



# AUTOMATED ATTENDANCE SYSTEM

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**Abstract :** The main purpose of this research is to change the current attendance system. Attendance is an important aspect of the daily classroom evaluation at the beginning and the end of the class. While manually calling out names and marking it or taking student signatures, attendance becomes a time consuming task. The teacher manually calls student names and there are chances that teacher can miss any student or some student don't answer their calls. So we can solve this issue with the help of facial recognition based attendance system, in which student faces are captured by high-definition monitor video and other internet of things based technology. Instead of using time consuming approaches, we present a real time Facial Recognition System for marking and tracking attendance in class. This method identifies human faces by using a camera mounted on the wall or we can also use webcams. Face recognition is the main aspect for using this technique. By using this technique many institutions will get profit. It will reduce the amount of time it takes and the human errors will also be minimized which will make this technique more efficient.

**Keywords :** attendance system, time consuming, face recognition.

## I. INTRODUCTION

Attendance by recognizing the face of an individual. The technology uses algorithms and artificial intelligence to detect and match facial features, such as the distance between the eyes, the shape of the nose, and the contour of the face, to identify individuals. This technology is gaining popularity due to its accuracy, speed, and convenience. It eliminates the need for manual attendance systems, such as paper-based or electronic attendance systems that require employees to manually sign in or swipe a card to record their attendance.

The system can also generate real-time reports, which can help in monitoring attendance, identifying attendance patterns, and taking corrective measures if necessary. This can help organizations to improve productivity, reduce absenteeism, and increase employee engagement.

### a. Problem Statement and Motivation

Based on the previous automated attendance system, there was a big issue Attendance using face recognition is a biometric technology that is used to automatically record in the accuracy. This is because someone else use to record the attendance without institution knowledge. For example, if a student misses the class then his/her friend marks the attendance without the knowledge of the institution with results in unfair practices. Thus all the recorded attendance in the previous system is not reliable for the analysis usage. The previous system is too time consuming. Assume the time taken per student is 30 seconds so for 60 students the time will be more so this system is very time consuming and therefore not at all accurate. The another issue was about tracking the attendance some parents wants to know the attendance of their student but in the old system they are not able to track the attendance so keeping this in mind we have designed and developed the system in such a way that the child and his parent is able

to track the attendance whenever they want. Therefore, evolution is needed to be done to the previous system to improve efficiency, data accuracy and provides accessibility to the information.

### **b. Project Scope and Direction**

The main intention of the project is to solve the issues we faced in the old attendance system. While making a new innovative smart integrated system that can provide easy access to the institution. In this project, a system would be developed which would be capable of recognizing the identity of each individual and record them into database system also an excel sheet would be created to show the students attendance and this data will be directly mailed to respective faculty.

### **c. Hardware / Software Requirements**

- Ram 2GB or above
- 500 GB Hard Disk
- Intel core processor
- Python 3.2
- OS
- Window 7 or above
- Camera
- Internet and power connection

### **d. Impact and Contributions**

Many systems that exist nowadays have lack of efficiency. So through this project we will overcome those limitations also we will improve our project by :

- Students will be more punctual to attend the class as attendance can't be changed
- The institution can save a lot of resources by means of technology rather than human supervision which will save resources
- The application can operate on any device if there is Wi fi coverage which makes this system portable
- It will remove the paper work
- It is also time effective

