

# Student attendance system using facial detection

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**Abstract:** Generally accepted methods of recording, the students of the movement during the class, such as the role of in-form, were not effective in terms of time, and in the work of the employees [1]. In addition, they can also be captured as a result of human error and false-trips, it can be said to have any inaccuracies in the data that can be stored. There has been a lot of research has been done to improve the way in which we take on the class attendance [2]. However, many of the proposed solutions are very expensive, and inefficient. Many of the solutions do not accept session and detect fraud. There is a low-cost solution for the registration of your students. The participants will be recognized at the photos of coworkers, of students, faces are set up, and take it to the students in their presence, just by pointing the staff at the shop, in the records. The mobile applications are designed for both students and teachers, as they are the most important areas of communication, a system of interaction. The verification can be a serious problem in the management of a computer's operating system in the world, [3], [4]. Human face recognition has long been an important component of many programs, such as the monitoring, audit, network, security and communication system [5]. By default, attendance system that provides real-time facial recognition database, and the information of the students of the university. This is not a very difficult task, because it is the preview of the images in real time, it is always a challenge. In addition, the management of a database that contains a large amount of student's information is a great challenge to the existing system. The proposed system can provide real-time tracking system, which supports face unlock with the help of simple and fast algorithms, and, more importantly, get to a high level of accuracy of measurement [6].

**Key Words:** Image Processing, Face Recognition, Authentication, Automatic Attendance, Enrollment, Verification

## 1. INTRODUCTION

In the past few years, the national government, like the Hindus, have been working on the construction of a security system to designed to combat the threat of terrorism. A lot of office of the authentication system, the government, based on the security of your data, behavior-based, and individuals. It is a biometric system to be processed from the raw data, such as faces, fingerprints, irises, etc., etc. The description of the property, the nature of the data stored in the biometric

system, and will have to decide on the format, according to the [1].

There are a variety of biometric systems that are based on people's faces, irises, fingerprints, palm prints, etc. However, in most of the cases, facial recognition is used as a unique technology. Facial recognition technology is being used not only in offices, immigration, and the airport with the controls, but with new production technologies, such as robots, digital cameras, and a variety of web sites, such as Facebook [1].

The traditional way to commemorate the participants, due to the tedious work of many colleges and universities. This is also a tax, which would mean that it has to have a hand in the gesture of the names of the students, it can take up to five minutes for a period of time. It takes a lot of time. There are a number of ways to be a flagship office. Therefore, more and more organisations have started to publish in many different ways in order to register the visitor, such as the use of radio frequency identification (RFID), rainbow's point of view, the recognition of fingerprints, and so on. However, many of these programs are available in the list, that is a long, long time, and they are, of course, is available in the nature [2].

### 1.1 Face Recognition

A face recognition system is a technology that has the ability to recognize the face of a person from a digital image or a video frame is compared with that of the background in the face, which is often used to authenticate users by means of a verification of the identity of a service, through the identification and measurement of the features of the face in the image.

Although at first, it was a computer application system, face recognition has recently become commonplace in smartphones, and other forms of technology such as robots. Since its computer-generated, face detection is the measure of a person's physical appearance, they have been classified as sensitive. Although the accuracy of facial recognition systems, such as biometric technology, it is less than the iris and fingerprint recognition, it is generally accepted that the communication process as well as the non-invasive process. The facial recognition system will be used for the advanced personal communications, computers, monitors, and automated image format.[2]

Face recognition is to install the important biometric features that will be easily accessible and comfortable? The human visual system is based on a variety of observations of facial expressions. The face recognition system consists of two phases: authentication and facial recognition. In the face of mounting of the procedure is 1 to 1, with a face of the stereotypical image of the face of the graphics and 1-Over. the tasks in order to compare with the face and figure of a question, [2].

