

# Face Recognition Attendance System

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**Abstract:-** The Attendance system is an important administration department of any organisation, like schools, colleges, hospitals, offices, companies, or working areas. The production, performance, wages, and salaries of the employees or workers and the overall statistics of an organisation are mainly dependent on parameters such as hours, days, and the number of people working. Monitoring attendance is highly essential, and it interconnects huge amounts of data as it concerns the data analysis and the information of any company, institution, or organisation, as records of it are important. This paper mainly focuses on using the technology of face recognition to improve the attendance system of students in a college or institution. The attendance of students is the major factor that influences the student's exam eligibility criteria and performance evaluation.

**Keywords:-** Facial Recognition, Open CV, Machine Learning, Technology, Python.

## I. INTRODUCTION

On a day with seven-hour classes and considering 60 students, the students attendance is noted by the teacher in every class hour, which equates to marking the attendance seven times a day. The approximate time taken by the teacher to call the students names and mark their attendance is 10 minutes. This method of taking attendance takes away 10 minutes of each one-hour class, and the remaining time left for the teacher or lecturer to skill the students is 50 minutes, which has to be used judiciously. This 10 minutes of each hour-long class causes interference with the flow of thoughts, and gradually academic productivity drops. Therefore, using face recognition in the field of attendance management systems will be helpful as there will be no use of books or paper and time will be reduced, which can be utilised for teaching more to the students. Face recognition is a contactless method of marking attendance. By developing and implementing automation in various fields, we will encourage people to use the latest technologies and have a better future.

## II. LITERATURE SURVEY

A proposed method, as outlined in reference [10], explains that the students of each and every class will have to first register themselves by entering their details with their different-angle images of faces captured, which are stored in a database for face recognition. When the class

session is going on, faces will be detected from the live streaming video of the camera in the classroom. The faces detected will be compared with each student's images stored in the database. If the match is successful, attendance will be recorded for the respective student. At the end of each class, a list of absentees will be mailed to the faculty handling that particular session of class.

Reference [13] A camera is installed at the stage, middle, or centre of the class room at a height so as to get a full view of the class until the last bench, covering all the students in the camera. When students have settled down, the camera takes a picture and starts the face detection process using the Viola Jones algorithm. For face recognition functions, which are mentioned in this project, a neural network architecture with LBPH (Local Binary Pattern Histogram Algorithm) is used. After all the algorithms are executed, face recognition is done, and the programme designed will automatically create a folder in the database for having recognised the students.

The reference [14] system's proposed aim is to capture each student's face and store the face images in the database for future workings. The system in this paper uses Convolutional Neural Networks algorithm. A convolutional neural network (CNN, or ConvNet) is a type of deep neural network that is used to analyse visual imagery. The student's face is captured in such a way that all of the student's facial traits, location and posture, are detected.

The reference [15] proposed system improve the attendance management system using of our unique characteristics of their face. For the purpose of confirmation and documentation face acknowledgment technique is used. In this system we can use Haar Cascade method. A Haar Cascade is used in image recognition and image processing that is specially designed for pixel data.

In our proposed system we also use Haarcascade algorithm for face recognition with the feature of GUI for the teacher to enter the respective class details and upload the class photo to detect the face and mark attendance. We have taken the database of the students and trained them many times so that we can get more accuracy and detect faces correctly. So this system eliminates the existing traditional way of taking attendance by calling out the student names and then marking the attendance.

➤ Objectives

- To reduce the consumption of time take during attendance marking in the class
- To automize the attendance functioning without much human interference.
- To increase the productivity graph by managing the attendance using technologies.
- To increase the speed of analysing the students performance data and academic results by taking attendance using the modern technique of face recognition.
- To introduce the latest technology in order to manage attendance.
- To eliminate proxy attendance when the attendance is taken.

**III. METHODOLOGY**

A. Creation of Database :

The very first procedure to be followed in order to design an attendance management system with the help of

face recognition technology is the creation of a database for the undergraduates in a class. In this paper, we have designed a Python programme to create the student's database. When the Python programme is run, the camera will capture the student's face from different angles and with different expressions. A student's database will have 20 to 25 different images of various angles of the face, and they are stored in a folder by the student's name. In a class of 60 students, the database is created with 60 folders with the students names, or USN.