## **II. METHODOLOGY**

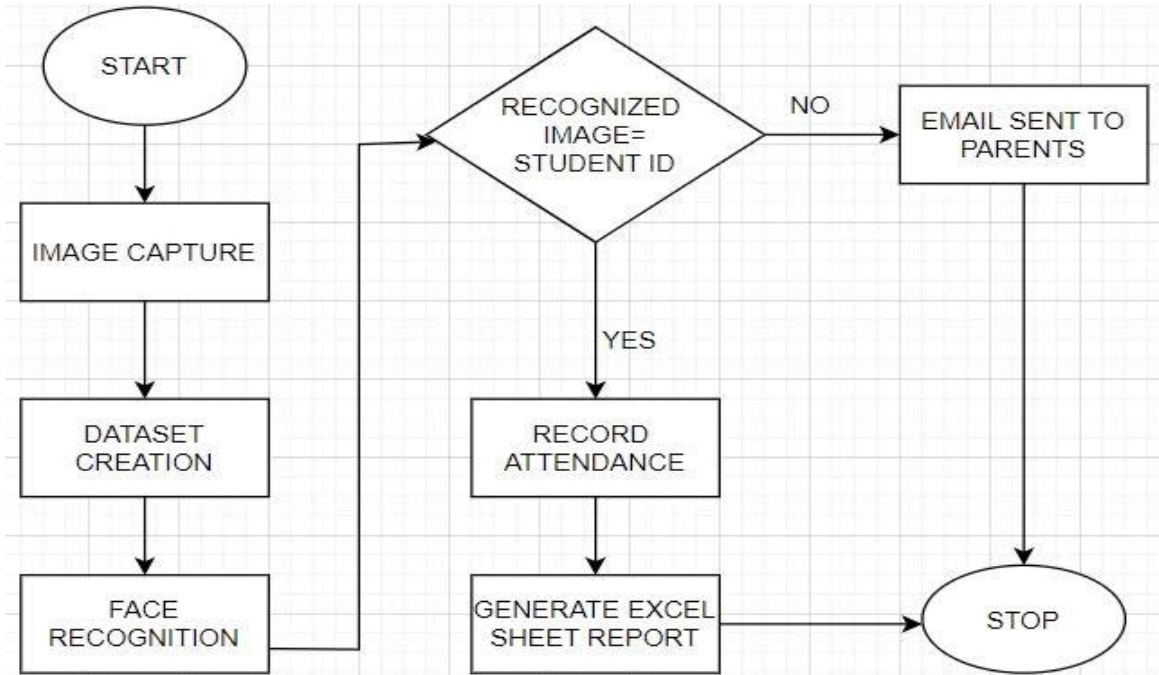
The attendance automation system using the technology of face recognition is developed using the following steps:

- I. Data Collection: the first step is to collect the data of students by capturing their facial images and storing it in the database.
- II. Pre processing: the collected facial images need to be pre processed before using them for recognition purpose
- III. Face detection: the next step is to detect faces in the images using a face detection algorithm.
- IV. Feature detection: after the face is detected the system extracts the unique features of an individual for the purpose of recognition.
- V. Face recognition: once the template of the face is created it is then compared with the template stored in the database. If the match is found the attendance of the student is marked.
- VI. Attendance management: the attendance data is stored in the spreadsheet for further analysis.

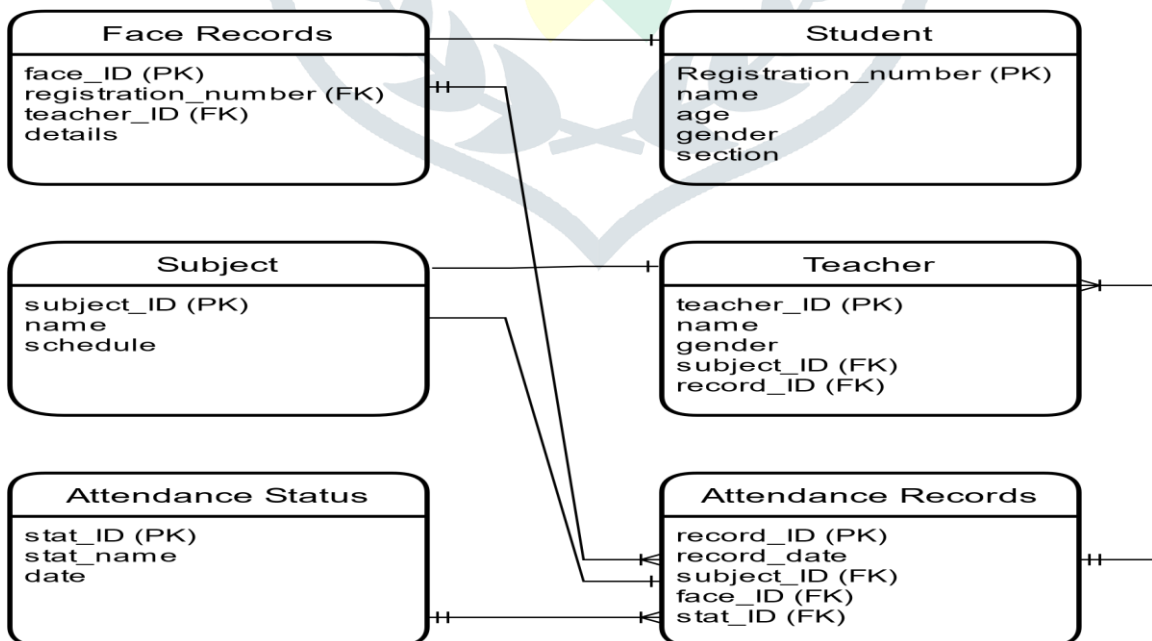
VII. User interface: A user interface can also be developed to allow users to interact with the system. The user interface should have options such as add student, view attendance records and export attendance data.

