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2025 Research Symposium

Multidisciplinary Solutions with AI in the Digital Age:
Connecting Technology, Business and Society

14 April 2025

Message from the Pro-Vice Chancellor and Director

Dear Colleagues, Students, and Research Collaborators,

I welcome you to the 2025 Research Symposium: Multidisciplinary Solutions with AI in the Digital Age: Connecting Technology, Business, and Society. Hosting this gathering and witnessing our MDX community come together to share and discuss cutting-edge research is always a privilege.

This year's symposium features 24 papers presented across two tracks, all showcasing innovative findings and technologies shaping our future. As we explore the intersection of technology, business, and society, I hope these abstracts will serve as a foundation for full conference papers or academic journal articles. I want to remind everyone that we will be hosting two international conferences on campus in the coming months. I encourage you to consider these opportunities to disseminate your work further and engage with a broader audience. The ShiftXchange Conference is scheduled for 1, 2 and 3 September 2025. Building on the success of the 2024 conference, it aims to attract a diverse range of presenters and participants from around the globe, along with an engaging audience. This year, the conference will once again feature thought-provoking workshops. In addition to full research papers presented in parallel sessions, it will include poster presentations and open mic sessions. During these open mic sessions, presenters can introduce their research projects or works-in-progress, fostering scholarly conversations in a "round table" format that encourages idea generation and allows for diverse perspectives. The conference theme is 'Leading with Purpose: Sustainable Practices for a Resilient Future'. The Absa Business Ethics Network Conference will take place on 6 and 7 November, and the theme is 'Innovative Technologies, Friend or Foe? Reflecting on Governance and Ethics.'

We offer the symposium and conferences to engage in meaningful discussions and connect with your peers and colleagues. For presenters, this is a time to share their work and to get constructive feedback to shape the direction of their projects. Academics need to conduct research and disseminate their findings, as this not only advances knowledge in their fields but also contributes to the betterment of society. According to the National Science Foundation, nearly 90% of innovations in the U.S. economy are driven by research conducted in academic institutions, underscoring the profound impact of scholarly work on real-world applications.

Thank you to all the participants and the Research and Knowledge Transfer Committee for your invaluable efforts in making this symposium possible. Your commitment is what drives the success of our event. I wish you a productive and inspiring experience. May you leave this gathering with new ideas and a renewed passion for our vision to transform outcomes and futures for individual students and for the communities in which we are embedded.

Prof. Mari Jansen Van Rensburg
Pro Vice-Chancellor, Middlesex University
Director, Middlesex University Mauritius

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Can AI Make Us More Generous? Proposing AI-Driven Message Framing in Charity Advertisements

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Purpose: The charitable sector is increasingly competitive globally, particularly for causes like domestic violence (Charities Aid Foundation, 2022; Immordino et al., 2020, Sung et al., 2023). An alarming decline in charity giving was noted in developing nations such as Mauritius from 2017 to 2021 (CAF World Giving Index, 2022). This situation highlights the critical need for effective marketing strategies to address societal challenges. Building on prospect theory (Kahneman and Tversky, 1979), which examines decision-making under risk, and social role theory (Eagly and Crowley, 1986) which explores gendered helping behaviours, the study investigates the impact of positive (i.e., hope) versus negative (i.e., disgust) message framing on donation behaviors, focusing on the moderating role of victim gender.

Methodology: A quantitative approach was used to investigate the efficacy of emotional message framing on donation behaviors through a between-subject online experiment. A 2 (disgust: low/high) x 2 (hope: low/high) x 2 (gender of victim: male/female) experimental design was employed. Participants in the experimental group were exposed to one of eight advertisements, each varying in emotional framing and victim portrayal, and indicated their donation via click counts. Then, they completed a survey, assessing their donation behaviours. A control group completed the survey without seeing any advertisement, ensuring internal validity. A total of 388 participants randomly assigned to control (n=123) and experimental (n=265) groups attempted the survey, ensuring a robust comparison for internal validity.

Findings: From the website database, 51.2% (n=213) of participants chose to donate, while 48.8% (n=203) did not. Among donors, 54.5% (n=116) responded to disgust-framed messages compared to 45.5% (n=97) hope-framed messages. This finding highlights the stronger impact of loss/negative framing, compared to gain-framing, as supported by literature (Chung and Lee, 2019; Yousef et al., 2022). Survey results, further, emphasised the importance of message framing and gender portrayal. Of the 140 donors, high-disgust advert featuring male victim (n=26) and high-hope advert portraying female survivor (n=25) were most effective. Conversely, among the 124 non-donors, low-hope advert featuring female survivor (n=21) and high-hope advert with male survivor (n=20) were the most disengaging.

Discussions: This study enhances literature by integrating prospect theory and social role theory in the context of emotional message framing and charitable giving. Findings suggest that charities can optimise donation campaigns by aligning message framing with societal perceptions of vulnerability. However, subjective emotional perception among audiences was evident, with participants interpreting low-intensity messages as high-intensity. Given these variances, Ai-driven strategies such as microtargeting (Lv and Huang, 2024) and predictive analytics (Arango et al., 2023) could refine

charity advertising efforts. Ai-powered behavioural analysis can forecast the most effective emotional framing (positive v/s negative) for specific donor profiles, by analysing their historical engagement, emotional responses and digital interaction patterns (Lakshika et al., 2024). Moreover, Ai-based adaptive messaging can personalise advert intensity in real-time, while minimising donor fatigue and negative psychological effects (Simchon et al., 2024). Future research should empirically assess the ethical implications of Ai-powered charity advertising, focusing on transparency, fairness and responsible personalisation, to prevent unintended persuasion effects (Baek et al., 2022; Sands et al., 2025).

Keywords: Message framing; Charity Donation; AI Advertising

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The Stress You Don't See Yet: Exploring Anticipatory AI Stress Beyond Job Demands and the Buffering Roles of Transformational Leadership and Hope

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Purpose of the Research: The rapid integration of Artificial Intelligence (AI) across industries is transforming workplace dynamics and operational processes. While technological advancements offer notable efficiencies, they are also introducing heightened psychological demands on employees. Notably, anticipatory stress, triggered by the fear of potential job displacement or the need to adapt to AI systems, has emerged as a key concern. A recent survey by the American Psychological Association (2023) found that two-thirds of employees reported stress or burnout linked to AI-related anxieties. Though the Job Demands-Resources (JD-R) model (Bakker and Demerouti, 2007) has long explained the interplay between job demands and resources in influencing burnout and engagement, it has not adequately addressed future-oriented stressors such as AI-driven uncertainty. The OECD (2025) has also highlighted the pressing need for adaptable governance mechanisms to manage technological change. This study proposes that anticipatory AI stress acts as a latent job demand that contributes significantly to burnout and seeks to examine whether this effect is moderated by Psychological Capital (PsyCap), particularly the HOPE dimension, and enhanced by Transformational Leadership.

Methodology: This study will adopt a primary research approach to explore how employees perceive and respond to anticipatory stress associated with the growing influence of AI in their professional roles. Quantitative data will be gathered through an online survey targeting employees from various sectors undergoing significant digital transformation, including finance, logistics and customer services. Grounded in the Job Demands-Resources model, the research aims to examine the potential role of psychological capital, particularly hope and transformational leadership in shaping how employees cope with the demands posed by AI disruption. This approach will offer insights into how individuals and organizations can navigate the psychological demands of digital transformation more effectively. The framework will also incorporate recommendations from Schaufeli (2021), Luthans et al. (2023), and Zhao et al. (2024), integrating both personal and leadership resources within the JD-R model.

