4TH AFRICAN SYMPOSIUM ON BIG DATA, ANALYTICS AND MACHINE INTELLIGENCE AND 16TH TYAN INTERNATIONAL THEMATIC WORKSHOP

"DATA-DRIVEN AI FOR A SUSTAINABLE SOCIETY AND ECONOMY"

https://bigdataafricasymposium.org

Welcome Address
By the Organizing Chair, Professor Bolanle Ojokoh
Department of Information Systems, Federal University of Technology, Akure
Principal Investigator, ACTRG; Member, TWAS Young Affiliates Network (TYAN)

The Vice-Chancellor, distinguished guests, speakers, and participants, all protocols duly observed,

It is with immense pleasure and a profound sense of purpose that I welcome you all to the **4th African Symposium on Big Data, Analytics, and Machine Intelligence**, held alongside the **18th TYAN International Thematic Workshop**.

This year's theme, *"Data-Driven AI for a Sustainable Society and Economy,"* is both highly relevant and indispensable for tackling the intertwined challenges of development, equity, and sustainability that define our time—particularly across Africa and other regions of the Global South.

The African Symposium on Big Data was conceived during my tenure as an Executive Board Member of the TWAS Young Affiliates Network (TYAN), precisely in May 2018, at one of our meetings in Istanbul, Turkey. The idea was to create a platform that brings together young scientists across disciplines to harness their strengths and innovative potential in solving pressing challenges facing the Global South, while also building capacity and promoting collaboration.

The first edition of the symposium held in Akure in June 2019, drawing scientists from thirteen countries for in-person discussions on health, agriculture, and environmental sustainability. The second edition was hosted virtually in November 2020, attracting participants from over twenty countries. The third edition, held in 2024, focused on "Open Data Science and AI for Healthcare," with representation from fifteen countries.

Now in 2025, we are proud to host this 4th edition, with an expanded focus on how data-driven AI can propel sustainable development, inclusive innovation, and economic resilience across Africa and beyond. This year, the symposium welcomes participation from **fifteen countries**, with **six represented physically here in Akure**. Discussions will span a wide range of topics—from AI applications in finance, health, and national security to open data policies and ethical considerations.

A special feature of this year's event is the inclusion of conference proceedings, with outstanding presentations selected for publication in CEUR, further extending the reach and impact of the ideas shared here.

We are privileged to have with us Prof. KC Santosh, one of our keynote speakers, attending in person. Also here in person is Prof. Emile Chimusa from Northumbria University, UK. We warmly welcome Hassane Bouzahir, TYAN member from Morocco, Eman Nossier and Fayed from Egypt, as well as our distinguished speakers from South Africa. We also gratefully acknowledge Prof. Ingmar Weber, AVH Professor and virtual keynote speaker from Germany, along with Emmanuel

Letouze and Asegul Hulus, who have kindly accepted our invitation to present remotely. Your participation affirms the truly Pan-African and international character of this event.

This year's TYAN workshop continues to promote the network's core mission of addressing the United Nations Sustainable Development Goals through multidisciplinary scientific cooperation. The workshop sessions will particularly focus on AI as a driver for sustainable, cross-sectoral solutions.

I extend my heartfelt appreciation to the **Federal University of Technology, Akure**, and our amiable Vice-Chancellor, **Prof. Adenike Temidayo Oladiji**, for graciously hosting this hybrid event.

My sincere thanks to the **Automated Contact Tracing Research Group (ACTRG)** in the Department of Information Systems, the organizing team, and the TYAN co-organizers, including **Dr. Hasan Aljabbouli** from New York University, USA.

Special thanks to the Executive Director of **COMSATS**, Ambassador **Dr. M. Nafees Zakaria**, and Deputy Director **Dr. Huma Balouch** for their facilitating support. My gratitude also goes to the **TWAS Executive Director, Professor Marcelo Knobel**, for approving the support from TYAN. Thanks to the TYAN co-chairs, **Prof. Fang Chen** and **Roula**, **Dr. Max Paoli**, and **Fabrizia Niscio**, for their unwavering support.

We also deeply appreciate **GigaScience Press**, led by **Dr. Laurie Goodman**, for their generous support, and **Prof. Ibrahim Adeyanju**, Director of **Galaxy Backbone**, for his contributions. I appreciate the hosting and financial support of the **School of Computing**, ably headed by the Dean, **Prof. B.K. Alese**.

To the dedicated **Organizing Committee**, I say thank you for your tireless efforts and commitment to excellence.

I am confident that the next few days will be filled with stimulating presentations, thought-provoking discussions, and transformative ideas. Let us embrace this opportunity to collectively shape the future of AI-powered sustainable development in Africa and beyond.

Thank you all, and welcome.

OPENING ADDRESS BY THE VICE-CHANCELLOR, FEDERAL UNIVERSITY OF TECHNOLOGY, AKURE, NIGERIA AT THE 4TH AFRICAN SYMPOSIUM ON BIG DATA, ANALYTICS AND MACHINE INTELLIGENCE & 18TH TYAN INTERNATIONAL THEMATIC WORKSHOP ON 18TH JUNE, 2025.

Executive Governor of Ondo State, His Excellency, Hon. Lucky Aiyedatiwa represented by Secretary to the State Government – Dr. Taiwo Fasoranti,

Deputy Vice Chancellors,

Registrar and other Principal Officers,

Executive Director, Commission on Science and Technology for Sustainable Development in the South (COMSATS) – Amb. Dr. M. Nafees Zakaria,

Co- Chair of the World Academy of Sciences (TWAS) Young Affiliates Network (TYAN) – Prof. Fang Chen,

Keynote Speakers; Prof. Ingmar Weber – AVH Professor in AI, Saarland University, Germany and Prof. KC(Casey) Santosh, Chair Computer Science Department, University of Soutrh Dakota, USA,

Organising Chair – Prof. Bolanle Ojokoh,

Co-Organising Chair, - Prof. Emile Chimusa, Northumbria University, UK,

TYAN members present, International Delegates

Distinguished Ladies and Gentlemen,

It is with great pride and profound honour that I welcome you all to the Federal University of Technology, Akure, for the 4th African Symposium on Big Data, Analytics and Machine Intelligence, held alongside the 18th TYAN International Thematic Workshop.

I acknowledge with due reference the presence of the Number One citizen of Ondo State, our amiable Governor, His Excellency, Hon. Lucky Orimisan Aiyedatiwa, ably represented by the Secretary to State Government, Dr. Taiwo Fashoranti. We are deeply appreciative of His Excellency's interest in FUTA and all the supportive roles that he has been playing, especially in consolidating our Medical programmes.

To our international keynote speakers, resource persons, and participants from across Africa, Europe, Asia, and America: your presence here today—physically and virtually—is a powerful testament to the global nature of the challenges we face and the shared commitment to creating solutions through knowledge, data, and technology.

The theme of this year's symposium, "Data-Driven AI for a Sustainable Society and Economy," could not be more relevant. We are at a critical juncture in human history, where the decisions we make today will shape the future of generations to come. Climate change, global health crises, income inequality, resource depletion, and geopolitical instability are some of the pressing issues confronting our world. These challenges require more than just isolated action; they require collaborative, data-informed, and ethically sound innovation.

Artificial Intelligence (AI), driven by meaningful data and contextual understanding, offers immense potential to transform societies. In Africa, the integration of AI into sectors such as agriculture, education, healthcare, transport, climate monitoring, and public governance is helping to bridge historical gaps and promote inclusive growth. However, this promise will only be realized if we approach AI not as a replacement for human agency, but as a tool for enhancing collective intelligence, decision-making, and social good.

This symposium, therefore, is not just an academic exercise—it is a call to action. It brings together leading researchers, data scientists, engineers, policy makers, students, and development partners to deliberate, collaborate, and co-create solutions that align with the Sustainable Development Goals

(SDGs). Our focus over the next three days will range from technological frameworks and data ethics to deployment challenges and real-world applications that are reshaping African societies.

It is also a moment of pride for FUTA. As a premier institution dedicated to technological innovation and applied research, we are pleased to host this landmark event that exemplifies our motto—*Technology for Self-Reliance*. FUTA continues to play a vital role in national and regional development by investing in emerging technologies, nurturing future-ready graduates, and building platforms for international dialogue. We are proud of the Automated Contact Tracing Research Group (ACTRG) for their pioneering work and leadership in convening this symposium.

Our gratitude extends to COMSATS, TYAN, and GigaScience Press, for their steadfast partnership and commitment to promoting scientific collaboration in the Global South. These partnerships reflect a shared belief in the power of knowledge to transform lives, especially in developing contexts.

Let me also salute our Organising Chair, Prof. Bolanle Ojokoh, for her tireless effort, academic leadership, and global network-building, which have contributed immensely to the success and stature of this event. The same gratitude goes to her Co-Chair, Prof. Emile Chimusa, and all members of the local and international planning committee.

To our Faculty members and early-career researchers participating from within and beyond FUTA: this is your time. I urge you to immerse yourself fully in the proceedings, ask questions, share insights, and build collaborations. The future of AI, big data, and analytics belongs to you, and the seeds you plant today may bloom into the innovations that will shape tomorrow.

In conclusion, I welcome you once again to FUTA and to Akure—the Sunshine State capital. May this symposium serve not only as a platform for knowledge exchange, but also as a springboard for continental impact and lasting partnerships. Together, let us harness data and intelligence for a more sustainable, equitable, and innovative Africa.

I wish you all a successful, engaging, and inspiring symposium.

Thank you.

PROF. ADENIKE TEMIDAYO OLADIJI *FAS*
VICE CHANCELLOR

Ceremony of the 4th African Symposium on Big Data and TWAS Young Affiliates Network (TYAN) Workshop
(18-20 June 2025)

Executive Director's Address
Big Data, Analytics and Machine Learning

Bism….

Hon. Prof. Bolanle, Distinguished Experts, Respected Organizing Team of the 4th African Symposium, Ladies and Gentlemen! **Assalaam Alaikum & Good Morning Africa!**

My profound thanks to Prof Bolanle and the Organisers for honouring me with the invite.
I am happy that COMSATS has been able to cooperate and contribute to the Symposium. I appreciate initiative of my CCCS team, led by Dr. Mehwish.

But I want to benefit COMSATS member states in Africa much more substantively with the resources and expertise of COMSATS.

We are witnessing a technological revolution where Artificial Intelligence, Big Data Analytics, and Machine Intelligence are transforming every aspect of our life.

Every day, we generate staggering amounts of data, such as healthcare records, financial transactions, social interactions, weather patterns, diseases and diagnostics and anything and everything that generates information.

However, the data only becomes valuable when analyzed for extracting meaningful findings and help make informed decisions.

Businesses use these insights to predict market trends, optimize operations, and personalize customer experiences. On the other hand, government organizations leverage data-driven approaches to improve public services and policy making. However, governments must invest in digital infrastructure adequately, coupled with educational and skills development programs to prepare skilled workforce.

Data analysis is important, but its sanctity and privacy is equally, if not more, important. Governments must protect privacy of the data through comprehensive data protection policies and regulatory frameworks.

Ladies and Gentlemen!

COMSATS, the intergovernmental organization I am heading as its Executive Director, has 12 African countries as members out of 27 Member States. Our mission is to support Member States by prudently utilizing the emerging technologies.

COMSATS facilitates knowledge exchange, capacity-building, skills development, IT & Digital Technology trainings using the resource base of its Centres of Excellence and COMSATS' International, regional and national partners.

We want the members states in Africa to benefit from COMSATS skill development programs in Web Design and Development, Graphics Design, Mobile App Development, Business Intelligence, e-Commerce, AI and SQA. It will help enhance skills and hence employability.

Many of COMSATS' Centres of Excellence are actively employing AI, Big Data, Analytics, and Machine Intelligence in various sectors. COMSATS Telehealth program is a flagship program. We can train people in this field.

Our Centre for Climate and Sustainability is equipped with expert human resource to impart knowledge and training in a variety of areas to help deal with climate change adversities.

We have recently established a versatile Nano Technology Lab for material testing, forensic analysis, and research learning. We are developing training programs to benefit youth of COMSATS member states. While we post information on our website www.comsats.org, we send information to our focal points and centres of excellence in African member states.

We have recently made a breakthrough in Electric Vehicle Technology and Battery Technology. Next year we will run training courses on learning EV Technology and would be willing to transfer technology to the member states.

COMSATS wishes to benefit our member states. It is up to the member states to come forward and meaningfully engage us.

Thank you all and wish you a very fruitful African Conference.

Keynote Speakers

Prof Ingmar Weber, Saarland University.

Ingmar Weber is the recipient of an Alexander von Humboldt Professorship, Germany's most valuable research award, and holds the Chair for Societal Computing at Saarland University. His interdisciplinary research comprises (i) computing of society, i.e. the measurement of different social phenomena, in particular using non-traditional data sources, and (ii) computing for society, i.e. working with partners on implementing solutions to help address societal challenges. Analyses performed by his team and collaborators have been used in displacements contexts ranging from Venezuela to Ukraine. Prior to joining Saarland University, Ingmar was the Research Director for Social Computing at the Qatar Computing Research Institute. He studied mathematics at the University of Cambridge before pursuing a Ph.D. at the Max-Planck Institute for Computer Science. He is and ACM Distinguished Member and is among the top 2% of most cited scientists worldwide.

Title: New Data Sources for Old Problems: How Satellite Imagery and Social Media Data Can Support Sustainable Development

Abstract: *Traditional data collection methods often fall short in providing timely, granular, and actionable insights for addressing urgent global development challenges. In this keynote, Ingmar Weber explores how novel digital data sources—particularly satellite imagery and social media advertising data—can be used to complement traditional data and to inform policy in low-resource settings. His research demonstrates how Facebook advertising data can be used to map gender gaps in digital access and monitor migration trends in near real-time. Complementing this, satellite imagery is employed to track internal displacement and estimate poverty levels with high spatial resolution. Going beyond a "data and AI saves the day" narrative, the keynote will also discuss shortcomings and risks that need to be carefully considered.*

Keynote Speaker- Prof. KC Santosh, Chair, Department of Computer Science, University of South Dakota, USA.

Biography

Prof. KC Santosh–highly accomplished AI expert and TEDx Speaker–is Chair of the Department of Computer Science (since 2020) and founding director of the AI Research Lab (since 2015) at the University of South Dakota (USD). He previously served as Graduate Program Director for seven years (2017–24), was a research fellow at the National Institutes of Health (NIH), and completed a PostDoc at INRIA (France), where he also earned his PhD in Computer Science - Artificial Intelligence.

