

Face Recognition Based Smart Attendance System with Web Apps Using Machine Learning(KNN)

Prepared by:

Nour Ghsaier

Junior IT/ BA

Supervised by:

Prof Dr.Manel Abdel Kader

IT360: Information Assurance & Security

1-Introduction

Facial recognition technology has become increasingly prevalent, offering a convenient and secure method for user authentication. Its applications span various domains, from exam proctoring and KYC (Know Your Customer) verification to unlocking smartphones and securing access to restricted areas.

This system aims to leverage facial recognition capabilities to provide a user-friendly and secure login experience.

By utilizing a webcam and image processing techniques, the system will be able to identify authorized users based on their facial features. This report details the design, implementation, and evaluation of this web-based facial authentication system.

2-Components

★ User Interface:

- Request permission to access the user's camera.
- Display a live video feed from the webcam.
- Display a loading indicator or message while processing the captured face image.
- Provide visual feedback:
 - ❖ Highlight the detected face with a bounding box in the video feed.
 - ❖ display the user's name upon successful recognition.

★ Camera:

- User Identification: The camera provides a live video feed that allows the system to identify the presence of a user in front of the screen.
- Face Detection and Framing: The camera feed is analyzed by the facial recognition engine to detect the presence of a face. OpenCV can identify faces within the frame, even if the user is at a slight angle.
- Data Acquisition for Recognition: Once a face is detected, the camera captures a snapshot or continuously feeds frames containing the user's face. This captured image data is then used by the facial recognition engine to extract facial features.

★ **Facial recognition engine(OpenCV):** responsible for processing the facial image and identifying the user.

★ **Database:** The database stores user information, including credentials and facial data for recognition.

★ **Web app to display the attendance:** an interface to display the retrieved attendance information (name, time, date,...)

3-Project Requirements

a- Functional Requirements

**Facial Recognition Capture Flow:* A live video feed from the webcam should be displayed with clear instructions for users

**Database Management:* The system should securely store user credentials.

b-Non-Functional Requirements

**Performance:* Facial detection and recognition should be performed with minimal latency to ensure a smooth user experience.

The web application should load and respond to user actions efficiently.

**Usability:* The user interface should be intuitive and easy to navigate, with clear instructions. The system should provide informative feedback to users throughout the login process.

**Scalability:* The system should be designed to accommodate an increasing number of users and data entries in the future.

**Availability:* The system should be designed with high availability in mind, minimizing downtime and ensuring user access most of the time.

4-Project Architecture and Design

a-Functional Flow:

- 1-Upon running the code a pop-up appears requesting permission to access the user's camera.
- 2-If permission is granted, a live video feed from the webcam is displayed on the login page.
- 3-Clear instructions are presented on the screen, guiding the user to position their face within the frame.
- 4-The system employs facial detection algorithms to identify the presence of a face within the video feed.
- 5-When a face has been selected in the image, the system analyzes the spatial geometry(distance between eyes, shape of nose,..), which will be compared to the stored information in the database.
- 6-If the facial image matches the stored template, the system grants the user access and the attendance is marked. If the facial image does not match the stored template, the system denies the access.