Expected Contributions: As an exploratory investigation, this study aims to identify how anticipatory AI stress operates as a latent job demand with implications for employee burnout and engagement. Grounded in the Job Demands-Resources (JD-R) framework, the research anticipates that such future-oriented stress will emerge as a critical psychological burden impacting workplace well-being. It further proposes that Psychological Capital, specifically the HOPE dimension, can serve as a personal coping resource, especially when complemented by the presence of Transformational Leadership. These dual buffering mechanisms are expected to moderate the impact of anticipatory AI stress by enhancing resilience and promoting positive work outcomes. These propositions echo the views of

Morandini et al. (2023) and Cheng (2024), who assert that employee interpretations of AI's workplace impact strongly influence levels of burnout and engagement. Additionally, incorporating the theory of self-fulfilling prophecy (Broussard, 2025) offers a novel lens to understand how employees' fears of AI disruption might lead to behavioural changes that reinforce those fears, ultimately shaping outcomes in the workplace. Overall, this study is expected to contribute to both theory and practice by enriching the JD-R model with anticipatory stress constructs and providing actionable insights for organizations seeking to foster resilience amid AI-driven change.

Keywords: Anticipatory stress; PsyCap HOPE; Transformational leadership

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Staff Perspectives on University Students' Experiences of Psychological Distress

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The higher education landscape in Mauritius is a unique one due to many international universities having mushroomed over the past decade or more as satellite campuses on the island. Emerging adults comprise the majority of the student population at university and they are at an age which makes them particular vulnerable to developing mental health issues. Even though over the past two decades international research has revealed that university students' wellbeing has been declining worldwide, little is known about the prevalence rates as well as manifestations of student psychological distress locally, suggesting an important line of inquiry for research on the phenomenon.

Cases of distress have been observed within the current university where this research is being conducted. A case study approach to conducting research was undertaken to gain the perspectives of different members of the university community about their understanding or experiences of student psychological distress. Staff, existing students and alumni took part in the research.

University staff have regular contact with students and were deemed an important source of insight in potentially understanding the causes and indicators of student distress. Hence, both administrative and academic staff took part in three semi-structured focus group interviews as part of the overarching data collection process to gather their insights on the topic under investigation. A total of sixteen staff members took part in the interviews. Each focus group interview lasted about two hours. To explore and interpret staff's perspectives, a thematic analysis was conducted. Five main themes and nine subthemes were generated following analysis of the data collected. The main themes were 'Causes of psychological distress', 'Perceived signs of psychological distress', 'Potential consequences of unaddressed distress', 'Support' and 'Recommendations for promoting student mental health'. Key findings feed into future recommendations aimed at supporting students' mental health and alleviating distress.

Keywords: Staff Perspectives; Student Psychological Distress; Thematic Analysis

Exploring Quality Model Tools for Intelligent Environments: Initial Findings

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During the development of Intelligent Environments (IEs), ensuring that the requirements are context-specific and maintaining the quality of the systems throughout the development lifecycle involves a structured and iterative approach. Given that these systems include critical areas such as healthcare, home automation, assisted living, agriculture, among others, thereby playing a pivotal role for e.g., in advancing operational efficiency, improving quality of life, and fostering innovation across these diverse fields.

Although robust frameworks and strategies now exist to assess the quality of the systems, during or after development, tools to support developers in these stages remain scarce. Recent work by Santokhee et al. (2024) showcased a comprehensive framework specifically tailored for IEs with a quality-in-use model. Limitations however include reliance on manual calculations (mostly using spreadsheets), prolonged development stages, and lack of visualisation over progress mirroring field-wide automation gaps. Pointing towards a potential tool to automate the task.

There are existing tools that assist in development of these systems by assisting developers in different phases of the software lifecycle (e.g., requirement analysis, development, testing, validation, and evaluation). However, most fall short with no integration of quality models. Other limitations identified with current research is the heavy focus on proposing solutions and theoretical frameworks, while tools, metrics, and process enhancements tend to be overlooked. Adoption of these tools in industry is also questionable with limited empirical research on quality aspects.

The initial findings suggest new avenues for research, particularly the need for automation in the form of a tool for evaluation processes to improve framework applicability, efficiency, and overall reliability.

Keywords: Intelligent Environments; Quality Model; Developer-Centric Tool

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The Use of AI in Financial Audit: Its legal and Ethical Implications. A Case for Mauritius

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Purpose: The integration of AI in financial audit shows an increase in audit efficiency and a reduction in human errors through the evolution of manual data collection in audit to automation. The aim of this study is to explore the integration of Artificial Intelligence (AI) in financial auditing, focusing on the benefits, challenges and potential reforms.

Methodology: The research would employ a mixed-method approach, from integrating qualitative insights from interviews with auditing professionals to a comprehensive literature review to comparing the practices in different jurisdictions.

Findings: AI-driven auditing tools improve risk assessment and provide real-time financial insights through data analytics. Nonetheless, the study highlights the ethical concerns with such AI practices. For instance, algorithmic bias is an alarming concern as this may lead to an inaccurate audit outcome. Transparency and accountability are the cornerstone of good audit practice. Traditional audit processes rely on professional judgement, while AI-driven audits present the ability of auditors to justify their findings, leading to possible ethical dilemmas.

From the legal aspect, AI-driven audits must comply with financial regulations, data protection laws and international audit standards. Since financial audit involves the handling of sensitive data, especially in governmental institutions such as the National Audit Offices, there are concerns regarding data security and confidentiality. The legal uncertainties in relation to compliance with regulatory frameworks and data protection policies are discussed. Moreover, the ethical challenges are linked to the auditor's independence and professional judgment. While audit profession is built on principles of fairness, accountability and transparency, the use of AI raises questions about whether auditors can maintain ethical obligations when relying on AI systems.

Despite these concerns, the study concludes that AI has a strong potential to transform the conduct of audit practices. The legal and ethical barriers can be addressed through targeted reforms. One such reform is the implementation of training programs to professional auditors on the use of AI-driven audit tools, the setting up of regulatory frameworks on data protection and compliance with financial regulations. The ethical barriers can be addressed through the introduction of specific guidelines to improve transparency and accountability in AI audit processes.

Research limitation: Due to the rapid evolution of AI technologies and regulatory landscape may have an impact on the long-term application of findings.

Keywords: Artificial Intelligence; Financial Audit; Legal and Ethics

AI-Driven Enhancements in Commercial Arbitration: Multidisciplinary Solutions for Efficiency and Fairness in the Digital Age

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Arbitration has become the preferred mechanism for resolving disputes, especially in the commercial arbitral process, due to its efficiency, flexibility, and enforceability. As businesses operate in increasingly digital and interconnected markets, the need for streamlined dispute-resolution mechanisms has grown. This research examines the effectiveness of commercial arbitration in the digital age, focusing on how artificial intelligence (AI) is transforming arbitral procedures to enhance efficiency, fairness, and accessibility. The study explores the role of AI in automating legal research, optimizing case management, and reducing procedural delays, thereby reinforcing arbitration's value for businesses (Katsh & Rabinovich-Einy, 2017).