### 1.2 Image Processing

The processing of digital images with the help of an algorithm. As a subcategory or field of digital signal processing, digital image processing, it has more advantages over analogue image processing. This allows for a much wider range of algorithms to be used in the input data, and it helps to prevent problems such as noise generation, and error occurs during the processing. [3] in particular, Since the images are defined over two dimensions (perhaps more) digital image processing may be carried out with the aid of a multi-program model. The evolution and development of digital image processing are mainly affected by three factors: first, the development of computers; second, the development of mathematics, in particular in the development and improvement of the methodology of teaching of mathematics; in the third place, the question is, for a variety of applications in physics, agriculture, military, industrial, and medical fields have increased dramatically.[3]

## 2. PROPOSED SYSTEM MODEL

The proposed face recognition method is based on machine learning algorithms. Figure 1 describes the suggested system block diagram [1].

This is an automated attendance system based on face recognition algorithms. When a person is the first picture is of him when he was taken by a camera in the emergency room [2].

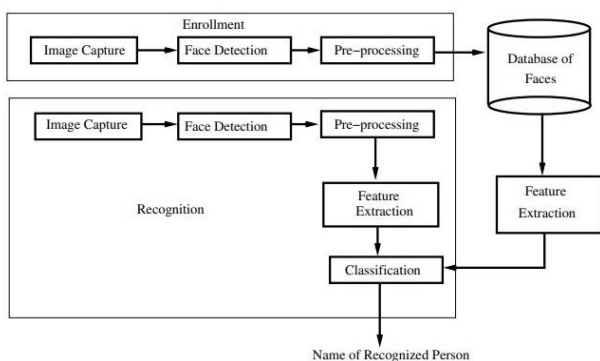


Fig., 1. Proposed System Model

The area of the master has been loaded and processed in, the first a continuous process. Since a class can have only two people, the face recognition algorithm, it has a little bit of work to be done. Face recognition seems to be useful, and there are other plans that are set out in Table 1 of [6]. If a student in the face and recognize it as not being included in this kit is for use in post-production. The system's algorithm is discussed.

Table 1

Drawbacks of various Attendance Systems

Type of the System	Drawback
RFID-based	Fraudulent usage
Fingerprint-based	Time Consuming for students to wait and give their attendance
Iris-based	Invades the privacy of the user
Wireless-based	Poor performance if topography is bad

The steps proposed in the Presence of the Monitoring System is shown in Figure 1. The technical details of the implementation of each phase are described in the following sections [6].

### A. Image Capture:

The camera is set up at a little distance from the door to the setting of the front panel of researcher's footage. The image on the monitor, it is a better size to 640 x 480 in order to prevent the size of the image in the background, as we have seen, that is, the size, and can sometimes lead to poor performance [3].

### B. Face Detection:

An accurate and efficient face recognition algorithm always improves the performance of a face recognition system. Several algorithms are presented for face recognition, such as a, methods that are based on the face of the geometry of the methods that are invariant to the methods based on machine learning. Any of these methods,

the Viola and Jones proposed a framework that provides a high detection rate and, in addition, it is slim, [2] [3].

### C. Pre-processing:

The reconstructed part of the walls should be removed and disposed. This preprocessing step consists of the balance of the histogram of the selected face image, and the size of 100x100. Histogram equalization is the best standard process is to normalize the histogram. This increases the contrast of the image on the transfer of a picture-in-picture file, it will be clear to [4],[5],[6].

### D. Database Development

Because we have chosen to use for the sensitive systems, the registration of any person it is not required. This is the phase of the database development will consist of the record of each and every person, to obtain a biometric feature, in our case, this is a person that is then reinforced with a preprocessing method and is stored in the database. In this project, we took photos of people, from different angles, different expressions, as well as in a variety of lighting conditions [6].

### E. Feature Extraction and Classification

The functionality of the new facial recognition system, it is also depending on the position of the ad and the format to get the results of the measurements to get it. The function is also available using the function-based methods, or a complete methodology. In some of the more advanced techniques we can use to reduce the size of the splitting [6].

Principal Component Analysis (PCA), it was the first of the algorithm is to represent a cost-cutting measure. In the EVENT, the face images are used it must be of your own face, as well as their guesses on their own, persona. In its turn, in order to make use of all of the dimensions of the image, only a reasonable size that is shown in the display of the image. A statistical picture, with the help of PCA

$$x = Y + \mu$$

Where to get it? the wall is a vector, Y is the surface of a characteristic vector, and B is the characteristic vector, and m is the mean wall-vector, [6].

