Kouyakou-Abalo SIMSOBA

Google DeepMind Scholar | M.Sc. in Artificial Intelligence

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GitHub | LinkedIn | Website | Google Scholar | ResearchGate

Profile

Motivated researcher in Artificial Intelligence with a strong focus on robust machine learning, time-series forecasting, and multimodal AI for scientific and medical applications. Demonstrated ability to lead research projects from conception to peer-reviewed publication, including a first-author article published in IEEE Access, a high-impact Q1 journal. Possesses a solid foundation in Python programming, deep learning, machine learning, and artificial intelligence. Currently a Google DeepMind Scholar at AIMS, undertaking a second Master's degree in Artificial Intelligence for Science.

Research Interests

- Robust machine learning with applications to noisy data.
- Time series forecasting and deep learning methodologies
- Natural Language Processing & Large Language Models
- Explainable Artificial Intelligence (XAI)
- Computer Vision and Speech Processing

Education

African Institute for Mathematical Sciences (AIMS), South Africa

M.Sc. in Artificial Intelligence for Science **Sept 2025 – Present**

Google DeepMind Scholar || `https://www.aims.ac.za`

- Project: Generative AI for Multimodal Breast Cancer Diagnosis and Staging from Histopathology and Clinical Records

Pan African University Institute for Basic Sciences, Technology and Innovation (PAUSTI), Kenya

Joint M.Sc. in Mathematics (Statistics Option) **Apr 2023 – Jun 2025**

In collaboration with Jomo Kenyatta University of Agriculture and Technology

- Thesis: A Hybrid Minkowski-Log-Cosh loss function for RobustLSTM-based time series forecasting
- Core Courses: Econometrics, Statistical Designs, Research Methodology and Proposal Development
- Awarded the Prestigious African Union Scholarship || `https://www.jkuat.ac.ke/pausti`

Université de Kara, Togo

B.Sc. in Mathematics , Statistics and Socio-economic Applications **Nov 2018 – July 2021**

- Relevant Coursework: Analysis 1-11, Linear Algebra 1-2, Programming in C/C++
Database Systems management, Algebra 1-3 , Statistics 1-6
- Thesis: Evaluating the Effects of Online Learning on the Student Population of the Université de Kara During the COVID-19 Pandemic
- Awarded the Scholarship for Academic Excellence by the Togo National Directorate of Scholarships and Internships (DBS-TOGO) || `https://univ-kara.org/`

Lycée Scientifique de Kara, Togo

Nationally Selective Science High School

Baccalauréat (Mathematics and Physical Sciences Series C) **Nov 2015 – Sept 2018**

- Awarded a highly competitive National Government Scholarship, a merit-based award granted by the

Government of Togo to the top 100 secondary students nationwide.

Peer-Reviewed Publications

Simsoba, K.-A., Oscar, N., & Mageto, T. (2025).
A Hybrid Minkowski–Log–Cosh Loss Function for Robust Long Short-Term Memory-Based Time-Series Forecasting.
IEEE Access, 13, 187307–187319.
https://doi.org/10.1109/ACCESS.2025.3626795

Published in *IEEE Access* (Impact Factor: 3.9, 2023). As first author, I led the idea, designed the hybrid loss function, implemented the LSTM model, ran experiments, analyzed results, and wrote the manuscript. The journal is indexed in Scopus and Web of Science with a Q1 ranking.

Research Experience

A Hybrid Minkowski-Log-Cosh Loss funcrtion for Robust LSTM-Based Time Series Forecasting

Graduate Research Project **2024–2025**

- Designed a novel hybrid Minkowski–Log-Cosh loss function for robust time-series forecasting
- Applied LSTM models to predict malaria case using 10-year public health data (2013–2023)
- Addressed challenges of noisy and outlier-contaminated data in epidemiological forecasting
- Demonstrated improved robustness compared to traditional loss functions

Evaluating the Effects of Online Learning on the Student Population of the Université de Kara During the COVID-19 Pandemic

Undergraduate Research Project **2021–2022**

- Designed and conducted primary data collection among university students, gathering information on academic performance (number of credits validated), type of digital device used for online learning, internet access and quality, and learning conditions during the COVID-19 pandemic..

- Applied statistical analysis to identify relationships and patterns affecting student performance under remote learning constraints.

Ongoing Research Projects

Scalable Matrix Factorization: Implementing ALS-Based Baseline and Content-Aware Recommenders on the MovieLens 32M Dataset

Single-author research project **2025–Present**

- Developing a scalable recommender system framework based on Alternating Least Squares (ALS), progressing from baseline matrix factorization to content-aware recommendation models.

- Conducting large-scale experiments on the MovieLens 32M dataset, with emphasis on sparsity-aware optimization, performance evaluation, and representation learning.

- Manuscript currently in preparation for journal or arXiv submission.

Generative AI for Multimodal Breast Cancer Diagnosis and Staging from Histopathology and Clinical Records.

