

# Face Recognition Based Attendance System

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**Abstract:** This paper explores the use of automated technologies in the face recognition based recognition system, with a focus on automating attendance capture. The project aims to improve the attendance marking of students by providing a more personalized and efficient service through the design and implementation of a Digital Attendance Web application. A face-based recognition system is a computer-based system that utilizes image recognition technology to identify individuals. In this paper, we present a face-based recognition system that uses deep learning techniques to extract features from facial images and identify individuals.[1] The proposed system utilizes Haar Cascade to extract features from facial images, and a classifier is trained to recognize the individual in the image.[6] The system is trained on a large dataset of facial images. It achieves high accuracy in identifying individuals in different scenarios, such as variations in illumination, pose, and facial expressions. The proposed system has a wide range of applications, including security, surveillance, and identification systems. It has the potential to revolutionize the way we interact with technology and enhance the security of our personal information.

**Keywords:** Digital Attendance, Haar cascade, Images, Dataset, Face recognition, Automated Attendance.

## I. INTRODUCTION

Facial recognition systems have become increasingly popular in recent years due to their potential to enhance security and identification systems. The technology behind facial recognition systems is based on computer vision and deep learning techniques that enable machines to recognize faces and extract features from facial images. The first face recognition systems were developed in the 1960s and 1970s, but they were largely based on manual feature extraction and were not very effective at identifying individuals.

Biometric access control are automated methods of verifying or recognizing the identity of a living person on the basis of some physiological characteristics, such as fingerprints or facial features, or some aspects of the person's behaviour, like his/her handwriting style or keystroke patterns. Since biometric systems identify a person by biological characteristics, they are difficult to forge. Face recognition is one of the few biometric methods that possess the merits of both high accuracy and low intrusiveness.

The aim of the facial-based attendance system project is to develop a system that utilizes facial recognition technology to automate the attendance tracking process. The proposed system will enable students or employees to mark their attendance by simply looking at a camera. The system will then extract features from their facial images and compare them to a database of known faces to identify the individual and mark their attendance.

The project aims to improve the accuracy and efficiency of the attendance tracking process. This is done by eliminating the need for manual entry or the use of traditional attendance tracking methods such as swipe cards or biometric scanners. The proposed system also aims to enhance security by preventing proxy attendance, where one person marks attendance for another.

## II. LITERATURE SURVEY

The concept of facial recognition-based attendance systems and their benefits over traditional attendance systems.[8] In existing facial recognition-based attendance system, various techniques such as, such as eigenface, fisherface, local binary pattern, and deep learning-based methods.[7] The authors compare the performance of these techniques based on various metrics such as accuracy, speed, and robustness, and highlight the advantages and limitations of each approach.

The various types of facial recognition methods used in attendance systems, including feature-based methods, holistic methods, and hybrid methods.[3] The paper also said the various components of facial recognition-based attendance systems, such as image acquisition, pre-processing, feature extraction, matching, and decision-making. The authors describe the techniques used in these components and their impact on the overall system performance.[2]

This system is basically based on face detection and recognition algorithms, automatically detect the student when he enters the classroom and marks the attendance by recognizing him. Because of LBPH outperforms other algorithms with better recognition rate and low false positive rate the system is based on this algorithm.[6] The system uses SVM and Bayesian as a classifier because they are better when compared to distance classifiers [1]. The workflow of the system architecture is when a person enters the classroom his image is captured by the camera at the entrance. A face region is then extracted and pre-processed for further processing. As not more than two persons can enter the classroom at a time face detection algorithm has less work. [7] The future work they are saying on this paper is to improve the recognition rate of algorithms when there are unconscious changes in a person like tonsuring head, using a scarf, facial hair.

### III. PROPOSED SYSTEM

To improve the more accuracy in face recognition, we are proposing the Web Application based Attendance System for marking the Attendance of student which are present in classroom. The system should be able to handle variations in lighting and pose. The system should be designed to protect student privacy by ensuring that the images and attendance records are stored securely.

- **Camera:** The first component is the camera, which is used to capture images of the students.
- **Image pre-processing:** Once you've captured an image, you'll need to pre-process it to make it suitable for face recognition. This involves tasks such as cropping the image to isolate the face and removing any background noise.
- **Face detection:** The next step is to detect the face in the pre-processed image. There are multiple face detection algorithms available, such as Haar Cascade or Viola-Jones algorithm, that can be used for this purpose.
- **Face recognition:** After detecting the face, the next step is to recognize the individual. This is typically done using deep learning algorithms such as Convolutional Neural Networks (CNNs). A pre-trained CNN can be used to recognize faces based on their features.
- **Attendance Recording:** Once the face is recognized, the system will mark the student present in the attendance record.
- **Database:** All the recognized faces and attendance records should be stored in a database. This database can be used for generating reports or for further analysis.
- **Analytics:** After the entire process is completed, we can visualize the data by subject and we can also visualize each student's date. The whole week, month, or semester data can be visualized

