# Hossam Fakher

Ai Engineer

hossamfakher11@gmail.com | 01277880678 | Tanta
HossamFakher1 | Hossam Fakher | LinkedIn | Youtube

## Summary

**Teaching Assistant** at the **Faculty of Computers and Artificial Intelligence, Benha University**, in the **Department of Artificial Intelligence**, where I teach courses in **Machine Learning**, **Deep Learning** and **Computer Vision**. Additionally, I am an **Instructor** for **NTI's Machine Learning for Data Analysis Course**. Actively pursuing my master's degree in **Artificial Intelligence** at the **Faculty of Computers and Artificial Intelligence, Benha University**.

## Professional Experience

2023/12–present
Benha

**Teaching Assistant – Artificial Intelligence Department.** **Full time**
**Faculty of Computers and Artificial Intelligence, Benha University**

- Taught advanced AI topics, including deep learning, machine learning, Computer Vision, and NLP, to undergraduate students.
- Designed and delivered interactive course materials to enhance student engagement and understanding of complex AI concepts.

2024/07 – present

### Instructor for NTI's Machine Learning for Data Analysis **Part time**

• Taught data pre-processing and visualization techniques, preparing students for machine learning model implementation.

• Covered a wide range of machine learning algorithms including **Linear Models, SVM, Naive Bayes, Decision Trees, Random Forest, XGBoost, CatBoost, LightGBM, Gradient Boosting, AdaBoost, and KNN**.

• Focused on model evaluation techniques to assess the performance of these models using appropriate metrics.

2022/05 – present

### Youtube Channle

I also create and explain comprehensive AI and machine learning content on my YouTube channel, where I cover a wide range of topics. In 2025, I shared detailed tutorials on various courses, including Machine Learning, Computer Vision, and Deep Learning.

- **Machine Learning Course:** I explained key concepts such as data preprocessing, linear regression, logistic regression, KNN, Naive Bayes, decision trees, random forests, SVM, and K-means clustering, with real-world examples and Python implementations.
- **Computer Vision Course:** I provided in-depth explanations on topics such as CNNs, transfer learning, YOLO for object detection, image segmentation with U-Net and Mask RCNN, pose estimation, face recognition, and OCR techniques like Llama-OCR and PaddleOCR.
- **Deep Learning Course:** I taught the fundamentals of neural networks, CNNs, LSTM, GRU, autoencoders, and GANs.

## Education

**Master of Artificial Intelligence | May 2024 – Present**

Faculty of Computer Science and Artificial Intelligence, Benha University

I am currently pursuing my master's degree, studying advanced AI concepts and methodologies. Engaged in various research projects, focusing on cutting-edge AI applications. My research is centered around **Deep Learning Models for Athletic Talent Discovery**, and I am working towards contributing to future publications.

**Conference Paper:** *RTMPose and Ensemble Learning for Real-Time Swimmer Talent Detection*

• Presented a research paper at the **AMLTA'25 Conference** held at **MISR University for Science and Technology, Cairo, Egypt**.

**Bachelor of Computer Science and Artificial Intelligence | May 2022**

Faculty of Computer Science and Artificial Intelligence, Banha University

Graduated with honors and an 87% overall grade.

**Graduation Project: An Intelligent System for Assessing Student Participation and Interaction**

- Developed a system for detecting and identifying student faces, storing the data in Firebase.
- The system tracks focused and unfocused students, identifies those wearing masks, and counts raised hands to assess participation.

## Technical Skills

- Data Analysis (Pandas, Matplotlib, SciPy, Plotly, Signal and Textanalysis).
- Software Development (C++, Python, OOP, Flask, Data Structures, Algorithm).
- Applied Mathematics (Calculus, Linear Algebra, Probability,Statistics).
- Machine and deep learning (Sikit-Learn, Pytorch, TensorFlow, Spacy, CNN, RNN, LSTM, GRU, BiLSTM and Evaluation).
- Computer Vision (Generative Adversarial Networks (GANs), Yolo, Unet, SAM, Pose Estimation).
- NLP (Generative Model, Transformer, LLM, Hugging Face, LangChain,Groq, RAG).

## Soft Skills

- Problem-solving & Analytical Thinking: Adept at translating complex data into actionable insights, with experience in model optimization and evaluation.
- Project Management: Demonstrated ability to balance multiple roles, managing AI research projects, academic responsibilities, and client relationships.

