MERCY NTHIWA

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PROFESSIONAL PROFILE

MSc. Actuarial Science graduate and current MSc. Artificial Intelligence student with a practical research experience and a strong passion for Artificial Intelligence (AI), and its transformative applications.

My research interests focus on the development of predictive models and AI-driven solutions for improving patient outcomes and enhancing the efficiency of healthcare systems. I have practical experience in building machine learning models, including unsupervised machine learning algorithms to cluster NHS data for optimising healthcare delivery.

My ambition is to leverage AI to revolutionise early diagnosis, personalise medicine, and healthcare resource management, while contributing to research that has the potential to change lives on a global scale.

KEY SKILLS AND COMPETENCIES

- Proficient in developing machine learning and deep learning models
- Skilled in data mining and visualisation
- Experienced in data modeling and model validation
- Proficient in programming languages including Python, R, C++, and C
- Experienced in analytical tools such as Excel, Prophet Software, Tableau, and Power BI
- Experienced in working with Oracle RDBMS and SQL

EDUCATION

MSc. Artificial Intelligence, University of Leeds (Ongoing)

Modules:

- Data Science
- Algorithms
- Deep Learning
- Robotics
- Machine Learning
- Data Mining and Text Analytics

Ongoing Project: Detection of fibroid growth in time-series MRI data

MSc. Actuarial Science, University of Kent (2022)

Modules:

- Time Series Modelling and Simulation
- Survival Analysis
- Probability and Statistics
- Actuarial Mathematics
- Modelling

Project: GP Practice Clustering

BSc. Actuarial Science, Jomo Kenyatta University of Agriculture and Technology (2016)

Modules:

- Research Methodology

- Statistical Programming
- Theory of Estimation and Tests of Hypotheses
- Database Management Systems
- Decision Theory and Bayesian Inference

Research Project: Investigating Barriers to Micro-health Insurance Access for Low-Income Populations

Professional Qualification: Certified Investments & Financial Analyst (CIFA)

PARTICIPATIONS

- October 2024: awarded the Coding Black Females Scholarship, focusing on developing advanced AWS Cloud Computing and programming skills.
- 2021/2022: awarded the prestigious Chevening scholarship in recognition of academic excellence and my commitment to using my skills to address global challenges.
- Participated in the 2019 United Nations Habitat Assembly Hackathon, developed IoT based water pollution detection system.
- Presented an innovative greenhouse crop monitoring system at the Nairobi Tech Week 2019 hackathon, hosted at the Strathmore University.
- Founder of Africa Dreams Initiative, advocating for environmentally friendly practices and supporting young people in Kenya, South Africa, Uganda, Congo, Nigeria, and Zimbabwe.

RECENT PROJECTS

- **GP Practice Clustering**: Utilised the K-Means clustering technique on NHS data from Norfolk and Waveney ICB to identify key traits of high-performing practices, with the goal of enhancing operational efficiency and optimising resource allocation, through targeted interventions.

- **Data Analytics Programme**: Recently led the development of an automated data analytics programme tailored for a client (Lifetime Training Group Limited), targeting over 1,000 data professionals within a year.

- **Insurance Chatbot**: Developed an innovative insurance chatbot using an external API, doubling customer interaction rates. The chatbot provided real-time, automated responses to common queries, improving query resolution efficiency and customer satisfaction.

- **Fraud Detection Model**: Developed supervised machine learning models using Python and key libraries including scikit-learn, pyTorch, tensorflow, pandas, and seaborn. Applied decision tree, random forest, SVM, and CNN algorithms to optimise insurance fraud detection. Evaluated model performance through precision, recall metrics, and confusion matrix analysis.

RELEVANT WORK EXPERIENCE

Data Scientist Trainer, Avado Learning Limited **October 2022 – September 2023**

- Used Python for detailed analysis of electric vehicle datasets, identifying optimal fleet selection for operational efficiency, by employing machine learning and statistical techniques.
- Led development of Power BI reports and interactive dashboards, providing comprehensive insights into market trends and financial performance, enabling informed strategic initiatives and competitive pricing.
- Delivered comprehensive training and mentorship to junior data analysts and scientists by tailoring training programs in Excel, SQL, Power BI, and Python, fostering rapid skill development.

