# Mohamed Ali Ben Youssef

**Application – Machine Learning Engineer**

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## Education

**École Nationale Supérieure des Mines de Saint-Étienne**                                              **Sept 2022 – Nov 2025**
*Engineering degree: Computer Science*
*Double degree Master: Applied Mathematics & Machine Learning*

**IPEST - Tunis**                                              **Sept 2020 – July 2022**
*Preparatory Classes for Engineering Schools: MPSI/MP*

## Professional Experience

**AI Scientist Intern – Neural Network Reliability**                                              **Apr 2025 – Sept 2025**
*NXP Semiconductors | Toulouse*                                              *Internship*
- Designed data-driven methods to evaluate neural network reliability and parameter sensitivity.
- Implemented analytical metrics (Gradients, Fisher Information Matrix, Hessian) for model vulnerability scoring.
- Correlated analytical sensitivity scores with empirical fault injection data, achieving a **0.87 best correlation**.
- Built a scalable experimentation pipeline (processing, scoring, visualization) in **Python** and **Streamlit**.

**AI Scientist Intern – AI Safety**                                              **Apr 2024 – Aug 2024**
*NXP Semiconductors | Toulouse*                                              *Internship*
- Conducted **Fault Tree Analysis (FTA)** to model AI failure causes and propagation.
- Applied **Explainable AI (LIME)** to CNNs for interpretability and anomaly detection.
- Built data pipelines and statistical evaluation tools for analyzing the impact of data and parameter perturbations.

**Head of Corporate Relations**                                              **Jan 2023 – Jan 2024**
*ISMIN Career Fair | Gardanne*                                              *Student Association*
- Coordinated the team responsible for company outreach (40+ companies attended).
- Promoted academic programs and maintained partnerships with key industry actors.

## Projects

**Job Description → Course Recommendation System (Semantic Retrieval & Ranking)**
- Unified and cleaned Coursera & Udemy datasets, engineered rich course descriptions, and built a high-quality text corpus for retrieval.
- Designed a semantic search engine by embedding job descriptions and courses with **Sentence Transformers** and indexing them with **FAISS** for fast vector similarity search.
- Implemented a full ranking pipeline combining FAISS similarity with lightweight skill-matching heuristics for more relevant recommendations.
- Deployed the system as a microservice architecture using **FastAPI** (backend) and **Streamlit** (UI), fully containerized with **Docker** and orchestrated with **docker-compose**.

**Local PDF Assistant (LLM + RAG)**
- Built a local document question-answering system using **Retrieval-Augmented Generation**.
- Implemented semantic search, text embedding pipelines, and context-aware response generation.
- Deployed via **FastAPI** and **Streamlit**, containerized with **Docker**.

**Personalized Chess Game Analyzer**
- Parsed PGN files, analyzed moves with Stockfish, and created per-move evaluation metrics.
- Classified moves (blunders, inaccuracies, optimal) and visualized gameplay weaknesses.
- Built a **deep learning model** predicting move choices based on game context (**+200 Elo improvement**).

## Skills

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| **Machine Learning & Deep Learning:** | TensorFlow, PyTorch, Sentence Transformers, Vector Databases, Similarity Search, XAI, RAG, NLP |
| **Programming:** | Python (expert), C/C++, SQL, Bash, Git, Linux |
| **Data Engineering & MLOps:** | FastAPI, Streamlit, Docker, Azure |
| **Mathematics:** | Linear Algebra, Probability, Statistics, Optimization, Information Theory |
| **Languages:** | French (C2), English (C2), German (B2), Arabic (C2) |

## Certifications

- Machine Learning Specialization – Stanford (Coursera)
- Vector Databases: from Embeddings to Applications
- Machine Learning in Production (MLOps) – Coursera
- Large Language Model Operations (LLMOps) – Coursera

## Interests

- Chess
- Fitness and sports