- Recently initiated the project, with a comprehensive literature review on multimodal learning, medical imaging, histopathology analysis, and clinical data integration for cancer diagnosis and staging.

- Ongoing work focuses on model design and data-driven approaches for integrating histopathology images and clinical records using advanced deep learning and generative AI methods.

Technical Skills

Programming Languages: Python (Advanced), R (Intermediate), MATLAB (Intermediate), SQL (Intermediate)

Machine Learning & AI: LSTM Networks, ANN Architectures, Deep Learning, Time-Series Analysis, Statistical Modeling, Feature Engineering

Data Analysis Tools: Power BI, STATA, SPSS, GIS, MySQL, Pandas, NumPy, Scikit-learn, TensorFlow/PyTorch

Research Tools: LaTeX, GitHub, Google Colab, Jupyter Notebooks, Overleaf

Languages: French (Native), English (Excellent Written & Spoken)

Awards & Honors

- **Google DeepMind Scholar** – African Institute for Mathematical Sciences (AIMS) 2025–2026
  `https://deepmind.google/`
- **African Union Scholarship** – Pan African University Institute for Basic Sciences, Technology and Innovation (PAUSTI) 2023–2025
  `https://www.jkuat.ac.ke/pausti/`
- **Togolese National Government Scholarship** – Baccalauréat studies 2015–2018

Professional Development

Data Analysis for Sustainable Development Goals
Universitas Pendidikan Indonesia – International Summer Course
[Link] **Jun–Jul 2024**

Data Science and Scientific Computing
Faculty Development Program organized by Central University of Punjab, Poornima University, Nexus University, Baba Farid College, and MathTech Foundation
[Link] **Jan 2024**

- Data collection and cleaning, exploratory data analysis, and hypothesis testing
- Fundamentals of machine learning, deep learning, and neural networks
- Natural language processing, scientific Python (NumPy, Pandas), and data visualization
- Big data concepts, cloud computing, and real-world AI applications

Beginner Machine Learning in Python + ChatGPT Prize [2025]
Udemy – Taught by Hadelin de Ponteves, Kirill Eremenko, SuperDataScience Team, Ligency
[Link] **Feb 2024**

- Applied foundational machine learning models using Python and scikit-learn
- Integrated ChatGPT to assist with data exploration and model interpretation
- Covered regression, classification, and evaluation metrics for real-world problems

R Programming A–Z™: R for Data Science with Real Exercises
Udemy – Taught by Kirill Eremenko (SuperDataScience Team, Ligency)
[Link] **Mar 2024**

- Practical training in R programming, including data manipulation, visualization, and statistical modeling
- Completed 10.5 hours of coursework across 79 lectures, with hands-on projects and case studies

100 Days of Code: Python Pro Bootcamp
Udemy – Taught by Dr. Angela Yu

- Intensive Python programming bootcamp covering object-oriented programming, web development, and APIs
- Includes Flask web apps, automation scripts, games, data visualization, and backend development
- Project-based learning with real-world coding exercises and deployment practice

Teaching Experience

Mathematics and Physics Teacher **2019–2023**

Kara, Togo

Delivered high school–level instruction in mathematics and physics to diverse student cohorts, with a strong emphasis on conceptual understanding, analytical reasoning, and systematic problem-solving. Taught a broad range of theoretical and applied topics across both disciplines, combining rigorous content delivery with examination-focused preparation.

Mathematics topics included:

- Probability and Combinatorics
- Spatial Geometry (Three-Dimensional Geometry)
- Second-Degree Polynomial and Homographic Functions
- Methods of Mathematical Proof and Logical Reasoning

Physics topics included:

- Kinematics
- Free Fall and Motion under Gravity
- Mechanical and Electrical Oscillations
- Wave Phenomena and Propagation

Designed examination-oriented problem sets to strengthen students' quantitative reasoning and analytical skills. Developed supplementary instructional materials and facilitated guided, laboratory-style problem-solving sessions to reinforce theoretical concepts through structured practice.

Tutor, Big Data Master's Programme (Volunteer)

École Polytechnique de Lomé (Polytechnic School of Lomé), Togo

- Provided tutorial instruction in **inferential statistics** and **optimization** to first-year Master's students enrolled in the *Big Data* program.

Inferential Statistics modules included:

- Hypothesis Testing
- Confidence Intervals
- Parameter Estimation
- Likelihood-Based Inference
- Sampling Distributions and Asymptotic Results

Optimization modules included:

- Unconstrained Optimization
- Constrained Optimization (Lagrange Multipliers and KKT Conditions)
- Gradient-Based Optimization Methods
- Convex Optimization Fundamentals

Covered core concepts in inferential statistics and optimization in a clear and structured manner, guiding students step by step through theoretical foundations and applied problem sets. Supported learners in developing strong statistical reasoning and effective optimization-based solution strategies.

Professional Activities

- Participation in AI and machine learning research seminars

- Attendance at applied machine learning and data science workshops
- Participation in GIS and spatial data analysis workshops

References

- Available upon request