The study considers key arbitral institutions, including the London Court of International Arbitration (LCIA) and the International Chamber of Commerce (ICC), assessing how they integrate AI-driven tools to improve arbitration processes. AI applications such as predictive analytics, automated document review, and data-driven decision-making are increasingly shaping commercial arbitration, making dispute resolution faster and more cost-effective (Susskind, 2020). By leveraging AI-powered platforms, arbitral institutions can provide more transparent and consistent rulings, helping businesses resolve disputes with greater certainty (Wahab, Katsh & Rainey, 2021).

A comparative law methodology is employed to analyze the impact of AI in commercial arbitration, examining case studies and institutional practices across two key jurisdictions namely UK and France. Comparative law serves as a critical tool in this research, enabling a structured evaluation of the way different legal frameworks approach AI integration in arbitration. By comparing the London Court of International Arbitration (LCIA) and the International Chamber of Commerce (ICC), this study identifies key differences and similarities in how these institutions utilize AI-driven tools to streamline proceedings, optimize arbitrator selection, and enhance procedural fairness (LCIA, 2023; ICC, 2023).
The comparative analysis not only examines procedural efficiencies but also assesses the legal and ethical considerations surrounding AI in arbitration. As highlighted by the LCIA (2023), AI-powered tools have significantly enhanced procedural efficiency by automating case management and improving document review processes. Similarly, the ICC (2023) emphasizes the role of AI in facilitating more objective arbitrator appointments through data-driven selection mechanisms. However, both institutions acknowledge the challenges posed by AI, including the risks of algorithmic bias, data privacy concerns, and the reduction of human oversight in decision-making (LCIA, 2023; ICC, 2023).

Through an evaluation of LCIA and ICC regulations, this research examines how these institutions have developed regulatory approaches and institutional safeguards to mitigate these risks. The LCIA (2023) highlights its commitment to ensuring transparency in AI-driven processes, while the ICC (2023)

focuses on the need for continuous human oversight to prevent undue reliance on AI-generated decisions. By adopting a comparative law approach, this study contributes to a deeper understanding of how AI is reshaping international arbitration, offering insights into the evolving role of technology in legal adjudication and identifying best practices for its responsible implementation.

Findings suggest that AI integration significantly enhances the efficiency of commercial arbitration, reducing case backlog, improving contract analysis, and lowering dispute resolution costs. Businesses benefit from faster settlements, while arbitral institutions gain from improved procedural consistency and accessibility (Katsh & Rabinovich-Einy, 2017). However, the digital divide, ethical risks, and regulatory uncertainties must be addressed to ensure responsible AI adoption in arbitration.

In conclusion, arbitration continues to be a crucial dispute-resolution mechanism in commercial contexts. By incorporating AI into commercial arbitration, businesses can resolve disputes more effectively, fostering economic stability and confidence in global trade. Future research could explore AI's role in further refining arbitral award enforcement and expanding digital arbitration frameworks in emerging markets.

Keywords: AI in Arbitration; Commercial Arbitration; LCIA; ICC

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A Critical Analysis of the Legal Framework Regulating the Use of Artificial Intelligence: A Case Study for Mauritius

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Artificial Intelligence (AI) is increasingly pervasive across sectors, in many countries including Mauritius, transforming industries and redefining conventional practices. Its application spans from assisting individuals in daily tasks to supporting professionals, such as legal practitioners and journalists, in complex decision-making processes. While AI facilitates efficiency and innovation, it simultaneously raises profound ethical and legal concerns. For instance, legal professionals may rely on AI tools to search case law, draft legal opinions, or develop legal strategies—raising critical questions about liability in cases of erroneous decisions based on AI-generated outputs. Similarly, the use of AI by journalists and students for content generation poses issues related to authorship, plagiarism, and academic dishonesty. A proper legal framework will help to solve these legal issues related to liability, data protection, intellectual property, public safety or human rights.

The regulation of AI remains inherently challenging due to the ambiguity surrounding its definition, the rapid pace of technological advancement, and conflicting stakeholder perspectives. There have been different approaches to regulating AI, for example, Horizontal v/s Vertical regulation, Risk based regulation, Ethics based principles, rule-based regulation, co-regulation approach, industry-led regulation or sandboxing regulation. This research will first employ doctrinal legal research methodology, which will involve a critical analysis of the different regulatory approaches described above, the most relevant laws concerned and the enforcement mechanism. A country need not rely on a single regulatory approach for AI but should instead adopt those that best suit its specific context. While it is essential to establish a robust legal framework that safeguards the rights of all stakeholders, care must be taken to avoid overregulation that could hinder AI innovation and development.

The second phase of the research will adopt an empirical approach grounded in socio-legal methodology, with Mauritius serving as the case study. Notably, Mauritius was the first African nation to adopt a national AI strategy in 2018. In 2021, the country also endorsed UNESCO's Recommendations on the Ethics of Artificial Intelligence, reaffirming its commitment to responsible AI governance. Further demonstrating its proactive stance, the Ministry of Information Technology, Communication, and Innovation, in collaboration with the Mauritius Emerging Technology Council, hosted an AI Summit under the auspices of UNESCO in May 2024. Mauritius has shown a clear intent to foster a conducive environment for the advancement of emerging technologies such as AI. For instance, the Financial Services (Robotic and Artificial Intelligence Enabled Advisory Services) Rules 2021, enacted by the Financial Services Commission, represents a regulatory step forward. However, numerous legal challenges remain unaddressed. To explore the most contextually appropriate regulatory approach, this stage will involve a series of semi-structured interviews. Initially, AI experts will be consulted, followed by legal professionals, and subsequently, representatives from the relevant ministries and regulatory bodies. Their insights will be critically analysed to identify which of the regulatory models discussed in the first stage of the research are most suitable for addressing the legal

gaps in Mauritius. Based on the findings, concrete recommendations will be developed to enhance the country's legal framework for AI governance.

Keywords: Artificial Intelligence Regulation, Legal Framework, Ethics, Mauritius.

Empowering Ethical Use of Generative AI: Addressing Academic Integrity and AI Literacy in Higher Education

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The rapid integration of Generative AI (GenAI) tools into academic writing has transformed student engagement with coursework, raising opportunities and challenges. While these tools provide efficiency and language support (Su & Yang, 2023), they also present risks such as fabricated references, oversimplified content, and ethical concerns (Lubowitz, 2023). To uphold academic integrity and ensure students critically engage with AI-generated content, universities must establish clear guidelines and educational interventions (Kim, Yu, Detrick, & Li, 2024).

In alignment with Middlesex University's revised Academic Integrity Policy—which defines the 'unauthorized use of artificial intelligence in a piece of work submitted for grading' as academic misconduct (Middlesex University, 2024)—this study explores how interactive academic support initiatives can enhance students' understanding of the responsible use of GenAI. The Learning Enhancement Team (LET) at Middlesex University Mauritius is implementing various awareness-driven activities, including an instructional video, workshops, and interactive table sessions incorporating quizzes, exercises, and a scavenger hunt to engage students in discussions on AI ethics and academic integrity.

To evaluate the effectiveness of these interventions, this study will employ a mixed-methods approach, collecting data through a survey questionnaire administered to students participating in the academic support sessions. The survey will assess students' perceptions of GenAI, their understanding of its ethical use, and the impact of interactive activities on their ability to critically assess AI-generated content. Both quantitative and qualitative data will be analyzed to identify key trends and areas requiring further educational support.

Findings from the study will provide insights into student attitudes toward AI in academic writing and the effectiveness of pedagogical strategies aimed at fostering ethical engagement with GenAI tools. The results will contribute to ongoing discussions on integrating AI literacy into higher education curricula and inform future institutional policies on AI governance. This research aims to offer evidence-based recommendations on how universities can balance innovation with academic integrity in the digital age.