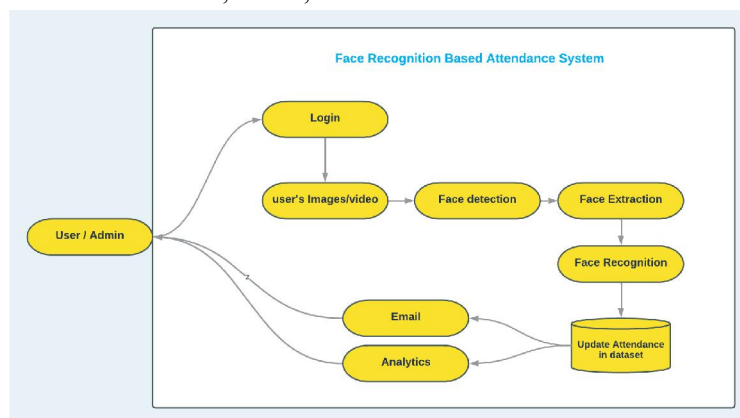
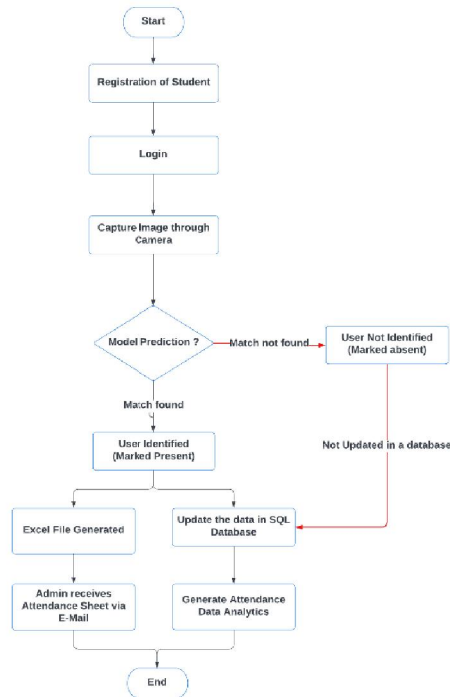


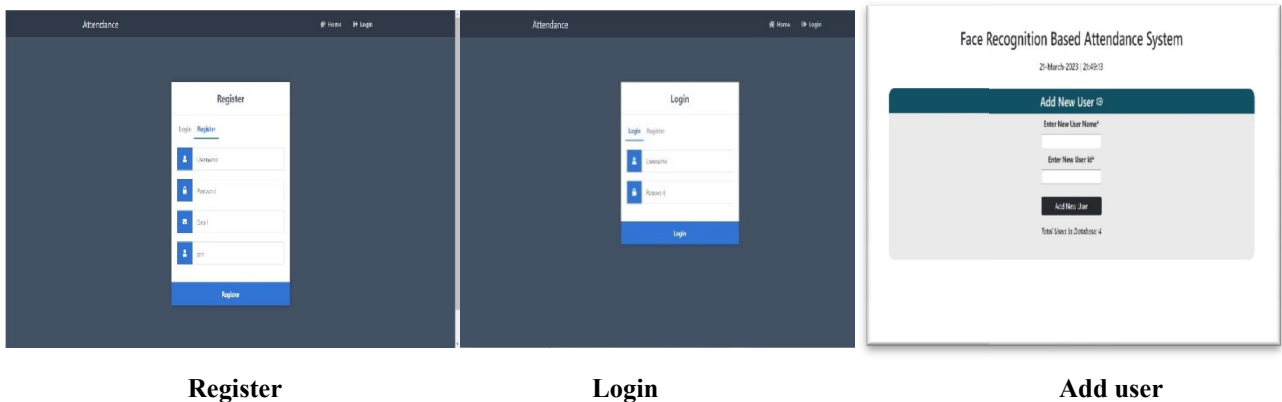
Figure 1: Block Diagram of Face Recognition Based Attendance System