- A highly trained academic leader—having completed the President's Executive Leadership Program and national Chair/Dean trainings (Levels 1.0 & 2.0)—Prof. Santosh has led transformative efforts in curriculum innovation and program assessment, including ABET accreditation (2016/17 and 2022/23). Through the AI+x initiative, he has developed interdisciplinary AI and Data Science programs in collaboration with Biology, Physics, Biomedical Engineering, Sustainability, and Business Analytics, establishing USD as a pioneer in AI education and driving a remarkable 3,000% departmental enrollment growth. He also serves as the AI lead for the South Dakota Biomedical Computation Collaborative (https://sd-bcc.org), a major research education initiative funded by the Department of Education ($6.5M) and the South Dakota Board of Regents ($0.725M), and organizes the

annual IEEE-sponsored USD AI Symposium to foster collaboration in AI statewide and nationally.

With a total funding exceeding $8.7 million from sources like DOD, NSF, ED, and SDBOR, he has authored 10 books and more than 250 peer-reviewed research articles, including IEEE TPAMI, IEEE TMI, and IEEE TAI. He serves as an associate editor for esteemed journals such as IEEE Transactions on AI, IEEE Transactions on Medical Imaging, Int. J of Machine Learning & Cybernetics, and Int. J of Pattern Recognition & Artificial Intelligence and leads review panels for NSF and Mitacs, to name a few. He has delivered 90+ keynote talks and chaired more than 20 international conferences, including IEEE CAI, IEEE CVMI, IEEE CBMS, IEEE ICMI, and IEEE AI symposium (USD).

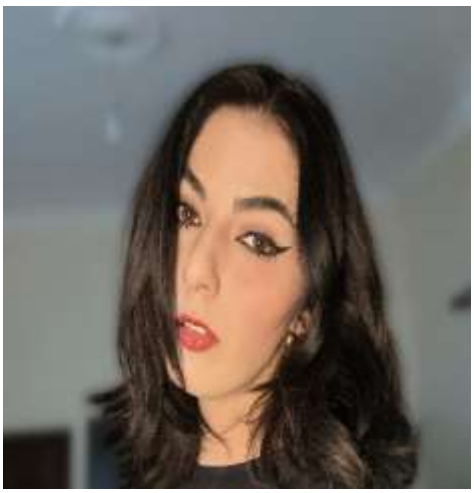
To name a few, Prof. Santosh is the proud recipient of the Visionary Leadership Award (University of Derby - UK, 2023), the Cutler Award for Teaching and Research Excellence (USD, 2021), the President's Research Excellence Award (USD, 2019), and the Ignite Award from the US Department of Health & Human Services (HHS, 2014).

As of Spring 2024, he serves in the NIST AI Safety Institute Consortium and, since December 2024, has represented South Dakota in the U.S. Speaker Program (U.S. Department of State), delivering talks on AI and AI education.

Title: Green Computing is All What We Need – Sustainable AI Solutions

Abstract*: How large should datasets be for machine learning scientists to start meaningful work? Can we afford to wait years to gather data, risking limited testing opportunities? This challenge mirrors what we faced during the COVID-19 pandemic, where rapid response was essential. With future epidemics likely, isn't human-in-the-loop machine learning essential for effective public healthcare? And as we aim to harness AI for good, what about its carbon footprint? Tech giants like Amazon, Meta, Google, and Tesla are analyzing massive data, but should we not address the carbon emissions tied to these AI models? Now is the time to seriously explore sustainable computing with human AI mechanism. In my talk, I will address green computing is key to achieving sustainable AI solutions that prioritize societal well-being, by considering real-world cases (foundational AI models with experiments). Technically speaking, human AI is the key.*

Plenary Speakers



Dr. Asegul "Ace" Hulus. Assistant Professor in Computing, a Fellow of the Higher Education Academy (UK)

Dr. Asegul "Ace" Hulus is an Assistant Professor in Computing, a Fellow of the Higher Education Academy (FHEA), and a leading researcher in S.T.E.A.M. fields including HCI, UX, and User-Centered System Design, AI, and EdTech. She is a published author, ACM-W Professional Global Committee Member, among others. Her work spans academia and industry, with active collaborations across the globe, for example, Europe, Africa, and the Middle East. Dr. Hulus also contributes as a chair, editor, and reviewer for various journals and conferences. Her research bridges innovation with impact, emphasizing diversity, ethics, and inclusive design in computing.

Title: Navigating Gender Bias in EdTech: Using the J.A.W.S Protocol to Understand AI Bias

Abstract*: AI is a double-edged sword; it can deepen bias or dismantle it. Through the JAWS Protocol (Justice, Advocacy, Watchfulness, Structural-change), we can critically study how AI operates in EdTech, and use that insight to push for more just and inclusive systems.*

Professor Emile Rugamika Chimusa, Northumbria University, UK.

Emile Rugamika Chimusa, BSc, MSc, PhD, SFHEA, is a Professor of Bioinformatics & Computational Biology at the Department of Applied Science, Northumbria University Newcastle, UK. His expertise and research build on his mathematics and bioinformatics background and focus on genomics data science and AI methods and tools development pertinent to human variation and diversity to uncover the role of genetics and environment in determining the risk of and disease susceptibility. He has long-standing experience in developing software packages and implementing workflows for Omics data analysis and FAIR principles to facilitate reproducible and impactful science. He has recently been awarded The Academy of Medical Sciences Professorship, UK to investigate novel artificial intelligence approaches for disease risk prediction and stratification. He is the principal/co-investigator of several collaborative and consortia NIH-funded projects, particularly the Data Science for Health Discovery and Innovation in Africa Initiative, and H3ABioNet, a pan-African bioinformatics network for H3Africa consisting of 28 institutions in 16 African countries. He accumulated experience in bioscience industries and incorporated Omics Data Solution Limited in both Ireland and South Africa. He has been an expert in protocol design and strategy development in several African Bioscience projects funded by the Bill & Melinda Gates Foundation. For the past 3 years, He has been a European Commission expert/Reviewer and reviewed several Horizon Europe grant applications and recently joined the Pool of Experts and Follow-up Fund Committee. He is a scientific co-chair of the State of Data Science for Health in Africa, a US-NIH initiative project, and co-leader of the Northumbria Turing Universities network. Recently nominated as Deputy of the Steering Group of Northeast Fatigue Research Network.

Dr. Emile R. Chimusa is a Professor of Bioinformatics & Computational Biology at Northumbria University, UK. His research builds on his bioinformatics background and focuses on methods and tools development pertinent to human genomic diversity intending to uncover the role of genetics and environment in determining the risk of and disease susceptibility. He has long-standing experience in developing software packages (https://github.com/echimusa) and implementing workflows for Omics data analysis and FAIR principles to facilitate reproducible and impactful science. He has a record of peer-reviewed research publications and educational pedagogy articles (ORCID:0000-0001-8846-2047). He has recently been awarded the Academy of Medical Sciences Professorship, UK to investigate novel artificial intelligence approaches for disease risk prediction and stratification. He is the principal/co-investigator of several collaborative and consortia NIH-funded projects, particularly the Data Science for Health Discovery and Innovation in Africa Initiative, and H3ABioNet, a pan-African bioinformatics network for H3Africa consisting of 28 institutions in 16 African countries. Through these networks, He contributed to the strategy development of research protocols, translational research, and social impacts, and the development of standards for phenotype data for cohort studies.

Title: AI-driven next-generation disease risk prediction and risk stratification

***Abstract**: The development of various models for genetic risk prediction has been possible due to numerous genome-wide association studies (GWAS), mostly of European ancestry, with some studies reaching up to hundreds of thousands of study subjects. The clinical validity of genetic risk prediction has largely been explored in populations of European ancestry. While it is well-known that the prediction varies according to the genetic ancestry of the population, current genetic risk prediction models have not been evaluated in populations of non-European ancestry. This raises questions as to whether the clinical validity within the predictive power of these methods could be equitable across populations, and it is currently unclear how to accurately predict health and disease risk in populations of non-European ancestry. A substantial part of this problem could be solved by investigating a novel risk prediction framework that leverages genetic characteristics across diverse and mixed ancestry populations, the host's microbiome interactions, and a broad range of health and disease measures. This talk will cover our PredictMix tool, next next-generation, integrative framework for disease risk prediction and risk stratification in diverse ethnicities. We will also cover current research and outputs, and a discussion on challenges and opportunities from multi-omics disease risk prediction*.

Prof. Bolanle Ojokoh, Federal University of Technology, Akure.

Prof. Bolanle Ojokoh is a distinguished Professor of Information Systems at the Federal University of Technology, Akure, specializing in Artificial Intelligence (AI) and Data Analytics. Her research explores the intersections of AI, big data, and machine learning, with applications in sustainable development and societal impact.

She has been at the forefront of advancing AI and data-driven solutions, chairing the 4th Big Data, Analytics, and Machine Intelligence Symposium, themed “Data-Driven AI for a Sustainable Society and Economy.” Prof. Ojokoh has also contributed significantly to global discussions on AI ethics, sustainability, and digital transformation, including her role as a speaker at the 21st Annual Meeting of the Science and Technology in Society (STS) Forum in Kyoto, Japan.

Beyond her research, she is a passionate advocate for women in STEM, actively involved in projects such as Promoting Female Academic Excellence in STEM. She collaborates internationally to foster capacity building, diversity, and scientific advancements, particularly in the Global South.

Prof. Ojokoh serves as an external examiner for PhD theses, contributes to cutting-edge AI research, and engages in policy discussions on technology for sustainable development. She is committed to bridging the digital divide and leveraging AI for positive societal impact.

Title: Data-Driven Insights for Epidemic Preparedness: A Nigerian Case Study

Abstract: *The COVID-19 pandemic underscored the vital role of data science and machine learning in informing public health responses—especially in resource-constrained settings. This plenary presents insights from a Nigerian case study that leveraged statistical and machine learning techniques to analyze COVID-19 transmission dynamics between January 2020 and December 2021. Drawing from demographic patterns, symptom progression, and contact tracing data provided by the Nigeria Centre for Disease Control (NCDC), the study identified high-risk groups and assessed the efficacy of existing containment strategies. Key findings include the identification of healthcare workers and students as high-risk populations, a 94.97% positivity rate among confirmed contacts, and an 87% classification accuracy achieved using a Random Forest model. While challenges around data quality and minority class prediction persist, the study offers valuable lessons for epidemic preparedness and the design of responsive, evidence-based public health policies in Africa and beyond. This presentation advocates for sustained investments in health data infrastructure and capacity-building to harness machine intelligence for future outbreak resilience.*

Dr. Emmanuel Letouzé, Data-Pop Alliance, USA.

Emmanuel Letouzé is a development economist, economic demographer, and political scientist with 25 years of experience exploring the intersections of data, statistics, technology, and AI with human development, democracy, and humanitarian action in the Global South. His work addresses issues such as poverty, inequality, conflict, migration, climate, gender, and governance, with a focus on ethical and impactful data-driven solutions.

He is the co-founder of Data-Pop Alliance (2013) and the OPAL project (2016), leveraging private data for public good in Senegal and Colombia. He has held key roles at Harvard, MIT, Columbia SIPA, and Sciences Po, and was a Marie Curie Fellow at Universitat Pompeu Fabra (2021-2023). His influential publications include the UN Global Pulse White Paper on Big Data for Development (2012) and OECD Fragile States reports (2013-2014).

With a PhD from UC Berkeley and degrees from Sciences Po and Columbia University (Fulbright Scholar), he has worked with the UNDP, OECD, and the French government on economic development, post-conflict recovery, and public finance.

Beyond academia, he is also a political cartoonist ('Manu'), contributing to international media and using art to communicate complex global issues.

Prof O. Olabode, Federal University of Technology, Akure

Olabode O is a Professor of Computer Science from the Federal University of Technology, Akure. He holds a B.Tech degree in Industrial Mathematics, M.Tech. Degree in Computer Science, M.Tech in Statistics, MSc in Peace and Security Studies and PhD in Computer Science in 1991,1999, 2015, 2021 and 2005 respectively. He has over 80 publications in reputable Journals and Conference proceedings. His research interest is in modelling with AI and Machine learning. He is a reviewer of some academic and professional journals such as International Journal of Computer Systems and Applications, British Journal of Mathematics & Computer Science, Issues in Business Management and Economics. Presently he is in the department of Data Science, FUTA.

Dr. Oluwarotimi Williams Samuel, University of Derby, UK

Dr. Oluwarotimi W. Samuel is a Senior Lecturer at the University of Derby, UK, specializing in intelligent systems, machine learning, and health informatics. He earned a Ph.D. in Pattern Recognition and Intelligent Systems from the University of Chinese Academy of Sciences (UCAS), Beijing, under the CAS-TWAS President's Fellowship. Previously, he was an Associate Professor at SIAT, Chinese Academy of Sciences (CAS), and an Adjunct Lecturer at Dongguan University of Technology.

He has led multiple international research projects and published over 100 peer-reviewed articles with 4,400+ citations. Recognized among the "Top 2% Scientists Globally" by Stanford University, his research focuses on AI-driven solutions for cyber-physical systems.

Dr. Samuel has received IEEE Best Paper Awards, the IEEE Outstanding Young Investigator Award, and a Merit Award for Youth Innovation Projects. He was also nominated for the STEM for Britain Award, presenting his work at the House of Commons. Currently, he is a Visiting Research Fellow at SIAT-CAS and a Research Fellow at INTI International University.

Furthermore, Dr. Samuel's unwavering commitment to promoting scientific research, fostering collaboration, and demonstrating leadership led to his appointment as a member of the Global Young Academy (GYA); Associate Editor of Frontiers in Big Data; Advisory Board Member of the ELSP International Open Science Platform; Chair, Co-chair, and Technical Program Committee Member for various IEEE international conferences; and Distinguished Speaker at events organized by the United Nations (UN) and the European Commission (EC).

Title: AI in Healthcare and Well-being: Recent Advances, Challenges, and Future Prospects

Abstract: *Artificial intelligence (AI) is transforming healthcare and well-being through innovative solutions that enhance diagnosis, treatment, and rehabilitation. One critical area of impact is the development of assistive robotic systems for restoring lost limb function, an issue that significantly affects millions of individuals' independence and quality of life globally. AI-driven assistive robots, powered by biosignals, have shown great promise in supporting functional recovery. However, their real-world deployment remains limited due to various technical, clinical, and systemic challenges. This presentation showcases recent advances in my research on AI-powered assistive robotics,*

focusing on the use of efficient machine learning and signal processing techniques to overcome deployment barriers. I will discuss the key confounding factors hindering clinical and commercial adoption, share progress made toward scalable and intelligent rehabilitation systems, and explore future prospects for integrating AI more effectively into healthcare and well-being applications.

Prof. Hassane Bouzahir, Ibn Zohr University, Morocco.

