

# ATTENDANCE MANAGEMENT VIA FACIAL RECOGNITION

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**Abstract** - Bio-metric authentication is being widely used and it is replacing traditional systems with its main features being fast and reliable. There are different methods for biometric security such as systems based on fingerprint scanners, facial recognition, iris scanner, and voice recognition. Fingerprint scanner is extensively used in most the places for purpose of authentication but their major drawback can be hygiene. Facial recognition is emerging as a popular technology in this era. There has been a significant advancement in the field of facial recognition for the purpose of biometric security. It is really challenging to remember different passwords for various accounts, but in the system which uses facial recognition we don't have to remember the passwords, we become the password. Facial recognition is majorly used in fields of defense, security, smartphones, and banking, but this system can be further developed to be incorporated into our day-to-day life for attendance marking in schools and offices and also by law enforcement to identify criminals or lawbreakers. Our project is the integration of web development, machine learning, and database with a user-friendly interface with the help of this system many organizations such as schools, and corporate office can change their conventional method of attendance management.

**Key Words** : PYTHON; FACE RECOGNITION; IMAGE PROCESSING; DJANGO; OPENCV; HOG+SVM

## 1. INTRODUCTION

This project attendance management system uses facial recognition for marking attendance, time of entrance, time of departure, and maintaining attendance records of students. This is an efficient replacement for the traditional attendance system that is done manually. It covers areas of computer vision (face detection, alignment, and recognition), machine learning, and web application development to implement various functionalities namely student registration, creation of dataset, training of ml model on the dataset, and view attendance reports, etc. This project can be extremely useful for maintaining attendance records in schools and various organizations.

## 2. EXISTING SYSTEM

Over the last few years, a variety of attendance management systems based on facial recognition have been deployed in various organizations to enhance the performance of employees and students. J. Joseph and K Zacharia suggested a Matlab-based system that included

PCA, Eigenfaces, image processing, and a micro-controller. The system works with facial picture data, and a suitable method that works with the systems' orientation is required. A. Patil and colleagues introduced a face identification approach for attendance marking based on Haar cascades and the Viola-Jones algorithm. The system of artificial neural networks was proposed, which is both secure and simple. PCA was used to extract facial data, as well as training and testing. In which neural networks are achieved, the system operates in several orientations. M. Kalyani.K and Veera-Muthu proposed a 3D face recognition method for the system for managing attendance, each student's attendance was recorded in the monthly timeframe. There is an urgent need for a new algorithm that can improve the identification of oriented faces. The PCA algorithm was used to create an effective attendance management system that attained a precision of up-to 83 percent, but the system's performance was disturbed by minute changes in lighting conditions. The author introduced an eigenface technique along with PCA algorithm for marking facial recognition attendance systems, and they mentioned comparisons of various facial recognition algorithms. Overall, keeping a record of attendance was a good idea.

## 3. SYSTEM FEATURES

System features are highly divided into 3 modules.

- **Registration and Access Module** This module works closely with related tasks For the registration of any new user in the organization, Login to the system, and managing user profile information. Using features provided by this module manager may register new users in the system and the controller/user can access both the system through their credentials.
- **Manage attendance information** This module primarily addresses issues concerning the student's attendance. Students can use it to record their presence, time of entrance, and time of departure in the system. Admin can view each student's report generated by the system, and students can view their attendance report, With some filters, like filter by date and by student name.
- **Manage Student Records** This module includes features of the user profile. By using this module admin can add a photo of the newly registered student during registration. Admin can also command the system explicitly to train the model and the system will make necessary calculations and will generate some data

which will be used internally to identify each student uniquely.

### 3.1. Manage Attendance and Login

#### Student registration

New Registrations can be made by the admin.

Input: Student information (username and password)

Output: Success message is displayed "user successfully registered".

#### Login page

Input: Username and password

Output: If username and password are verified, the user will be directed to the dashboard

Exception: If entered username and password are invalid then the system will redirect the user to the login page, and an error message is displayed.

### 3.2. Administer Attendance Info

#### Marking your presence-in

Input: With the use of an integrated webcam or external webcam system will scan the student's face.