Keywords: Generative AI in Education; Academic Integrity; AI Literacy

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Taste the Future: Go Green with AI in your Kitchen

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Food wastage is a significant global issue, impacting the environment, economy, and food security (Gustavsson et al, 2011). In the United States, over one-third of the food produced is never consumed, resulting in the waste of resources used in its production and leading to various environmental consequences. The annual market value of food loss and waste (FLW) in the US is estimated to be $408 billion. Households contribute approximately 43% of total food waste, amounting to around 60 million tons each year (Kenny et al, 2021). In Australia, $19.3 billion is attributed specifically to household food waste(FIAL,2021). Similarly, Europe faces a substantial challenge, generating 59.2 million tonnes of food waste, with household waste accounting for 54% of this total (Eurostat, 2024).

Environmentally, decomposing food waste in landfills produces methane, a potent greenhouse gas, contributing to climate change (Parfitt et al, 2020). Socially, food waste exacerbates food insecurity, as perfectly edible food is discarded while millions suffer from hunger (Stangherlin et al., 2020). Addressing food waste can thus enhance sustainability, improve food security, and foster economic efficiency. In response to this pressing issue, Governments are implementing various strategies, including educational campaigns, food recovery initiatives, and legislative actions aimed at reducing food waste (Akkerman et al., 2024). Research indicates that consumers who do not use a grocery list are more susceptible to making impulse purchases. This absence of a predefined list often results in shoppers exceeding their budgets, as they tend to buy more items instead of concentrating solely on essentials (Di Talia et al., 2018).

In today's households, where smartphones are prevalent, it's beneficial to leverage this technology to our advantage (Statista). Our objective is to create a mobile application dedicated to managing pantry inventory, which will help reduce food waste. This pantry-app will alert users about items approaching their expiration dates and offer AI-generated recipe suggestions based on the ingredients they already have at home. Additionally, it will generate a grocery list derived from the pantry inventory, assisting households in budgeting more effectively and contributing to a greener sustainable economy.

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FinWise - Enhancing Financial Literacy through AI-Powered Advisory and Investment Tools

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Finance broadly refers to the study of resource allocation, considering legal frameworks, economic conditions, and accounting principles. In Mauritius, with a population of 1.23 million (Government of Mauritius, 2022), a significant youth demographic accentuates the need for financial literacy. As technology transforms financial transactions, educating youth on responsible money management is crucial. A World Economic Forum (2024) survey found that only 50% of U.S. citizens are financially literate, highlighting the need for greater awareness. Financial literacy becomes an essential competency enabling individuals to effectively allocate resources while considering their financial goals and long-term security.

Finance encompasses a variety of activities including lending, borrowing, hedging, investing, and trading securities. Each activity comprises financial instruments which aids in achieving specific financial goals and needs of an individual, corporate entities or the government (Brunnermeier et al., 2021). With evolving economies, new financial instruments emerge, making financial literacy imperative. Several existing solutions cater to financial management and literacy, each with unique features. Credit Karma, owned by Intuit, provides tools for managing credit, finances, and spending (Credit Karma, n.d.). Cleo offers AI-powered personalized financial insights through an engaging conversational interface (Cleo, n.d.). Mint, a widely used financial app, features a comprehensive spend analyzer to help users track expenses efficiently. Zogo offers a gamified approach to financial education, making learning more interactive and rewarding (Zogo, n.d.). These apps have enhanced users' ability to manage their finances better by encouraging better budgeting, spend analysis, and credit control. However, they rely on traditional financial models, which may not fully adapt to modern financial trends. The integration of AI can bridge this gap, enabling real-time financial trend analysis, new investment opportunities, and predictive analytics.

From these gaps and opportunities identified, this project aims to develop an inclusive solution to enhance financial literacy. Beyond financial education, the proposed solution will function as a virtual financial advisor, offering tailored recommendations on investment options based on factors such as spending patterns, earnings, and risk tolerance. Investment options will be classified by risk, returns, liquidity, and duration, ensuring accessibility for users with varying financial goals. The proposed application will integrate AI-driven analytics to monitor transactions, classify expenditures, and generate insights on financial behavior. Additionally, features such as a spend analyzer, automated tax estimations, and a credit score calculator will be incorporated to improve financial decision-making.

For future work, the application could introduce a unified credit card management system, allowing users to track multiple credit cards from different banks in a single dashboard. Real-time spending

analytics, predictive financial modeling, and blockchain integration for secure transactions and tokenized assets could further strengthen financial literacy efforts. By using AI, the application will analyze transaction narrations, timestamps, expense categories, and recurring income sources to identify spending patterns, detect impulsive purchases, and recommend budgeting strategies (Cao, 2023). A supervised learning algorithm will be employed to analyze historical data and forecast future spending trends, empowering users with proactive financial insights.

In conclusion, integrating AI-driven analytics and blockchain technology into financial literacy tools can revolutionize personal finance management. By equipping users with advanced tools for responsible financial behavior, the proposed solution aims to improve wealth management, promote economic stability, and contribute to a financially literate society.

Keywords: Financial Literacy; Financial Instruments; Investment Advisory; Artificial Intelligence (AI); Predictive Analytics; Blockchain Technology

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AI-Powered Stock Trading Platform for Predicting Market Trends

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Predicting market trends and optimizing investment strategies is a critical skill for individuals and businesses looking to maximise individual portfolio growth and profits. Traditional methods often fall short of capturing the complexity and dynamics of modern financial markets, leading to inefficiencies and suboptimal returns.

To address these limitations, this paper presents the development of an AI-powered platform that aims to provide investors with insights and a curated list of profitable stock picks for the upcoming month. By leveraging machine learning, this platform aims to aid investment decision-making and improve returns on investments while reducing user effort.

Early evaluations suggest that AI-driven platforms outperform traditional approaches in identifying high-potential stocks, reducing risk, and improving the consistency of returns. The platform's design integrates with modern predictive models (Linear Regression, Time Series, XGBoost), which use supervised machine learning techniques (built in Python) to analyse historical equity market data, identify patterns, and predict future trends. To ensure its reliability and adaptability, extensive testing and iterative analysis will be conducted as the platform evolves.

Data will be systematically collected for each month, consisting of historical stock prices, technical indicators, and variables which are calculated using the available data to improve model accuracy and robustness. The platform is designed to be user-friendly to enhance accessibility. The front end will be built using standard HTML and Bootstrap for styling.

The platform's core features are complemented by an emphasis on transparency in AI predictions. It builds user trust by providing users with graphical representation of past performance in comparison to traditional investment options such as the S&P 500, as well as portfolio growth for an investor utilising the platform. The machine learning model outputs will be uploaded to a MongoDB Database, which will also contain past model performance and the portfolio growth metrics, which will be displayed on the frontend using Node.js. Ultimately, this platform serves as a guide to the public, allowing for better-educated stock decisions to help build financial literacy and provide a better quality of life to those using it.

Keywords: Predictive Models; Investment Optimization; Stock Market

CuraBlock: A Blockchain-Based Healthcare Management System

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Healthcare data security is paramount in ensuring patient privacy, regulatory compliance, and the integrity of medical records. However, traditional Electronic Health Record (EHR) systems face significant challenges, including data breaches, unauthorized access, and interoperability issues, compromising patient trust and healthcare efficiency. To address this, CuraBlock, a blockchain-based healthcare management system, is proposed to enhance data security, transparency, and interoperability. By leveraging blockchain technology, the system ensures that medical records are tamper-proof and accessible only to authorized users, reducing risks associated with centralized data storage.

