GÉRAUD BADÉLÉ OGOUNCHI

Data Scientist, Togo AI Lab | AI for Health, NLP & Reinforcement Learning | Applied Mathematician

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PROFILE

Data Scientist at **Togo AI Lab** (Agence Togo Digital), where I build privacy-first AI for health: offline medical speech recognition, OCR and clinical text extraction for paper-based hospital records. MSc in Data Science (**AIMS Senegal**) and Master's in Fundamental Mathematics (**IMSP Benin**); **MIORPA 2026 research fellow** with the Mathematical Institute, University of Oxford. I combine solid theory (stochastic processes, PDEs, optimization) with hands-on deep learning, LLM fine-tuning, RAG and reinforcement learning.

PROFESSIONAL EXPERIENCE

2026– Present — **Data Scientist**
Togo AI Lab, Agence Togo Digital (ATD), Togo
▷ **Clinical intelligence for operative reports:** local, privacy-preserving pipeline (scan → OCR with Qwen2.5-VL via Ollama → clinical entity extraction → structuring → anonymization). Streamlit demo returns each value with its confidence score and source position; API layer planned for an electronic medical record system.
▷ **Offline medical speech transcription:** French dictations transcribed on the local machine with LiquidAI LFM3-Audio-2B; pause-based segmentation, flagged gaps, and a test bench with word error rate and clinical-term checks.
▷ **Handwritten medical records OCR:** TrOCR fine-tuning with official train/validation/test splits; real records used only for the final test; target exchange format HL7 FHIR.
▷ **Field diagnostic** in a public hospital: interviews and questionnaires, functional requirements for a hospital information system interoperable with DHIS2, prioritized short/medium/long-term recommendations report.

Jul–Sep 2026 — **MIORPA Research Fellow**
Mathematical Institute's Online Research Projects with Africa, University of Oxford (remote)
▷ 8-week research project *Holographic Krylov Complexity from Gravity*, one-to-one with an Oxford-affiliated mentor: a Routhian reduction makes the momentum–complexity dictionary consistent for charged probes, checked numerically on AdS_3 and quiver geometries.
▷ Report on Zenodo: doi.org/10.5281/zenodo.22675312, with open code and data.

2026 — **Organizer, Brain Tumor MRI Classification Challenge**
AIMS Senegal
▷ Designed the full competition (data curation, RSA-encrypted submissions, automated grading with GitHub Actions, live leaderboard) on 7,023 MRI images (4 classes); EfficientNet-B0 baseline at ∼**92% accuracy**.

2024 — **Research & Statistics Intern**
CaSEG, Cabinet de Recherche et d'Études Statistiques, Économiques et de Gestion, Togo
▷ Statistical models for economic development analysis of SMEs/SMIs; institutional research reports. ⇒ Report PDF

2022–2024 — **Mathematics Teacher**
Benin
▷ Lesson plans and tutoring for grades 6–11 (algebra, analysis, probability).

EDUCATION

2025–2026 — **MSc in Data Science (Data Science, Big Data & AI)**
African Institute for Mathematical Sciences (AIMS), Senegal
Thesis: *From Delta to Policy: Benchmarking Reinforcement Learning against Black–Scholes Delta Hedging under Market Frictions* (supervisor: Dr. Yaé Ulrich Gaba)
▷ Ten learned hedging methods (QR-DQN, SAC, TD3, PPO, Deep Hedging) against three classical hedges, with transaction costs and Heston stochastic volatility: **900 training runs**, 50,000 test paths per market, statistical tests corrected for multiple comparisons.

