Kouyakou-Abalo SIMSOBA

Google DeepMind Scholar | Artificial Intelligence

South Africa (Cape Town) | kouyakou@aims.ac.za | 0009-0005-4050-5040

GitHub | LinkedIn | Google Scholar

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

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

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*

Lycée Scientifique de Kara, Togo

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

- Awarded Togolese National Government Scholarship

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. **DOI:** 10.1109/ACCESS.2025.3626795

Research Experience

A Hybrid Minkowski-Log-Cosh Loss funcrtion for Robust LSTM-Based Forecasting of Malaria Incidence

Graduate Research Project **2024–2025**

- Developed 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 ANN models integrating climate and soil variables for agricultural yield prediction
- Conducted feature sensitivity analysis to identify key predictive factors
- Focused on model generalization for varying agricultural conditions

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
- **African Union Scholarship** – Pan African University Institute for Basic Sciences, Technology and Innovation (PAUSTI) 2023–2025
- **Togolese National Government Scholarship** – Baccalauréat studies 2015–2018

Professional Development

Data Analysis for Sustainable Development Goals

Universitas Pendidikan Indonesia Summer Course **Jun–Jul 2024**

- Python programming, data visualization, machine learning, deep learning, computer vision

Data Science and Scientific Computing

Central University of Punjab / MathTech Thinking Foundation, India **Jul 2024**

- Exploratory data analysis, hypothesis testing, machine learning, NLP, cloud computing

100 Days of Code: Python Pro Bootcamp

Udemy **Feb–Oct 2024**

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
- Set Theory
- Spatial Geometry (Three-Dimensional Geometry)
- Second-Degree Polynomial and Homographic Functions
- Continuity and Differentiability of Functions

- Arithmetic and Geometric Sequences
- Complex Numbers
- 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
- Electrostatics
- Alternating Current and RLC Circuits
- Thermodynamics (Ideal Gases and Thermodynamic Processes)

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 Program (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