- Developed course materials and lesson plans in collaboration with the content team, achieving more than 95% graduation rate.
- Provided mentorship, feedback and guidance to students on assignments, projects, and exams.

Development Analyst, Kenya Climate Innovation Center, World Bank Initiative **May 2021 – September 2021**

- Analysed market dynamics using statistical and machine learning techniques, thereby optimising pricing, growth strategies and product development efficiency, ultimately resulting in at least a 10% revenue increase for each client.
- Utilised data-driven insights to assess appropriate financing structures, facilitating the acquisition of funds and supporting about 100 clients in my portfolio.
- Trained my portfolio of clients in area of business performance analysis.
- Implemented data analytics tools, enhancing risk assessment accuracy while reducing due diligence processing time.

Analyst, Metropol Corporation Limited, Financial Consultancy **May 2018 – April 2021**

- Validated and Implemented data analysis and predictive modelling techniques to analyse and mitigate risks associated with investment decisions, leading to a 50% improvement in analysis efficiency and enhanced risk management.
- Led the implementation of milestone-based payment structures by utilising data analysis techniques, strategically reducing the company's financial exposure and contributing to long-term financial stability.
- Managed the departmental projects database using SQL, ensuring efficient data retrieval and accessibility, leading to timely completion of projects, adherence to SLAs, and improved customer retention.
- Conducted financial and credit analyses aligned with stakeholders needs, evaluating company fundamentals, credit metrics, and operational strategies, producing reports that guided investment decisions and enhanced client success.
- Employed data mining techniques to extract common themes from client feedback, driving significant reforms such as the implementation of an automated analysis system and marketing strategies, leading to a streamlined analysis process.

Actuarial Intern, Alexander Forbes **April 2017 – July 2017**

- Used R and Excel for comprehensive data preprocessing, statistical analysis, and visualisation of insurance data, enabling robust insights into risk assessment and pricing strategies.
- Utilised actuarial modelling methodologies for risk assessment, including reserve evaluation and product pricing within the insurance industry, aligning with industry regulations and standards.
- Evaluated pension schemes (Defined Benefit and Defined Contribution) and life insurance firms, conducting portfolio analysis and monitoring asset performance to optimise returns and provide valuable insights for trustees and fund managers, contributing to effective risk management strategies.
- Prepared detailed actuarial reports to support decision-making processes, while collaborating closely with colleagues to ensure accuracy, integrity and reliability.
- Conducted research on insurance trends, informing company expansion strategies and diversification.

COMMUNITY ENGAGEMENTS & PERSONAL INTERESTS

- Women in Data Award nominee (2024).
- AI labs participant, Avado Learning Limited (2023).
- Global Skills Award, University of Kent - for engaging in workshops, talks and volunteering (2021/2022).
- Student Representative, University of Kent, (2021/2022).
- Member, SMSAS Trading Club, University of Kent - engaged in simulated trading and market analysis (2021/2022).
- Member, Metropol Corporation Limited Health Committee (2019/2021).
- Member of Jomo Kenyatta University Actuarial Students' Association (JKUASA) (2013/2016).
- Brand ambassador, Jomo Kenyatta University, driving high-impact marketing, including a national TV advert.

REFEREES

Dr Melania Nica
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Dr Joseph Mung'atu
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Mercy Nthiwa

PERSONAL STATEMENT

I have always been driven to address inequalities, having been born and raised in a small village in eastern Kenya, where the arid climate and scarce resources shaped my perspective. My journey in BSc Actuarial Science at the Jomo Kenyatta University of Agriculture and Technology was born out of a love for mathematics, but upon reflection, my natural curiosity and problem-solving nature were clear from a young age. At 10, I devoured my sister's literature books, and as a teenager, I would sit under a tree with my father reading newspapers, trying to understand the world beyond my village. I journaled my aspirations, fueled by a desire to create solutions to problems that seemed insurmountable.