The system is built on Ethereum, incorporating smart contracts for role-based access control (RBAC) to regulate data access between patients and healthcare providers. To improve scalability, an InterPlanetary File System (IPFS) model is used for off-chain storage, with cryptographic hashes stored on-chain for verification. The front end is developed using React, while a Node.js-based backend interacts with the blockchain network. Agile development methodologies ensure iterative refinement and adaptability to evolving security needs.

As the system is still being developed, a structured plan has been designed to assess its effectiveness once implemented. This plan includes expert review, security validation, and performance testing. Healthcare professionals will evaluate usability and workflow integration, while security assessments validate access control, data integrity, and compliance with GDPR and HIPAA. Performance tests will measure throughput, transaction speed, and scalability under high demand to ensure reliability in real-world deployment.

Key findings indicate that blockchain enhances data security, patient privacy, and healthcare interoperability. Decentralizing data management eliminates single points of failure, reducing cyberattack risks. Smart contracts ensure seamless and automated access control, improving workflow efficiency. Additionally, the system aligns with global health data regulations, empowering patients with greater control over their medical records.

CuraBlock provides a secure, decentralized, and scalable solution to EHR management challenges. Rigorous evaluation ensures compliance with industry standards and optimized system performance. As blockchain adoption grows, CuraBlock demonstrates its potential to streamline healthcare operations and reinforce trust in digital records.

Keywords: Blockchain; Healthcare Management; Data Security

A Critical Comparison of Tools for Detecting AI-Generated Text in Multilingual Settings

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The rapid advancement of generative Artificial Intelligence (Gen-AI) technologies has led to the increasing prevalence of AI-generated text across various domains, raising significant concerns regarding authenticity, academic integrity, and misinformation. The rise of large-scale language models has further blurred the distinction between AI-generated and human-written content. This has led to growing concerns about authenticity, credibility, and intellectual property rights (Solaiman et al., 2019). For instance, within academic settings, AI-generated text can be used to produce essays, research papers, and other assignments, potentially leading to academic dishonesty. A recent survey found that, 50% of university students have used AI generated text in some form for coursework (Johnston et al., 2024). In journalism and media, AI-generated fake news articles can spread misinformation, undermining public trust in traditional media sources. Moreover, in cybersecurity, AI-generated phishing emails and automated scams pose a threat to individuals and organizations (Floridi & Chiriatti, 2020).

As such, as AI-generated text becomes more prevalent, the need for reliable detection tools has become critical. Without effective detection mechanisms, AI-generated content could be misused to manipulate public opinion, commit academic dishonesty, or produce misleading information (Birks and Clare, 2023). However, despite the growing number of AI detection tools, research has primarily focused on English-language AI detection, while other languages remain largely untested. To address this key issue, this study conducted a critical comparison of AI-generated text detection tools across four languages—Creole, Spanish, Hindi, and French—assessing their accuracy, reliability, and limitations. To achieve this, the study employed an experimental research methodology. A comparative evaluation was conducted using seven widely used detection tools, including Turnitin AI Detector and GPTZero. A dataset of 16 samples, comprising both AI-generated and human-written texts, was prepared and tested in all four languages.

The key findings reveal that most detection tools exhibited significant drops in accuracy when applied to non-English texts, with increased false positive and false negative rates, confirming concerns raised in earlier studies. The proposed solution was a structured comparative analysis framework which evaluated detection tools based on three core criteria which are accuracy, false positive rate, and false negative rate. This research contributes to the existing body of knowledge by addressing the multilingual detection gap and providing recommendations to improve the reliability of AI detection tools across diverse languages.

Keywords: Generative Artificial Intelligence (Gen – AI), Detection Tools, Multilingual Settings, Text Detection Accuracy, Comparative analysis

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Online Shopping Behaviour Analysis: A Study of Shopping Preferences and Behaviours Using Data Mining Techniques

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The rise of e-commerce has transformed consumer purchasing habits, making it vital for businesses to analyse online shopping behaviour. This study applies data mining techniques to examine consumer preferences, trends, and motivations, providing insights for retailers.

The research identifies key factors influencing online shopping, such as price sensitivity, trust, website usability, product recommendations, and psychological influences. Using large-scale datasets, it segments shoppers based on demographics and behavioural patterns. Techniques such as clustering (K-Means, DBSCAN), classification (Decision Trees, Random Forests), and association rule mining (Apriori Algorithm) uncover trends to enhance consumer targeting.

A core aspect of this study is MarketPulse, a web-based analytics platform that provides businesses with data-driven insights. It enables dataset uploads, generating reports and visualizations. MarketPulse integrates machine learning for real-time analysis, supporting decisions in pricing, inventory, and marketing.

The platform's backend uses FastAPI for high-performance API interactions, while the frontend is built with React.js for an intuitive experience. MarketPulse now utilizes Firebase Firestore, a NoSQL cloud database ensuring real-time data synchronization. Data visualization is powered by Plotly for interactive trend analysis.

Findings suggest that personalized recommendations, seasonal trends, and security concerns significantly impact online shopping. Real-time analytics improve customer engagement and loyalty, though challenges such as data privacy, model biases, and computational efficiency remain.

This research demonstrates how data mining and machine learning predict shopping behaviours, equipping businesses with tools to refine strategies and enhance customer satisfaction. Future work will expand predictive capabilities, refine real-time analytics, and ensure compliance with GDPR.

As e-commerce evolves, leveraging data-driven insights is crucial for businesses to meet changing consumer expectations. This study lays the groundwork for advancements in online shopping behaviour analysis, leading to more personalized and efficient digital shopping experiences.

Keywords: Online Shopping Behaviour; Consumer Analytics; Data Mining; Machine Learning; E-Commerce Insights

Reinforcement Learning for Traffic Light Control

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Background: Traffic congestion is a pressing challenge which affects transportation efficiency, economic growth, and the overall quality of life, especially in developing regions such as Mauritius. The rapid and constant growth of vehicle ownership worsens this issue, leading to longer travel times and increased delays (Investor's Mag, 2024). Moreover, traditional traffic light systems rely on fixed time schedules which lack the adaptability to respond to the ever-changing traffic patterns. This creates the need for a more dynamic and self-learning approach to traffic management.

Purpose: This study aims to develop and evaluate a Reinforcement Learning-based Traffic Signal Control System to address the shortcomings of conventional methods. The use of reinforcement learning can enable the system to dynamically adjust traffic signals based on real-time traffic conditions, enhancing traffic flow efficiency. While existing AI-based solutions, such as Adaptive Traffic Signal Control, Green Light Optimal Speed Advisory, and Smart Junctions offer some improvements, they require high implementation costs and extensive infrastructure requirements. Additionally, some systems are still dependent on past traffic data, making them less effective in managing live conditions. There is also the lack of a proper mechanism for communication with emergency vehicles, preventing their prioritisation and leading to slower emergency response times (Ayush Dodia et al., 2023).