### F. Post-processing

Under the proposed program, and by the look on the students' faces, the most significant of these are updated on a sheet of interest to you. At the end of the lesson, the order of the announcement of the names of all the students in the class will be restored. This is done with the help of text-to-speech feature. The system has been installed for the send e-

mail notifications on that will not work, as their location was selected [6].

## 3. TECHNOLOGIES USED

### 3.1 OpenCV

OpenCV is an open source library for computer vision, machine learning, and image processing. OpenCV supports a wide variety of programming languages such as Python, C, C++, Java, etc.). It can convert videos and images to identify objects, faces, or even the script. If your device is integrated with a variety of libraries such as Numpy, which is a highly optimized library, and the number of transactions, the number of weapons in your armory will increase, which means that all of the operations that can be done in Numpy can also be combined with OpenCV.

OpenCV is a cross-platform library that we will be able to use it to create a real-time computer vision application. It focuses mainly on photo editing, video capture and analysis including features like face detection and object detection.

### 3.2 NumPy

NumPy is a library for the Python programming language that adds support for large, multi-dimensional arrays and matrices, along with a large set of high-level mathematical functions for working with these tables. It's ancestor, Numeric, was originally created by Jim and Instagram, with contributions from several other developers. In 2005, Travis Oliphant created NumPy, after the introduction of the function to be competitive in a numeric array Numeric, with so many changes. NumPy is open-source software and has many contributors.

NumPy is a package for scientific computing in Python. This is a Python library which returns a multidimensional array object, various derived objects (such as a mask, and matrices, arrays), and a set of routines for fast array operations, including mathematical, logical data operations, as sorting, selection, input, output, and discrete Fourier transforms, linear algebra, basic, basic statistical operations, random models, and much more.

The NumPy package is the database that contains a nd array object. It's going to be an n-dimensional array of standard data types, and many of the activities that are performed in compiled code for performance.

### 3.3 Tkinter

Tkinter is a Python binding to the Tk GUI toolkit. It is the standard Python interface to the Tk GUI toolkit, and is the de-facto standard in the Python GUI. Tkinter is included with standard settings, such as Python, unix / Linux, Microsoft

Windows, and Mac OS X. the name Tkinter comes with a Tk interface. Tkinter was written by Instagram Lund. Tkinter is free software released under the Python license.

Python provides a standard Tkinter library to create a graphical user interface for desktop-based applications. Programming desktop applications based on python Tkinter is not a complex task. An empty Tkinter window, and at the highest level that can be created with the help of the following steps.

- It's time to import the Tkinter module.
- Create the main application window.
- To add Widgets, such as labels, buttons, frames, etc., etc. to get to the window.
- To Start the main event loop, so that the action can take place on a user's computer screen.

### 3.4 Haar Cascade Algorithm

This is an object-detection algorithm is used to identify a face in an image or video in real-time. The algorithm is used for edge and line detection function, which was proposed by Viola and Jones in their research paper, "Rapid Object Detection using an Amplified Cascade of Simple Features", which was published in 2001. The system will give a lot of positive images of people, and a lot of the negative images that are not made by one person, and to train them. The model has been made on the basis of this study will be available in the store OpenCV GitHub

[https://github.com/opencv/opencv/tree/master/data/haar\\_cascades](https://github.com/opencv/opencv/tree/master/data/haar_cascades).

It is an archive of the models that are stored in XML files and can be read the use of the OpenCV computer vision techniques. These include the designs for face detection, eye detection, the upper the body and the lower part of the body, recognition, license plate recognition, and so on. The system can be divided into four main steps:

- Computation of functions
- To Make the Integrated Graphics for You
- You Will Need to Make Use of The Adaboost
- You must be an implementation of a Cascade of Classifiers

It is important to note that this algorithm requires a large amount of positive human statues-and negative-to human and images to train the classifier, and the other the machine learning models.

