Hamza Boulahia

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WORK EXPERIENCE

Freelancer

(May 2024 – Present)

Freelance AI Engineer - AI Inheritance Chatbot

- Led dataset creation and preprocessing for domain-specific Islamic inheritance Q&A, preparing data for both fine-tuning and RAG.
- Experimented with quantized LoRA fine-tuning of open-source LLMs using augmented Arabic data; evaluated via ROUGE, BLEU and custom LLM-based metrics, and concluded RAG was preferable.
- Benchmarked Arabic embedding models to select the best for vector indexing.
- Designed, implemented, and evaluated multiple RAG pipelines (simple RAG, reranking, LLM-judged), using classical NLP, custom LLM, and RAG-specific metrics to identify the optimal setup.
- Integrated the chosen RAG retrieval module into the chatbot to deliver accurate, context-aware inheritance answers in Arabic.
    - **Tech stack:** Python, LangChain, FAISS, Hugging Face Transformers, PyTorch, unsloth, ragas, Gradio.

(Oct 2020 – May 2022)

Data Science Consultant

- Creating and improving classification and regression machine learning models using Python as per client's requirements.
- Performing exploratory data analysis to extract insights and delivering detailed reports.

Data Scientist

Aléria Consulting (May 2022 – May 2024)

- Developed a web application for webpage attention heatmap prediction
    - Training and testing a deep learning model to predict webpage saliency.
    - Achieving more than 85% accuracy on the Webpage Saliency public dataset.
    - Implemented a robust Python API for seamless model integration.
        - **Tech stack:** Python, U-Net, OpenCV, Flask
- Designed a Windows desktop application for ID Optical Character Recognition (OCR)
    - Creating and optimizing object detection models for efficient extraction of information from ID cards.
    - Applied advanced image processing techniques to minimize OCR errors.
    - Achieving accurate and reliable extraction of data from ID cards, and delivering product within due time.
        - **Tech stack:** Python, YOLO, OpenCV, Tesseract-OCR, PyQT5

Math Tutor

Sigma Training Center (Oct 2016 – Aug 2018)

- Tutoring students in bachelor level mathematics (Calculus, Linear Algebra, and Convex Optimization).
- Incorporating visuals using Python to help students better understand certain math concepts.

EDUCATION

Research Master in Mathematical Modeling and Scientific Calculations

Relevant subjects: Statistics, Stochastics, Optimization

National Engineers School of Tunisia (2014 – 2016)

Bachelor of Science in Applied Mathematics

Relevant subjects: Linear Algebra, Calculus, Statistics, Algorithmics & Data Structures

Higher School of Science and Technology of Tunis (2011 – 2014)

CERTIFICATIONS

- TensorFlow 2 for Deep Learning (Coursera - Aug 2021)
- Deep Learning Specialization (Deeplearning.ai - Oct 2020)
- Machine Learning (Coursera – Apr 2020)
- Data Analyst Nanodegree (Udacity | Oct 2019 – Jun 2020)

SKILLS

Languages: Arabic (Native), French (Professional), English (Professional).
Programming & ML Frameworks: Python (Pandas, PyTorch, TensorFlow, FastAPI, Flask, Plotly, Streamlit, Gradio), SQL.
NLP & Computer Vision: LLM Fine-tuning, RAG, AI Agents (LangChain, LangGraph, LlamaIndex), BERT, spaCy, OpenCV, YOLO models, SAM models.
Tools & DevOps: Git, CI/CD (GitHub Actions), AWS, Docker, MySQL, PyQT5, Selenium

PROJECTS & CONTENT CREATION

- **YouTube Channel: Machine Learning With Hamza**
  - Creator & Host of ~32 educational videos focusing on machine learning and AI tutorials; channel grew to ~5.5K subscribers as of June 2025
  - Produced content on topics such as neural networks, fine-tuning LLMs, chatbots, NLP and CV techniques, and Reinforcement Learning.
  - Managed end-to-end production: topic research, scripting, recording, editing, and thumbnail design; solicited and responded to viewer questions, fostering community engagement and feedback loops.

- **Web application for football video analysis** (Github | YOLOv8, OpenCV, Streamlit):
  Creating a web application for football object detection with team prediction and tactical map representation.
- **Customized chatbot web application** (Github | GPT-3.5, Gradio, Tacotron 2):
  Creating a chatbot web application for lyrics generation and speech synthesis using deep learning model for voice cloning.
- **Web scraper for job offers on LinkedIn** (Github | Python, Selenium):
  Creating a web scraper to collect job offers data based on a job title and location, and save the extracted data in csv files.

INTERESTS

Reading, educational videos creation, and calisthenics workout.