Umar Balak

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Education

Saraswati College Of Engineering **Navi Mumbai, India**

*Bachelor of Engineering in Computer Science And Engineering (AIML) with **8.66 CGPA*** *2021 – 2025*

Relevant Coursework: Artificial Intelligence, Machine Learning, Data Structures, Analysis of Algorithms, Operating Systems, Database Management

Skills

Programming Languages: Python, SQL

Frameworks and Tools: Microsoft Azure, Hugging Face, Ollama, Vercel, Git, GitHub

Libraries: TensorFlow, Keras, Scikit-Learn, Transformers, LangChain, NumPy, OpenCV, FastAPI, Streamlit

Projects

AdaptFL: Federated Learning Framework – *Try Now* **GitHub**

A federated learning framework enabling decentralized model training across 100+ clients while preserving data privacy.

- Trained a multi-input federated learning model with diverse data types (images, point clouds, time-series, sensor data), achieving an initial loss of 0.4 while ensuring data privacy and efficient global model updates.
- Built a FastAPI-based server managing client registrations, model weight aggregation, and global weight distribution with an average **latency of <200ms** per request.
- Integrated WebSockets for real-time synchronization, handling **500+ concurrent clients**, and Microsoft Blob Storage for AES-256 encrypted model weight storage.
- Developed an admin panel displaying real-time metrics, model aggregation updates, and client contributions with 99% uptime.
- *Technologies: Python, FastAPI, PostgreSQL, NextJs*

AI-driven Proctored Exam System – *Try Now* **GitHub**

Developed a system utilizing advanced AI technologies for real-time proctored exam monitoring.

- Implemented YOLOv8 for **background monitoring** to detect unauthorized individuals, enhancing exam integrity.
- Deployed a real-time **eye gaze tracking** and head movement detection system, ensuring active monitoring in exams.
- *Technologies: OpenCV, MediaPipe, Django, SQL*

TinyVGG: Image Classification Model – *Try Now* **GitHub**

An optimized image classification model based on the VGG16 architecture, designed for high efficiency and performance.

- Achieved **92% classification accuracy** on the CIFAR-10 dataset by utilizing a robust VGG16-based model.
- Reduced model size to 4MB, optimizing it for deployment on resource-constrained devices while retaining performance.
- Integrated a image preprocessing pipeline, ensuring consistent input quality for the model.
- *Technologies: TensorFlow, Convolutional Neural Network*

CineMate: Movie Recommendation System – *Try Now* **GitHub**

A movie recommendation system leveraging advanced algorithms and techniques for accuracy and user satisfaction.

- Utilized K-Nearest Neighbors and TF-IDF algorithms to provide users with the top 10 tailored movie recommendations.
- Features two sections for movie: one with 8,000 top Netflix movies and another with 75,000 top TMDB movies.
- *Technologies: KNN, Python, Scikit-Learn, Pandas, Streamlit*

Experience

Quasar 2.0 Hackathon - *1st Prize Winner* **March 2024**

Developed an innovative AI-powered proctoring system, integrating YOLOv8 for detecting unauthorized individuals and employing OpenCV and MediaPipe for accurate eye gaze and head movement tracking to enhance exam integrity.

NASA Space App Challenge - *Winner* **October 2023**

Engineered an intelligent project collaboration platform featuring a machine learning-based recommendation engine, facilitating seamless student-recruiter matchmaking via a user-friendly web interface.

Open Source Contributions

PerceptionPro: Computer Vision-Based Attention Tracking – *Pypi* **January 2025**

A Python library for real-time computer vision tasks (head pose estimation, eye tracking, object detection).

Certifications

Microsoft Azure AI-900 - Microsoft **March 2023**