with secure data storage, aiming to improve patient outcomes and overall quality of life. The research objectives encompass the creation of a functional model with accurate attack detection, robust data security measures, and compliance with healthcare regulations. Motivated by the potential to empower patients and enhance well-being, the literature review explores the conceptual foundations and technological advances in HAE management. The methodology outlines a comprehensive research approach, emphasizing the importance of user training, continuous monitoring, and collaboration with healthcare providers. The implementation details the key components, from sensors and microcontrollers to encryption and power management, ensuring a secure and user-friendly device. Physical design prioritizes comfort, inconspicuous monitoring, and adaptability to diverse user needs. This study aims to bridge existing gaps in HAE management, offering a holistic approach to early detection, treatment planning, and patient empowerment through the innovative HAE Attack Detector Bracelet.

**Keywords:** Hereditary Angioedema (HAE), Emergency medical attention, HAE Attack Detector Bracelet, HAE attacks, Quality of life.