Methodology: The proposed system integrates an agent trained using reinforcement learning in a simulation environment, using Simulation of Urban Mobility (SUMO) to create a traffic network for training and evaluation. The reinforcement learning agent is trained and tested across a variety of traffic scenarios, such as peak and off-peak hours, as well as the presence of emergency vehicles. Deep Q-Learning is employed to enable adaptive decision making, where the agent learns optimal signal timings based on real-time traffic conditions. The reward function is designed to evaluate the agent's effectiveness by taking factors such as wait times and traffic flow into consideration, with shorter delays at intersections as the reward. The system's performance will be evaluated based on model accuracy, reward effectiveness, adaptability and its efficiency compared to traditional and existing systems.

Expected Findings: The reinforcement learning-based traffic signal control system is expected to lower average vehicle wait time, shorten queue lengths at intersections and accurately adapt to varying traffic densities and flows. Additionally, it aims to properly handle the presence of emergency vehicles by dynamically adjusting signal timings. By employing comparative and visual analyses, the reinforcement learning system is expected to demonstrate improved performance over traditional fixed-time traffic control methods.

Keywords: Reinforcement Learning; Deep Q-Learning; Adaptive Traffic Management

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AI-Powered Plant Disease Detection

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This project focuses on the development of an AI-powered web application for the identification of plant diseases using Convolutional Neural Networks (CNNs) and computer vision techniques. The application aims to address the critical challenge of early and accurate plant disease detection, which is essential for mitigating crop losses and ensuring global food security. Traditional methods of disease identification, which rely on visual inspection and lab tests, are often slow, labor-intensive, and inaccessible to farmers in rural or underdeveloped regions.

The proposed solution leverages a fine-tuned ResNet50 model to classify diseases across four staple crops: potatoes, tomatoes, corn, and rice. The system processes user-uploaded images of plant leaves, providing real-time predictions along with detailed information about the detected disease, including symptoms, treatment recommendations, and preventive measures. The web-based platform is designed for accessibility, featuring an intuitive interface optimized for low-bandwidth environments and mobile devices.

Key deliverables include a high-accuracy deep learning model, a responsive web application, and a comprehensive disease database. The project follows the Agile methodology, ensuring iterative development and continuous improvement based on user feedback. Testing results demonstrate an overall accuracy of 87.2%, with performance varying by crop type (e.g., 91% for tomato diseases). Usability evaluations, conducted with farmers and agricultural experts, yielded a System Usability Scale (SUS) score of 82.4, indicating strong user satisfaction.

This project contributes to the field of precision agriculture by bridging the gap between advanced AI technologies and practical farming needs. It offers a scalable, cost-effective tool for farmers to make informed decisions, ultimately enhancing crop health and productivity. Future work includes expanding the model to support additional crops, integrating offline functionality, and localizing treatment recommendations for regional applicability.

Keywords: Plant Disease Detection; Convolutional Neural Networks (CNNs); Computer Vision; Deep Learning; Precision Agriculture; Web Application; ResNet50

Hybrid Predictive Similarity-Based Model for Drug-Drug Interactions

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In the healthcare industry, Drug-Drug Interactions (DDIs) are a common occurrence as a result of polypharmacy or the ingestion of multiple drugs, i.e., more than five drugs. A 2023 study found that 62.9% of potential DDIs occurred in a sample size of 377 patients (Hamadouk et al., 2023). DDIs can lead to various adverse effects, such as reduced drug efficacy, nausea, or even death. Combining drugs, however, has also proven to be beneficial when thoroughly researched; for instance, to achieve more effective results, the treatment for HIV, (HAART) is composed of 3 or more drugs depending on the patient.

To mitigate the detrimental side effects of drugs, numerous computational solutions based on similarity features have been developed during the last 15 years. However, most of the computational solutions are only focused on the prediction of DDIs and not the interpretability of results.

This research leverages data from DrugBank, PubChem, and KEGG databases to train a neural network-based DDI prediction model. The model will generate an initial prediction, which will be refined using PSL-based soft rules to filter out false positives, ensuring more reliable predictions. The effectiveness of this hybrid model will be evaluated using three performance metrics: area under the precision-recall curve (AUPR), area under the receiver operating characteristic curve (AUROC), and F1-score. Additionally, a user-friendly interface will be developed to present the results clearly to researchers and healthcare professionals.

By combining the high predictive accuracy of deep learning with the ability of PSL to improve interpretability, this study seeks to provide a more trustworthy computational tool for DDI prediction. The proposed hybrid approach is expected to enhance reliability and transparency, addressing a critical gap in existing computational models. These findings will contribute to developing safer, more interpretable AI-driven solutions for drug interaction analysis in healthcare.

Keywords: Drug-Drug Interaction; Machine Learning; Deep Learning

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Perfectionistic Traits, Procrastination Habits, and Academic Burnout among University Students in Mauritius

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Purpose: The dual model of perfectionism (Frost et al., 1990) defines two constructs of this trait: perfectionistic strivings (PS), commonly understood as the persistent motivation to perform better, and perfectionistic concerns (PC), which explains the excessive worrying and anxiety over making mistakes. Despite the extensive research carried out on these two constructs, there is still ongoing debates about how distinct these two constructs are from each other (Hill, 2016; Stoeber & Gaudreau, 2016). PS is commonly understood as being the adaptive component, while PC is seen as maladaptive. Previous studies have shown a strong link between perfectionistic traits and procrastination, such that students with adaptive perfectionism procrastinate less, while students with maladaptive perfectionism procrastinate more, because adaptive perfectionists set realistic goals and believe in themselves, while maladaptive perfectionists fear failing and doubt their abilities, causing them to delay their tasks (Huang et al., 2023). However, most studies have looked at procrastination as a passive process, which is the delay of tasks and activities leading to negative consequences. Yet, recent studies have distinguished another form of procrastination. Active procrastination, which is the intentional delay and effective time management under pressure, implypotential adaptive benefits (Chu & Choi, 2005). This study aims to investigate the dual model of perfectionism to determine whether PS and PC have distinct effects on active procrastination and burnout. It will also look into the role of active procrastination as a potential coping mechanism against burnout among digital native university students.

Methods: This study adopted a quantitative, cross-sectional approach. 100 university students aged between 18 and 25 years old were recruited to take part in an online, anonymous survey on Momentive. The online survey consisted of a battery of validated psychometric measures, namely Frost Multidimensional Perfectionism Scale (FMPS), the Active Procrastination Scale, the Academic Procrastination Scale, and the Maslach Burnout Inventory Student Survey. The variables measured were Perfectionistic Strivings, Perfectionistic Concerns, active procrastination and Burnout. The data will be analysed using partial and bivariate correlations, and multiple linear regressions.

Results: The findings are not yet known. However, based on our hypotheses, we anticipate that students who strive for perfection (with higher scores on PS construct) will engage more in active procrastination habits and experience less burnout effects, particularly more so when the effect of perfectionistic concerns (PC) is controlled. Additionally, we anticipate that students who strive for perfectionism (PS construct) will experience less burnout if they actively procrastinate, implying that active procrastination may serve as a protective factor against academic burnout.

Significance of the study: Digital natives are a population heavily influenced by digital technology (Kesharwani, 2019). By distinguishing between adaptive and maladaptive forms of procrastination, the study aims to shed light on how specific procrastination styles can serve as coping mechanisms for academic burnout among digital natives students with perfectionistic traits. Furthermore, the findings may influence interventions aimed at minimising the effects of perfectionism and burnout in university settings, particularly among digital natives who face particular challenges associated with digital connectedness.

Keywords: Perfectionism, Active Procrastination (AP), Burnout, Digital Natives.