### 3.5 EasyFacenet Algorithm

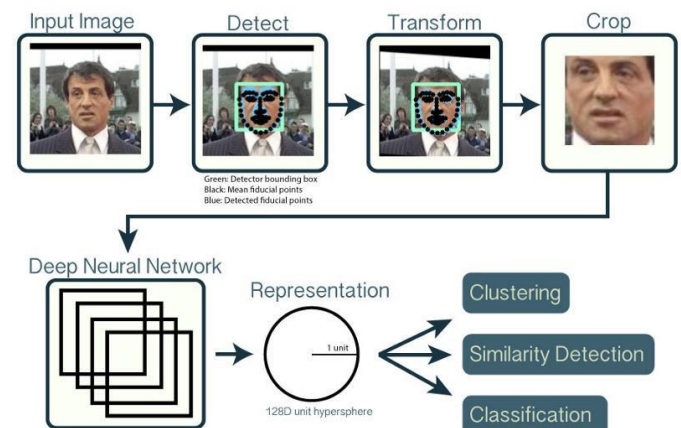


Fig. 2 Face Recognition Steps

As you can see from the picture above, the steps would be as follows:

1. You will get a picture of a face (a person.)
2. You will need to figure out exactly where the person is, and to set a boundary box around the face
3. The consistency of the algorithm, it is necessary to transform the image, so that, the position of the mouth, the nose, the eyes, and is consistent with a number of images.
4. Next, crop it
5. Do the cropped image in the Facenet algorithm, which is a deep in the neural network.
6. Maybe a prefab from the wall. After that, it is a 128-dimensional vector is now a 512-dimensional.
7. You can do whatever you want with this view. You can to do classification, clustering, or simply make use of the similarity calculation images.

In principle, we can, in the group of the 7 steps, 3 steps, which are:

1. **Alignment:** perform the picture and watch the aligned cut-out faces
2. **Embedding:** enter, faces, and then view the presentation
3. **Compare:** compare, these kinds of are they similar or not?

### 4. IMPLEMENTATION

Firstly, we have to take image of the student to store into database. So, to take the image of the student we have wrote the following snippet of code sown in the figure.

```

import cv2
import sys

if ((name.isalpha()) or (' ' in name)):
    cam = cv2.VideoCapture(0) # for laptop web cam uncomment this
    #cam = cv2.VideoCapture('http://192.168.2.12:8080/video') #for mobile ip cam uncomment this

```

Fig. 3 To capture Image

Then, we have to calculate the haar cascade values from the store images path and convert it into grey scale for that we have use following code

```

harcascadePath = "haarcascade_frontalface_default.xml"
detector = cv2.CascadeClassifier(harcascadePath)
sampleNum = 0
ret, img = cam.read()
gray = cv2.cvtColor(img, cv2.COLOR_BGR2GRAY)
faces = detector.detectMultiScale(gray, 1.3, 5)
cv2.imwrite("db\ " + name + "." + Id + ".jpg",
            gray)
    
```

Fig. 4. To calculate haar values

To connect with the MySQL, we implement following code part.

```

import mysql.connector

import os
import cv2
from easyfacenet.simple import facenet
mydb = mysql.connector.connect(
    host="localhost",
    user="root",
    password="",
    database="face_attendance"
)
mycursor = mydb.cursor()
    
```

Fig. 5. MySQL connection

To recognize the face of a student we use the easyfacenet algorithm. Easyfacenet is a python library for recognize the face of a person. It is a simple library in which face is aligned first and then embeddings are given n then comparisons are done. Just in 3 steps face recognition is done by using easyfacenet algorithm. That code snippet are as follows:

```

images.insert(0, 'db/testim.jpg')

aligned = facenet.align_face(images)
comparisons = facenet.compare(aligned)
    
```

Fig. 6. Easyfacenet module

This is the main code snippet which we have given here. By using this we have implemented the face recognition system. Now to store the attendance in MySQL we used the XAMPP server. Code snippet are as follows:

```

q="INSERT INTO `records` ('Id', 'Name', 'Curr_Date', 'Curr_Time') VALUES(%,%,%,%)"
val=(Id,name,date,time)
mycursor.execute(q, val)
mydb.commit()

rows=(Id,name,date,time)
wb = load_workbook('Attendance.xlsx')
ws = wb.active
    
```

Fig. 7. To store attendance in MySQL database

## 5. EXPERIMENTAL RESULTS

Now the output of the system. Firstly, the GUI of the system are as follows:

