



Malek Senoussi, PhD

AI Engineer / ML Researcher

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French, 29 years old

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PROFILE

Deep Learning Engineer with a PhD in Applied Mathematics, specializing in neural architectures, high-dimensional modeling, and large-scale experimentation. Experienced in applying deep learning to biological and environmental datasets, with a strong interest in AI-driven optimization and sensor-based monitoring systems. Passionate about open-source and deploying research into real-world applications.

SKILLS

Programming: Python, SQL, Bash

Libraries/Tools, Visualization: PyTorch, Scikit-learn, Pandas, NumPy, Dask, Plotly, Dash, Streamlit

Deep Learning & Architectures: CNNs, RNN/LSTM/GRU, Transformers (basic), autoencoders, tabular neural networks, time-series deep learning, forecasting networks, anomaly detection

Computer Vision: Image classification, segmentation, weak supervision, augmentation pipelines

Model Development: Model design, hyperparameter tuning, training loops, early stopping, cross-validation, batch processing, GPU acceleration

Infrastructure: Docker, Git, HPC / SLURM, Remote training

Data Science, Analysis & Domains: Environmental data modeling, multi-variate time-series analysis, large dataset preprocessing, feature extraction, sensor data cleaning, Machine Learning, Deep Learning, Data Analysis, Statistical Modeling, HPC, Biological systems, environmental modeling, sensor data, industrial processes, time-series monitoring

Cloud & DevOps: AWS / Azure (foundations level), CI/CD concepts

Soft Skills: Communication with interdisciplinary teams, explanation of complex methods, teaching experience, coordination of small research groups

Languages: French (Native), English (C1), Italian (B1)

SELECTED PROJECTS

Machine Learning Pipeline for Large-Scale Classification

- Designed and deployed ML and Deep Learning models handling high-dimensional noisy transcriptomic data.
- Conducted large-scale benchmarking and comparative analysis across multiple algorithms to optimize performance.
- Built automated labeling and evaluation pipelines to improve annotation consistency and reduce manual data curation time by 95%.
- Achieved a 3–20% accuracy gain by developing and optimizing a custom deep learning classification architecture.

Multimodal & Temporal Cross-Domain Translation via coupled Autoencoders (Deep Learning Project)

- Designed and implemented coupled autoencoders to integrate multiple biological modalities (images, videos, scRNA-seq, multi-omics) into a shared latent space using adversarial alignment and divergence minimization.
- Built modality-specific deep architectures (CNNs, RNNs/LSTMs, MLPs) and unified them through a latent-space alignment loss, enabling cross-modal translation (e.g., image → RNA-seq, RNA-seq → image).
- Added a temporal modeling component by enforcing time-ordered latent trajectories, allowing forecasting of future states in a target modality from past observations in another.
- Developed pipelines for data preprocessing, reconstruction, cross-modal generation, and clustering evaluation, validating alignment via AUC, neighbor preservation, and differential signal recovery.

Environmental Forecasting & Resource Optimization

- Built an end-to-end ML pipeline including preprocessing, feature engineering, forecasting models (Random Forest, LightGBM), and evaluation.
- Predicted energy consumption trends for optimization scenarios.
- Developed a business-oriented interactive dashboard for monitoring KPIs, predictions and resource optimization scenarios.

WORK EXPERIENCES

PhD Researcher — Machine Learning & Computational Biology 10/2020 — 07/2024
Aix-Marseille University — Laboratoire Informatique et Systèmes & Centuri. Marseille

- Collaborated with interdisciplinary teams (biologists, data scientists, engineers) to ensure analytical insights.
- Presented results to both technical and non-technical audiences, developed dashboards, and delivered reproducible ML pipelines integrated into real research workflows.
- Reduced data preprocessing time using automated Python pipelines.
- Improved classification accuracy through feature engineering and model selection
- Designed and trained deep learning models (CNNs, shallow networks, and hybrid architectures) for biological data, including noisy and high-dimensional measurements.
- Built pipelines to process environmental parameters, growth patterns, and temporal variations, enabling predictive insights for biological growth processes — transferable to cultivation optimization. Accelerated model experimentation by 3× using GPU + SLURM parallelization.
- Performed large-scale experimentation using SLURM clusters for architecture search, hyperparameter optimization, and model evaluation.
- Developed predictive deep learning models capturing complex nonlinear behaviors in biological systems, improving forecasting accuracy and early anomaly detection.
- Published 4 peer-reviewed papers and collaborated with multidisciplinary teams.

Research Supervisor 09/2021 — 06/2023
Laboratoire Informatique et Systèmes Marseille

- Acted as technical lead for student ML projects.
- Adapted explanations to varied technical backgrounds.
- Reviewed code and contributed to architectural decisions.
- Communicated model insights to interdisciplinary collaborators and improved model interpretability for domain experts.

Mathematics Professor 09/2021 – 06/2023
Thiers High School Marseille

- Oral examination in preparatory classes MPSI.
- Taught advanced mathematics, algorithmic reasoning and analytical thinking.
- Developed strong presentation skills and structured explanations.

Research Intern — Mathematical Modeling 03/2020 – 08/2020
Laboratoire Informatique et Systèmes Marseille

- Probabilistic and statistical modeling of embryogenesis in *C. elegans*.
- Produced data-driven insights and contributed to scientific reports.

PUBLICATIONS

Partial Label Learning for Automated Classification 2024
Built scalable ML models for noisy-label classification on high-dimensional datasets.

Hierarchical Novel Class Discovery 2024
Developed algorithms for discovering unknown patterns in unlabeled data environments.

Network Analysis & Random Walk Visualization 2023
Built interactive visualization tools for large-scale network simulations.

Weakly Supervised Learning Systems 2022
Designed hierarchical classifiers for real-world partially labeled data.

EDUCATION

PhD in Mathematics and Computer Science 2024
Aix-Marseille University Marseille

- Led research and produce academic manuscript: [Classification of single cell RNA sequencing](#).
- Learning with missing and ambiguous labels, High-dimensional data modeling, Algorithm design and evaluation

Master's Degree in Mathematics and Applications 2020
Aix-Marseille University Marseille

- Statistics, Probability, Machine Learning, Brain Imaging, Pharmacology.