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NeuroScan AI: A Web-based Application for Real Time Brain Tumour Classification using ResNet50 and VGG16

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Overview: Brain tumours are a significant public health problem. Due to the variation in tumour location, shape, and size, as well as the complex anatomy of the brain, identification and detection of brain tumours are very challenging. Traditional diagnostic methods, such as the visual interpretation of MRI scans, are time-consuming, prone to human error, and not always available in resource-poor areas. Considering this, there is growing interest in the application of artificial intelligence (AI) to enhance the precision and efficiency of diagnosing brain tumours. The latest breakthroughs in deep learning have uncovered opportunities in medical image analysis, including brain tumour classification and segmentation. This project, NeuroScan AI, proposes an innovative, web-based application that leverages deep learning tools to assist healthcare professionals in the real-time classification of brain tumours.

Purpose of the Research: The purpose of this research is to develop an accessible and user-friendly platform that utilizes advanced machine learning models. The program will classify brain cancers using machine learning models, specifically ResNet50 and VGG16. These models were selected due to their shown ability to classify images: VGG16 offers a robust architecture with excellent feature extraction capabilities (Mostafid, 2023), while ResNet50 excels at addressing the vanishing gradient problem while maintain a high accuracy in very deep networks (Arati, et al., 2025). In order to make the model's predictions easier to understand, the app will also use saliency maps to visually highlight areas of interest in MRI scans. To simulate the analysis of a skilled neurologist, a large language model (Gemini) will be incorporated into the app to offer explanations of the categorization result in natural language. The goal of this blend of explainability, visual interpretability, and AI-driven categorization is to close the gap between cutting-edge machine learning technologies and their suitability for use in clinical workflows.

Methodology/Design: The system will be implemented with focus on usability, accessibility, and real-time processing. Streamlit will be utilized to develop the frontend. This platform was chosen due to its simplicity, ease of rapid prototyping, and compatibility with other machine learning libraries. Pytorch is utilized for developing the pre-trained CNN models (ResNet50 and VGG16 model). This application will exploit the models proven good transfer learning and handling of complex image classification tasks.

Key Findings: For the evaluation of NeuroScan AI, Accuracy, Recall, Precision, and F1 Score will be analysed from the classification report, followed by an analysis of the confusion matrix on the test dataset. These provide an indication of the performance of the machine learning model and are important factors in determining the extent to which the application accurately classifies brain tumours.

Conclusions: NeuroScan AI offers a new platform for handling brain tumour diagnostics by bridging the gap between clinical knowledge and technical innovation. NeuroScan AI is meant to showcase the revolutionary potential of artificial intelligence (AI), as technology continues to change the healthcare environment with innovative solutions. This proposed solution has the ability to greatly enhance patient outcomes by resolving the shortcomings of current systems.

Keywords: Brain Tumour; Deep learning; Medical Imaging

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The Use of Explainable AI in the Classification and Prediction of ALS

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This research thesis aims to classify and predict ALS through the analysis of EMG and EMG signal graph. The purpose of this research is to classify and predict ALS from the few clinical invasive procedures that exist to diagnose and confirm all the while providing an explanation for the output generated by the AI models used. Of the few options, EMG is by far the only invaluable and critical diagnostic procedure coupled with Nerve Conduction Studies. EMG when interpreted by a physician can either confirm ALS, identify conditions that mimic ALS or along the spectrum of ALS or differentiate between diseases of myopathic origin and neurodegenerative conditions like ALS.

Electromyography (EMG) is a diagnostic test that measures muscle electrical activity through skin electrodes or needle electrodes meant to capture those signals. It records signals ranging from 0–30 mV which is the maximum action potential of a nerve, with individual motor unit action potentials around 500 µV. EMG graphs display signal amplitude, conduction velocity, and duration, helping to distinguish ALS which along with it being marked by abnormal spontaneous activity at rest is also commonly known to have fasciculations also a form of rapid twitching. Fasciculations are not exclusive to ALS but if suspicion of ALS is indeed present then fasciculations may appear and confirm the diagnosis and such is also viewable through an EMG.

My implementation revolves around the black box of AI and as such the models used have been incorporated with novel algorithms such as Grad Cam and Integrated Gradient. I am using two models, one for each type of data used. The EMG scores being a collection of EMG voltages with time are thus time specific and so an LSTM has been designed to classify the time steps and accompanying voltages most determinant to classify and predict ALS. For the XAI, I am using a fused Integrated Gradient with Attention layer which combines the gradient of the curve with the attention layer, representing the overlapping importance of the gradient relative to the overall input then permutation feature importance which assesses how shuffling each voltage alters the model's performance, thereby highlighting its importance and finally Counterfactual Explanations finding the smallest modifications to the input voltages that would change the model's prediction.

My CNN model utilizes Grad-CAM, Grad-CAM++, and Guided Grad-CAM to generate heatmaps that highlight the critical regions in the EMG graph revealing which areas contributed most to the model's decision. Through these implementations, my aim is to find a pattern regarding the voltages which are more representative of ALS by analyzing the determining voltages in the LSTM and comparing it to the graphs alongside the heatmaps generated to explain the spots which guided the output meanwhile bearing in mind that changes in action potential, innervations, muscle fibers polarization and depolarization are different for everyone. My findings are impeded by the lack of appropriate datasets and as such the models, although outputting key voltages, cannot conclusively identify viable patterns.

AI-Driven Web Portal for SME Business Listings, Reviews, and Consumer Insights in Mauritius

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Mauritius' Small and Medium Enterprises (SME) contributes around 40% to GDP and represents 54.6% of total employment, SMEs constitutes an important driver of growth. Over the last decade, this sector has established itself as a economic pillar with the Government supporting the vision to transform the SME sector by making more vibrant and resilient. However, most SMEs find themselves falling short of accessing economic value with the use of some (often disparate) digital tools, access to little or no insights provided by Artificial Intelligence, and high operational costs. To solve these problems, this project builds an integrated AI powered web portal specifically designed to improve the SME visibility, customer engagement and data driven making decisions.

The lack of a centralized, cost-effective platform which provides business listings review management and AI consumer analytics is what the problem is about. Today there are existing solutions in form of Google My Business or TripAdvisor that do nothing more than deliver isolated functionals but not supported by AI to create meaningful insights. Consequently, SMEs in Mauritius experience poor online visibility, inefficient customer feedback utilization, and reduced competitiveness. Topics of discussion are financial constraints, complex technologies, and different parts of a digital ecosystem. To address these gaps, the project designed and implemented a web portal using Agile methodology, ensuring iterative development and stakeholder feedback. The solution integrates React.js for a responsive frontend, Node.js and MongoDB for backend operations, and TensorFlow for AI models. Core features include:

- AI-driven sentiment analysis to categorize and derive insights from customer reviews.
- A recommendation system providing actionable strategies for business growth.
- A chatbot for 24/7 customer interaction and support.
- A user-friendly dashboard visualizing AI-generated analytics.
- Secure authentication and encrypted data storage to ensure privacy compliance.

This project developed an AI-driven web portal to help Mauritian SMEs enhance visibility, manage reviews, and gain consumer insights. The platform integrates React.js, Node.js, MongoDB, and TensorFlow to offer sentiment analysis, a recommendation engine, and a chatbot.

Evaluation includes: 1. Technical Testing – Unit/integration tests, AI model benchmarking (F1-score ≥0.85), and load testing (<2s response). 2. User Testing – SUS scores (≥75), NPS (≥40), and task success rates from 50 SME beta testers. 3. Business Impact – Tracked review volume, revenue growth (≥15% in 6 months), and time savings. 4. Security – Penetration tests confirmed GDPR compliance with zero critical vulnerabilities.