Originally founded leader of an engineering program in Data Science, Artificial Intelligence, and Big Data at Ibn Zohr University, Morocco, Prof. Hassane Bouzahir is a Full Professor of Applied Mathematics and Data Science. Having worked in higher education for more than 20 years, he has occupied important administrative and scholarly responsibilities all throughout Africa, Europe, Asia, and the Middle East. His multidisciplinary study links mathematics, artificial intelligence, and practical applications in energy, healthcare, and sustainable development. Prof. Bouzahir has supervised several Ph. D. and Master's students and actively supports quality assurance, curricular innovation, and capacity building in African higher education having received several esteemed Fellowships including IMU, AUF, IMG Tempus Europe, Simons Africa, Fulbright, DAAD, Matsumae, ICTP and TWAS.

***Abstract**: "The rapid advancement of Data Science, Big Data, and Artificial Intelligence (AI) has created a pressing need for specialized engineering education. This presentation explores the design and implementation of an engineering program focused on these transformative technologies, highlighting the key challenges, best practices, and industry-academia collaborations.*

We will first discuss the core components of the curriculum, including foundational mathematics, machine learning, deep learning, cloud computing, and big data processing. The integration of hands-on projects, industrial partnerships, and research-driven learning will be emphasized as critical elements to bridge the gap between theory and practice.

Next, we will examine the challenges faced in launching such a program, from selecting the right pedagogical approach to ensuring students gain both technical and ethical competencies in AI. We will also highlight how interdisciplinary collaboration and access to high-performance computing resources enhance learning outcomes.

Finally, we will discuss the impact of such a program on the job market and innovation ecosystem. Graduates will be well-equipped for careers as data scientists, AI engineers, big data analysts, and technology leaders, contributing to industry and research advancements.

This session will provide valuable insights for academic leaders, industry professionals, and policymakers interested in shaping the next generation of AI and data science engineers."

Dr. Hasan Aljabbouli, New York University.

Dr. Hasan Aljabbouli is a Clinical Associate Professor of Computer Science at the Courant Institute of Mathematical Sciences, New York University (NYU). He earned his Ph.D. and MPhil in Data Mining and Machine Learning from Cardiff University, UK, and a Bachelor of Informatics Engineering from Homs University, Syria.

With over two decades of experience in academia and industry, Dr. Aljabbouli has contributed extensively to the fields of artificial intelligence, data mining, and machine learning. His research has led to numerous publications and two patents.

At NYU, Dr. Aljabbouli teaches courses such as Object-Oriented Programming, Programming Tools for Data Science, and Computer Systems Organization. He is also an Adjunct Associate Professor of Political Science at Columbia University, where he teaches Machine Learning for Social Sciences.

Dr. Aljabbouli's commitment to education and research is evident in his dedication to fostering innovation and knowledge in computer science and its applications across disciplines.

Title: Digital Twins for a Resilient Future

***Abstract**: In response to growing urban complexity and the need for proactive, data-driven planning, Digital Twins offer a transformative path toward building more resilient, adaptive, and equitable urban futures. This session introduces the concept of digital twins within the urban context—as dynamic, data-rich virtual replicas of physical environments powered by IoT devices, GIS systems, environmental sensors, transportation data, and citizen input. By integrating these components with existing city infrastructure and governance systems, digital twins provide a holistic platform for understanding and managing urban systems.*

At the core of these systems lies predictive AI—using historical and real-time data to simulate "what if" scenarios where advanced machine learning models optimize operations and detect anomalies, and support adaptive, real-time decision-making.

This session will explore how digital twins are being applied across diverse domains to improve decision-making, optimize system performance, and enhance overall resilience.

Invited Speakers

Prof. Eman Nossier

Pharmaceutical Medicinal Chemistry and Drug Design Department, Faculty of Pharmacy (Girls), AlAzhar University, Cairo, 11754, Egypt. dr.emannossier@gmail.com

Eman Nossier is a Professor of Pharmaceutical Medicinal Chemistry at the Faculty of Pharmacy (Girls), Al-Azhar University, Cairo, Egypt. Nossier received her Bachelor's degree in Pharmaceutical Sciences (2002), Master's (2009) and Ph.D. degree (2014) in Pharmaceutical chemistry from Faculty of Pharmacy (Girls), Al-Azhar University in Cairo. She is a member in the Egyptian Chemical Society, the Arab Association of Pharmacy Progress and recently in the Egyptian National Committee of Drugs by Academy of Scientific Research and Technology (ASRT) and The Organization for Women in Science for the Developing World (OWSD), Trieste, Italy. She participated in ten research projects funded by National Research Centre, Cairo, Egypt, and recently has continued with five others funded by STDF and Saudi Arabia. Also, she actively participated in many national and international conferences and workshops in Saudi Arabia, India, Nigeria, and Italy. Nossier is a section editor in Azhar International Journal of Pharmaceutical and Medical Sciences. Her research interests center around designing and synthesis of anticancer, anti-inflammatory, and antimicrobial agents using molecular modeling studies. She has authored 100 publications (2012-2025) with Scopus H-index 30.

Topic: AI-Powered Drug Design: Innovative Solutions for Sustainable Cancer Treatment

Eman S. Nossier a,b

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Abstract- *Cancer is a big medical issue worldwide. The significant heterogeneity of cancers means that using the same medications or surgical approaches in various patients can result in varied curative outcomes. This highlights the need for more precise and individualized treatment methods for tumors and patients. Understanding the alterations in tumor genes, proteins, and phenotypes is crucial for developing focused therapy methods for patients. Artificial intelligence (AI) can uncover hidden patterns, substantial details, and expertise from massive amounts of data. Machine learning and deep learning can mine data from genomes, transcriptomics, proteomics, radiomics, digital pathology images, and other sources to provide clinicians with a full understanding of malignancies. AI can identify new biomarkers in data to improve tumor screening, detection, diagnosis, treatment, and prognosis for individual patients, leading to better clinical results. AI technologies assisted in drug repurposing, identifying new therapeutic options, and improving the efficacy of current drugs like immune checkpoint inhibitors and multikinase inhibitors, including sorafenib and regorafenib. However, challenges including limited explainability, data quality, and the need for large prospective trials remain debated. Advancements in AI and cooperation between academia and pharmaceutical companies have the potential to improve patient outcomes and shape the future of cancer therapy. Further research is required to validate AI algorithms and integrate them into clinical practice. Keywords: Artificial intelligence; cancer, drug discovery, drug repurposing; machine learning.*

Dr. Olatunji Omisore.

Shenzhen Institute of Advanced Technology.

Dr. Olatunji Omisore earned his PhD in Pattern Recognition and Intelligent Systems from the University of the Chinese Academy of Sciences in January 2019. His research aims to reduce global mortality and morbidity rates associated with cardiovascular diseases and cancer. Dr. Omisore's interests focus on developing AI technologies to advance robotic surgery. He has led extensive research efforts centered on developing physics-based and learning-based methods for intelligent minimally invasive surgical interventions. Olatunji has secured multiple competitive grants to develop AI-driven robotic systems and methods for endovascular interventions. The research has profound impacts, with 60+ articles published, 2800+ citations (h-index of 26), 5 international patents on prototyping three robotic systems, and industrial collaboration experience with the Shenzhen Ruixin Medical Technology Co., Ltd. Dr. Omisore has successfully supervised five students, including two PhD graduates. Olatunji is a member of several professional bodies including the Institute of Electrical and Electronics Engineers, Association for Computing Machinery, Australian Computer Society, and Nigerian Computer Society.

Title: Modeling Multi-lateral Network Branching for Tool Segmentation in Robot-Assisted Endovascular Interventions

***Abstract**: Robot-assisted catheterization is gaining traction for its promise in improving the treatment of cardiovascular diseases. However, enhancing effective surgeon-robot collaboration remains an ongoing research challenge, particularly in the area of task-specific automation. One such area is the automated segmentation of endovascular tools, which is vital for accurate visualization and real-time tracking during procedures. This talk presents a newly developed multi-lateral branched deep learning network for tool segmentation in cardiovascular angiograms. The presentation is structured in two parts:*

In the first part, we introduce a fully supervised deep neural network with branched encoder blocks for pixel-level segmentation of guidewires in angiograms acquired during robot-assisted catheterization. The encoder integrates lateral separable convolutions and depth-wise attention mechanisms, while the decoder employs an enhanced loss function to boost segmentation performance. The network, trained end-to-end, achieved strong validation outcomes, with a mean Intersection over Union (mIoU) of 84.89% and an Area Under the Curve (AUC) of 90.64%.

The second part focuses on a weakly supervised segmentation approach using multi-lateral decoder branching. Built on a modified U-Net architecture, the model includes a single encoder and several laterally branched decoders, each generating diverse pseudo-labels under varying perturbations. This method significantly improved tool visualization, achieving high connectivity indices for both guidewires and catheters, with a mean segmentation time of 35.26±11.29 ms per frame.

Together, these methods offer robust, fast, and cost-effective solutions for enhancing tool tracking and visualization during endovascular catheterization, thereby paving the way for future developments in autonomous navigation and real-time visual analytics.

Prof. Peter Adebayo Idowu

Department of Computer Science and Engineering, Obafemi Awolowo University, Nigeria.

Peter Adebayo Idowu is a Professor in the Department of Computer Science and Engineering, Obafemi Awolowo University, Nigeria. Dr Idowu received MPhil (Computer Science) and PhD (Computer Science) from Aston University, Birmingham, United Kingdom and Obafemi Awolowo University, Ile-Ife, Nigeria in 2009 and 2012 respectively. His research focus is on Applied Computing that is application of computing to address and solve health related problems in Sub Saharan Africa. He is currently researching into HIV/AIDS, disease modelling and cloud computing in health care delivery. He is also a Member of British Computer Society, Internet Society Nigeria Chapter, Nigerian Computer Society, Computer Professional Registration Council of Nigeria, Nigerian Young Academy, International Geospatial Society, International Association of Engineers and International Federation of Information Processing WG 9.4. His research interest includes Health Informatics, Data Modelling, Software Engineering, Geographical Information System, and Informatics. Within the last ten years, Dr Idowu has successively trained over 30 graduate students (including PhD). He has published over 100 articles in journals and referred conference proceedings. He is blessed with three Research Associates. He enjoys reading and driving.

Title: Health Informatics: From Predictive Analytics to Policy Impact

Abstract: *In today's rapidly evolving world, the role of technology in improving patient outcomes cannot be overstated. Healthcare informatics which is a field that focuses on the efficient and effective use of data to optimize patient care has transformed the landscape of the medical industry. Predictive analytics, a powerful tool that allows healthcare stakeholders to harness the power of data to gain valuable insights and make evidence-based policy decisions. By analyzing vast amounts of data and identifying patterns, trends, and potential outcomes, predictive analytics empowers policy makers to allocate resources more efficiently, plan for the future more effectively, and ultimately improve the lives of their citizens. With the ability to forecast future scenarios and mitigate risks, predictive analytics has become an indispensable tool in the policymaking process. Predictive analytics in health informatics uses data to forecast future health outcomes, improve care delivery, and optimize resource allocation. It leverages historical and real-time data to identify patterns, trends, and risk factors, allowing for proactive interventions and better patient outcomes. This paper explores the transformative impact of predictive analytics for policy decision-making and how stakeholders across the Africa region can leverage on this technology to provide a better healthcare delivery. This paper offers insights into the steps involved in predictive analytics, different predictive modelling, different application predictive models, recent studies in the field of predictive analytics in healthcare and the future directions.*

Dr. Samson Adeyemi

University of the Witwatersrand, South Africa.

Title: Data-Driven AI for Sustainable Healthcare in Cancer Nanomedicines – Transforming Cancer Therapy with AI-Powered Precision Medicine

Prof. Dr. Eman Fayed, Pharmaceutical Organic Chemistry at Al-Azhar University.

I am currently a Professor of Pharmaceutical Organic Chemistry at Al-Azhar University, former Head of Pharmaceutical Organic Chemistry Department, Faculty of Pharmacy, Al-Azhar University. I also taught different Pharmaceutical Chemistry courses through part-time contracts at the Faculty of Pharmacy, Egyptian Russian University, Sinai University, Kantara branch, and Modern University of Technology and Information. In addition, I am an IVLP Alumni. I have extensive research experience in Pharmaceutical Organic Chemistry fingerprints. I have published several research articles in various fields of Pharmaceutical Organic Chemistry. I published around 50 international papers; my H index is 25 and the citation is around 1620. I have a funded project from STDF, in addition to another two submitted projects to ASRT. I also gained five awards, ACS Publications Award 2020, a Scientific research award from the Faculty of Pharmacy-(Girls)-Al-Azhar University 2017/2018, three best poster awards from the second International Conference on New Horizons in Basic and Applied Science, 1-6 August 2015, Hurghada, Egypt, the Fifth International Conference of Pharmaceutical Sciences and Drug Industries, 13-15 September 2017, TIA Heights Makadi, Hurghada, Egypt, and the Scientific
Research award from Faculty of Pharmacy (Girls), Al-Azhar University 2017/2018 and the Fifth International Conference on New Horizons in Basic and Applied Science, 26 - 29 September 2021, Hurghada, Egypt. The most resent award is the best researcher award from International Research Awards on New Science Inventions. I am a reviewer in more than twenty Scientific Journals related to Springer Nature, American Chemical Society, Elsevier, as well as MDPI journals. I shared as an Organizing Committee in many Conferences and workshops. I am currently supervising master and Ph.D. students in Pharmaceutical Organic Chemistry. I am a head of the Central Laboratory at the Faculty of Pharmacy (Girls), Al-Azhar University, in addition to establishing a research development unit at the Faculty of Pharmacy, Al-Azhar University. I was a member of the Technical Office for Writing International Cooperation Projects Erasmus+ at Al-Azhar University and a member of Al-Azhar University Entrepreneurship club. I got many training workshops and online courses in the field of entrepreneurship.

Prof. JAIYEOLA, TEMITOPE GBOLAHAN

Obafemi Awolowo University, Nigeria.

Prof. JAIYEOLA, TEMITOPE GBOLAHAN is a Professor of Mathematics at the Obafemi Awolowo University, Nigeria.

He specializes in the areas of Algebra called "Group Theory and Generalization" and "Non-Associative Algebraic Systems". His particular field of expertise is in the "Theory of Quasigroups and Loops". However, he also works on "Neutrosophic Algebraic Structures", "Non-Associative Hyper-Algebraic Structures" and "Soft Quasigroup". He is enthusiastic to apply these areas of studies to Cryptography, Sociology, Sports, Physical and Chemical Systems and Biological Inheritance. He is a Fellow of the Nigerian Young Academy (FNYA) and serves as Editor-in-Chief of the International Journal of Mathematical Sciences and Optimization. He is presently the Head of the Nigerian branch of Neutrosophic Science International Association (NSIA), University of New Mexico, United States of America and currently occupies the Pastor Enoch A. Adeboye Professorial Chair of Mathematics (2024-2026) at the University of Lagos.

