

MOHAMED ABDALKADER

AI Engineer

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PROFESSIONAL SUMMARY

AI Engineer with 1+ year of experience in deep learning, computer vision, and NLP systems. Specialized in building production-grade machine learning pipelines from model development to deployment. Expertise in fine-tuning large language models, developing RAG architectures, and optimizing neural networks for medical imaging and healthcare applications. Proven track record in model optimization (quantization, PEFT), achieving 240% accuracy improvements on medical vision tasks. Strong deployment experience with PyTorch, TensorFlow, Docker, and cloud platforms. Recipient of 105,000 EGP in competitive research grants and national AI innovation recognition.

EXPERIENCE

Freelance AI Engineer

Sep 2024 – Present

Deep Learning, Computer Vision, NLP, Medical AI, MLOps

Remote

- Fine-tuned Qwen 2.5 7B VLM for diabetic retinopathy via LoRA and multi-agent CNN architecture.
- Achieved **240% total accuracy gain** (20% to 68% retinopathy, 87% to 94% edema) through hybrid pipeline.
- Built medical RAG system with FAISS indexing 50+ textbooks for real-time knowledge retrieval.
- Improved caption quality **26x** (BLEU 0.01 to 0.26) and reduced inference memory **50%** via quantization.
- Deployed end-to-end ML pipelines with Docker, Flask, and evaluation frameworks (BLEU, ROUGE, perplexity).

AI Research Intern

Aug 2024 – Sep 2024

Neuronetix

- Designed ensemble models (XGBoost + Random Forest) for healthcare diagnostics, achieving **AUC 0.92, F1 0.89** on 5,000+ patient records.
- Ranked Top 3 of 150** in Customer Churn Prediction challenge with 93.5% accuracy using gradient-boosted trees.
- Documented ML evaluation protocols, model cards, and deployment readiness assessments for production systems.

Machine Learning Intern

Mar 2024 – Jun 2024

ShAI

- Built music genre classifier using MFCC extraction + XGBoost, achieving **95% accuracy** across 8 classes.
- Developed regression models for price prediction with **MAE < \$50** through feature engineering and Optuna optimization.

RESEARCH & COMPETITIVE FUNDING

ITAC Research Grant | 70,000 EGP

2023

- Developed high-reliability deep learning models for industrial predictive maintenance applications.

ASRT Research Grant | 35,000 EGP

2023

- Explored AI-IoT integration for renewable energy optimization and forecasting systems.

IEEE Graduation Project Competition | National Recognition

2023

- Awarded for innovation in applied AI systems, technical execution quality, and research rigor.

PROJECTS

Medical VLM with Multi-Agent Architecture | Qwen 2.5, PyTorch, LoRA

2024 – Present

- Fine-tuned Qwen 2.5 7B VLM using LoRA rank-32, achieving **224% accuracy gain** (20% to 59% retinopathy, 72% to 87% edema).
- Designed multi-agent architecture (2 CNNs + RBF-SVM) improving report generation quality (**BLEU 0.01 to 0.17**).
- Implemented ensemble decision fusion for automated medical captioning and diagnosis classification.
- Optimized inference via 4-bit quantization, reducing VRAM from **17GB to 7GB** while maintaining accuracy.

Medical Knowledge RAG System | LangChain, FAISS, Transformers

2024 – Present

- Engineered RAG pipeline indexing 20+ medical textbooks with FAISS for real-time semantic retrieval.
- Achieved **9% retinopathy gain (59% to 68%)** and **7% edema gain (87% to 94%)** by grounding VLM outputs.
- Built evaluation framework for factual accuracy and hallucination detection using medical literature.
- Enhanced caption quality from **BLEU 0.17 to 0.26** through knowledge-augmented generation.

Brain Tumor Classification | CNN, TensorFlow, Streamlit, Docker

GitHub | Demo

- Developed CNN classification system for brain tumor detection achieving **95% accuracy** on medical imaging dataset.
- Built production Streamlit web app with real-time inference and containerized deployment for clinical accessibility.

Face Recognition & Similarity System | PyTorch, Streamlit, SQL

GitHub | Demo

- Developed facial recognition architecture with desktop GUI featuring database integration for identity management.
- Deployed Streamlit API for real-time face comparison with optimized embedding extraction and cosine similarity.

Real-Time Gesture Recognition | OpenCV, MediaPipe, Tkinter

GitHub

- Built low-latency CV pipeline achieving **60 FPS** with <20ms inference for mouse control on desktop systems.
- Developed Tkinter interface for real-time gesture-based pointer control and interaction.

TECHNICAL SKILLS

LLM & Generative AI: Large Language Models (Qwen 2.5, LLaMA, BERT, GPT), Vision-Language Models, Fine-Tuning & PEFT (LoRA, QLoRA, Prefix Tuning), Prompt Engineering (Few-shot, Chain-of-Thought), RAG Systems (LangChain, FAISS, Chroma), Evaluation (BLEU, ROUGE, Perplexity, Hallucination Detection)

Modeling & Training: PyTorch, TensorFlow, Hugging Face Transformers, CNNs (DenseNet, EfficientNet, ResNet), YOLO, OpenCV, MediaPipe, Quantization (int8/FP16), Model Pruning, Knowledge Distillation, XGBoost, LightGBM, Scikit-learn

LLM Infrastructure & Deployment: Docker, Kubernetes, MLflow, DVC, FastAPI, Flask, Gunicorn, Uvicorn, Azure (ML Studio, IoT Hub, AKS), AWS (EC2, S3), Airflow, Git/GitHub Actions, CI/CD Pipelines

Data & Tools: Pandas, NumPy, Vector Databases (FAISS, Chroma, Pinecone), Matplotlib, Seaborn, Streamlit

Programming: Python (Expert), Java, SQL, Bash Scripting

EDUCATION

B.Sc. Computer Science

2019 – 2023

Zagazig University

- Relevant coursework: Machine Learning, Deep Learning, NLP, Computer Vision, Data Structures, Algorithms, Databases.
- Graduation Project:** Developed Python framework with 21 deep learning models for renewable energy forecasting (LSTM, GRU, Transformers).

Digital Egypt Pioneers Initiative (DEPI)

Apr 2024 – Oct 2024

Machine Learning Engineer Scholarship (Microsoft Track)

- Completed intensive 6-month program in production ML engineering, MLOps, Azure deployment, and end-to-end pipelines.
- Graduation Project:** Breast Cancer Classification achieving **97% accuracy** on 15,000+ images using DenseNet transfer learning.

Additional Certifications:

- Deep Learning Specialization – DeepLearning.AI / Stanford University (2024)
- Machine Learning Specialization – Andrew Ng, Stanford University (2022)

SOFT SKILLS

System Design & Architecture • LLM Debugging & Evaluation • Prompt Optimization • Technical Documentation • Cross-functional Collaboration • Research & Problem-Solving (100+ LeetCode) • Fast Learning & Adaptability