PAPA AHMADOU SEYDOU SOW

AI Research Engineer · Data Science · *Computer Vision* · *Climate AI* · *Machine Learning*

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RESEARCH INTERESTS

Computer Vision and Visual Recognition · Climate AI and Environmental Monitoring · Geospatial Data Analysis and Remote Sensing · Multimodal Machine Learning and Heterogeneous Data Fusion · Human-Centered AI and Intelligent Interactive Systems · AI for Sustainable Development and Disaster Risk Reduction · Deep Learning for Decision Support and Early Warning Systems.

EDUCATION

M.Sc. in Artificial Intelligence and Smart Technologies *2022 – 2026*

Université de Technologie de Troyes (UTT), France · Université Iba Der Thiam de Thiès (UIDT), Senegal · Double-degree programme · Graduated with honours (mention Bien).

Grades: M1: 12.69 / 20 · M2: 15.56 / 20 · Thesis defence: 16 / 20 · Final mention: *Bien (with honours)*.

B.Sc. in Computer Science, Software Engineering *2019 – 2022*

Université Iba Der Thiam de Thiès, Senegal.

MASTER THESIS

Artificial Intelligence for Flood Prediction and Detection in Senegal: Saytu-Mbeund *(2025 – 2026)*

Supervisor: Prof. Ibrahima Gueye, École Polytechnique de Thiès (EPT), Senegal.

Designed an integrated AI framework combining machine learning, computer vision and citizen participation for operational flood early warning in data-scarce West-African urban environments, where conventional hydrological monitoring is limited.

- **Methodology:** 20 years of meteorological data (2005–2025) across flood-prone zones of Senegal; rigorous temporal validation via TimeSeriesSplit (5 folds); benchmark of four deep architectures (ResNet-18, EfficientNet-B3, Swin-Tiny, ConvNeXt-Tiny) on a balanced 410-image corpus; Grad-CAM analysis for visual model interpretability.
- **Forecasting (1–3 day horizon):** reformulated as a genuine, leakage-free anticipation task under strict temporal cross-validation; AUC-ROC 0.80–0.86, rising to 0.913 when a genuine numerical weather forecast is integrated, clearly outperforming a persistence baseline.
- **Vision model (ConvNeXt-Tiny):** best of the four backbones with F1-score = 96.48%, AUC-ROC = 0.988 and 100% precision on the flood class (zero false alarms).
- **Contributions:** trained models released openly on Hugging Face Hub; an operational web platform for real-time citizen flood reporting and AI-driven decision support, deployed in Senegal, demonstrating that low-cost, explainable AI pipelines can complement traditional hydrological monitoring in the Global South.
- **Remote sensing:** initial experiments on Sentinel-2 spectral bands (B03, B04, B08, B11, B12), computing NDVI, NDWI and MNDWI vegetation and water indices, exported as GeoTIFF rasters with Rasterio and Google Earth Engine.
- **Topics:** Climate AI · Computer Vision · Remote Sensing · Early Warning Systems · Explainable AI · Geospatial Analytics.

RESEARCH EXPERIENCE

Computer Vision Research Engineer, Absar Group *Dec. 2025 – Jul. 2026*

Applied research on AI-based predictive maintenance of railway infrastructure.

- Studied single-stage object detection architectures (YOLO family) for the automatic identification of structural defects on railway tracks from in-service imagery, addressing class imbalance and small-object detection challenges.
- Designed reproducible annotation and dataset-curation protocols (Roboflow) to enable rigorous experimental evaluation and longitudinal benchmarking of detection performance.
- Conducted ablation studies on data augmentation and hyper-parameter regimes, demonstrating the viability of vision-based predictive maintenance in resource-constrained industrial settings.

AI and MLOps Engineer, Engy Partner *Jan. – Jun. 2025*

Applied research on personalisation and recommendation for educational technology.

- Designed and integrated a machine-learning-based pedagogical recommendation module to investigate the personalisation of learning paths in a real-world e-learning platform, with attention to user-centred design and adaptive feedback.
- Built the full experimental and production stack (data pipeline, backend, deployment) to evaluate recommender behaviour with real users, bridging prototypes and Human-Centered AI deployment.