Keywords: Artificial Intelligence; Small Medium Enterprises, Digital Transformation.

Fine-Tuning Large Language Models for the Tanzanian NECTA Syllabus

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Purpose: The rapid evolution of artificial intelligence (AI), particularly large language models (LLMs), has the potential to transform education by enabling personalized learning and enhanced accessibility (Gros, 2016),(Husam et al, 2025), things that teachers teaching multiple students couldn't address effectively. However, existing LLMs aren't aligned with the Tanzanian national curricula. We would like to specialize LLMs specifically for the Tanzanian National Examinations Council (NECTA) syllabus using Low Rank Adaptation as well as some Retrieval-Augmented Generation methods, addressing the gap between AI content and state educational requirements.

Methodology:
1. Data Collection: Our training data will be created from NECTA-approved textbooks, past papers and notes to ensure curriculum alignment.
2. Model Fine-Tuning: The LLM will be fine-tuned using Low-Rank Adaptation and Retrieval-Augmented Generation. For areas with low internet connectivity, there will be a quantized variant (Renren et al.), ensuring 24x7 availability.
3. Pilot Testing: The model will be tested in selected Tanzanian schools, assessing usability and accuracy. After collecting feedback, we will make any necessary improvements and then initiate deployment in other schools.

This project is currently underway - we are in the process of getting No Objection Certificates from respective authors, and the NECTA board.This research anticipates that curriculum-aligned LLMs will significantly enhance personalized learning by analyzing individual performance to design specific materials for each student. Unlike existing LLMs, which often include irrelevant or hallucinated information, this specialized model ensures accurate, appropriate and curriculum-focused responses. As preliminary reference, we observed the finetuning of the DistilBERT model using the SQuAD dataset, from which we learnt how to fine-tune a model efficiently without having to retrain all parameters, the difficulties in training the models and realized the importance of well-formatted, high quality data.

Keywords: AI in education; fine-tuned LLMs; NECTA syllabus.

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Decentralized Finance (De-Fi) Application through Zero-Knowledge Proof

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Blockchain technology was first introduced in 1991 by researchers Stuart Haber and W. Scott Stornetta. The primary goal was to create a secure method for time-stamping digital documents to prevent tampering or misdating. Built on the principles of cryptography, this innovative technology laid the groundwork for the development of decentralized systems (Devi and Sharma, 2022). Many industries, including finance, real estate, technology, and politics, operate under conventional models of centralized power and authority. However, in certain cases, it becomes essential to prioritize users' freedom and right to choose. Empowering individuals with greater control and decision-making authority over their assets not only enhances transparency but also efficiency, and security in these systems.

Finance has always been a fundamental aspect of human survival, enabling individuals to meet their basic needs. Most financial institutions follow a centralized model, where power and authority are concentrated in the hands of top management. This structure grants them indirect control over client deposits, which are often allocated to various sectors such as long-term government bonds, corporate investments, and stock markets, typically without the depositors' knowledge or consent (Bennett, 2023). Blockchain with its peer-to-peer functionality and decentralization makes it an ideal technology to achieve this goal. Decentralized finance (DeFi) has leveraged the power of blockchain to offer lending, borrowing and transfer of cryptocurrencies without the need of any intermediaries. A variety of DeFi platforms have been developed over time each catering to specific gaps. Uniswap a leading decentralized exchange built on Ethereum blockchain allows users to trade ERC-20 tokens directly from their wallets using the automated market-making model (Uniswap, 2023). Aave is a DeFi platform for lending and borrowing, allowing depositors to earn interest and rewards on their crypto holdings. It also introduced flash loans, enabling instant, uncollateralized borrowing (Aave, 2023). Compound another popular DeFi platform allows users to supply assets to liquidity pools and earn interest for the same, while borrowers get direct access to tokens by providing collateral (Compound, 2023). MakerDAO, the protocol responsible for creation of DAI, a stablecoin pegged to the US dollar which is fully decentralized and collateralized by various assets deposited in the vault (MakerDAO, 2023). These platforms have enhanced users' ability to decentralize their finances. However, as blockchain and cryptocurrencies are novel and unconventional, educating users and developing a unified platform to cater to all their needs is essential.

This project aims to develop a platform that enables depositors to earn fair interest while providing borrowers with secure and transparent transactions. The web app seeks to create a unified platform for various financial activities, including staking, flash loans, lending, and borrowing. Implementation of zero-knowledge proof feature will allow transactions to remain confidential without compromising the security of the platform. For future development, the platform could incorporate features for

creating cryptocurrencies and tokens using different ERC standards (Miah, 2024), as well as asset tokenization, allowing users to own a proportionate share of high-value assets. Additionally, non-fungible tokens (NFTs) could enable users to create unique digital representations of irreplaceable assets such as licenses, transcripts, or agreements.

In conclusion, the platform empowers users with decentralized financial control, secure transactions, and future innovations like asset tokenization, fostering greater financial inclusion, transparency, and autonomy for diverse financial needs.

Keywords: Blockchain; Decentralization; Staking; Flash loans; ERC standards; Zero-knowledge proof; Tokenization

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The Role of Drones: A Technological Shift in Delivery and Logistics

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Today drones are considered the most advanced technology, it is drawing the attention of many businesses that want to solve logistical issues. In addition, experiments have been conducted by companies such as Amazon. The future of drones to deliver products to your doorstep will be actualised. Legislation is still under development to regulate drones in solving logistical issues. However, many issues must be solved before the realisation of drones flying overhead to deliver products to customers should not be long.

In America, major retailers like Amazon and Walmart are trying to Implement the world first Ariel delivery systems. Courier companies such as DHL are trying to apply this new phenomenon. In early September 2020, Amazon was approved by the Federal Aviation Administration (FAA) to start delivering drones as an air carrier. In addition, UPS have got the approval for drones to deliver goods and products to customers. Amazon have drone development centres in the UK, France, Austria, Israel. This sort of delivery method will require additional resources and support.

The use of drones in the logistic sector has gained interest among academics and practitioners. The industry and academia are undertaking exponential research to make drone delivery a commercial success. Drones used for logistics will provide advantageous factors such as, cost reduction and efficiency in logistics. However, they are challenges in its implementation phases including, government regulations, safety, environmental and economic issues make the future of using drones for logistical purposes uncertain. In addition, the lack of regulation should be solved, countries should allow the use of drones for commercial purposes.

Therefore, it is extremely important for governments to issue necessary regulations for improving drone delivery for logistics. Therefore, it is imperative to increase public awareness of the use of drones, however it is difficult to the change the status quo of many businesses. unless they fully adopt this modern technology. In order, to reduce the resistance in drone delivery, companies with a global reputation should increase their use in drones, this will create competitiveness and awareness among businesses out there to implement the use of drone on logistical processes.

Drone technology can change how businesses conduct customer transactions. The rise of E- commerce in recent years have experienced challenges such as higher costs and time of delivery. But, by using drone technology it has the potential to increase the effectiveness of logistical processes and timely deliveries. Companies should identify the potential problems to drone implementation and create solutions to overcome them. Governments around the world should embrace modern technology in order to transform the way, we conduct business.

Keywords: Drones, Logistics, Amazon, UPS, Cost Reduction, Efficiency, Aerial Delivery Systems, Government Regulations, Global Companies

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