**Figure 2:** Flow Diagram

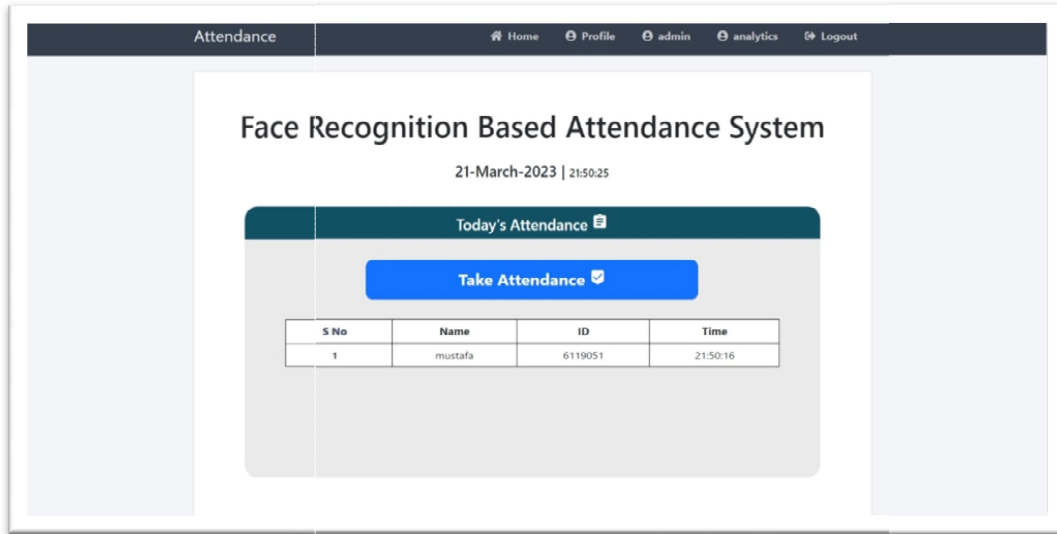
**IV. SYSTEM IMPLEMENTATION**

Figure 3 is representing Registration, login and Add user pages. In these pages, the new student have to register their details with username, password, email and prn number for marking Attendance. Before attending, we must log in to the website with a username and password. In Add user, the student can enter their name with PRN number for attendance



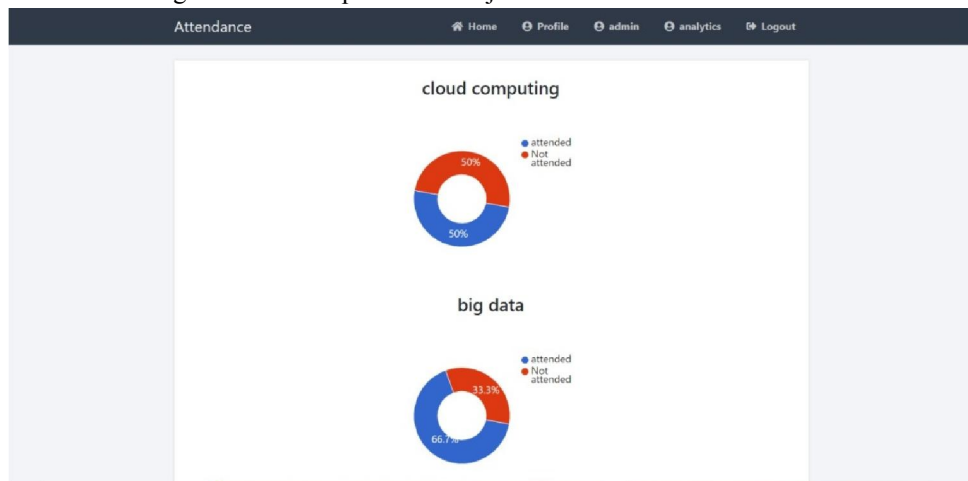
**Figure 3**

Figure 4, shows see the main page of the website where attendance will be updated live. Click on “Take Attendance” then it will open your webcam and capture the faces which are present in classroom but we have to must logged in the website then only it will mark or update into the student table which are already created in database.



**Figure 4: Main page**

The data visualization of a single student in a particular subject over the course of the semester is Shown in the figure 5



**Figure 5: Pie chart of present student**

### V. FUTURE SCOPE

The rapid advancement of technology, the system can be further improved and expanded to offer more benefits to schools, colleges, and other educational institutions. Integration with other technologies the face recognition-based attendance system can be integrated with other technologies such as biometric authentication systems, smart devices, and Internet of Things (IoT) devices. This integration can help enhance the security and convenience of the system. The incorporation of AI and ML algorithms can improve the system's accuracy and efficiency, enabling the analysis of attendance patterns, identifying anomalies, and predicting future attendance trends. The development of mobile and cloud-based solutions can make the system more accessible, and advanced data analytics and reporting features can provide deeper insights into attendance data. Finally, integrating the face recognition-based attendance system with academic performance data can provide a comprehensive view of student performance, helping teachers and administrators identify students requiring additional support and resources. With these advancements and innovations, the future scope of the face recognition-based attendance system is vast, offering more efficient, accurate, and convenient attendance tracking solutions for educational institutions.

## VI. CONCLUSION

Face recognition-based attendance systems are powerful tools for educational institutions to track attendance data accurately and efficiently. It has the potential to transform traditional attendance tracking methods by eliminating manual processes and reducing errors. To manage all records of old and current attendance, a database and table are created. Data analytics and reporting features can further our system improve system accessibility and provide deeper insights into attendance data. The implementation of face recognition-based attendance systems can have a positive impact on the education sector by improving efficiency, accuracy, safety, and security. This is done by offering a more efficient, accurate, and convenient attendance tracking solution that benefits teachers, administrators, and students alike.

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