When we consider the actual classes conducted in colleges, there are separate departments and eight semesters for four years. Each semester has six to seven subjects. The attendance of the students is marked for each subject every day. Under each subject, all the students' databases for that subject class are saved.

Here folders are created for each department, semester, and subject, and accordingly, the student database folder is created in the hierarchical way shown in Fig.1. The letters A, B, and C stand for the students' names.

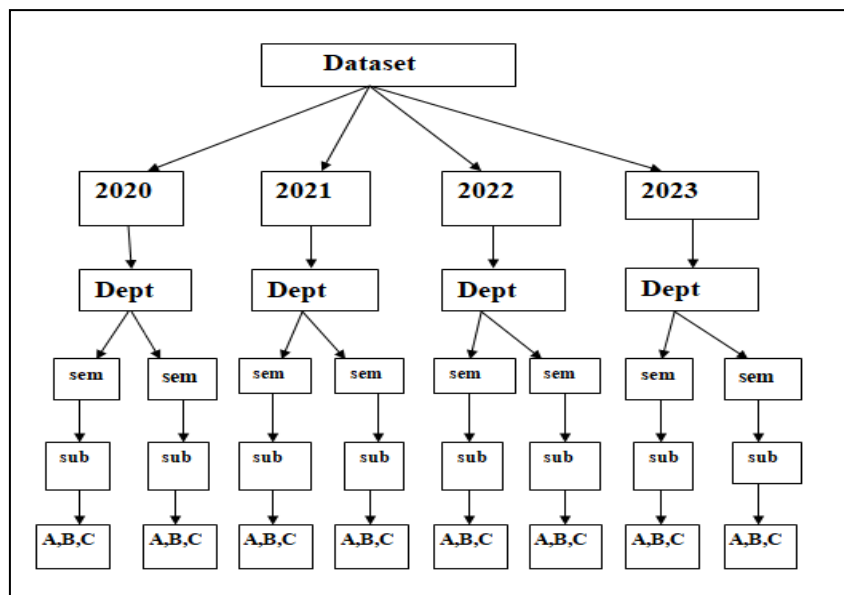


Fig 1 Database Creation Structure

B. Training the Database :

Training the newly created database is the next step in the process. Here, training Python code has been designed and run for the purpose of training the database of the students for face recognition. Training the face dataset means training the machine learning model to recognise, discover, and learn the patterns. Training the database is the major data learning process, as it involves algorithms to discover patterns, make observations, and take decisions. Here, the function of determining and learning the optimal combinations of variables is done during the development of the model by training the data. The data features are identified, and the relationships are found in order to predict the desired outcome. The model that has been designed is for analysing the dataset repeatedly over and over again for deeply understanding its characteristics and for adjusting by itself to get a better performance.

C. Testing of the Database

The trained data is then tested for efficiency and accuracy. This paper introduces a GUI for the teachers to use on the desktop to enter details like year, semester, and subject to take attendance of the students coming under that particular subject class. After entering the details, the students will be facing the camera, and the face detection is done through the testing code written in Python. An attendance Excel sheet is then created for the particular subject class with the markings of students present and absent. In this GUI part, we have included another option for uploading a photo. This photo is of the students sitting in the class and was taken through a mobile. All students will have to focus the phone camera while the photo is taken. Through this photo, faces can also be detected, and attendance can be marked for the class by uploading the image using other options designed in the GUI part. The

diagram below shows the flow of functions of the attendance management system using the technology of face recognition and identification proposed in this paper. In real-time applications, the GUI part can be extended to an

Android app to be used by teachers for entering the details, and the particular camera gets activated, detects the faces, and marks attendance automatically.