The all steps needs to be followed in order to make an effective and accurate automatic attendance system using the technique of facial recognition.

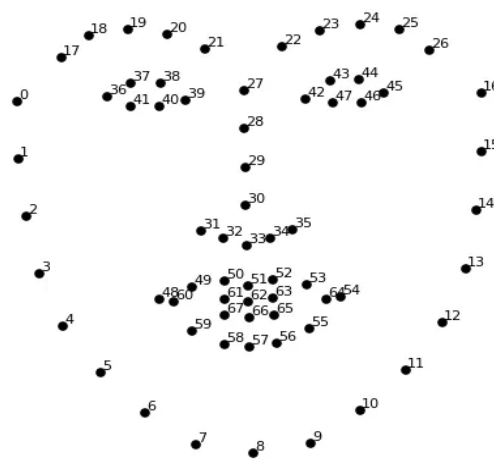
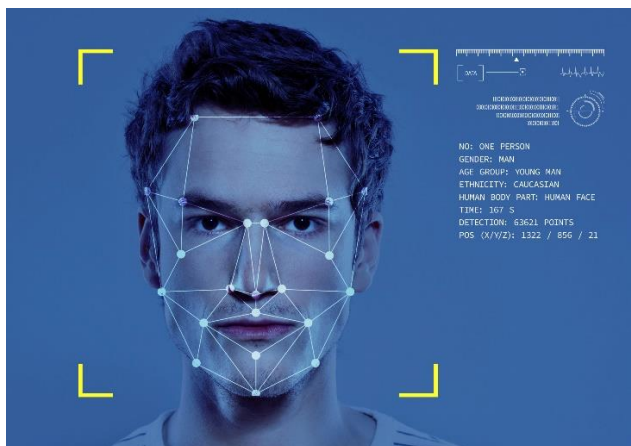
**a. Flow Chart**