Output: Registered students will be identified and system will mark students' time of entrance to the database. A success message will be transmitted to the user.

#### Mark your presence-out

Input: With the use of an integrated webcam or external webcam system will scan the student's face.

Output: Registered students will be identified and the system will mark the student's time of entrance to the database. A success message will be transmitted to the user.

#### View my attendance report

Students may often need to see their attendance record throughout the month or year. Using this feature students can see their attendance record to the date.

Input: User selection

Output: Statistical analytics of the particular student who is currently logged into the system will be displayed.

#### View student's attendance report

This feature is for the admin for monitoring the availability of each student to the date. i.e., how many students are present today out of total students etc. can be monitored. Input: user selection

Output: Attendance record of each student including how many students are present today along with the graph.

### 3.3. Manage Student's Details

#### Adding images

This feature can only be accessed by the admin, Admin can capture images of students via webcam while the registration process and create a folder with username as the folder name in face\_recognition\_data.

Input: Student's username  
Output: Dataset created successfully

#### Training the system

Input: Username of student

Output: The system will train a machine learning model with the available datasets created in the above process.

## 4. METHODOLOGY

### 4.1. Data Acquisition

#### User Creation

The user is created with a specific username and password.

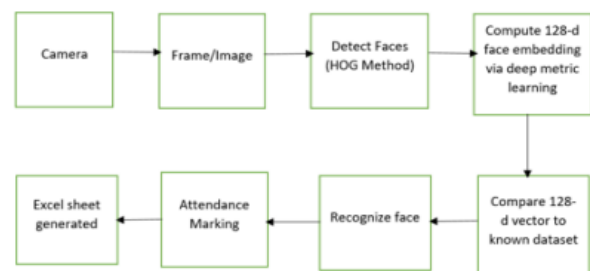
#### Image Capture

Images are captured using the webcam of the laptop using the OpenCV module.

#### Dataset Creation

Dataset is created to train the model. For better accuracy, 25 images of the student are captured. The captured image is stored in a folder with names specific to the respected student.

### 4.2. Facial Recognition



#### Face Detection and Feature Extraction

Facial recognition is a significant aspect wherein the image captured by the camera is fed into the system, a facial recognition algorithm is used to recognize the unique faces in the input dataset, several computer vision algorithms are being used to identify faces in an image, and the location of facial landmarks is also determined. To identify different faces within a given image, we have used the HOG feature extraction algorithm.

#### Face Alignment

There are 68 distinct points on the person's face or 68 landmarks. This step's primary aim is to discover facial landmarks and placement of faces in the image without distorting the image.

#### Encoding of the Face

After detecting faces in an input dataset of faces, the Extraction of uniquely identifying features from the face is an important step. Essentially, whenever we get face

localization, the 128 specific facial features were extracted from each image from the input dataset, and all these 128-d facial features are saved in a 23 data file for face recognition.

### Face recognition

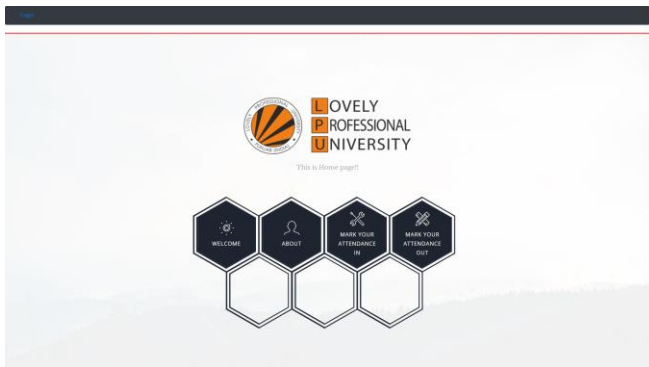
The final stage of the face detection and recognition procedure. We used one of the most effective learning techniques, deep metric learning, being highly accurate and competent in producing real-value feature vectors. This system validates the faces by building the 128-d embedding for each one. The Euclidean distance between the face in the image and all faces in the dataset is computed using an internally compare-faces function. If the current image matches the 70 percent threshold in the entire dataset, it will proceed to attendance marking.