Topic: Isotopic properties of -inverse Quasigroups with Application to Cryptography

Abstract: *The (Î±,Î²,Î³)-inverse property was shown to be universal in quasigroups. Thereafter, practical applications of the universality of the (Î±,Î²,Î³)-inverse property, notably in the field of cryptography was provided. By developing double encryption ciphers, we facilitate secure data*

transmission and information exchange between parties, thereby addressing contemporary concerns regarding data privacy and security.

Dr. Tobore Igbe

University of Virginia, USA.

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Topic: Interpreting and Classifying CGM Time Series for Personalized Diabetes Management using Symbolic Encoding

Abstract- *Continuous Glucose Monitoring (CGM) offers rich time-series data that can be harnessed to improve diabetes management through advanced data science techniques. This study introduces a novel approach for the interpretation and classification of CGM profiles by encoding glucose traces into symbolic CGM text and CGM string formats. These representations allow for the measurement of glycemic patterns using a distance-based scale and facilitate classification based on normal glucose transitions (NGT). We propose a Principal Transition Space model that captures both the extent and dynamics of NGT fluctuations, yielding insights into glycemic variability and control. Data of type 1 diabetes (T1D)and type 2 diabetes (T2D), 8000 and 9000, respectively, were simulated. Training and test set percentages of 70% and 30%, respectively, for both T1D and T2D were used to train the model and achieved an accuracy of 98% for T2D and 97% for T1D.*

Furthermore, this approach is capable of revealing patterns linked to disease progression and complications such as diabetic ketoacidosis (DKA). This analysis reveals actionable insights associated with stress, illness, and lifestyle, enabling predictive modelling and personalised intervention. This work demonstrates the potential of symbolic CGM representations and AI-driven analytics to revolutionise diabetes care through personalisation, prediction, and proactive intervention.

Ms. Temitope Obasa

Gisma University of Applied Sciences, Germany

Temitope Obasa holds a Bachelor's degree in Real Estate Management from the Federal University of Technology, Akure (FUTA), dual Master's degrees in Real Estate and Facility Management from Zuyd Hogeschool, The Netherlands and University of Greenwich, UK, and a third Master's in Data Science, AI & Digital Business from Gisma University of Applied Sciences, Germany. She currently works as a Pricing Analyst, where she applies analytical methodologies to support strategic decision-making. Her academic and professional background reflects a growing interest in data-driven solutions for sustainable development. She is particularly focused on the integration of AI and digital innovation to optimize resource management in emerging markets.

Title: Bridging the Facilities Management Gap: Leveraging Dutch Practices and Data-Driven Approaches for Sustainable Commercial Real Estate in Nigeria

Abstract**:** *As cities evolve towards sustainability and efficiency, effective facilities management (FM) becomes essential for optimizing resource use in commercial real estate. This study investigates the potential of adopting Dutch FM practices—renowned for their integration of data, sustainability, and user-centered design—within the Nigerian context, where FM remains in its developmental stages.*

Through comparative analysis based on 14 expert interviews (six from the Netherlands and eight from Nigeria), the research identifies significant gaps in Nigeria's FM sector, including limited access to data, weak regulatory oversight, and a lack of standardized practices. Dutch FM models prioritize data-driven decision-making, technological innovation, and sustainable operations—elements that can significantly enhance Nigeria's real estate performance if appropriately adapted.

Recommendations include leveraging AI-driven models for maintenance prediction, integrating the EFQM/INK framework for process alignment, and establishing FM research centers to foster local expertise. The study underscores the role of cross-national knowledge transfer and data-centric infrastructure planning in driving more sustainable, resilient urban environments.

Dr. Abiola Ezekiel Taiwo

Faculty of Engineering, Mangosuthu University of Technology, Durban, South Africa**.**

Topic: Process Model Development for Recovery of Heavy Metals from Wastewater Using Artificial Intelligence

Abstract- *Increasing economic development generates wastewater containing a wide range of pollutants, which poses severe threats to natural water resources. Artificial intelligence (AI) has become increasingly important for data analysis, classification, and prediction. Models based on artificial intelligence are more efficient at solving complex nonlinear problems than conventional models used in water-related research. Heavy metal removal from water has attracted the attention of researchers in recent years due to its extreme toxicity. As a result, artificial intelligence could be used to develop sustainable technologies for water and wastewater treatment. As part of the wastewater treatment process, this study demonstrates how artificial intelligence modelling techniques can predict the amount of adsorbed heavy metals. Results from the case study scenario show approximately 95-98% maximum removal efficiency of zinc and lead in the wastewater. Thus, this study shows that artificial neural networks and adaptive neuro-fuzzy inference systems are reliable tools for modelling heavy metal removal from wastewater. In addition, AI will assist stakeholders in making decisions regarding waste management.*

Keywords: Artificial Intelligence, heavy metals, modeling, process recovery, waste management, sustainability.

Dr. Emmanuel Tolulope Busayo

Wits University, South Africa

Dr. Emmanuel Tolulope Busayo is an environmental and planning researcher at the University of the Witwatersrand (Wits) in Johannesburg, South Africa. With over a decade of academic experience, he specializes in geography, spatial planning, and environmental studies. Dr. Busayo's research focuses on institutional strengthening for climate change adaptation, disaster risk reduction, sustainable living, and coastal resilience. His work emphasizes public participation, spatial planning, and environmental empathy. He employs ethnographic fieldwork and digital urban informatics to inform policy and practice.

Topic: Water digitalisation: Implications for urban water informatics

Abstract*: Digitalisation represents a contemporary paradigm that is strategically addressing a range of societal issues. In the water sector, numerous technological innovations are underway, aimed at enhancing water security and promoting the sustainable management of water resources. This research seeks to clarify the concept of water digitalisation and to address three primary questions: What are the drivers of water digitalisation? How can the Internet of Things facilitate advancements in water digitalisation? What barriers hinder the realisation of water digitalisation? While digital transformation and digital water solutions have made significant strides in the Global North, progress remains nascent in the Global South, where many water entities and sectors face challenges in delivering modern water services. Consequently, this study conducts a comprehensive review of various case studies and advancements in water digitalisation to assess the current state of affairs, drawing insights from the perspectives of institutional strength and technical capacity. The recommendations and findings from this research will provide foundational information for future studies and support urban water informatics in both the Global North and Global South.*

Dr. Temitope Cyrus Ekundayo

Department of Life and Consumer Science, University of South Africa, South Africa.

Topic: Machine learning based nomogram predictive support for sustainable water and wastewater reuse microbiological quality in agricultural systems

Temitope C. Ekundayo[ab]; Ayodeji C. Osunla[bc]; Frederick T. Tabit[a]; Etinosa O. Igbinosa[bd]; and Anthony I. Okoh[b]

[a] Department of Life and Consumer Science, University of South Africa, South Africa [b] SAMRC Microbial Water Quality Monitoring Centre, University of Fort Hare, South Africa[c] Department of Microbiology, Adekunle Ajasin University, Akungba-Akoko, Nigeria [d] Department of Microbiology, Faculty of Life Sciences University of Benin, Nigeria.

Abstract- *Sustainable food production and food safety relied on availability of microbially safe irrigation water and wastewater reuse (WWU) in farming system. However, the turnaround time required for microbiological assays posed a challenge for agriculturists due to lack of technical-know and the requirement for expert services. Therefore, the present study aimed at developing a point-of-use diagnostic system for assessing microbiological safety (MS) associated with WWU using Vibrio as a model pathogen. Vibrio density (VD) and physicochemical parameters (PPs) of four irrigation water sources were assessed according to standard protocols over a year period and fitted to eighteen machine learning algorithms (MLAs). Features identified following 5000-permutation-based variable-importance test by the best MLA were implemented in constructing a nomogram for timely practical on farm decisions making about VD/MS of irrigation water prior to use. The MLAs fitted PPs with different performance as independent elements in predicting VDs/MS. XGBoost outperformed other MLAs in predicting VD/MS with an MAE = 0.0349 log10 and 0.9936 adjusted R2. XGBoost identified TSS, DO, temperature, salinity, matrix, month, and pH in descending order of magnitude as the importance predictive variables. Nomogram constructed from these variables had an area under the receiver operating characteristic curve (AUC) =85.14% in training set and AUC=77.12% in validation data. In conclusion, ML-motivated nomogram reduced the turnaround time required to determined VDs/MS <10 minutes compared to 3–4 h for PCR culture-independent and 18–24 h culture-dependent approaches and provided low-cost means for irrigation WWU MS decision making in agriculture.*

Keywords: Nomogram; Machine learning; Sustainable food production; Food safety; Wastewater reuse; Quantitative microbial risk.

Matthew Alaofin (MBA, CC, ACMA, CGMA, ACA). Dell Technologies, Austin, Texas, U.S.A

Matthew currently works as a Corporate Strategy Senior Advisor at Dell Technologies, where he contributes to shaping the company's long-term direction through data-driven insights, strategic planning, and cross-functional collaboration. He works on high-impact initiatives that span emerging technologies, Artificial intelligence, hybrid cloud, edge computing, market expansion, portfolio optimization, and operational efficiency. His role involves partnering with senior leaders across business units to identify strategic priorities, evaluate AI-driven solutions, assess new market opportunities, and develop recommendations that support growth, innovation, and competitive advantage. His background spans leadership roles at American Tower, British American Tobacco, and KPMG, with a strong track record of improving financial performance, optimizing operations, and identifying high-impact opportunities in tech, telecom, and FMCG sectors.

Title: Unified AI Frameworks for Risk, Personalization, and Threat Detection across Industries

Abstract: *Artificial Intelligence (AI) is increasingly being adopted in mission-critical systems across finance, cybersecurity, and marketing. However, the development of domain-specific AI solutions often leads to siloed tools and redundant infrastructure. The presentation will explore the concept and architecture of unified AI frameworks that can address common patterns in risk assessment, customer personalization, and threat detection across multiple industries. By identifying core machine learning primitives shared across applications, such as anomaly detection, real-time scoring, and adaptive learning, a modular AI framework designed to scale and adapt across contexts is proposed.*

Dr Gbêmêmali Castro Hounmenou

University of Labe (Guinea) & CERFIG, Université Gamal Nab (UGANC)

Topic: Analysis of the Determinants of Knowledge and Practices Among Poultry Workers Regarding Highly Pathogenic Avian Influenza in Guinea Using Multilayer Perceptron Neural Networks

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Abstract- *Background: Highly pathogenic avian influenza (HPAI) poses a serious threat to public health and the poultry economy in Guinea. Understanding the factors influencing poultry workers' knowledge and practices is crucial for developing effective interventions. This study aims to analyze these determinants using multilayer perceptron neural networks.*

Methods: A cross-sectional study was conducted in the prefectures of Coyah and Forecariah, using a questionnaire to assess knowledge, biosecurity practices, and socio-demographic and professional factors among poultry workers. The collected data were used to train a multilayer perceptron neural network model, followed by the application of the Olden approach to identify complex relationships between different variables. The model was evaluated and adjusted to optimize its predictive accuracy.

Results: The analysis included a total of 326 poultry workers. Preliminary results showed that factors such as education level, professional experience, and access to information were significant determinants of knowledge levels and biosecurity practices. The neural network helped identify subtle interactions between these factors, revealing that some variables, when considered in isolation, might not fully explain the observed behaviors.

Conclusion: This study demonstrates the usefulness of multilayer perceptron neural networks in analyzing the determinants of knowledge and practices among poultry workers regarding avian influenza. The findings suggest that targeted interventions based on these determinants could improve awareness and safety practices among poultry workers, thereby contributing to the prevention of virus transmission.

Keywords: Avian influenza, Poultry workers, Neural networks, Olden method, Poultry farms.

Dr. Olayemi Oladimeji Emmanuel

Title: Data Driven AI for Sustainable Healthcare: Advancing Early Diabetics Reretinopathy Detection with Lightweight Deep Learning Models.

Abstract*: The integration of artificial intelligence (AI) into healthcare has the potential to enhance early disease detection, reduce diagnostic costs, and improve patient outcomes. This study explores the application of lightweight deep learning models for the timely detection of diabetic retinopathy (DR), a leading cause of blindness worldwide. Early detection is crucial to mitigating its progression. This research integrates deep learning approaches to develop a lightweight convolutional neural network (CNN) for diagnosing diabetic retinopathy. Employing a well-balanced dataset, the model achieves an accuracy of 81.1% and a macro F1-score of 0.8125, with a compact size of 11 MB, making it ideal for low-resource settings. Comparative experiments with benchmark models such as ResNet, GoogLeNet, and VGGNet demonstrate its computational efficiency and competitive performance. The findings highlight the potential of lightweight models to deliver timely and accurate diagnostic services, particularly in resource-constrained environments.*

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Title: TUBERCULSIS DISEASE CLASSIFICATION USING MACHINE LEARNING-BASED TECHNIQUES.

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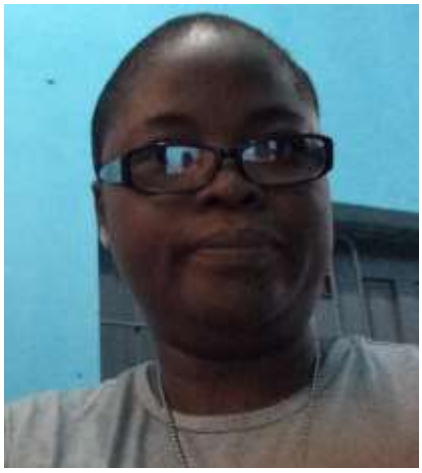
Abstracts: *Tuberculosis remains a major global health concern. Early detection is essential to improving treatment outcomes for tuberculosis. This project explores the classification of tuberculosis from medical images using machine learning models, including Random Forest, Support Vector Machine (SVM), and Logistic Regression (LR). These models were trained using extracted features, and the accuracy, precision, recall, and AUC-ROC metrics were used to assess the models. The receiver operating characteristic curve's area (AUC) and characteristics were used to evaluate model performance. The results revealed that the Random Forest model excelled, achieving an AUC-ROC score of 99%, accuracy of 96%, specificity of 97%, precision of 97%, sensitivity (recall) of 94%, and an F1 score of 95%. In contrast, the Support Vector Machine attained an AUC-ROC of 100%, with an accuracy of 97%, specificity of 98%, precision of 98%, sensitivity of 96%, and an F1 score of 97%. The Logistic Regression (LR) model achieved an AUC-ROC of 100%, an accuracy of 99%, a specificity of 100%, a precision of 100%, a sensitivity of 98%, and an F1 score of 99%. The evaluation suggests that the Logistic Regression model displays superior predictive abilities and overall performance, showcasing its efficacy in learning from the features present in tuberculosis susceptibility in this work. The performance of these models has showcased how effective they are in classifying tuberculosis from Chest-Xray which will help in the early detection and diagnosis of tuberculosis diseases for radiologists and the medical field at large.*



Dr. Bukola Badeji-Ajisafe
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Topic: AL-Driven Model for Detecting Alzheimer's Disease Progression.