**b. ER Diagram**



### c. HOG

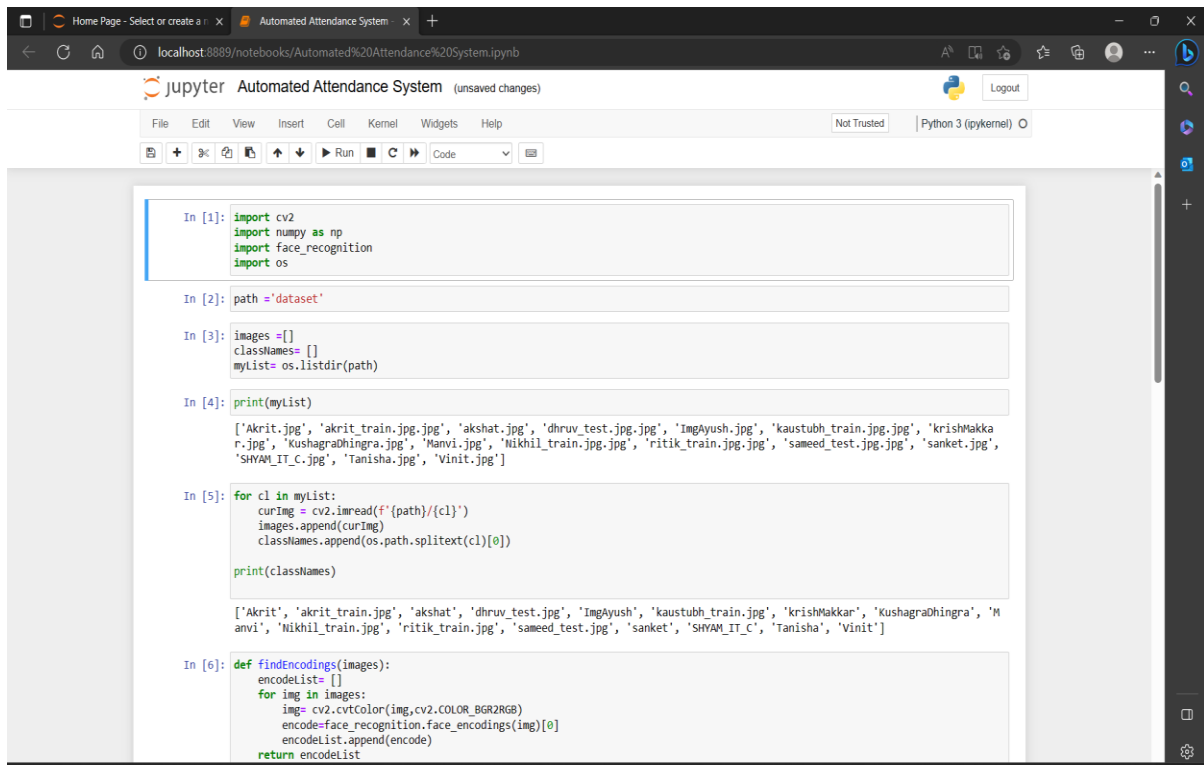


## III. SPECIAL FEATURES

This system has some features which makes it popular in many organisations:

- **Accuracy:** One of the biggest advantage of face recognition attendance system is there is high level of accuracy. Unlike the traditional attendance method such as manual sign-in sheets or swipe cards, face recognition system can identify individual with a high level of accuracy, minimizing the risk of errors or fraud.
- **Convenience:** Face recognition attendance system are also convenient for students as they don't require any physical contact or manual input. Students simply need to look at the camera to have their attendance recorded, making the process easy and quick.
- **Security:** Face recognition attendance system are more secure than the traditional attendance methods, as they can prevent unauthorized access.
- **Real-time monitoring:** Face recognition attendance systems can provide real time monitoring of attendance data, allowing teachers and parents to track students attendance and manage it.
- **Cost-effective:** In the long run, face recognition attendance system can be more cost effective as they eliminate the need for manual data entry, reduces errors and frauds and improve overall efficiency.
- **Reliable:** The attendance automation system using face recognition is more reliable and error free and more accurate

