Project Title:

Face Recognition Based Attendance System with Age, Gender, and Emotion Detection

Introduction:

This project is an intelligent attendance monitoring system based on face recognition, enriched with real-time age, gender, and emotion detection. It eliminates the need for manual attendance marking while simultaneously capturing emotional and demographic insights of attendees. The system works within a specific time window and marks absent if students are not detected in that time.

Background:

Manual attendance systems are time-consuming and prone to errors. With advancements in computer vision and machine learning, it is possible to automate this process using facial recognition. Enhancing it with age, gender, and emotion detection provides further analytics and personalization capabilities.

Learning Objectives:

- Understand and implement facial recognition using embeddings.
- Train and integrate custom models with pre-trained networks.
- Apply OpenCV for real-time video capture and face detection.
- Integrate age and gender detection using pre-trained Caffe models.
- Use deep learning models for emotion recognition.
- Automate Excel-based attendance logs.
- Use time-based logic to enforce attendance windows.
- Handle large models with optimization for performance.

Activities and Tasks:

- Trained a custom facial recognition model using OpenFace embeddings and an SVM classifier.
- Integrated OpenCV DNN-based face detector for better speed and reliability.
- Added age and gender detection using Caffe models.
  Added emotion detection using a pre-trained Keras model.
- Implemented real-time attendance logging into an Excel sheet.
- Added logic to restrict attendance to 9:30 AM to 10:00 AM.
- Marked students absent automatically if they are not detected within the time frame.

- Enabled test mode for testing the system at any time.

Skills and Competencies:

- Python Programming.
- OpenCV for image and video processing.
- Face recognition using embeddings.
- Keras and TensorFlow model loading and prediction.
- Pandas and Excel file handling.
- Error handling and optimization techniques.
- Project structuring for deployment.

Challenges and Solutions:

- Face recognition model was slow using face_recognition module so switched to OpenFace embeddings.
- Emotion model slowed down frame processing so optimized model usage and preprocessing.
- Large model files could not be uploaded to GitHub directly so shared using Google Drive links.
- Time zone and time restriction logic had to be debugged for real-time testing and deployment.
- GUI was avoided for simplicity but modularized code for future extension.

Outcomes and Impact:

- Successfully developed an integrated, automated, intelligent attendance system.
- System accurately identifies known students, detects their age, gender, and emotion.
- All information is logged in an Excel sheet, and absent students are marked correctly.
- Project structure is clean, with models handled via Google Drive links.
- Suitable for educational institutions and research on classroom behavior

Conclusion:

This project demonstrates how multiple computer vision models can be combined into a powerful real-time system. The use of real-time emotion, age, and gender detection adds significant value to traditional attendance systems. With optimization and

modularity, the system is ready for integration into larger educational platforms or institutional monitoring tools.

Project Folder Structure:

Attendance-System
known_faces
models
age_gender_emotion.py
attendance_system.py
classifier.pkl
openface.nn4.small2.v1.t7
requirements.txt
README.md
Internship_Report.pdf

Model Accuracy:

- Face Recognition Accuracy: Above 90 percent with correct dataset.
- Age and Gender Detection: Accuracy above 80 percent using Caffe models.
- Emotion Detection: Accuracy approx 70 to 75 percent on FER+ model.