

# Attendance System using Face Recognition

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**Abstract** - Face recognition is one the most productive and efficient real-time image processing application and has a very important role in the IT sector. Face recognition is used in many areas of the technical field, especially for the authentication of faces for attendance. Attendance using face recognition is a system that recognizes students by using facial features based on real-time face capturing and other technologies. The aim of this system is to digitize the traditional system of taking attendance which requires calling the names of each student and maintaining logs and registers. Current methods for taking attendance are time-consuming, difficult to maintain and can be easily manipulated by marking proxies, adding or removing attendance from the register, etc. Attendance systems such as fingerprint and RFID systems can also be manipulated by taking thumbprints and marking fake attendance using others' RFID chips or cards. This system is proposed to tackle all these problems and to create a safe and fast attendance system. In this system, the attendance of the students will be marked using the Face Detection and Face Recognition method. First, all the facial data of all the students are stored in a dataset and then at the time of marking attendance, the webcam will scan the real-time footage of the webcam for the face of students and then detect the face, after detecting face it will recognize the student based on the given data. After face recognition, it will mark the attendance of the student in the attendance sheet. This system is created using Haar-Cascade face detection algorithm and KNN algorithm and multiple faces can be recognized simultaneously for attendance.

**Key Words:** Machine learning, Attendance, Face Detection, Face Recognition

## 1. INTRODUCTION

Traditional methods of marking attendance is a hectic and time-consuming task in schools, colleges, offices, etc. It is a burden for teachers or record keepers who marks attendance in a rather traditional way of calling names and making attendance in a register which is tedious and a time-consuming task. This can lead to vulnerabilities such as manipulation of records, making proxy attendance, loss of attendance register and many such problems. Therefore, traditional methods are not safe and confidential. Many offices, colleges, etc. stated using attendance systems using RFID, fingerprint but these systems cost a lot and proxy

attendance can be marked using someone's RFID card or thumbprint. Face recognition has played a very important part in machine learning and authentication-related activities which uses real-time webcam feed to detect and recognize the face of a human based on various features like nose, eyes, lips, face structures, etc. Face recognition also works with little face movements and expressions. This technology works efficiently and accurately in a decently-lit environment. Marking attendance consists of two processes: face detection and face recognition, both work in coordination with other. After recognizing the face, it marks the attendance in the backend which can be viewed or downloaded from the system. Here the face of a person and their facial features is considered for marking attendance.

### 1.1 Aim

The aim of this system is to create a digital attendance system that will be more secure, will be less burden for teachers, record keepers, etc., and saves the time of taking attendance and maintaining attendance records.

The need for this system is necessary as it will reduce the hassle of maintaining traditional attendance files, log etc. by maintaining records digitally which is way more hassle-free, easy, and secure from any manual manipulation or mistakes of records. Also, it reduces the cost of taking attendance as it uses face recognition for attendance thus, eliminating the use of files, registers, pens, etc.

### 1.2 Objectives

The primary objectives for this system are:

- To minimize human efforts as it can mark multiple attendances simultaneously thus reducing the effort of calling names, marking attendance manually in a register.
- To save valuable time as it can mark multiple attendances simultaneously without the need of any caretaker. Thus, it reduces the time of marking attendance.
- To provide a reliable way of taking attendance as it is secure from vulnerabilities such as data manipulation such as marking proxy attendance, removing someone's attendance etc. Also, this system is faster as compared to other attendance systems.

- It is a Low cost and highly accurate system as it requires elementary things such as a laptop or a PC with a webcam and a good internet connection.

- It is Easy to use as it uses a user-friendly GUI so that anyone with or without technical knowledge can use this system without any problem.

### 1.3 Scope

The scope of this project is to make the process of attendance more modern and simpler by finding the most accurate and efficient algorithm for face detection and face recognition. Using this system, it will be easier to take attendance and keep the record properly and securely. This system can be used in places where attendance is necessary such as schools, colleges, offices, etc.