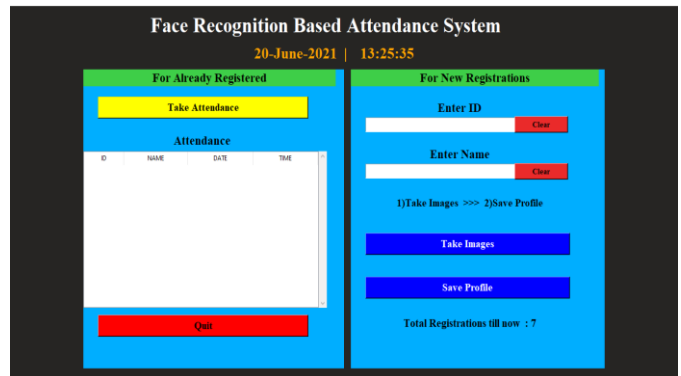


Fig 8. GUI of the System

This is the main GUI of the whole system. In this there are two frames are there. One for the new registrations and another for already registered.

For new registration we have to enter the unique ID of the student and name of the student. After entering the name and unique id of student we have to click on the take image button and then the face of the student will capture by system and store it into the folder.

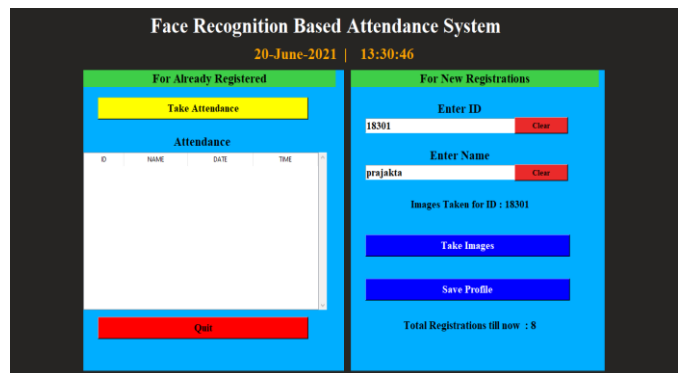


Fig. 9. Take student face image

The images get store into the folder on the pc.

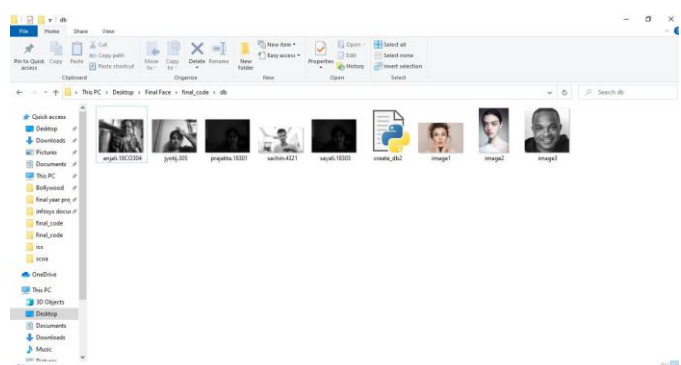


Fig. 10. Store images

Now, for already registered students, when we click on the take attendance button the list of attendance will show on the below box.

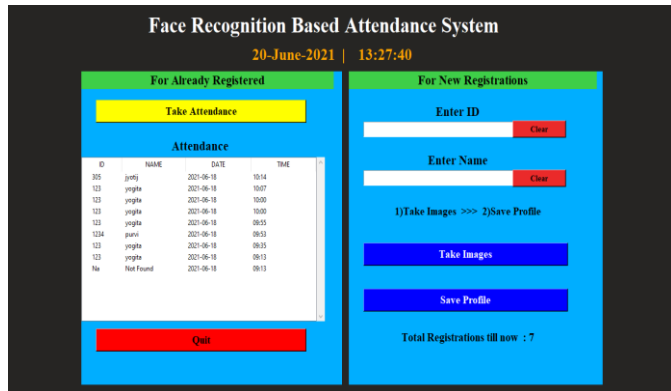


Fig. 11. Already registered students

To take the live attendance of the students we have to run second module i.e., start.py after running this module system will start the taking the attendance of a student and mark it as present.



