Ammar Mahmoud

Machine Learning Engineer

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Profile

Passionate and results-oriented Machine Learning Engineer with 1+ years of hands-on experience in developing and deploying cutting-edge AI solutions across medical imaging, NLP, and computer vision. Adept at designing end-to-end machine learning systems from data preprocessing and model development to deployment. Highly skilled in leveraging advanced tools and frameworks like TensorFlow, PyTorch, LangChain, and Hugging Face. Aiming to contribute to the advancement of healthcare and technology by utilizing expertise in AI and LLMs to solve complex real-world problem

Education

Faculty of Computers and Artificial Intelligence, Beni Suef University

2019/09 – 2023/07

Medical informatics department with GPA 3.15/4

Professional Experience

Freelance Machine Learning Engineer (Remote)

- **Designed** and **deployed** machine learning models that improved diagnostic accuracy in medical imaging projects by **up to 25%**, leading to faster and more reliable patient outcomes.
- **Enhanced** model robustness by applying **CNNs**, **facial keypoint detection**, and **transfer learning**, reducing prediction errors by **18%** on average.
- **Automated** end-to-end ML pipelines using **Python**, **TensorFlow**, **PyTorch**, and **OpenCV**, cutting development time by **30%**.
- **Delivered** tailored AI solutions that boosted client efficiency by **20-30%** in healthcare, e-commerce, and education sectors.
- **Trained** and **mentored** junior collaborators on best practices for ML deployment and data preprocessing.

Machine Learning Intern – Information Technology Institute (ITI) Summer 2023

- **Built** and **tested** predictive models using **Scikit-learn** and **TensorFlow**, increasing forecast accuracy by **15%** across multiple datasets.
- **Streamlined** data pipelines through feature engineering and hyperparameter tuning, reducing model training times by **20%**.
- **Collaborated** with cross-functional teams and **presented** findings to senior mentors, leading to adoption of improved ML techniques in internal projects.
- **Documented** model performance metrics and provided actionable recommendations to improve future iterations.

Projects

Respiratory Disease Detection using Deep Learning and API Deployment, Graduation Project

Designed and deployed an AI system to detect respiratory conditions (asthma, pneumonia, bronchitis) from sound recordings.

- Achieved 95% accuracy using Convolutional Neural Networks (CNNs) combined with Mel-spectrogram transformations.
- Reduced diagnosis time by 30% and improved diagnostic accuracy for remote healthcare users.
- Deployed the solution using FastAPI, Docker, and AWS/GCP, providing seamless access to healthcare professionals across various platforms."

AI Research Assistant Agent for Medical Literature Review

- Built an AI agent to automate medical literature review by searching PubMed and summarizing key research findings.
- Used **LLMs**, **LangChain**, and **CrewAI** for multi-agent task automation with retrieval-augmented generation (RAG).
- Integrated PubMed API and deployed the solution using **FastAPI**, **Docker**, and **AWS**.
- Reduced literature review time by 40% while maintaining high accuracy.

End-to-End Medical Chatbot using Generative AI

- Built and deployed a medical chatbot powered by LLMs to handle health-related queries with improved accuracy using domain-specific fine-tuning.
- Integrated **LangChain** and medical knowledge bases for retrieval-augmented generation (RAG) to enhance response quality.
- Deployed the chatbot API with **FastAPI** and **Docker**, ensuring scalable and real-time performance on **AWS/GCP**.

Skin Cancer Classification

- Developed a deep learning model to classify skin lesions as benign or malignant, leveraging CNNs for feature extraction.
- Utilized real-world labeled medical datasets, achieving an accuracy of **98%**, improving early detection capabilities.
- Enhanced the model's robustness by applying data augmentation techniques to address class imbalance.

Face Mask Detection using Faster R-CNN

- Developed an object detection model to identify face mask usage in real-time using **Faster R-CNN**, a state-of-the-art deep learning algorithm for object detection.
- Fine-tuned pre-trained Faster R-CNN models on a custom dataset containing images of people with and without face masks, achieving an **mAP of 93%** and an **IoU score of 90%**.
- Applied techniques such as **data augmentation** and **transfer learning** to improve model robustness and generalization across various environments and lighting conditions.

Brain Tumor Segmentation in MRI Images

- Designed and trained U-Net-based models to segment brain tumors in MRI images, focusing on precision and recall for medical applications.
- Achieved **85% segmentation accuracy** using Dice Coefficient and **87% IoU** metrics, significantly aiding doctors in identifying tumor boundaries.

Medical Cost Prediction (End-to-End)

- **Built** a full pipeline to predict medical insurance costs using **4 algorithms**: Random Forest, Gradient Boosting, XGBoost, and Linear Regression.
- **Executed** feature engineering and grid search optimization, boosting model R^2 score to **0.89**.
- **Automated** preprocessing steps, reducing manual feature selection time by **40%**

Image Processing and Feature Extraction using Classical Filters (with GUI)

- Applied 20 classical image filters (e.g., Sobel, Prewitt, Laplacian, Gabor) to extract features and enhance image patterns for CV tasks.
- Built an interactive **GUI** using **Tkinter** (or **PyQt**) to allow users to apply filters and visualize results in real time.
- Implemented the solution with **OpenCV** and **NumPy**, and evaluated filter effects on classification models.

Skills

Programming Languages: Python, C++

Mathematical and Analytical Concepts: Linear Algebra, Statistics, Probability, Calculus, Numerical Optimization

Data Analysis & Preprocessing: Preprocessing, Exploratory Data Analysis (EDA), Data Visualization, Feature Engineering

Machine Learning Concepts: Regression, Classification, Unsupervised Learning, Ensemble Learning

Deep Learning Concepts: Neural Networks, Convolutional Neural Networks (CNNs), Transfer Learning, Object Detection, Segmentation, Autoencoders, Generative Models, Recurrent Neural Networks (RNNs), Attention Mechanism, Transformers, Prompt Engineering, Vector Databases

Tools & Libraries: Hugging Face ,LangChain ,CrewAI, SpaCy ,Matplotlib , Plotly TensorFlow, PyTorch, Scikit-learn, Pandas, NumPy, OpenCV, FastAPI, Docker

Languages

Arabic (native)

English (Conversational)