Bukola Badeji-Ajisafe[1*], Balikis Pelumioluwa Abdulraheem[2]

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Abstract— *The brain is a mass of nerve tissue that controls all of our bodily and cognitive functions. It is susceptible to neurodegenerative diseases such as Alzheimer's disease (AD). AD is a progressive and irreversible disease that leads to memory loss, continuous cognitive decline, and behavioral deterioration. This research compares Artificial Intelligence (AI) algorithms trained with a longitudinal non-imaging dataset to detect AD progression. The Support Vector Model (SVM), which is termed long_SVC, achieved the highest accuracy of 0.829 and an Area Under Curve (AUC) 0.83 score. The long_RFC model was the second-best model with 0.808 accuracy and 0.806 AUC score. The long_1D-CNN model and long_LSTM-AE model performed poorly in differentiating between 'Non-demented' and 'Demented'. The long_1D-CNN model performed better than the long_LSTM-AE model; it had an accuracy of 0.566 and an AUC score of 0.585. While the long_LSTM-AE has an accuracy of 0.533 and an AUC score of 0.558. The long_1D-CNN and long_LSTM-AE models had a log loss of 0.683 and 0.708, respectively. The long_SVC model outperformed the Convolutional Neural Network (CNN) and Long Short-Term Memory Auto-Encoder (LSTM-AE) models due to the dataset's size. This research highlights the potential of the long_SVC model as a decision support tool in healthcare, helping doctors to come to an early diagnosis. Challenges in deployment, such as model interpretability for doctors, are discussed. Future studies could explore integrating this model into real-world healthcare settings to improve patient outcomes.*

Keywords: Alzheimer's disease, Neurodegenerative disease, Artificial Intelligence, Dementia, Non-dementia.

Dr. Abimbola Helen Afolayan.

Federal University of Technology Akure, Nigeria.

Title: Post-COVID Health Behaviours and Perceptions among Nigerian University Students: Insights for Sustainable Public Health Policy and Future Pandemic Preparedness.

Abimbola H. Afolayan[1]* and Chukwuemeka C. Ugwu[2]

1* Department of Information Systems, Federal University of Technology, Akure, Nigeria‖ahafolayan@futa.edu.ng 2 Department of Data Science, Federal University of Technology, Akure, Nigeria‖ugwucc@futa.edu.ng

Abstract: *The outbreak of the COVID-19 pandemic underscored the critical importance of public knowledge, attitudes, and perceptions (KAP) in managing infectious disease outbreaks and informing sustainable health policies. This study provides a data-driven assessment of COVID-19-related KAP among university students at the Federal University of Technology, Akure (FUTA), Nigeria. A cross-sectional survey of 500 students across nine academic schools was conducted in February 2023. Pearson correlation analysis was conducted to explore the relationships among key variables, revealing moderate to strong associations between knowledge, attitudes, and preventive practices. Furthermore, unsupervised machine learning techniques, K-means clustering and Principal Component Analysis (PCA) were employed to identify three distinct behavioural archetypes: compliant knowledgeable, high-conformity but misinformed, and cautiously aware but less active groups. In addition, supervised machine learning, multiple linear regression, was used*

to examine the influence of demographic factors on health behaviours. The results indicated that gender, religion, academic level, and faculty significantly shaped students' adherence to preventive measures. These findings underscore the importance of targeted, data-driven public health interventions and integrating behavioural insights into institutional strategies for future pandemic preparedness.
Keywords: *COVID-19 Knowledge, Attitude, and Perception (KAP), University students, Pearson Correlation, Unsupervised and Supervised Machine Learning*.

Dr. Victoria Ibiyemi Omoniyi.

Federal University of Technology, Akure.

Title: Prediction of University Network Traffic behaviour Using LSTM and OGRU

Abstract: Recently, the surge in Internet usage across academic institutions has created a pressing need for effective and intelligent methods of predicting network traffic. These mechanisms are vital for efficient resource management, early detection of irregularities, strengthening cybersecurity, maintaining uninterrupted connectivity for both academic and administrative activities, and improving service quality. This research explores the application of Long Short-Term Memory (LSTM) and Optimized Gated Recurrent Unit (OGRU) models to study and predict network traffic trends within university settings. Both LSTM and OGRU are advanced deep learning frameworks designed to recognize temporal patterns in sequential data, making them well-suited for modelling intricate and dynamic network behaviours. The system undergoes some stages, such as Data collection, Data Pre-processing, Training stage, Testing Stage, Prediction stage, and Evaluation. The data were splitted by assigning 70% to training, 10% validation, and 20% to testing. Findings from the experiments reveal that while both models excel at identifying complex, nonlinear traffic patterns, LSTM outperforms OGRU slightly in terms of faster convergence and superior predictive accuracy across key metrics. This indicates that LSTM has strong predictive power better than the other model used.

Dr. Olukemi Victoria Olatunde. Federal University of Technology, Akure.

Title: Development of Ensemble Machine Learning Model for Stroke Detection.

Abstract: Stroke, a cerebrovascular accident is a significant global health concern and a leading cause of disability and death worldwide. Rapid medical intervention is crucial for successful treatment and improved patient outcomes. An ensemble stroke prediction machine learning system that can be used to support early risk assessment and preventive care was developed using dataset containing clinical features from the University of Medical Sciences, Akure, Nigeria. The dataset was preprocessed using label encoding, scaling, and Synthetic Minority Over-sampling Technique (SMOTE) for class balancing. Support Vector Machine (SVM) and K-Nearest Neighbors (KNN) models were trained and combined using a soft voting ensemble. The ensemble model was evaluated using accuracy, precision, recall, and ROC curve. The results showed strong predictive performance, highlighting the modelâ€™s reliability. The system demonstrates the potential of machine learning in enhancing clinical decision-making and improving personalized stroke risk evaluation.

Dr. Iyanu Pelumi Adegun.

Federal University of Technology, Akure.

Title: Forecasting Lassa Fever Cases in Nigeria: A Multi-sourced Dataset and Ensemble Learning Approach.

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Abstract*: Lassa fever is a deadly viral hemorrhagic fever endemic to some parts of West Africa including Sierra Leone, Liberia, Guinea and Nigeria. There have been some previous attempts to predict Lassa fever outbreaks and to understand its transmission dynamics Lassa fever. Most of these used mathematical and statistical models like ARIMA and its variants to understand the transmission dynamics of Lassa fever while a few others explored machine learning approach for its prediction. However, deep learning technique(s) and their ensembles have not been explored for forecasting Lassa fever cases. This study therefore seeks to explore a weighted ensemble deep learning approach to forecast Lassa fever cases in Edo and Ondo State being two Nigerian states with the highest cumulative confirmed cases. Multiple data sources including from historical Lassa fever incidence and weather data were used for building the ensemble model. The forecast was carried out eight (8) weeks and (12) weeks into the future. Selected deep learning techniques includes Long-Short Term Memory (LSTM), Bidirectional LSTM and Gated Recurrent Unit. Findings from the experiments shows that the 8-week forecast achieved a co-efficient of distribution (R2) of 52% and 26% while the 12-week forecast achieved an R2 of 26% and 10% in Ondo and Edo States respectively. Summarily, the findings show that the weighted ensemble models outperformed the individual deep learning models (LSTM, BILSTM and GRU), the machine learning models (SVR and MLP) and the statistical model (ARIMA in the two states. This research has shown the potential of ensemble deep learning techniques in forecasting Lassa fever cases, thereby enhancing epidemic preparedness and response from the government and other relevant stakeholders.*

Keywords: Lassa Fever, Machine Learning, Deep Learning, Ensemble, LSTM, BiLSTM, GRU.

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Topic: AUTOMATIC MISOGYNY DETECTION USING SUPERVISED ARTIFICIAL NEURAL NETWORKS

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Abstract- *The modern development in social networks and internet technologies has drawn researchers from around the world to investigate cyber bullying meme detection systems for*

detecting targeted bullying text and images at females known as misogynistic text and images. Based on the literature reviewed, very few studies have employed BiLSTM and VVCG16 models on the Multimedia Automatic Misogynistic Identification (MAMI) dataset using Bidirectional Long-Short Term Memory (BiLSTM) and Visual Geometry Group 16 (VGG16). This study aims to develop a Misogynistic Text and Image Detection System using the Bidirectional Long-Short Term Memory (BiLSTM) for text classification and Visual Geometry Group 16 (VGG16) for image classification. The methodology integrates the Visual Geometry Group 16 (VGG16) and Bidirectional Long-Short Term Memory (BiLSTM) model for multimedia analysis. Utilizing the MAMI dataset, encompassing 12,000 misogynistic memes which was spilt to training and test sets in the ratio 75% to 25%. Furthermore, this study addresses two primary subtasks. Sub-task A which involves classifying memes as misogynistic or non-misogynistic memes, and Sub-task B which aims at identifying the type of misogyny, which includes stereotype, shaming, objectification, and violence. Analysis and visualization of these categories were conducted using pandas, numpy, spacy, unicodedata and scikit learn. The performance of the system witnessed enhancement through the application of both the CNN and RNN Algorithm on the MAMI dataset giving the best performance with an accuracy of 0.99 on both text and image data.

Keywords-misogyny, artificial neural networks, social media, cyber bullying, deep learning.

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Topic: Development and Evaluation of a Transformer-Based Yoruba-English Machine Translation System with BLEU and ROUGE Scores

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***Abstract**- The importance of machine translation (MT) systems for underrepresented languages like Yoruba has been amplified by the ever-increasing demand for seamless communication across diverse languages. This paper proposes a deep-learning-based bi-directional MT system focused on translating between Yoruba and English language by exploiting the power of transformer model. This system incorporates a bilingual parallel Yoruba/English corpus, preprocessing, training and testing modules, and robust evaluation mechanisms, all designed to handle the unique challenges presented by the Yoruba-English language pair. The Transformer model's encoder-decoder framework, enhanced by multi-head self-attention mechanisms, is utilized to capture long-range dependencies between words in both languages, improving translation quality and fluency. The system's performance is evaluated using standard metrics ROUGE and BLEU scores and the results compared to establish the performance of both metrics with a promising ROUGE score 46% and BLEU score of 26%. This result is encouraging, given the size and sentence length of the training corpora used.*

Keywords— Machine Translation, Languages, deep-learning, transformer model, multi-head self-attention

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Topic: Toward Data-Driven AI in Healthcare: Design of a Smart Wearable for Autonomous Contact Tracing and Vital Monitoring

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Abstract- *Wearable health monitoring devices are emerging as critical tools in building data-driven, AI-enhanced health systems. Such systems could support early diagnosis, prevention, and population-level wellness of certain diseases., which are key components of a sustainable society and economy. In this study, a wearable device, built on ESP32 microcontroller, is designed and validated for automatic contact tracing. The device hosts multiple sensors for lodging users' body vitals and monitoring their proximity to other users. Body vitals, namely users' temperature, heart rate, and movement rate are lodged and transmitted via Bluetooth stack and processed on mobile app in real-time. The data stream lays the foundation for future machine learning applications, such as anomaly detection or predictive health alerts. The wearable device is low-power, rechargeable, and enclosed in a durable 3D-printed casing, supporting up to 12 hours of continuous use. With its low-cost, scalable architecture, the device offers a sustainable, locally adaptable solution for digital health monitoring, contributing to SDGs in health (SDG 3), innovation (SDG 9), and reduced inequalities (SDG 10). This research exemplifies how data-driven AI infrastructure can enable proactive healthcare systems and support economic resilience in underserved regions.*

Dr. Adeoye Samuel Adedara. Federal University of Technology, Akure.

Title: An Adaptive E-Learning Model using Ant Colony Optimisation and Hybrid Filtering.

Abstract**:** *Traditional e-learning models often fail to cater to individual learner needs due to limitations in parameter flexibility, generalisability across diverse populations, and the scope of adaptive courses. In addressing these challenges, this study proposes an adaptive e-learning model that leverages on the strengths of Ant Colony Optimization (ACO), collaborative filtering and content-based filtering. The ACO is used for adapting the learning contents and activities, and dynamically adjusting the learning path. For collaborative filtering, K-Nearest Neighbor (K-NN) is used for e-learning styles and teaching strategies to generate courses for learner. The Felder-Silverman Learning Style Model is employed to identify and accommodate different learning styles, ensuring a tailored educational experience. The implementation of the model is done using python and php frameworks. An online survey was conducted with 50 undergraduate students from various academic disciplines to evaluate the developed model. Using a 5-point Likert scale, results showed that 90% of the participants responded with 'Strongly Agree' regarding the platform's effectiveness, ease of use, and positive impact on their learning experience. It demonstrates significant improvements in learner satisfaction and academic performance. This research contributes to the*

e-learning by offering a flexible adaptive solution that enhances educational outcomes through personalized learning experiences.

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Topic: A Data-Driven Ensemble Deep Learning Framework for Intelligent Intrusion Detection in Ethical Telehealth Systems.

***Abstract*—** *The rapid digitization of healthcare via telehealth systems introduces complex cybersecurity risks due to heterogeneous devices, real-time data exchange, and strict privacy constraints. This study proposes a tailored intrusion detection framework for telehealth, integrating Long Short-Term Memory (LSTM), Convolutional Neural Network (CNN), and Deep Belief Network (DBN) models into a unified ensemble. Trained and evaluated on the UNSW-NB15 dataset, the model achieved 79% accuracy and a significantly lower false positive rate than standalone classifiers. The results affirm the effectiveness of ensemble deep learning in building secure, ethical, and data-driven telehealth systems. Beyond accuracy this research highlights the importance of ethical AI practices, ensuring privacy, fairness, and reliability in intrusion detection mechanisms tailored for telehealth systems. Results validate the model's potential for secure, explainable, and deployable IDS in sensitive telehealth infrastructures*.

Keywords— *Deep learning, ensemble learning, intrusion detection, Telehealth, Artificial Intelligence (AI),* SHAP (SHapley Additive exPlanations)

Prof. Kolawole Gabriel Akintola.

Federal University of Technology, Akure.

Title: Roles of Big Data Analytics in eCommerce and Digital Financial Services.

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Abstract*: The rapid generation of structured and unstructured data—commonly called big data—offers great opportunities for financial institutions and systems, such as electronic banking (e-banking) companies, electronic commerce (e-commerce) companies, electronic Payment systems,*

to extract valuable insights that enhance operational efficiency and profitability. These data are gotten from customers, vendors, markets, and business environment. This paper presents a comprehensive review of big data analytics techniques applied to e-commerce and digital financial services (DFS) in this era of digital economy. It examines existing literature on big data analytics and knowledge discovery through data mining and machine learning techniques to highlight its relevance and effectiveness. The review aims to demonstrate the role of big data analytics financial data analysis and ecommerce in shaping contemporary digital economy.