Fig. 12. Taking attendance

After this it will store into the database.

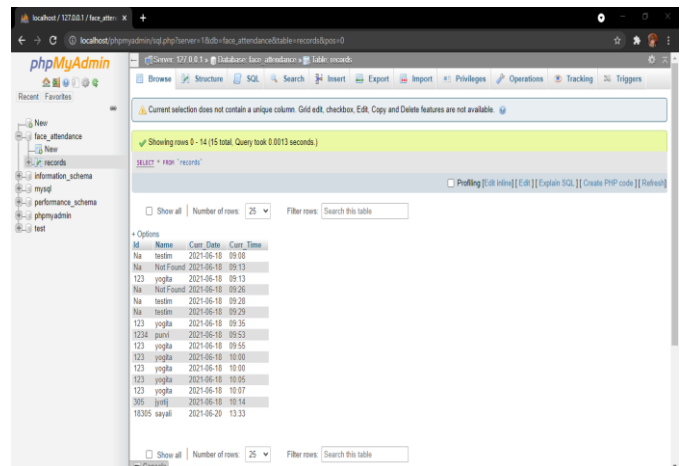


Fig. 13. Store into database

And it will also retrieve into the excel sheet.

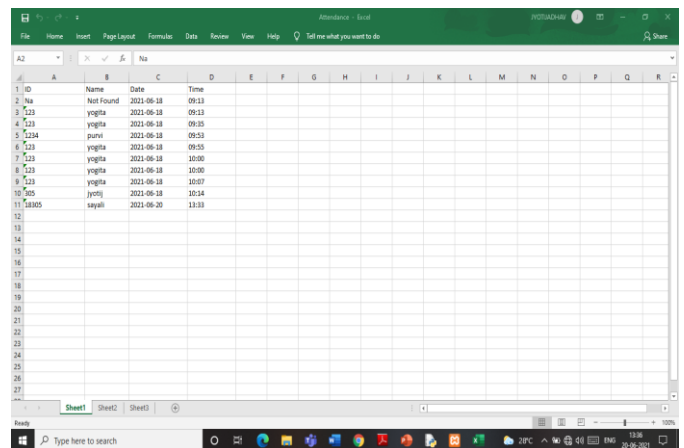


Fig. 14. Retrieve into excel sheet

## 8. CONCLUSIONS

Private sessions are described in order to provide the ease and convenience of errors that can occur as a result of the traditional participation system (the manual). The goal is to get you to change, and use of useful settings such as the institute. Work, and the exact form of the office, that will replace the old manual method. This method is reasonable, safe, secure, reliable and available for you to use. You don't need any special items related to your installation of office equipment. You can also use it to build with the use of a computer and the camera [1],[2],[3].

Thus, face recognition methods have been found to be time-saving and safe to use. This program will also be used to identify any of the unknown. In the real-time cases, LBPH, it is superior to other algorithms, a faster capture rate and a lower false alarm. SVM and Bayesian methods, are also found to have the best directions, as compared to the distance [4],[5],[6].

## 9. FUTURE SCOPE

Work to do in the future is to increase the popularity of the algorithms when there is unexpected change in the human process, such as the main time to use as a scarf also. The proposed system can recognize a maximum of 30 degrees celsius and the change in the angle at which it should be fixed in the future. Gait recognition is often paired with facial recognition systems, in order to realize better performance of the system.

The system can be measured, for use in the universities, where the content is being re-written, to support at the time, the students get points for completing tasks on the topic [1-5].

## ACKNOWLEDGEMENT

We would like to extend my sincere thanks and gratitude to my director Mrs. S. S. Kolte, by her precious guidance and giving us practical input and encouragement over and over again, which inspired us to work hard. Because of her forethought, he appreciated the work involved with the continuous transmission of useful tips, this paper has been successfully completed. Many thanks to Professor Dr. D. P. Gaikwad, Head of the Department of Computers Engineering, with his encouragement while doing paper work. We also extend our heartfelt thanks to the staff of the Department of Computer Engineering their cooperation and support. We also take this opportunity to thank all our classmates, friends and all those who have directly or indirectly provide their greatest support during our paper work and development of this paper.

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