## 2. FEASIBILITY

### 2.1 Technical Feasibility

Software and tools required to create and use this system are easily available online free of cost. Downloading and installing these tools is fairly easy using a good internet connection. On the software side, we used Visual Studio code for all the coding purposes using python as the coding language. On the Backend side, we used SQL database using PHP language and Xampp server. GUI of this system is created using flask, HTML and CSS.

Hardware required for this system are elementary things such as a decently powerful computer/laptop with a webcam. The system relies on a powerful CPU and GPU so, the more the powerful PC, the better the result it will generate.

### 2.2 Economic Feasibility

This system is quite feasible economically as it does not require any paid software and all the tools, software, languages are free and available on the internet. It requires elementary things such as a laptop or a personal computer with a webcam and a stable internet connection which is nowadays in this online world available with everyone.

### 2.3 Operational Feasibility

This system is easy to use with an intuitive GUI which helps people with no technical knowledge to use it without any problems. The installation of tools and software is also quite easy and people can set this system up on their PC without any problems.

## 3. PROPOSED SYSTEM

An attendance system is a system that will detect and recognize the face of a person accurately using the most efficient algorithm for face detection and recognition. After

recognizing the face, the name of the student will be stored in the database. We can download the attendance list according to the Date and Subject in the PDF format.

## 4. METHODOLOGY

The proposed method in this paper is to mark the attendance using the Face recognition technique. It contains mainly two parts, first is Enrolment of Student or Registration of Students in the database, and another part is Marking Attendance, as the name says, will be used for Marking down the attendance of students. In both of these processes, the two most important part is common, which is Face Detection and Face Recognition. For Face Detection Haar Cascade Classifier and for Face Recognition we have used KNN (K Nearest Neighbors).

### 4.1 Algorithms

#### A. Face Detection using Haar-cascade Classifier:

Haar cascade is an algorithm for object detection which is used to identify faces in real-time video and image. It is a machine learning-based algorithm that approaches lots of negative and positive images used to train a classifier.

Positive images - It contains images that a user want the classifier to identify

Negatives images - it contains images of everything else that users do not want to detect

This method is the oldest algorithm but still, it is a powerful algorithm for face detection. This algorithm exists long before when deep learning becomes famous. Haar features in this algorithm was not only used to face but also for lips, eyes, number plates etc.

#### B. Face Recognition using KNN (K Nearest Neighbor):

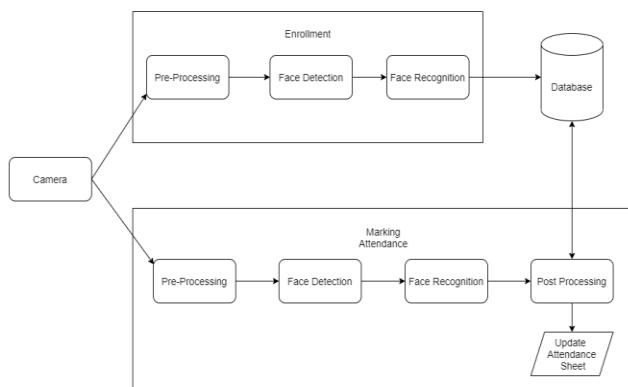
The K Nearest Neighbors algorithm can be used for classification as well as regression.. KNN algorithm is used to check the similarity between new and available data and put the new one into the category that is similar. K-NN algorithm classifies a new data point from available data from the similarity. Whenever new data get added, that data can be easily classified into a well-defined category. K-NN algorithm is mostly used for Classification over Regression, but it can be used for both. On underlying data, K-NN does not make any assumption, as it is a non-parametric algorithm. K-NN stores the dataset and performs an action on the data at the time of classification instead of learning from a training set, that is why it is also referred to as a lazy learner algorithm. In the training phase first, it simply stores the dataset, and whenever it gets the new data, then it put the data into the category based on similarity.

### 4.2 System Description

The proposed system works by first enrolling the student in the system by saving the data for each student. In this phase,

the face is detected via a webcam using face detection algorithm- Haar cascade which also does the feature extraction to determine who's face it is. After feature extraction, images of a student with the details are stored as a NumPy array in the database.