Keywords— Knowledge Discovery, Data Mining, E-Commerce, Big Data Analytics

Mr. Oladimeji Oluwatoyin Abereowo.

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Title: CYBER IMMUNE MODEL: ENHANCING SECURITY AGAINST DDOS ATTACKS.

***Abstract**: DDoS attacks have increasingly become a significant threat to online services, disrupting business operations and service availability. Amazon Web Services experienced a massive attack in 2020, peaking at 2.3 Tbps. In 2023, hacktivists targeted the U.S. government with similar attacks to draw attention to political causes. In 2024, Cloudflare mitigated the largest recorded DDoS attack, peaking at 3.8 Tbps. These attacks are costly, prompting the development of a cyber immune system to preemptively identify and neutralize threats, inspired by the human immune system. The system uses machine learning, behavioral analysis, and adaptive responses to analyze traffic patterns in real-time, distinguishing legitimate users from threats. A honeypot decoy gathers historical data, which the system uses to learn and adapt its defenses dynamically, identifying and mitigating emerging threats. The behavioral analysis component focuses on detecting deviations from normal traffic, indicative of DDoS activities. To strengthen system resilience, this framework includes an adaptive response mechanism that monitors and adapts to threats, refining detection models and deploying countermeasures like rate limiting, traffic filtering, and redirecting traffic. It emphasizes network collaboration for collective defense, sharing intelligence and resources. In conclusion, this research puts cybersecurity strategies a step ahead of the ever-growing sophistication of DDoS threats. By developing a robust cyber immune system, organizations can beef up their defense system, ensuring higher availability and resilience of their digital services. The findings contribute to the ongoing discourse on cybersecurity innovations, paving the way for future advancements in protective technologies against DDoS attacks.*

Dr. Temitayo Elijah Balogun. Federal University of Technology, Akure.

Title: AI-Powered Face Recognition System for Enhancing Academic Integrity and Access Control in Nigerian Universities.

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Abstract*: This research presents the design and implementation of a facial recognition system aimed at improving student authentication, attendance tracking, and campus security, Nigeria. Educational Institutions in developing regions continue to face persistent challenges in managing student identities, preventing examination malpractice, and securing restricted facilities. Traditional methods such as ID cards and manual attendance registers are vulnerable to forgery, impersonation, and administrative inefficiencies. To address these challenges, the study proposes an AI-driven biometric authentication system leveraging machine learning and deep learning techniques. The face recognition system was developed using OpenCV and Dlib libraries integrated within a Python-Flask web application. It includes modules for face registration, live facial detection, embedding extraction, and real-time recognition through webcam input. The system utilizes Haar Cascade for face detection and deep learning models for accurate face embedding and comparison using Euclidean distance metrics. It supports high recognition accuracy under diverse lighting and facial conditions and allows for seamless user interactions through a web interface. Experimental results demonstrate the system's efficacy, achieving a recognition accuracy of 99.75% and average processing speed of 0.48 FPS. User feedback indicated high satisfaction in terms of ease of use, detection accuracy, and system reliability. However, challenges such as variable lighting and hardware limitations were noted. This study contributes to sustainable digital transformation in education by showcasing how AI-based systems can replace insecure and outdated manual processes. It promotes ethical, secure, and scalable biometric solutions to enhance academic integrity and campus safety. The findings offer a scalable model for tertiary institutions across Nigeria and Sub-Saharan Africa, aligning with the United Nations Sustainable Development Goals (SDG 4 and SDG 9) focused on quality education and innovation infrastructure.*

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Topic: Economic Profile Generation from Textual Data Using an Algorithm Framework

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Abstract- *This paper outlines a multi-stage algorithmic framework for deriving an economic profile from a corpus of news headlines. The methodology integrates topic modeling, named entity recognition (NER), and network analysis to identify business-relevant themes, key economic actors, and their interconnections. The framework is designed to process a collection of articles, assign them to distinct topics, identify business-centric topics, extract relevant entities, analyze relationships between business and other topics, and synthesize these findings into an economic profile. Designed for scalability and interpretability, the framework supports applications in computational social science (CSS), policy-making, and market analysis, as a practical tool for understanding economic phenomena from unstructured text. The research is a domain-biased version adaption of a system that has been used to automatically extract social problems from a corpus of 148,000 news headlines; the framework is applied on 1,280 news headlines to show its working in parts.*

Keywords: Text Mining, Economic Network Analysis, Economic Profiling, Computational Economics, News Analytics.

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Topic: Detection of Phishing Uniform Resource Locators (URLs) Using Machine Learning Techniques

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Abstract- *A phishing attack is a calculated cybercrime, through which individuals and organizations are tricked by stealing their sensitive information (passwords, credit card details etc) via email, text messages websites or other online communication portals. The financial losses and loss of trust in online transactions due to phishing URLs pose great challenges against individuals and financial organizations; hence there is a need to deliberately detect phishing URL in order to avert the danger of vulnerability. This study aims to enhance phishing detection through the application of machine learning techniques. The study investigates various machine learning models; including Logistic Regression, Decision Tree, Gradient Boosting and Random Forest to determine their efficacy in detecting phishing URLs. The models were trained and evaluated using a comprehensive dataset from Kaggle, consisting of 32,167 instances, with 24,465 benign URLs and 7,702 malicious URLs. Key features distinguishing phishing domains from legitimate ones were extracted and analyzed to improve model accuracy using undersampling. Among the models tested, Gradient Boosting emerged as the most effective, achieving 92% accuracy, with a precision of 0.93 and a recall of 0.88; making it particularly reliable for phishing detection. Random Forest also performed well; notably in minimizing false positives. The study underscores the importance of feature extraction and model optimization in developing effective phishing detection systems. The findings contribute to the efforts in cybersecurity by offering resource-efficient solutions for real-time phishing detection, which can protect users globally against phishing attacks.*

Keywords: Phishing, Feature extraction, Machine Learning, Random Forest, Gradient Boosting

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Title: Watermarking Scheme for Ownership Biometrics.

Abstract: *"The Watermarking Scheme was proposed with the view of protecting and improving biometric Recognition system. This can be achieved through labeling stored biometric trait in a Repository before distribution. Binarization , Histogram equalization and removal of noise are the image enhancement that was done. To obtain authentication result , biometric features were extracted and matched with stored or template features."*

Dr. Taibat Onome Asunogie.

Edo University Iyamho Edo State., Nigeria.

Title: DATA DRIVEN AI FOR SUSTAINABLE AGRICULTURE AND FOOD SECURITY USING THE TRIPLE HELIX METHOD.

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***Abstract**: Addressing the escalating global concerns of food security and environmental sustainability necessitates innovative approaches within the agricultural sector. This abstract proposes a framework leveraging data-driven Artificial Intelligence (AI) through the lens of the triple helix model, fostering a synergistic ecosystem for transformative impact. By integrating the distinct yet complementary expertise of academia, industry, and government, this approach aims to unlock the potential of agricultural data for optimizing resource management, enhancing crop yields, predicting and mitigating risks (e.g., pests, diseases, climate variability), and ultimately bolstering food security.*

This research proposes a novel approach to sustainable agriculture and food security using a data-driven AI framework, leveraging the Triple Helix method. The Triple Helix model, which integrates industry, academia, and government, is applied to create a collaborative ecosystem that fosters innovation and knowledge sharing. Our framework utilizes machine learning algorithms and data analytics to optimize crop yields, reduce waste, and promote sustainable agricultural practices. By analyzing large datasets from various sources, including satellite imagery, weather patterns, and soil conditions, our AI system provides actionable insights for farmers, policymakers, and industry stakeholders. The framework also incorporates blockchain technology to ensure data integrity, transparency, and security. Our results show significant improvements in crop yields, water conservation, and reduced chemical usage, contributing to a more sustainable and food-secure future. This research demonstrates the potential of data-driven AI and the Triple Helix method to transform the agriculture sector, promoting a more collaborative, efficient, and sustainable food-system."

Dr. Oluyemi Gbadamosi Mangosuthu.

Federal University of Technology, Akure.

Title: DEVELOPMENT OF NOVEL LEAST COST FISH FEED FORMULATION AND PRODUCTION USING OPTIMISATION SOFTWARE PACKAGES FOR AFRICAN CATFISH, Clarias gariepinus.

***Abstract**: This research proffered solution by developing least cost, efficient, sustainable and environmental friendly fish feed formulation using appropriate deep-learning techniques. A novel computer software (AquaFeedApp) was designed and developed using data from ingredient composition, cost, nutrient requirements, water quality, and physical parameters. AquaFeedApp addressed the major limitations of the existing less efficient fish feed formulating methods for African catfish, Clarias gariepinus by allowing the optimisation of conventional and non-conventional feedstuffs, and cost, water quality to serve as a predicting tool for the determination and evaluation of nutritional effects on target fish production indicators such as growth, feed conversion, feeding costs and body composition. The computer software was a hybrid of three different models â€“ Artificial intelligence approach based on machine learning / deep learning*

techniques, linear and stochastic programming. Furthermore, in this study non-conventional but cost effective feedstuffs / ingredients were profiled and utilised to replace / substitute high cost imported fishmeal in practical fish diets. Growth performance, nutrient utilisation and feed cost efficiency were assayed for African catfish, Clarias gariepinus fed the experimental diets in situ. The study utilised a recirculating aquaculture system (RAS) to assess the nutritional value, water quality management, and overall performance of the different diets on the fish. The formulated diets varied in protein sources, including conventional and non-conventional ingredients, such as fish meal, soybean, blood meal, and blackfly larvae meal. Growth performance, feed conversion ratios (FCR), and economic cost analysis were evaluated. Results indicated significant differences in both the cost-effectiveness and growth potential of the diets. Diet 1 (control) demonstrated the lowest production cost and adequate growth, making it the most economically viable option for C. gariepinus farming.

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Topic: Enhancing Food Security Through Food Price Forecasting in Nigeria Using Machine Learning

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Abstract- *Food is a fundamental component of human survival and well-being, with food prices playing a critical role in determining access to nutritious food. Accurate food price forecasting is essential for promoting food security and economic stability, particularly in Nigeria, where price fluctuations have a direct impact on household access to food. This study aims to evaluate the performance of several forecasting models in predicting food prices across Nigerian states, with the objective of identifying the most accurate and adaptable models for real-time deployment.*

The data, sourced from the World Food Programme, includes monthly price observations for food commodities such as imported rice, maize, yam, and garri across various states including Lagos, Borno, and Kano. Six forecasting models were employed: Prophet, Support Vector Regression (SVR), Gradient Boosting Machines (GBM), Long Short-Term Memory (LSTM) networks, CNN-RNN hybrids, and Transformer-based architectures. The dataset was enriched with economic and market-related indicators. Event-awareness was incorporated by tagging critical periods such as the COVID-19 lockdown and fuel subsidy removal.

All models generated forecasts with varying degrees of accuracy. Deep learning models used demonstrated stronger temporal awareness and adaptability. While GBM outperformed SVR in most cases, it remained less flexible in capturing nonlinear temporal dynamics. Prophet delivered interpretable trend-based forecasts with moderate accuracy. Model performance was evaluated using Mean Absolute Error (MAE) and Root Mean Square Error (RMSE). Transformers, LSTM, and CNN-RNN consistently achieved lower error metrics across state–commodity combinations, demonstrating robustness in modeling seasonal and event-driven dynamics. This study offers actionable insights for policymakers, agricultural stakeholders, and market regulators, enabling informed decisions that enhance market stability, improve resource planning, and ultimately strengthen food security in Nigeria.

Keywords: Food Price Forecasting, Food Security, Deep Learning, Time Series.

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Title: Enhancing Concrete Crack Detection Using Preprocessing Techniques on a Convolutional Neural Network and a Vision Transformer

Abstract*: Structural cracks significantly compromise safety and durability in reinforced concrete structures. Early and accurate identification of these cracks is important for preventing progressive structural deterioration and potential catastrophic failure; however, traditional manual detection methods are time-consuming, laborious and prone to human error. In recent years, machine learning (ML) and deep learning (DL) approaches have emerged as promising alternatives for automating crack detection in structural health monitoring (SHM) systems. However, the effectiveness of these models heavily depends on the quality of input data. This study systematically investigates the impact of image preprocessing techniques on the performance of DL models in detecting cracks in reinforced concrete structures. Three image preprocessing techniques namely: Data Augmentation, Contrast Limited Adaptive Histogram Equalization (CLAHE) and Gaussian Blurring were applied to a publicly available image dataset. The preprocessed datasets were used to train two advanced DL architectures: a Convolutional Neural Network (CNN) based on ResNet-50 architecture and a Vision Transformer (ViT) model. The models' performances were evaluated based on accuracy, precision, recall and F1 score. Results indicate that preprocessing techniques, particularly data augmentation improve model detection capabilities compared to raw images. Data augmentation showed the most significant performance enhancement for both architectures, further enhancing the model's ability to generalize to unseen data. This research provides a practical framework for enhancing automated crack detection systems, contributing valuable insights for developing more reliable SHM solutions for infrastructure monitoring and maintenance.*

Keywords – Structural Health Monitoring, Crack Detection, Convolutional Neural Networks, Vision Transformers, image preprocessing.

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Topic: USE OF MEDIA MIX DESIGN STRATEGY IN COMMUNICATING CLIMATE CHANGE ADAPTATION TO RURAL FARMERS IN NIGERIA

Abstract- *Improving Nigerian rural farmers' resilience and food security requires effective communication of climate change adaptation measures. To improve communication between rural agricultural communities and climate scientists, this study investigates the use of a media mix design method. The public must be reached through a media strategy to plan and carry out climate adaptation actions. Public participation designs are often decided by local communities. However, it is necessary to find a media tool that would expedite engagement efforts and communicate the climate change goals from the planning stage to their execution stage. Adapted to the local setting, level of education, and media use patterns of rural farmers, a media mix method combines classic media (radio, community theatre, posters) with digital platforms (mobile SMS, social media, video content). Mixing these forms of communication provides greater reach, deeper understanding, and*

repetition of information. The use of localized radio shows in conjunction with text messaging in local languages greatly improves farmers' comprehension of climate risks and their readiness to use adaptation techniques, according to field data from selected Nigerian rural areas. Effective climate change communication depends on culturally relevant content, participative communication, and trust in local media, according to the study. According to the findings, policymakers, non-governmental organizations, and communication experts must implement inclusive and integrated media strategies that take into account the reality of rural areas. In the end, the design of the media mix provides a framework that is both scalable and flexible, enabling rural farmers to secure sustainable livelihoods and reduce the effects of climate change.

Keywords: Climate Change, sustainable agriculture, food security, agriculture, media mix design

Dr. Ibraheem Temitope Jimoh.

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Title: DEVELOPMENT OF MACHINE LEARNING BASED INTELLIGENT SYSTEM FOR TERRORISM PREDICTION.