RESEARCH PROJECTS

Railway Defect Detection: Computer Vision for Predictive Maintenance. Study of YOLO-based detection pipelines for automated identification of railway track defects, with rigorous dataset construction and evaluation under realistic operating conditions. *Topics: Computer Vision, Industrial AI, Predictive Maintenance.*

ANIP Benin Identity AI Challenge 2025: Vision-Based Biometric Pipeline. Developed deep face-embedding methods and age estimation on a large-scale identity dataset (>40,000 images), integrated with OCR and document-fraud detection for robust multi-task vision pipelines in civil identity applications. *Topics: Computer Vision, Biometrics, Multi-Task Learning, AI for Public Services.*

Mobile Money Fraud Detection: DataTour 2026 (2nd place, Senegal). With team Hackatsuki, a CatBoost fraud detector on mobile-money transactions (Average Precision), built on fold-safe target encoding and strict temporal validation to avoid account-ID leakage; ranked 2nd of the national ranking (Senegal), just behind the champion. *Topics: Data Science, Fraud Detection, Gradient Boosting.*

Real-Time Climate Data Platform. Built a streaming ingestion and processing architecture (Apache Spark Streaming, Big Data) for high-frequency environmental data, as a substrate for climate-aware decision-support systems. *Topics: Climate AI, Streaming Data, Decision Support.*

AI-Based Malaria Detection from Microscopy Images. Trained and evaluated a CNN classifier for malaria parasite detection on blood-smear images, deployed as a real-time web interface to assess feasibility of AI-assisted diagnostics in low-resource clinical settings. *Topics: Medical Image Analysis, AI for Health, Deep Learning.*

HONOURS, AWARDS AND SCIENTIFIC COMPETITIONS

- **Master with Honours (mention Bien):** UTT (France) and Université Iba Der Thiam de Thiès (Senegal), double-degree M.Sc. in Artificial Intelligence and Smart Technologies, 2026.
- **DataTour 2026, 2nd place (Senegal):** pan-African data science competition; 2nd of the national leaderboard (team Hackatsuki) on mobile-money fraud detection with a leakage-safe CatBoost pipeline (Average Precision).
- **DataTour 2025, national phase:** gradient-boosting credit-scoring models (LightGBM, XGBoost, Random Forest) with advanced feature engineering.
- **ANIP Benin Identity AI Challenge 2025:** national AI challenge on civil identity; contributed a face-embedding, age-estimation, OCR and document-fraud-detection pipeline on a dataset of >40,000 images.

TECHNICAL SKILLS

Research stack: Python, PyTorch, TensorFlow, Scikit-Learn, Hugging Face Transformers, OpenCV, YOLO, ConvNeXt / ResNet / EfficientNet, CatBoost, XGBoost, LightGBM, spaCy, Pandas, NumPy, Apache Spark.

Reproducibility and deployment: Git / GitHub, Docker, FastAPI, Flask, Hugging Face Hub, Roboflow, AWS, GCP, PostgreSQL, MongoDB.

Big Data and geospatial: Apache Spark (Streaming), Rasterio, GeoPandas, GDAL, Google Earth Engine, QGIS, GeoTIFF, spectral indices (NDVI / NDWI / MNDWI).

Methods: Transfer learning, transformer architectures, multimodal fusion, object detection, image classification, time-series forecasting, recommender systems, OCR, model evaluation (AUC, Average Precision, F1, precision/recall, ablations).

CERTIFICATIONS AND LANGUAGES

Certifications: Generative Artificial Intelligence (Simplon); Fundamentals of AI, Data Analytics, Cybersecurity, Mobile Development (FORCEN).

Languages: French (fluent) · English (professional working proficiency) · Wolof (native).

REFERENCES

Available upon request. Academic and industry referees (Master thesis supervisor, UTT / UIDT faculty, and research supervisor at Absar Group) can be provided to admission committees and prospective doctoral advisors on demand.