## Project

**1- Arabic Speech Recognition**

• Fine-tuned OpenAI's Whisper model for accurate Arabic speech transcription using Hugging Face Transformers.
• Collected and preprocessed a diverse Arabic speech dataset, covering multiple dialects.
• Applied transfer learning techniques to improve model performance and adapted it for real-world use cases like voice assistants and subtitling.

**2- Medical Chatbot Development**

• Fine-tuned GPT-2 using Hugging Face to create a medical chatbot capable of handling healthcare-related queries.
• Trained on a curated dataset of medical dialogues and clinical texts to ensure response accuracy and relevance.
• Focused on generating fluent, informative replies for patient education and virtual health support scenarios.

**3- English Question Answering System**

• Fine-tuned Flan-T5 using Hugging Face Transformers to develop an English question answering system.
• Utilized open-domain QA datasets to train the model on diverse topics and question types.
• Enhanced model performance through instruction tuning, enabling accurate and context-aware answers.

**4- Arabic Speech Emotion Recognition**

• Fine-tuned the facebook/wav2vec2-base model using Hugging Face for Arabic speech emotion recognition.
• Curated and annotated an Arabic speech dataset representing various emotional states.
• Applied transfer learning and audio preprocessing techniques to improve classification accuracy.

**5- English Question Answering with T5 and LoRA**

• Fine-tuned T5 for English question answering tasks using LoRA (Low-Rank Adaptation) for parameter-efficient training.
• Leveraged Hugging Face Transformers to implement LoRA on T5, reducing training time and resource usage.
• Trained on diverse QA datasets to ensure robust and accurate response generation across various topics.

**6- Medical Image Captioning with Microsoft Git Large, LoRA, and BLIP**

• Fine-tuned Microsoft Git Large for medical image captioning, leveraging LoRA (Low-Rank Adaptation) for efficient model training.
• Integrated the BLIP image captioning model to improve caption quality and relevance in medical contexts.
• Utilized Hugging Face and custom datasets of medical images to generate accurate and context-aware captions for enhanced patient diagnosis and healthcare communication.

**7- Fine-Tuning Google ViT Base for Egyptian Money Classification**

• Collected a diverse dataset of Egyptian currency using a Raspberry Pi for real-time image capture.
• Fine-tuned the Google Vision Transformer (ViT) base model to classify various Egyptian currency denominations.
• Preprocessed and augmented images to improve model robustness and accuracy.
• Trained the model on the collected dataset, achieving high performance in real-time money classification.

**8- COVID-19 Knowledge Chatbot with LangChain**

• Built a conversational chatbot using LangChain that provides insights from COVID-19-related PDFs.
• Integrated document parsing and question answering capabilities to extract relevant information from medical PDFs.
• Used LangChain's powerful tools to structure and fine-tune the model for accurate, real-time COVID-19 information retrieval.

**9- CV and Job Requirement Matching with LangChain**

• Developed a system using LangChain to assess the similarity between CVs and job requirements.
• The system evaluates whether a candidate is suitable for a job and identifies any skill gaps.
• Provides personalized course recommendations to bridge the identified gaps, enhancing candidate qualifications for the role.

**10- Segmentation of ORDAS Multi-Classification Dataset**

• Developed a segmentation model using U-Net, U-Net++, ResNet, and an ensemble approach, applied to the ORDAS multi-classification dataset.
• Incorporated YOLOv8 for additional object detection capabilities within the segmentation task.
• Utilized data augmentation techniques and pre-processing steps to enhance model generalization.
• Collaborated with doctors who manually annotated disease locations to create accurate segmentation masks, improving the overall precision of the model.

**11- Object Detection on ORDAS Dataset using YOLOv5 and YOLOv8**

• Applied YOLOv5 and YOLOv8 models for object detection on the ORDAS dataset to identify and locate key features in medical images.
• Fine-tuned both YOLO models to optimize detection accuracy for different object classes within the dataset.
• Enhanced model performance by incorporating data augmentation techniques and pre-processing strategies tailored for medical image analysis.