### 4.3. Marking Attendance

The system will recognize the user uniquely and will mark the student's time of departure in the database. Success Message will be received by the user. The attendance record of each student including the number of students present today out of the total along with the graph will be displayed.

## 5. RESULTS

### Home Page



Smart Attendance Management System is effective and efficient. On the home page, the user can mark his attendance with options to mark the arrival and departure time. The system works flawlessly after the registration process of a student is completed by the admin.

### Login

If the username and password are correct, the user will be taken to the system's dashboard. If the username and password entered are invalid, the user will be routed to the login page with an error notice.

### Admin



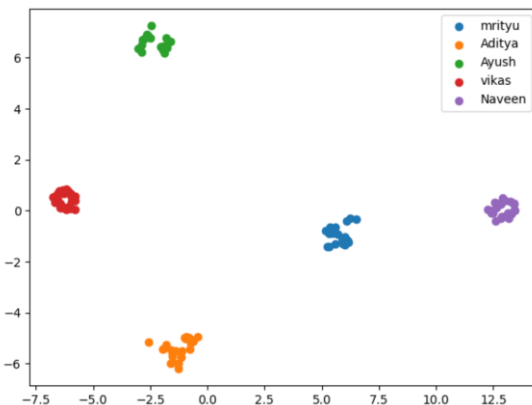
Admin can perform following tasks:-

- Admin can register new students
- Add photos of students
- Train the model using dataset
- View attendance reports of all students

### Register new student

Admin can register new students with unique username and password.

### Training Dataset



The system will train the machine learning model on the available dataset of images of students. After training, the system will be capable of identifying students distinctively.

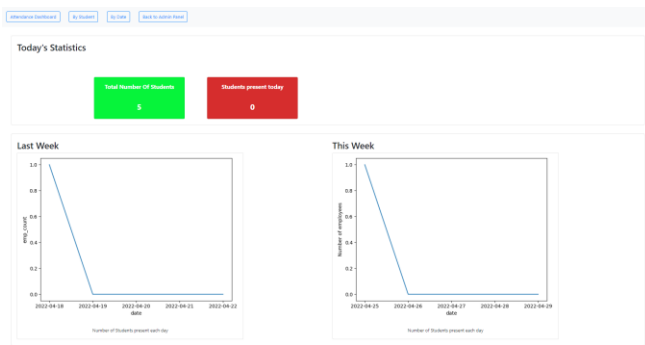
### Marking Attendance in

The system will uniquely identify the user and will mark his/her arrival time in the database. A success message will be received by the user.

### Marking Attendance out

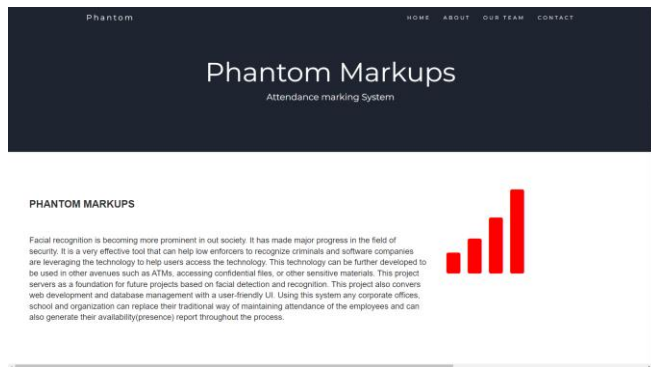
The system will uniquely identify the user and will mark his/her departure time in the database. A success message will be received by the user.

## View Attendance report



Statistical analytics of the particular employee who is currently logged into the system will be displayed.

## About us



Description about the project, details of team members, and contact form to reach out.

## 3. CONCLUSIONS

Attendance via facial recognition is a great replacement for the traditional Attendance marking system (manual). Concepts of facial recognition for marking attendance of students and making the system more efficient. The system can detect faces effectively with different positions and performs efficiently. The system has some limitations sometimes it fails to recognize faces from long distances, and it is less optimized with a low configuration system, but this can be resolved by the use of devices with high computing power. In-short facial recognition is the future of biometric security.

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