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***Abstract**: The anticipation of sustainable development goals 1, 4 and 16 is to eradicate poverty, provide quality education and ensure peace, justice, and strong institutions respectively but terrorism has led to unrest, fear, intimidation, loss of lives and multi-billion properties in Nigeria and the entire World. This work developed a machine learning based system that predict the terrorism activities to prevent economic loss. The work was carried-out using Bagging consisting of the Logistic Regressing, Random Forest and Support Vector Machine and deep learning module (Bidirectional Long Short-Term Memory and Bidirectional Encoder Representation from Transformer) that explored both the global terrorist dataset and scrapped dataset from social media platform to predict the likelihood of the attack, the likely time and location of attack. The model output integrates into a web based application to promote public awareness and early warning to the masses and constituted authorities. The system allows the user's interaction through the user interface of the internet Access enabled devices from which the user enter queries such as Boko Haram, Fulani Herdsmen or Hostage Taken. Both the traditional and deep learning models has the accuracy between 97.21% and 98.38%. The BiLSTM has the highest precision of 99.40% and LR has lowest precision of 94.67%, Which means all post were correctly classified up to the minimum of 99.87%. The F1-score for all the models; RF, LR, SVM, Ensemble Model, BERT and BiLSTM has are 97.54%, 95.85%, 97.10%, 97.10%, 97.54% and 98.38% respectively. The work developed an intelligent system for terrorism prediction.*

Keywords: Terrorism, SDG, ML, Prediction, Twitter.

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Topic: SYNTHESIS, CHARACTERIZATION AND APPLICATION OF A NOVEL AZO-BASED Pb (IV) COMPLEX FOR THE ANALYSIS OF ALLOYS

Abstract*—Strategies for environmental change mitigation require accurate analysis of metals in alloys, which is crucial for various industrial applications, waste reduction, and pollution prevention. In the present paper, a new method is proposed for the spectrophotometric determination of lead (IV) using an azo-based ligand derived from isatin and 4-aminoantipyrine. The ligand: 6-[(E)-(1, 5-dimethyl-3-oxo-2-phenyl-2, 3-dihydro-IH-pyrazol-4-yl) diazenyI]-1H-indole-2, 3-dione was synthesized by coupling diazotized 1-pheny1-2, 3-dimethyl-4-aminopyrazole-5-one and 1H-indole-2, 3-dione. It formed stabled and coloured complex with Pb (IV). Both the ligand and complex were characterized via UV, IR and NMR spectroscopy. Analytical data obtained show that Pb (IV) formed complex, with 1:1 metal-ligand stoichiometry when reacted with the ligand respectively. The metal ion was determined spectrophotometrically by measuring the absorbance at 498.0 nm. Beer's law was valid between 0.59-4.70 ppm, with calibration and analytical sensitivities of 0.033 and 33.00 ppm respectively. Very few elements were found to interfere in the determination. The method is quite simple and useful; its applicability has been tested by the analysis of solder and brass with potential applications in recycling, waste management and environmental monitoring. By promoting sustainable materials and technologies, this research contributes to mitigating environmental change and promoting a circular economy.*

Material/Environmental Science: Keywords: 4-aminoantipyrine; isatin; spectrophotometry; lead (IV); alloys

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Topic: Optimizing Mining Operations Using a Data-Driven AI Strategy: A Review

Abstract- *The urgent need to address challenges regarding safety, efficiency, and sustainability in the mining industry has consistently driven the integration of advanced technologies into operational decision-making. The advent of Artificial Intelligence (AI) and Machine Learning (ML) is rapidly gaining its prominence in the Mining Industry. Today, mining operators are gradually optimizing their operational approach, leveraging AI enhancement in its decision-making process through the integration of sensor data, geospatial data, satellite imagery data and more. Sensor-generated data helps identify performance trends and equipment health, while geospatial data provides insights into topographical constraints and mineral-rich zones. The applications of AI and ML models allows the extraction of valuable geospatial intelligence, essential for the optimizing mining strategies and resource allocation. Leading global mining companies are beginning to adopt such practices, including predictive maintenance, equipment automation, smart mine planning, and Health, Safety, and Environment (HSE) initiatives. The future of AI and Machine Learning integration in Mining operations mostly relies on accurate data from the sources. This paper explores state-of-the-art of mining operations in developing countries—particularly Nigeria—highlighting the challenges faced, the benefits of AI integration, applications and existing AI tools that support cost-effective mining, and what the future holds for data-driven mining in an increasingly digital world.*

Keywords: Artificial Intelligence, Mining, Machine Learning, Data

Dr. Tunde Joshua Fatoke

Federal University of Technology, Akure

Title: Development of A Web Based Yoruba Speech-To-Text System

***Abstract**: Yoruba is a low resources language especially in a digitalized form. This work aims to close the gap in Yoruba language natural language processing by developing a Yoruba speech-to-text system. The research builds an end-to-end system using machine learning, HTML, CSS, and JavaScript to address the need for effective and accessible speech recognition tools for underrepresented languages. To train a neural network architecture, the methodology entails gathering a curated Yoruba speech dataset. Important results show how well the system can translate Yoruba speech, with an emphasis on accuracy and error reduction. By providing insights into Yoruba language processing and creating opportunities for different corpus adaptability, the project advances the area of Natural Language Processing by revolutionize the process of developing a strong Yoruba Speech-to-Text system, opening the door for improvements in accessibility and language technology.*

Mrs. Asiat Mercy Adebisi

McPherson University, Seriki Sotayo, Abeokuta, Nigeria.

Title: "Data-driven, Context-Aware Multidimensional Ranking of Academic and Research Expertise"

***Abstract**: Researchers expertise are often ranked based on metrics that assess a researcher publications and the number of citations for each publication. Google Scholar is one of the major academic search engines, but its ranking algorithm for academic articles is unknown. There is no robust, context-aware expert ranking system currently existing in Nigeria" at least not one that is Multidimensional (beyond publications/citations), Context-sensitive (adapting to institutional, disciplinary, or national priorities), and openly available for use by policymakers, institutions, and researchers.*

In Nigeria, TETFund, the National University Commission (NUC), and some ministries may maintain internal lists of scholars, but these are often static and not transparent. Platforms like Google Scholar and Scopus are used informally, but they are global and do not reflect local relevance, societal impact, or contextual needs. There is a need for a national system that ranks researchers based on priorities like the Sustainable Development Goals (SDGs), national development goals, or region-specific challenges alongside traditional metrics such as publications and citations.

This research proposes a data-driven, context-aware ranking framework that leverages big data and advanced analytics to identify, categorize, and score academic expertise. The envisioned system will integrate diverse datasetsâ€"ranging from scholarly metadata and institutional records to SDG relevance tags and community impact indicatorsâ€"processed through analytical models. Future iterations will explore the use of machine learning and natural language processing to automate relevance scoring and generate insights for funding bodies and policymakers"

Dr. Ednah Olubunmi Aliyu

Adekunle Ajasin University Akungba Akoko, Ondo State.

Title: Convolution Neural Network-Based Facial Recognition System for Detecting Student Impersonation in Educational Institution.

Abstract*: Examination malpractice has eroded moral integrity and ethical principles within many Nigerian institutions. Traditional identification methods, like student ID cards and fee payment receipts, are easily falsifiable, fostering impersonation during examination. This research proposes a convolutional neural network (CNN)-based facial recognition system to address this issue. A facial corpus of students in the Department of Computer Science in Adekunle Ajasin University, Akungba Akoko were collected, stored in the database. Uploaded media was saved in Amazon Web Services (AWS) and processed using Open Computer Vision (OpenCV) library. Feature extractor and facial recognition are based on convolutional neural networks, which aid the translation of incoming images, store them as bytes in the database (MySQL), and facilitate the retrieval of the data during the verification process. An experiment was carried out at a 96% confidence level, and the test accuracy was set at 97% and 98% for matching at different confidence levels respectively. The system was implemented using JavaScript and the Python programming platform (Python Web Framework) with a good upshot. Hence, the proposed system is recommended for educational institutions to effectively curb impersonation and enhance examination integrity.*

Mrs. Adeyinka Bukola Abimbade.

Federal University of Technology Akure, Ondo State.

Title: DEVELOPMENT OF A PREDICTIVE MODEL FOR E-COMMERCE USERS' SHOPPING PATTERNS.

Abstract*: "This research developed a predictive model combining Markov Decision Process (MDP) and Recurrent Neural Networks (RNN) to forecast users shopping patterns on e-commerce platforms. Key findings include:*

High accuracy rates:

Markov model: 93.3%

MDP policy: 89.9%

Q-Learning policy: 94.3%

The combined model outperformed traditional predictive models.

The proposed model can enhance personalized recommendations, customer satisfaction, and retention."

Mr. Olajide Olawale Ogunbodede

Federal University of Technology Akure, Ondo State.

Title: User Behavior Analytics for Insider Data Theft Prevention and Detection.

Abstract*: Insider threats pose a serious danger to cybersecurity. Insiders possess greater privileges and authorized access to information and resources compared to external attackers, which can result in significant harm to a business. The increasing frequency and sophistication of these threats have intensified the need for proactive measures to prevent and detect data theft within*

organizations. Traditional perimeter-focused security models are often inadequate against trusted users who misuse access privileges. User Behavior Analytics (UBA) offers a promising paradigm by continuously monitoring and modeling user activities to identify anomalous patterns that may signal malicious intent. This paper proposes a UBA-driven framework for detecting data theft, leveraging advanced machine learning techniques including BiLSTM-Autoencoders and unsupervised anomaly detection to establish dynamic baselines of normal behavior. By incorporating contextual and temporal factors, the system can detect subtle deviations indicative of exfiltration attempts. Evaluations on benchmark datasets, including the CERT Insider Threat dataset, demonstrate the model's effectiveness in identifying malicious behaviors with high recall while minimizing false positives. The study underscores the role of behavior-centered analytics in strengthening data security and highlights its potential integration into organizational risk management strategies.

Dr. Samuel Ibukun Olotu

Federal University of Technology Akure, Ondo State.

Title: Development of a Hybrid Transformer-Based Deep Learning Technique for Email Spam Detection.

Olotu Samuel. Ibukun[1], Ayeyemi Bimbo. D.[2], Adekunle Adedamola. V.[3]

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Abstract: *Email has become one of the most efficient, cost-effective and effective methods of communication between individuals and within organisations. However, as the number of email users grow, the number of unsolicited and unwanted emails, known as spam, to the users also increases. These email spams are sometimes used for commercial purposes like advertising, but they can also be used for fraudulent schemes and to spread malware. This work presents a hybrid model for email spam detection technique based on Bidirectional Encoder Representations from Transformers (BERT) and Long Short-Term Memory (LSTM) deep learning techniques. The hybrid model is implemented using an email spam dataset containing both spam and ham messages. The result of the performance evaluation of the proposed system is compared with existing transformer-based deep learning techniques.*

Keywords: *Email spam detection, deep learning, BERT, LSTM, transformers*

Dr. Oluyomi Kolawole Akinyokun. Federal University of Technology Akure, Ondo State.

Title: NETWORK INTRUSION DETECTION SYSTEM USING K-NEAREST NEIGHBOR ALGORITHM.

Oluyomi Kolawole Akinyokun[1] and Ashafa Ayomide Andrew[2]

[1,2] Department of Cybersecurity, Federal University of Technology, Akure, Nigeria

Abstract: *The explosion of acceptance of a digitized era has brought cybercrimes and at various levels of sophistication. Network Intrusion Detection Systems (NIDS) play a pivotal role in securing computer networks against unauthorized access and malicious activities. This study focuses on the*

application of the K-Nearest Neighbor (KNN) algorithm to enhance the efficacy of NIDS. The KNN algorithm, a machine learning approach, is employed for its capability to classify network activities based on the majority vote of their nearest neighbors. The research aims to evaluate the effectiveness of the KNN algorithm in detecting various types of network attacks using datasets such as NSL-KDD. The optimized KNN model, coupled with refined methodologies, offers practical solutions for real-world network security challenges. The model, trained and evaluated using a split dataset, demonstrated impressive performance. With an accuracy score of 0.9849(98%), precision, and F1 score equally high, the optimized K-Nearest Neighbors (KNN) model exhibits robustness in network intrusion detection. These results underscore the model's effectiveness, validating its potential for real-world applications in cybersecurity.

Dr. Olayemi Grace Abimbola. Department of Computer Science Education, Lagos, Nigeria

Title: Designing a Predictive Model for Assessing Depression Risk among Youths in South-West Nigeria.

Abstract: *This study focuses on developing a prognostic model to predict depression risks among youths in South-West Nigeria, addressing the urgent need for early mental health diagnosis and intervention. A total of 795 participants, aged 17 to 45 years (mean age: 29.2), were surveyed, with a gender distribution of 59.2% male and 40.8% female. The study explored multiple risk factors, including family history of depression (33.3%), environmental stressors (68.3%), substance abuse (38.9%), medication use (51.6%), co-morbid medical conditions (40.1%), irregular sleep (65.9%), hormonal changes (38.2%), and personality traits (85.5%). Depression was diagnosed in 54.2% of the sample. To identify relevant predictors, the study incorporated insights from psychiatric experts through structured interviews, followed by data collection via Google Forms. The data underwent rigorous preprocessing-addressing missing values, encoding, and normalization-to ensure quality and consistency. Three ensemble machine learning algorithms-Support Vector Machine (SVM), Random Forest (RF), and Multi-Layer Perceptron (MLP)-were implemented using Python in Google Colab to construct and evaluate the predictive models. Model performance was assessed using standard metrics including accuracy, precision, recall, F1-score, and ROC AUC. Correlation analysis revealed significant relationships among risk variables, such as a strong positive correlation (0.94) between age and age of onset, and moderate associations between substance use and medication (0.43), and between genetics and environment (0.26). The MLP model achieved the highest accuracy of 87%, thus, outperforming SVM and RF models, and demonstrating a low misclassification rate. These findings highlight the effectiveness of ensemble learning in youth depression risk prediction.*

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Topic: An Artificial Neural Network Framework for Heart Disease Prediction in a Multi-Center Study with Comparative Machine Learning Analysis

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Abstract *-- Cardiovascular disease prediction remains a critical challenge in precision medicine, demanding models that balance accuracy, interpretability, and clinical utility. This study presents a comprehensive evaluation of machine learning approaches for heart disease risk stratification using a multi-center dataset of 920 patients. Our optimized artificial neural network (ANN) demonstrated state-of-the-art performance, achieving 0.921 ROC-AUC and 0.850 F1-score, comparable to ensemble methods (Random Forest: 0.887 ROC-AUC) while outperforming logistic regression (ΔF1 +1.1%) and SVM in recall (82.60%). Chest pain patterns and ST-depression were identified via correlation analysis, aligning with known clinical predictors. All models exhibited strong discriminative power (ROC-AUC >0.832), but the ANN uniquely combined high sensitivity (88.20%) with computational efficiency (142s training time), suggesting clinical viability for real-time triage. The framework's robustness was validated through stratified cross-validation and confusion matrix analysis, revealing consistent performance across demographic subgroups.*

Dr. Arome Junior Gabriel

Federal University of Technology Akure, Ondo State.