The second phase is marking the attendance. In this phase, the attendance is marked using a webcam, it detects the face of the student, and using face recognition algorithm-KNN algorithm, it determines who's face it is based on the data of students stored in the database. After recognition, it updates the attendance of that student in the database.



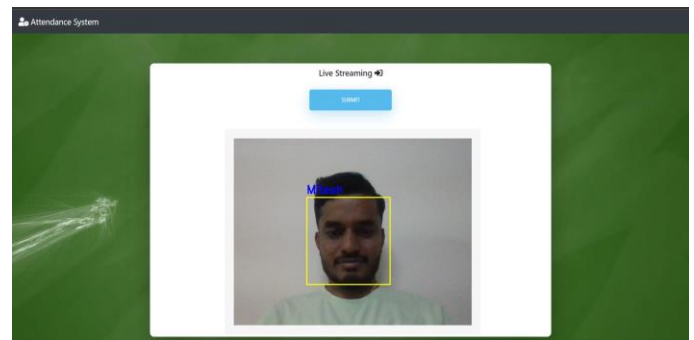
## 5. RESULTS

The users can interact with the system employing a GUI. Here users will be mainly provided with options, such as Student Registration, Mark Attendance, View Attendance and Send Mail.

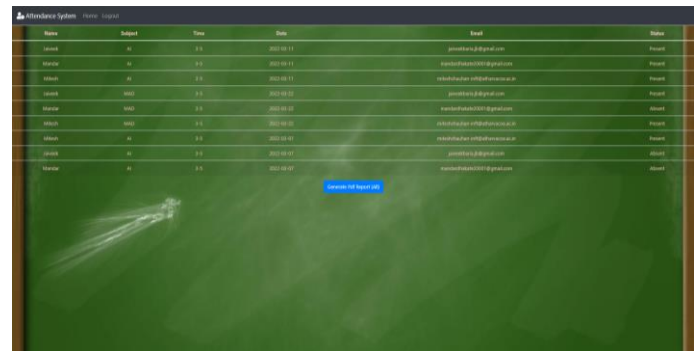


For Student Registration, the user is just required to enter the details such as the Name of the student, Email ID, Phone number, Class and Address. After that camera will pop up and it will take a number of images of the student and register the student in the database.

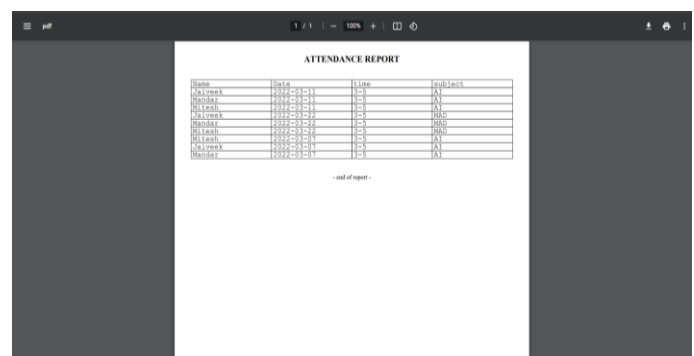
For Marking Attendance, the user is required to Enter the details of the Subject and Time slot. After that, the camera will pop up and mark the student attendance.



To view the attendance, the user has two options, one is to view the whole attendance, which will include all students plus all subject attendance. And another one is to view the attendance according to date and subject.



Also, if the user wants to get the attendance in PDF format, then the user can also generate pdf by clicking on "Generate PDF Report", which will take to the user to the download page and can simply download the PDF.



## 6. CONCLUSION

In this digitalizing world, this technique will contribute greatly to making classrooms digital and help to eliminate the traditional attendance systems problems. this technique allows the record keeper to see attendance automatically without any extra cost and energy whereas the proposed system needs very elementary things such as; a camera, laptop or personal computer and native network. This method is secure, reliable and easy to use. The proposed system will definitely solve many problems that happen

within the traditional attendance system and we can further improve our system to be more scalable and efficient using faster systems and more powerful algorithms.

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