

Ahmed Messaad

Artificial Intelligence & Machine Learning Researcher

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PROFILE

AI Research Engineer specializing in clinically-deployable computer vision systems for medical diagnostics. Proven track record developing production-grade deep learning models achieving 90-99% classification accuracy across multiple disease domains. Research expertise in transfer learning optimization, explainable medical AI, and efficient architectures for resource-constrained healthcare environments. Seeking advanced research opportunities to advance interpretable, regulatory-compliant diagnostic AI systems through federated learning and edge deployment strategies.

EDUCATION

Master's Degree in Electronics of Embedded Systems,

M'sila, Algeria | 2023

University Mohamed Boudiaf of M'sila

Thesis: "My Daily Health: Multi-Disease Diagnostic Platform Using Ensemble Deep Learning"

- Architected ensemble system integrating ResNet50, DenseNet-121, and EfficientNet-B3 achieving 90.3–99.5% accuracy across 5 disease domains
- Evaluated 12 pre-trained architectures using 5-fold cross-validation with 15,000+ annotated medical images
- Designed secure clinical interface with HIPAA-compliant data handling and role-based authentication

Bachelor's Degree in Electronics,

M'sila, Algeria | 2021

University Mohamed Boudiaf of M'sila

RESEARCH EXPERIENCE

Clinical Reinforcement Learning Engineer | MIMIC-III

2025

Dataset,

ICU Treatment Optimization with Deep RL

- Built sequential decision system on **120 MIMIC-III ICU** episodes optimizing treatment timing for abnormal lab values (glucose, electrolytes, creatinine)
- Trained **PPO**, **A2C**, and **DQN** agents in custom Gym environment; A2C achieved 99.5% clinical appropriateness with +76–145 reward improvement over baselines
- Engineered 26D state space with temporal lab trends and implemented rule-based safety filter boosting PPO/DQN appropriateness by 40 percentage points
- Authored 3,000-word clinical safety analysis documenting reward hacking behaviors, policy filtering mechanisms, and A2C's superior on-policy learning

GitHub: github.com/RYANX9/medical-treatment-drl 

AI Research Engineer | AIRM Medical Technologies,

Algeria | Jan 2024–Dec 2024

Brain Imaging Diagnostics Project

Production Brain Tumor Classification System for Clinical Deployment

- Developed EfficientNet-B7 architecture achieving **99% accuracy** classifying 4 tumor types (glioma, meningioma, pituitary, healthy) using PyTorch
- Built end-to-end DICOM pipeline with PyDICOM and SimpleITK integrating directly with hospital MRI scanners for automated preprocessing
- Engineered domain-specific augmentation strategy (rotation, elastic deformation, contrast adjustment) addressing limited annotated dataset availability

- Designed PyQt5 clinical interface with radiologist validation featuring real-time inference (<200ms latency) and batch processing capabilities
- Delivered comprehensive technical documentation and validation report for hospital deployment

Computer Vision Engineer | Hemolab Diagnostics,

Algeria | Aug 2023–Jun 2024

HimaVision Blood Analysis Automation System

Automated Hematology Analysis Platform Replacing Manual Microscopy

- Implemented YOLOv8 object detection pipeline achieving **97% accuracy** identifying multi-class blood cells (RBC, WBC subtypes, platelets)
- Designed U-Net semantic segmentation architecture isolating individual cells from high-density overlapping clusters using PyTorch
- Validated automated counting algorithm demonstrating **±3% agreement** with expert manual counts across 150 samples
- Created disease classification module detecting abnormal morphology markers for anemia and leukemia with visual highlighting using OpenCV
- **Reduced diagnostic time from 45 minutes to 3 minutes per sample** (93% reduction, 15× throughput increase)

Independent Research | Kaggle Public Dataset,

2024

Healthcare Cost Prediction Using Deep Learning

Novel CNN Application to Tabular Healthcare Data for Insurance Cost Forecasting

- Engineered 47 predictive features from raw insurance records: BMI stratification, regional risk indices, comorbidity scores, age-risk interactions
- Designed Conv1D neural network treating tabular features as sequential data achieving **$R^2 = 0.8793$** (12% improvement over regression baselines) using TensorFlow
- Identified primary cost drivers through SHAP analysis: chronic comorbidities, smoking status, BMI threshold effects
- Created interactive Plotly dashboards for feature importance visualization and prediction confidence intervals

GitHub: <https://github.com/RYANX9/healthcare-cost-prediction> 

Graduate Thesis Project | University of M'sila,

Univ of M'sila | 2023

Multi-Disease Clinical Decision Support Platform

Secure Web-Based Diagnostic System for Physician-Driven Medical Image Analysis

- Built 5 independent classifiers achieving **90.3–99.5% accuracy**: Brain tumors (99.1%), Alzheimer's (95.7%), respiratory (93.4%), skin cancer (94.8%), GI diseases (90.3%)
- Conducted systematic evaluation of 12 CNN architectures (ResNet, DenseNet, EfficientNet families) via stratified k-fold cross-validation using TensorFlow and PyTorch
- Optimized model selection per disease domain based on precision-recall tradeoffs and clinical false-negative cost analysis
- Implemented complete workflow with Flask: secure upload → real-time classification → probability visualization → encrypted patient history storage
- Validated system performance using 80/20 train-test split with independent validation cohort (15,000+ images)

SKILLS

Deep Learning & ML · Reinforcement Learning (PPO, A2C, DQN) · PyTorch · TensorFlow/Keras · Stable-Baselines3 · Gym/Gymnasium · ONNX Runtime · Scikit-learn · Transfer Learning · Ensemble Methods
Computer Vision & Med. Img · YOLOv8 · U-Net · EfficientNet · ResNet/DenseNet · OpenCV · SimpleITK · PyDICOM · DICOM Standard

Data Science & Analytics · NumPy · Pandas · SHAP (Interpretability) · Feature Engineering · Statistical Modeling · Plotly/Matplotlib

Software & Platforms · Python · Flask/FastAPI · PyQt5 · SQL · Git · Docker

Healthcare Data · MIMIC-III Clinical Database · Electronic Health Records · Clinical Decision Systems · Medical Data Privacy (HIPAA concepts)

PUBLICATIONS & PRESENTATIONS

"Helping System for Brain Disease Diagnosis Using Deep Learning"

International Conference on Science, Technology, Engineering and Management (ICSTEM 2023) Istanbul, Turkey | December 2023 | Paper ID: IS-STEMISTAN-061223-17466

- Presented transfer learning optimization methodologies for medical imaging in resource-limited clinical environments
- **Outstanding Research Presentation Award**

HONORS & AWARDS

Outstanding Research Presentation Award | ICSTEM 2023, Istanbul, Turkey
Robotics Competition Finalist | 54th Algiers International Fair (FIA 2023), Ministry of Knowledge Economy
Five-Star Academic Excellence Award | University of M'sila, 2023

RESEARCH INTERESTS

Explainable AI architectures for clinical trust and regulatory approval · Efficient model deployment on edge devices for point-of-care diagnostics · Federated learning for privacy-preserving multi-institutional medical AI · Accessible, interpretable ML systems for resource-constrained healthcare