**12- MRI Brain Segmentation and Classification**

• Developed a segmentation model using U-Net to detect brain structures in MRI images.
• Integrated classification tasks to identify specific conditions, such as tumors or abnormalities, within the segmented regions.
• Applied advanced pre-processing techniques to enhance MRI image quality and trained the model on a curated dataset to achieve high accuracy in both segmentation and classification.
• Evaluated model performance through rigorous testing to ensure reliable and precise results for medical diagnosis.

**13- Egyptian ID Detection and OCR Extraction**

• Developed a system using YOLOv9 for detecting key regions in Egyptian ID cards, such as the name, ID number, address, and birthday.
• Integrated OCR technologies like EasyOCR and Pytesseract to extract values from the detected regions.
• Enhanced accuracy by fine-tuning the YOLOv9 model and optimizing OCR settings for precise text extraction, ensuring reliable information retrieval from scanned IDs.

**14- Falling Person Detection using Pose Estimation and Machine Learning**
• Developed a system for detecting falling persons using Pose Estimation with MediaPipe combined with machine learning techniques.
• Extracted key pose landmarks and features to identify abnormal movement patterns indicative of a fall.
• Trained a machine learning model to classify normal and falling behaviors based on pose data, achieving high accuracy in real-time fall detection.

**15- Cheating Detection System using Face Detection, Recognition, and Pose Estimation**
• Developed a comprehensive cheating detection system by integrating YOLOv8 for face detection and tracking.
• Implemented face recognition using the VGGFace2 model to identify individuals.
• Applied pose estimation techniques to analyze head movements, utilizing camera calibration to determine movements such as left, right, up, and down as potential indicators of cheating behavior.
• Calculated the time spent engaging in suspicious movements to assess the likelihood of cheating, providing a reliable system for real-time detection and monitoring.

**16- YouTube Video Classification using RNN, LSTM, and GRU**
• Developed a video classification system for YouTube videos using RNN, LSTM, and GRU architectures.
• Preprocessed video frames and extracted features to be used as input for the models.
• Leveraged LSTM and GRU to capture temporal dependencies and classify videos based on content.
• Achieved high classification accuracy by fine-tuning the models for various categories, including genre-based and content-based video classification.

**17- Smoking Detection using YOLOv8**
• Developed a real-time smoking detection system using YOLOv8 for object detection in video streams.
• Trained the model to identify smoking-related activities such as the presence of cigarettes and smoking posture.
• Applied data augmentation techniques to improve the model's robustness and accuracy in different environments and lighting conditions.
• Evaluated and optimized the model to achieve high precision in detecting smoking behaviors in real-time scenarios.

**18- Time Series Prediction for KWh Consumption using LSTM and Machine Learning**
• Developed a time series forecasting model to predict KWh consumption on hourly, daily, weekly, and monthly scales using LSTM and machine learning algorithms.
• Trained the LSTM model to capture long-term dependencies and trends in historical KWh consumption data.
• Integrated traditional machine learning techniques, such as Random Forest and XGBoost, to compare performance and enhance prediction accuracy.
• Utilized performance metrics like MAE, RMSE, and R^2 to assess model accuracy and reliability across different time frames.

**19- Machine Learning Models for Classification and Prediction**
• Applied extensive data pre-processing techniques, including handling missing values, feature scaling, encoding categorical variables, and feature selection.
• Conducted data visualization to explore feature relationships and assess distributions, helping to inform model choice.
• Trained and evaluated several machines learning models, including Linear Regression, SVM, Naive Bayes, Decision Tree, Random Forest, XGBoost, CatBoost, LightGBM, Gradient Boosting, AdaBoost, and KNN.
• Optimized models through hyperparameter tuning and cross-validation to achieve better performance.
• Evaluated model performance using accuracy, precision, recall, F1-score, AUC.

**20- UK-Accident2018 Analysis and Prediction**
• Analyzed the UK-Accident2018 dataset, which contains information on road accidents in the UK, to identify patterns and trends in accident occurrences.
• Pre-processed data by handling missing values, encoding categorical features, and performing feature engineering to extract valuable insights.
• Applied various machine learning algorithms, including Random Forest, SVM, and Gradient Boosting, to predict accident severity and occurrence based on factors like location, and time of day.
• Evaluated model performance using metrics like accuracy, precision, recall, F1-score, and ROC-AUC.
• The project aimed to support road safety initiatives by providing predictive insights into accident patterns, helping policymakers take proactive measures.

## Languages

**Arabic** —Native **English** —Good