Abdul Rafay

Computer Science Student

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Profile

Student of computer science with a strong foundation in programming, algorithms and software development. Passionate about machine learning, deep learning and generative AI. Proficient in Python, TensorFlow, PyTorch, Scikit-Learn, and experienced in data preprocessing, model training, and evaluation with hands-on experience in building predictive models and working with real-world datasets.

Skills

Python - Tensorflow - Scikit-learn - Numpy - Pandas - Flask - MLFlow - DVC - Prometheus - Grafana - C - C++ - C - ASP.NET - Kotlin - Flutter - HTML - CSS - JavaScript - MongoDB - SQL Server - Cloud Platforms (Google Cloud - AWS - ModelBit - Firebase - Railway)

Education

BSc Computer Science *FAST NUCES Islamabad* **Islamabad, Pakistan** *2021-2025*
Relevant Courses: Deep learning, Statistical Modeling, Artificial Intelligence, Parallel and Distributed Computing, Cloud Computing, Programming Fundamentals, OOP, Data Structures, Database Systems, Algorithms, Computer Networks.

Projects

- **Video Frame Prediction using Deep Learning**
  Technologies: Python, TensorFlow, PyTorch, OpenCV, Streamlit, NumPy, Pandas
  Dataset: UCF101 (Human Action Recognition)
  - Developed a **video prediction model** that generates future frames from short input sequences using the **UCF101 dataset**.
  - Implemented and compared three deep learning models: **ConvLSTM**, **PredRNN**, and a **Transformer-based model** to capture spatial-temporal patterns in videos.
  - Trained models to **predict 5-10 future frames** given 10 input frames, simulating continuous motion.
  - Built a **user interface in Flask** to visualize input frames, predicted frames, and the final video clip in real-time.
  - Preprocessed video data (resized frames to 64x64, converted to grayscale/RGB) for efficient training.
  - Experimented with different architectures and optimization techniques to improve prediction accuracy.
- **MLOps Environmental Monitoring and Pollution Prediction System** *Technologies: Python, DVC, MLflow, Flask, Grafana, Prometheus, OpenWeatherMap API*
  - Developed an **MLOps pipeline** to monitor environmental data (air quality, weather, and pollution levels) and predict pollution trends.
  - Implemented **DVC** for versioning real-time environmental data collected from OpenWeatherMap and AirVisual APIs.
  - Created an automated **data fetching pipeline** using Python and scheduled updates via cron jobs and shell scripts.
  - Designed and trained **ARIMA time-series model** to predict **AQI trends** and identify high-risk pollution days.
  - Used **MLflow** to log experiments, track metrics (RMSE, MAE), and perform hyperparameter tuning.
  - Deployed the best-performing model as an **API using Flask/FastAPI** for real-time inference.
  - Integrated **Grafana and Prometheus** for live system monitoring and performance tracking.
  - Conducted real-time validation and optimization to enhance model accuracy and system efficiency.

• Projects

Plant Species Classification using Deep Learning *Technologies: Python, TensorFlow, Flask, MongoDB, Flutter*

- Developed a deep learning model using **CNN** to classify plant species based on leaf images.
- Collected and preprocessed a dataset of leaf images, including resizing, augmentation, and normalization.
- Trained the **AlexNet CNN model** to extract features and classify plant species with high accuracy.
- Built a **Flutter-based mobile app** to allow users to upload leaf images and get real-time classification results.
- Designed a **Flask backend API** to handle image processing, model inference, and return predictions.
- Integrated **MongoDB** as a database to store user queries, classification results, and model logs.
- Deployed the model and backend services to enable efficient real-time predictions via the mobile application.

Languages

- **Urdu** [Native]
- **English**