However, life's personal challenges, including witnessing my only brother suffer from seizures and ultimately losing him at the age of 26 to a sudden death in 2016, left me grappling with the helplessness of healthcare access and management. These experiences, combined with my mother's cancer diagnosis during my master's program, shaped my deep commitment to advancing artificial intelligence in healthcare, particularly for early detection, faster diagnosis, and targeted treatments. The personal encounters revealed the urgent need for technological innovation in healthcare, especially in predictive analytics and personalized medicine, areas in which I am eager to contribute. I am inspired to create AI-driven solutions that tackle these pressing healthcare needs, impacting lives like my family's and beyond.

I graduated top of my class with a BSc. Actuarial Science, where I researched on barriers to microhealth insurance access for low-income populations, focusing on the socio-economic challenges that prevent these individuals from obtaining adequate healthcare coverage. My research revealed that a lack of awareness, trust issues with insurers, and the high perceived costs of insurance were major barriers. As a student research fellow at @iLabAfrica, I developed an IoT-based water pollution detection system for UN Habitat, a project that was presented at the UN Habitat Makerthon. These experiences cemented my desire to combine my analytical background with societal impact.

I further honed my expertise during my MSc. Actuarial Science at the University of Kent, where I undertook a Python programming course that culminated in a project focused on predicting ICU mortality rates using machine learning. This project gave me a glimpse into the revolutionary potential of AI in healthcare. Currently, I am self-funding an MSc in Artificial Intelligence at the University of Leeds, where I am exploring the detection of fibroid growth in time-series MRI data using machine

learning. This research holds particular importance for me as a black woman, given the disproportionate impact of fibroids on black and Asian women, as highlighted by the National Institute for Health and Care Excellence (NICE, 2023), and reflects my broader commitment to ensuring that AI solutions are not only innovative but also equitable.

Professionally, I have consistently sought to harness the power of technology to solve complex challenges. As an intern at Kenbright Actuarial and Financial Services, I designed an insurance chatbot that automated customer interactions, significantly improving operational efficiency. Most recently, I led the development of an automated data analytics program for Lifetime Group Limited, which is aimed to upskill over 1,000 data professionals. My diverse experience in Python, R, SQL, and Power BI has enabled me to mentor emerging data scientists and foster innovation across various sectors. My leadership and commitment to creating a positive societal impact extend beyond my work in AI. In 2019, I founded a network of young leaders across Africa (Kenya, Uganda, Congo, South Africa, Zimbabwe, and Nigeria) to address pressing challenges such as youth empowerment and climate change. Based on my academic excellence and leadership capability, in 2021 I was recognized as a Chevening Scholar, awarded to the top 2% of global leaders. Additionally, in recognition of my contributions, I have recently been nominated for the 2024 Women in Data Award.

My research interests align closely with the work being done by the Computational Biology group, particularly in the application of technology to revolutionize healthcare. A key area of focus for me is the role of cell structure in informing personalized treatments. For diseases like cancer, where the same cancer type can manifest and respond differently in various patients, understanding these structural differences is critical for developing more effective, individualized therapies. I am especially excited about the opportunity to collaborate with distinguished professors such as Ansaf Salleb-Aouissi, Noemie Elhadad, Mohammed AlQuraishi, Bianca Dumitrascu, and Elham Azizi. Their expertise in computational biology, healthcare technologies, and AI will be instrumental in shaping my development as a researcher, and I am confident that their mentorship will be pivotal in achieving my vision of applying AI to improve healthcare outcomes.

Joining Columbia University’s distinguished research community represents the critical next step in my journey to drive transformative change in global healthcare. I am deeply committed to creating AI-driven solutions that not only enhance patient outcomes but also address healthcare disparities.

Columbia’s cutting-edge research environment will provide me with the mentorship, resources, and collaborative network necessary to make meaningful contributions to the field. This opportunity will also empower me to mentor and inspire the next generation of innovators, ensuring that the advancements we make today lead to lasting improvements in global healthcare.