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Course: B.Tech in Computer Science and Engineering

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Project Report

# Project Title:

Face Recognition-Based Smart Attendance System

# Objective:

To develop a real-time, automated, and contactless attendance system that identifies individuals using face recognition and records their presence in an Excel file.

# Tools & Technologies Used:

Programming Language: Python

Libraries & Frameworks:

- OpenCV (for video capture and image handling)

- DeepFace (for facial verification)

- Pandas (for data manipulation)

- Openpyxl (for Excel file operations)

- Threading (for performance optimization)

- Datetime (to log current date)

Hardware: Webcam

File Storage: Excel file for attendance logging (attendance.xlsx)

# Working Principle:

1. Initialization:  
- The system captures video input from the webcam.  
- Reference images stored in the reference\_imges folder are loaded, and each is mapped to a name.  
- An attendance dictionary is initialized with all users marked as False (Absent).

2. Face Detection & Matching:  
- The webcam continuously reads frames.  
- Every 30 frames, a new thread is triggered to perform face verification using DeepFace.verify().  
- If a match is found between the live frame and a reference image, the respective individual is marked as Present.

3. Visual Feedback:  
- The video feed displays "MATCH!" in green if a person is recognized, or "NO MATCH!" in red otherwise.

4. Attendance Logging:  
- When the user presses the "q" key, the system stops.  
- Attendance data is compiled into a DataFrame, mapped to "Yes" or "No", and written to attendance.xlsx.  
- If the file already exists, new records are appended without duplication for the same date.

# Features:

- Real-time face recognition

- Contactless attendance marking

- Multi-threaded design for smooth performance

- Dynamic Excel sheet update with date

- Easy scalability by adding more reference images

# Applications:

- Educational institutions for student attendance

- Corporate offices for employee check-ins

- Events or secure facilities requiring identity verification

# Limitations & Future Scope:

Limitations:

- Accuracy depends on lighting and camera quality

- Limited to pre-stored reference images

- No GUI interface (currently terminal-based)

Future Enhancements:

- Add GUI for better user interaction

- Store attendance in cloud-based systems like Google Sheets

- Integrate with mobile or biometric systems

- Add support for emotion detection or mask detection