2023–2025 — **Master 1 & Master 2 in Fundamental Mathematics and Applications**
Institute of Mathematics and Physical Sciences (IMSP), Benin
Thesis: *Asymptotic Behavior and Self-Similar Profiles of Solutions to the Heat Equation in* $\mathbb{R}^N$
▷ Convergence to a Gaussian self-similar profile as $t \to \infty$ (a Central Limit Theorem analogue), with rates of order $t^{-1/2}$, t^{-1} and beyond under finite-moment conditions. ⇒ Thesis PDF

2021–2022 | **Bachelor's in Mathematics–Computer Science** *Faculty of Sciences and Technology of Natitingou, Benin*

SELECTED PROJECTS & COMPETITIONS

2026 | **Zindi & Kaggle competitions** [Speech AI / Tabular ML / Climate]

▷ **Rank 6**, Google WAXAL ASR challenge (Lingala, Shona): ensemble of w2v-BERT 2.0 CTC models, language routing, Minimum-Bayes-Risk selection.

▷ **Rank 14 / 214**, Financial Stress Prediction (mobile-money data): feature engineering, LightGBM + CatBoost + GAM blend. ClimX climate-model emulation (Kaggle) in progress. ⇒ GitHub

2026 | **Generative AI projects** [Team SunuTech, AIMS Senegal / personal]

▷ **Wolof everyday chatbot:** Qwen3-0.6B fine-tuned with LoRA, retrieval and safety filter, Gradio Space. ⇒ GitHub

▷ **RAG on scientific papers:** chunking strategies, embedding benchmark and cross-encoder reranking over 100–200 NLP/LLM papers. ⇒ GitHub

▷ **AI web research agent:** scraping, ChromaDB + sentence-transformers knowledge base, grounded RAG with memory; FastAPI + Streamlit. ⇒ GitHub

▷ **Fake news detection:** LSTM on WELFake (94.01% test accuracy), Gradio app on Hugging Face Spaces with GitHub Actions CI/CD.

2026 | **Applied ML & optimization** [AIMS Senegal / personal]

▷ **Air quality & optimal sensor placement:** forecasting + submodular optimization on sensors.AFRICA data, **86% lower** deployment cost. ⇒ GitHub

▷ **Portfolio optimization dashboard:** Modern Portfolio Theory, Monte Carlo, Sharpe ratio maximization (Streamlit, yFinance). ⇒ GitHub

▷ **Mathematical biology:** stochastic (Gillespie SSA) vs. deterministic (ODE) epidemic models, two-strain model with waning immunity. ⇒ GitHub

▷ **Computer vision & data apps:** real-time traffic detection; object detection in PyTorch and TensorFlow; Streamlit scraper and dashboard for vehicle listings in Senegal (deployed).

2022–2024 | **Earlier:** tax fraud detection with classification models in R (2024); graph theory and scheduling (2022, IMSP). ⇒ PDF

ACTIVITIES

2024–2026 | AIMS Senegal Python Programming Competition (2026); Workshop on Mathematical Biology (2026); MIORPA workshops on scientific writing and PhD interviews (2026); English training, TBCAfrica (2024); AI Club, IMSP: smart robot car and ML seminar (2024–2025).

TECHNICAL SKILLS & LANGUAGES

AI specialisations	Speech & document AI (ASR, OCR with TrOCR / Qwen2.5-VL, clinical NER, de-identification); LLM fine-tuning (LoRA, QLoRA), RAG, reranking, evaluation; deep learning & computer vision; reinforcement learning (PPO, SAC, TD3, QR-DQN, deep hedging)
ML / AI frameworks	PyTorch, TensorFlow/Keras, scikit-learn, LightGBM, CatBoost, Hugging Face (Transformers, PEFT), Unsloth, LangChain, ChromaDB, Stable-Baselines3, Ollama
Programming & tools	Python, R, SQL, JavaScript, C/C++, Git & GitHub Actions, Docker, FastAPI, Streamlit, Gradio, Jupyter, LaTeX
Mathematics	Probability & statistics, stochastic processes, PDEs & asymptotic analysis, ODE models, optimization (convex, combinatorial, submodular)
Languages	French (native), English (professional), Goun (native)
Interests	Health-tech AI, NLP for African languages, quantitative finance, reading, music, travel