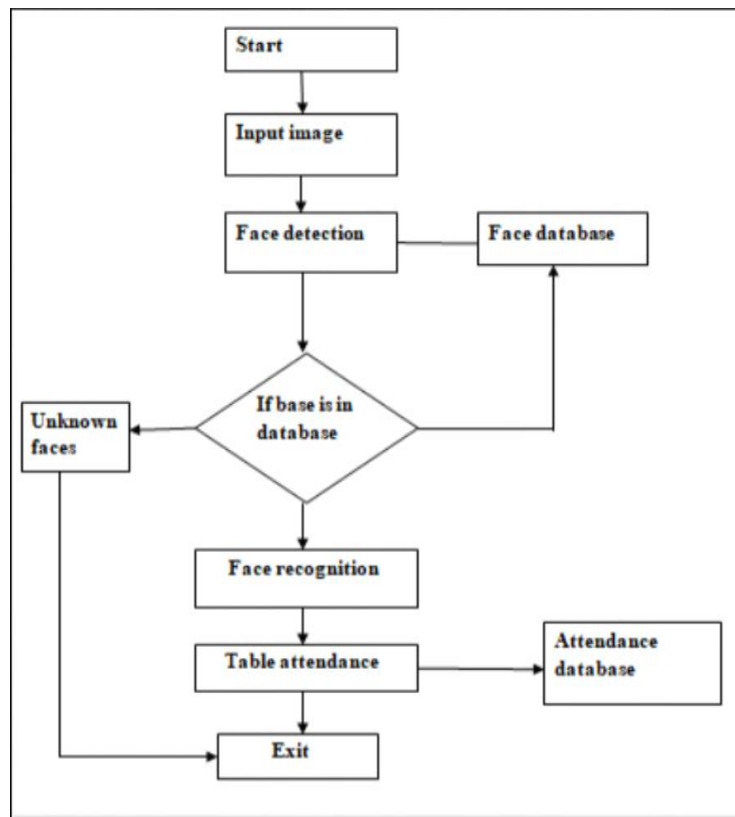


Fig 2 Block Diagram

#### ➤ Open CV

OpenCV is a library developed by Intel that is used by many people working in different companies and students of different institutions for learning and working purposes, as it is open-source computer vision and machine learning software. It facilitates being used as a common infrastructure for all kinds of applications that are related to working with computer vision and its associated fields. In our proposed system of attendance management, it is used to speed up the process of real-time machine recognition of images, objects, and video processing applications. In our paper, the Haarcascade features for the face detection technique are worked upon.

#### • To Initialize the Camera :

Use the function `cv2.VideoCapture()`. The picture must have a complete path specified

#### • To Capture Image From Camera :

Use the function `cv2.imread("Image.jpg")`

#### • To Convert the Captured Colour Picture to Grayscale:

Use `cv2.cvtColor(img, cv2.COLOR_BGR2GRAY)`

#### • To Detect Students Faces in the Grayscale Image:

Use `face_cascade.Detect Multi Scale (img, scale Factor=1.1, minNeighbors=5)`

#### • To Display an Image:

Use the function `cv2.imshow()`, `cv2.destroy Window ()` and `cv2.waitKey(0)`

#### ➤ Python IDE

Python IDEs are software platforms that are primarily useful for programmers and developers working on application development, as they provide a comprehensive set of tools, settings, or options for software development with the help of a single product, specifically in the Python programming language. Python IDEs are built to make it easy and flexible to work with specific application purposes. Python can work with different platforms, such as Windows, Mac, Linux, Raspberry Pi, etc. Python uses a very simple syntax that is almost similar to the English language and can be understood by anyone. Python has a syntax that minimises the use of more code lines by developers in order to write programmes when compared to other programming languages. Python is a programming language that can be run on an interpreter system, which means that the code can be executed as soon as it is written. The prototyping of the designed application can be obtained very quickly.

### IV. RESULTS

The below Fig.3 shows the photo of the GUI for selecting option for creation of database, training of image, uploading image and real time face recognition testing.

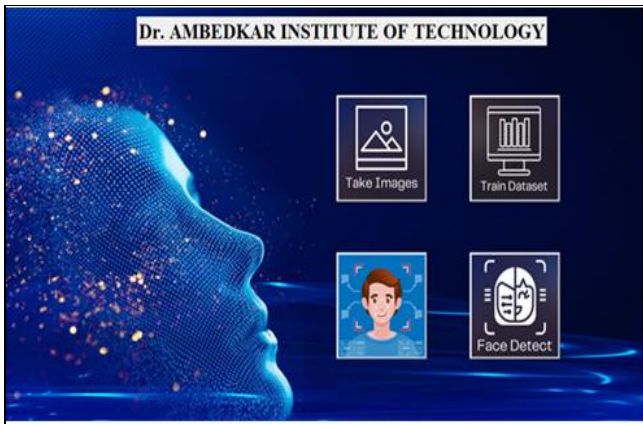


Fig 3 GUI to Create, Train, Detection using Real Time or Image

Then for the real time purpose the laptop camera gets on and it will detect the face of the person visible to the camera which is shown in Fig.5.