Title: Tracy and Tracer: AI-Powered Mobile Application for Privacy-Preserving Contact Tracing and Health Monitoring.

Abstract: *The COVID-19 pandemic highlighted the urgent need for intelligent digital technologies supporting large-scale public health surveillance while preserving user privacy. This paper presents "Tracy-Tracer," a mobile application designed to generate and leverage significant datasets for real-time monitoring, contact tracing, and health management. "Tracy" utilizes Bluetooth and GPS to automatically collect proximity and movement data, forming a substantial dataset for contact network analysis. "Tracer" empowers users to contribute their health information through self-assessment, enriching the overall data available for public health insights. Built using Flutter and Android Studio, with secure cloud data storage via Firebase, both applications are engineered with privacy-preserving features to ensure data anonymization and ethical compliance. Together, these apps showcase the potential of AI-driven mobile technologies to generate critical data for informed public health responses in emergencies. The study outlines the system architecture for data collection and management, emphasizing privacy and security, and discusses the potential for future in-depth analytics to support epidemic control.*

Dr. Sadura Priscilla Akinrinwa

Federal University of Technology Akure, Ondo State.

Title: Evaluating Model Fairness Using the Accuracy Disparity Ratio: Enhancing Ethical AI for Medical Diagnosis.

Abstract: *"The integration of artificial intelligence (AI) into medical diagnosis has immense potential to improve healthcare outcomes. However, ensuring fairness in AI models is critical to pre-venting biased decision making, which can disproportionately affect specific demographic groups. This paper introduces the Accuracy Disparity Ratio (ADR), a novel metric designed to quantify fairness by assessing performance consistency across different population subgroups. We apply ADR to a deep convolutional neural network (CNN) trained on the BreaKHis dataset for breast cancer diagnosis. The results demonstrate that ADR offers meaningful insights into model bias, guiding the development of more equitable AI-driven healthcare solutions."*

Dr. Akindeji Ibrahim Makinde. Federal University of Technology Akure, Ondo State.

Title: Emotion Recognition in Multi-Agent Mental Health Systems for Alerting and Recommendation Generation.

Akindeji Ibrahim Makinde[1], Emmanuel Onwuka Ibam[2], Veronica Olajumoke Bosede[3] Damilola Sunday Alabi[4]

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Abstract: *Mental health challenges are prevalent, affecting millions worldwide. Traditional approaches to mental health education and support often lack the personalization needed to effectively engage individuals. This challenges necessitate innovative, accessible solutions aligned with the United Nations Sustainable Development Goals (SDGs), particularly SDG 3 (Good Health and Well-being), which emphasizes reducing mental health disparities through technology-driven interventions. This research explores the integration of emotion recognition in multi-agent mental health systems for real-time alerting and personalized recommendations using DistilBERT, a lightweight version of BERT. The research compared two approaches: feature extraction with Logistic Regression and fine-tuning DistilBERT for sequence classification. The feature extraction method achieved 63.35% validation accuracy and a 62.14% weighted F1-score, struggling to distinguish closely related emotions like anger and fear. Fine-tuning DistilBERT resulted in a validation accuracy of 93.40%, test accuracy of 91.95%, and a test F1-score of 91.88%. These results underscore the efficacy of fine-tuned transformer models in enhancing emotion-aware mental health systems. The study successfully demonstrates that fine-tuned DistilBERT, significantly enhances emotion-aware mental health systems by enabling scalable, personalized interventions and fostering technology-driven mental health support.*

Keywords— Emotion Recognition, DistilBERT, Multi-Agent Systems, Mental Health

Dr. Olugbenga Ayomide Madamidola.

Federal University of Technology Akure, Ondo State.

Title: DEVELOPMENT OF A PICTURE ARCHIVING AND COMMUNICATIONS SYSTEM FOR A UNIVERSITY'S CLINIC.

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Abstract: *Picture Archiving and Communication System (PACS) is a medical imaging technology widely used in the healthcare sector to store, archive, and transmit medical images across various software platforms, in compliance with standards such as Health Level Seven (HL7). PACS digitizes traditional hardcopy films, thereby enhancing accessibility, efficiency, and long-term storage of patient imaging records. This study addresses the current limitation of the absence of a PACS in the clinic of universities. The primary aim of this project is to design and implement a functional PACS tailored for the university clinic. The specific objectives are to design a PACS that suits the operational needs of the PCU clinic and to implement the designed PACS for active use in the clinic. The development of the PACS was carried out using the Visual Studio Code integrated development environment (IDE), alongside technologies such as Laravel, PHP, MySQL, JavaScript, Bootstrap, CSS3, and HTML. Core functionalities like user registration, login, and other server-side*

operations were developed using Laravel (a PHP framework), enabling dynamic content delivery and multi-user functionality. By digitizing and centralizing medical imaging records, the system provides improved access, security, and accuracy in handling patient data for both students and staff. Although the system was developed with PCU as a case study, it is highly adaptable and can be implemented in other healthcare organizations. The use of PACS, as demonstrated, contributes significantly to improving diagnostic processes and healthcare service efficiency through streamlined access to patient imaging data.

Keywords— Picture Archiving, Medical Imaging, Communication, Health Services, Imaging Technology.

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Topic: Investigating the Performance of the Super-Learning Ensemble Algorithm in the Binary Classification of Diseases

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Abstract*- The super-learning ensemble algorithm has been demonstrated in the literature to improve classification tasks. However, limited works have been presented in the literature on investigating the performance of the super-learning ensemble algorithm on various benchmark datasets of diseases. This study, therefore, seeks to investigate and establish the effectiveness of the super learning algorithm in the binary classification of diseases. Five binary-class benchmark datasets of diseases were considered in this study. Results show that the super-learning algorithm produces a consistently improved classification model over the base learning ensemble algorithms or as good as the base learning ensemble algorithms. On the breast cancer dataset, a 97.7% accuracy and sensitivity of 0.968 which is the same performance as the best ensemble base learner (AdaBoost). Also, on the diabetes dataset, the super-learning algorithm achieved 80.7% accuracy and a sensitivity of 0.834, while the best base ensemble learner (Bagging) has an accuracy of 80.3% and sensitivity of 0.781. On the heart disease dataset, the super-learning algorithm achieved 87.7% accuracy and a sensitivity of 0.859 while the best base ensemble learner (AdaBoost) has an accuracy of 86.6% and a sensitivity of 0.841. On the prostate cancer dataset, the super-learning algorithm achieved 54.7% accuracy and a sensitivity of 0.519 while the best base ensemble learner (Random Forest) has an accuracy of 53.0% and a sensitivity of 0.410. Lastly, on the stroke dataset, the super-learning algorithm however achieved 96.7% accuracy and a sensitivity of 0.950 while the best base ensemble learner (Random Forest) has an accuracy of 96.8% and a sensitivity of 0.944. The findings in this study establish that the super-learning algorithm has the ability to improve the classification performance of the base learning ensemble algorithms or at least perform at par with them in the task of binary classification of diseases.*

Keywords: Adaptive Boosting, Bagging, Binary Classification, Disease Classification, Random Forest, Super-Learning Ensemble.

Dr. Kudirat Abiola Adegoke

Usmanu Danfodiyo University, Sokoto, Nigeria.

Title: Role of Academic Library in Data Management.

Abstract: *The evolving landscape of research and data-intensive activities has positioned academic libraries as pivotal institutions in the realm of data management. This study explores the multifaceted role of academic libraries in supporting researchers and academics throughout the data lifecycle, including collection, organization, preservation, and dissemination of data. It examines how libraries contribute to developing data management policies, fostering data literacy, and ensuring compliance with ethical and legal standards. The paper further highlights the innovative tools and technologies adopted by academic libraries to manage research data and the collaborative efforts undertaken with faculty, IT departments, and external stakeholders. By serving as hubs of knowledge and expertise, academic libraries not only enhance the quality of research outputs but also promote open science and long-term data accessibility. This research underscores the transformative potential of academic libraries in addressing the challenges and opportunities of the data-driven era.*

Mr. Abiodun Dare Kehinde

Ekiti State University, Ado-Ekiti, Nigeria.

Title: Data-Driven Smart Walking Stick for Visually Impaired Persons: Pathway to a Sustainable Society and Economy.

Abstract: *"This project presents the design and implementation of a smart walking stick integrated with data-driven technologies to enhance the mobility, safety, and autonomy of visually impaired individuals. By combining ultrasonic sensors for obstacle detection, water sensors for surface awareness, and GPS-GSM modules for real-time tracking and emergency communication, the system leverages embedded intelligence to provide contextual feedback through auditory and tactile cues. This assistive device embodies the principles of data-driven AI by collecting and responding to real-time environmental data, thereby facilitating safer navigation and situational awareness. Its ability to communicate user location and hazards fosters inclusive urban participation and reduces dependency on human assistance. Moreover, the project aligns with the United Nations Sustainable Development Goals (SDGs), particularly in promoting good health and well-being, reduced inequalities, and smart infrastructure. Economically, the use of low-cost, scalable components ensures accessibility and encourages localized production, contributing to inclusive innovation. The smart walking stick exemplifies how embedded AI systems can support a sustainable society by bridging accessibility gaps and enabling data-informed support for vulnerable populations."*

Dr. Bridget Chinalu Ujah-Ogbuagu

National Defence University Nigeria.

Title: Leveraging Data Analytics for Enhanced National Security in the Digital Era: Readiness Assessment

Ujah-Ogbuagu Bridget C. PhD. Research Fellow (Tech Innovations in Security and Development), Centre for Strategic Research & Studies, National Defence College, Nigeria.

Abstract: *This study critically assesses Nigeria's readiness to leverage data analytics for national security, benchmarking against*

global best practices and referencing authoritative indices such as the International Institute for Management Development Digital (IMD) Competitiveness Ranking (2024), the Global Cybersecurity Index, and the Global Peace Index. While recent strides—such as the growth of broadband penetration to 48.15%, the enrolment of over 120 million citizens in the National Identity Number (NIN) database, and the launch of the 3 Million Technical Talent (3MTT) program, among others reflect commendable progress, Nigeria's overall readiness remains low to moderate. The nation scored 2.2 out of 5 (or 44%) in the synthesised readiness scale, underpinned by challenges such as fragmented inter-agency data systems, limited enforcement of regulatory frameworks, and a shortage of AI and data analytics professionals within government institutions. Global benchmarking reveals that Nigeria ranks 66th out of 67 countries on the IMD Digital Competitiveness Index, indicating the urgent need to improve institutional coordination and digital capacity. Despite strong policy frameworks—such as the Nigeria Data Protection Act, National Cybersecurity Policy, and AI Strategy—their implementation remains weak. The most critical recommendation from this study is the establishment of a Unified National Security Data Exchange Platform to foster secure, real-time data sharing across security and intelligence agencies. This, combined with infrastructural investment, skills development, and enforcement of data protection laws, is essential to transitioning Nigeria from foundational to advanced readiness in national security analytics.

Keywords: Challenges, Data Analytics in Security, Opportunities, National Security in Nigeria, and Readiness Assessment.

Dr. Israel Emmanuel. Ekiti State University, Ado-Ekiti, Nigeria.

Title: Machine Learning-Driven Assessment of Seasonal Water Surplus in Coastal Nigeria Using ERA5 Reanalysis Data.

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Abstract: *Coastal Nigeria faces seasonal flooding, which demand for accurate water surplus assessment for sustainable planning. This study examines seasonal water surplus across the coastal stations in Nigeria using ERA5 reanalysis data. Machine learning models—Random Forest (RF), Support Vector Regression (SVR), and LSTM—were applied to evaluate historical patterns and predict future surplus. Results reveal distinct hydrological regimes: unsupervised classification (PCA and t-SNE) identified dry, moderate, and wet surplus clusters with clear seasonal trends. LSTM excelled in capturing long-term seasonal dynamics, while RF achieved superior prediction accuracy (lowest RMSE, highest R^2), outperforming SARIMA and Linear Regression in forecasting. The ERA5-ML synergy provides actionable insights for flood mitigation, agricultural water management, and climate resilience in vulnerable coastal communities, demonstrating the efficacy of data-driven approaches for sustainable resource planning.*

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Topic: Optimizing Image Augmentation for Lightweight Deep Learning Models in Resource-Limited Settings

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[3]Laboratoire des Sciences du Sol, Faculté des Sciences Agronomiques,Université d'Abomey-Calavi

Abstract- *Data augmentation is a key technique for enhancing the generalization of deep learning models, especially in small-data regimes. However, its efficacy depends on the choice of augmentation methods and dataset scale. This study presents a systematic evaluation of dataset expansion and augmentation strategies for lightweight convolutional neural networks (CNNs) in plant disease classification. Using a balanced subset of the PlantVillage dataset, we test four architectures—EfficientNet-B0, MobileNetV3, ShuffleNet, and SqueezeNet—across varying dataset sizes (50–300 images per class) and augmentation ratios (1:1 to 1:15). Augmentation techniques include geometric (rotation), photometric (contrast adjustment), noise injection, and kernel-based filtering (Gaussian blur). Our results reveal that: (1) increasing dataset size improves accuracy but with diminishing returns beyond 200 images per class; (2) augmentation boosts performance, yet gains saturate past a 5:1 ratio; (3) rotation, contrast adjustment, and noise injection yield consistent accuracy improvements, while Gaussian blur shows marginal benefits; and (4) EfficientNet and MobileNetV3 achieve higher accuracy but with longer training times, whereas ShuffleNet and SqueezeNet prioritize computational efficiency. These insights highlight the importance of balanced augmentation strategies that optimize both accuracy and resource constraints. Future work should investigate advanced augmentation approaches, larger datasets, and real-world deployment to further optimize lightweight models.*

Keywords: Data augmentation, deep learning, lightweight CNNs, plant disease classification, dataset size, computational efficiency.

Miss. Abisola Rukayat Oyewole.

Federal University of Technology, Akure.

Title: A Systematic Review of Chatbot Development for Low-Resource Languages.

Abstract: *"The development of chatbots for low-resource languages presents unique challenges and opportunities in natural language processing. This systematic review examines the current methodologies, technologies, and frameworks employed in developing chatbots for languages with limited computational resources and linguistic data. By analysing studies published in recent times, the study identified key trends in algorithmic approaches, data augmentation techniques, and the integration of local cultural intricacies. The review also highlighted significant achievements and outlined the substantial gaps and challenges that remain. Recommendations were provided for researchers to enhance the development of linguistically inclusive technologies, aiming to bridge the digital divide and foster equitable access to AI-driven solutions."*