Fig 6 GUI to Detect Face through Image

After the selecting the option of uploading image from Fig.3 the screen appears as shown in Fig.6. Here the teacher fills the required details of year, department, semester and subject. Then the submit button is pressed to load the entered details and after that test image button is clicked.



Fig 4 GUI for Real Time Face Detection



Fig 7 Class Photo for Detection and Marking Attendance

After the selecting the option of real time face recognition the screen appears as shown in Fig.4. The teacher fills the required details of year, department, semester and subject. Then the submit button is pressed to load the entered details and after that real time button is clicked.

The photo of the class students is taken and uploaded for detection of faces when test image button is selected. The Fig.7 shows the class photo uploaded for the detection.

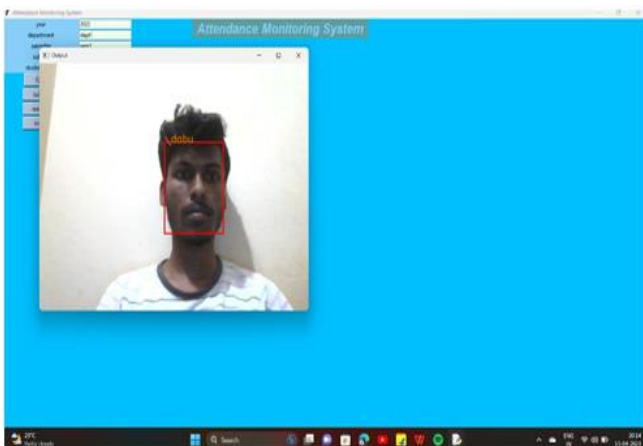


Fig 5 Capturing the Students Face through Camera

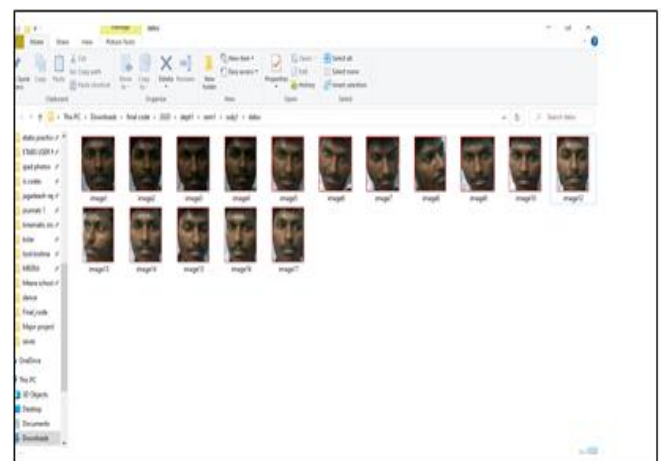


Fig 8 Database Created of the Student

The Fig.8 shows the folder created with the name of student in which the pictures are stored as database that will be used to compare the faces that are cropped from the uploaded image. Collecting of database is done at the starting of the course and remain same until the completion of the same.

	Name	Time	Date	Attendance
1	Yashu	11:00:00	30-09-2023	present
2	Sneha	11:00:00	30-09-2023	absent
3	Yashu	11:00:00	30-09-2023	present
4	Sneha	11:00:00	30-09-2023	absent

Fig 9 Attendance Stored in Excel Sheet

After face detection using real time or through test image the attendance of the students is marked and stored in excel sheets as shown in above Fig.9.

In our experiment we have taken database of around 27 students and after testing the uploaded image it has been able to detect faces of around 20 to 25 students from that test image.

## V. CONCLUSION

In this proposed model or system, the attendance marking work and management have been made easier by using technology for their development, like face recognition. Attendance is a major factor that influences the student's performance, results, and exam eligibility. Therefore, with the traditional way of taking attendance and marking it on a book or paper, more time is consumed to analyse each and every student's attendance and to use that parameter to calculate the student's result or performance analysis, and also more work is involved to get attendance recorded onto the computer.

This paper shows the attendance system being automated and getting recorded in the computer with a reduction in time, and further, the attendance of students can easily be linked to anywhere, like the result sheet, academic review, and for analysing performance graphs.

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