## IV. SYSTEM DESIGN



```

In [1]: import cv2
import numpy as np
import face_recognition
import os

In [2]: path = 'dataset'

In [3]: images = []
classNames = []
myList = os.listdir(path)

In [4]: print(myList)

['Akrit.jpg', 'akrit_train.jpg.jpg', 'akshat.jpg', 'dhruv_test.jpg.jpg', 'ImgAyush.jpg', 'kaustubh_train.jpg.jpg', 'krishMakka
r.jpg', 'KushagraDhingra.jpg', 'Manvi.jpg', 'Nikhil_train.jpg.jpg', 'ritik_train.jpg.jpg', 'sameed_test.jpg.jpg', 'sanket.jpg',
'SHYAM_IT_C.jpg', 'Tanisha.jpg', 'Vinit.jpg']

In [5]: for cl in myList:
curImg = cv2.imread(f'{path}/{cl}')
images.append(curImg)
classNames.append(os.path.splitext(cl)[0])

print(classNames)

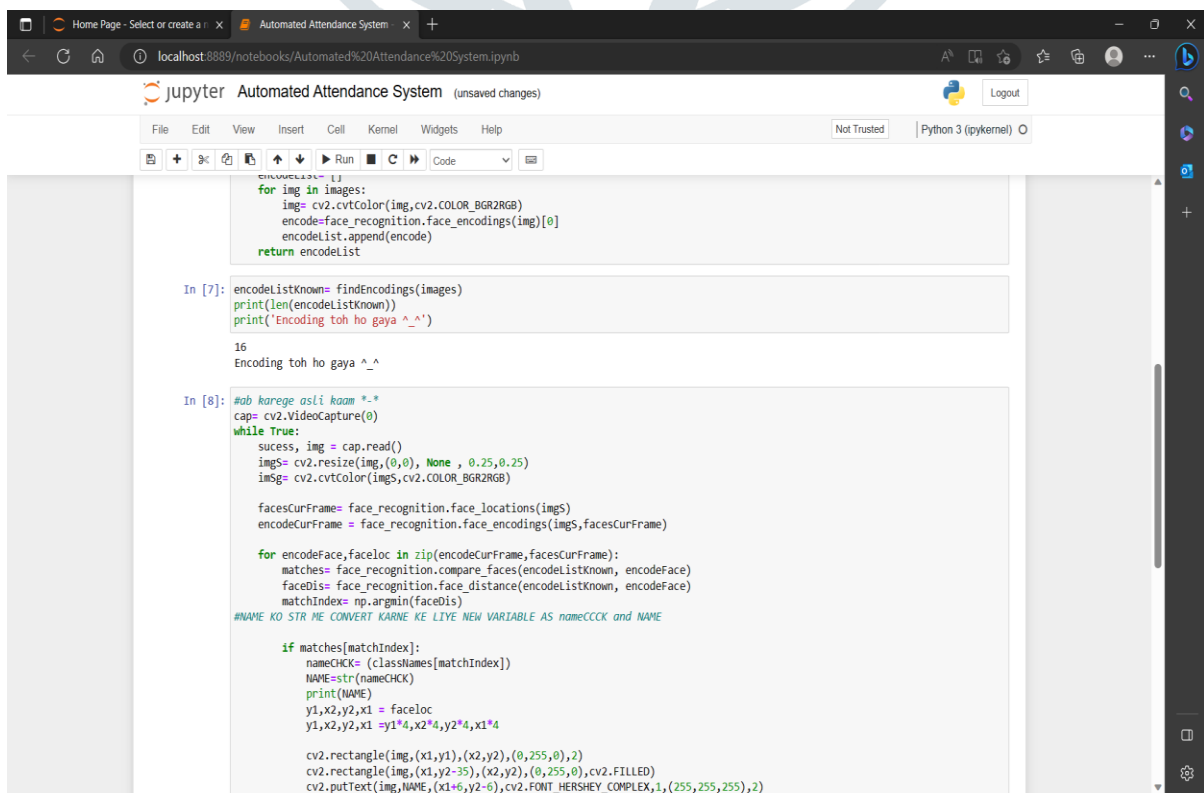
['Akrit', 'akrit_train.jpg', 'akshat', 'dhruv_test.jpg', 'ImgAyush', 'kaustubh_train.jpg', 'krishMakkar', 'KushagraDhingra', 'M
anvi', 'Nikhil_train.jpg', 'ritik_train.jpg', 'sameed_test.jpg', 'sanket', 'SHYAM_IT_C', 'Tanisha', 'Vinit']

In [6]: def findEncodings(images):
encodelist = []
for img in images:
img = cv2.cvtColor(img, cv2.COLOR_BGR2RGB)
encode = face_recognition.face_encodings(img)[0]
encodelist.append(encode)
return encodelist

```

We need to import some of the libraries:

- Cv2 – open cv is an open source computer vision and machine learning software library. Used to build common infrastructure for applications.
- O S – it provides functions for creating and removing a directory fetching contents.
- Face recognition – recognize and manipulate faces from Python
- NumPy- used for working with arrays
- Pip – it is the package installer for python.



```

encodelistKnown = []
for img in images:
img = cv2.cvtColor(img, cv2.COLOR_BGR2RGB)
encode = face_recognition.face_encodings(img)[0]
encodelist.append(encode)
return encodelist

In [7]: encodelistKnown = findEncodings(images)
print(len(encodelistKnown))
print('Encoding toh ho gaya ^_^')

16
Encoding toh ho gaya ^_^

In [8]: #ab karege asli kaam *-
cap = cv2.VideoCapture(0)
while True:
success, img = cap.read()
imgS = cv2.resize(img, (0,0), None, 0.25, 0.25)
imgSg = cv2.cvtColor(imgS, cv2.COLOR_BGR2RGB)

facesCurFrame = face_recognition.face_locations(imgS)
encodeCurFrame = face_recognition.face_encodings(imgS, facesCurFrame)

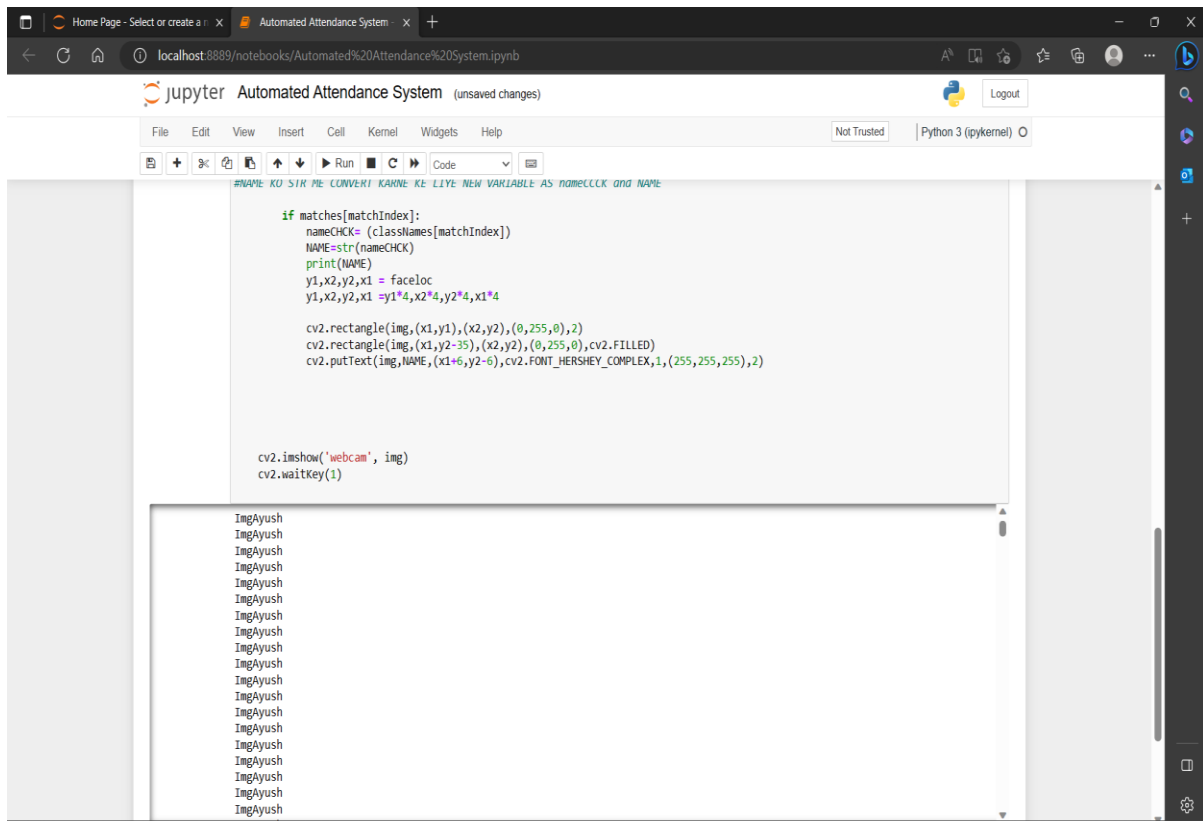
for encodeFace, faceLoc in zip(encodeCurFrame, facesCurFrame):
matches = face_recognition.compare_faces(encodelistKnown, encodeFace)
faceDis = face_recognition.face_distance(encodelistKnown, encodeFace)
matchIndex = np.argmin(faceDis)

#NAME KO STR ME CONVERT KARNE KE LIYE NEW VARIABLE AS nameCHECK and NAME

if matches[matchIndex]:
nameCHECK = (classNames[matchIndex])
NAME = str(nameCHECK)
print(NAME)
y1, x2, y2, x1 = faceLoc
y1, x2, y2, x1 = y1*4, x2*4, y2*4, x1*4

cv2.rectangle(img, (x1, y1), (x2, y2), (0, 255, 0), 2)
cv2.rectangle(img, (x1, y2-35), (x2, y2), (0, 255, 0), cv2.FILLED)
cv2.putText(img, NAME, (x1+6, y2-6), cv2.FONT_HERSHEY_COMPLEX, 1, (255, 255, 255), 2)

```



The screenshot shows a Jupyter Notebook window titled "Automated Attendance System". The code cell contains the following Python code:

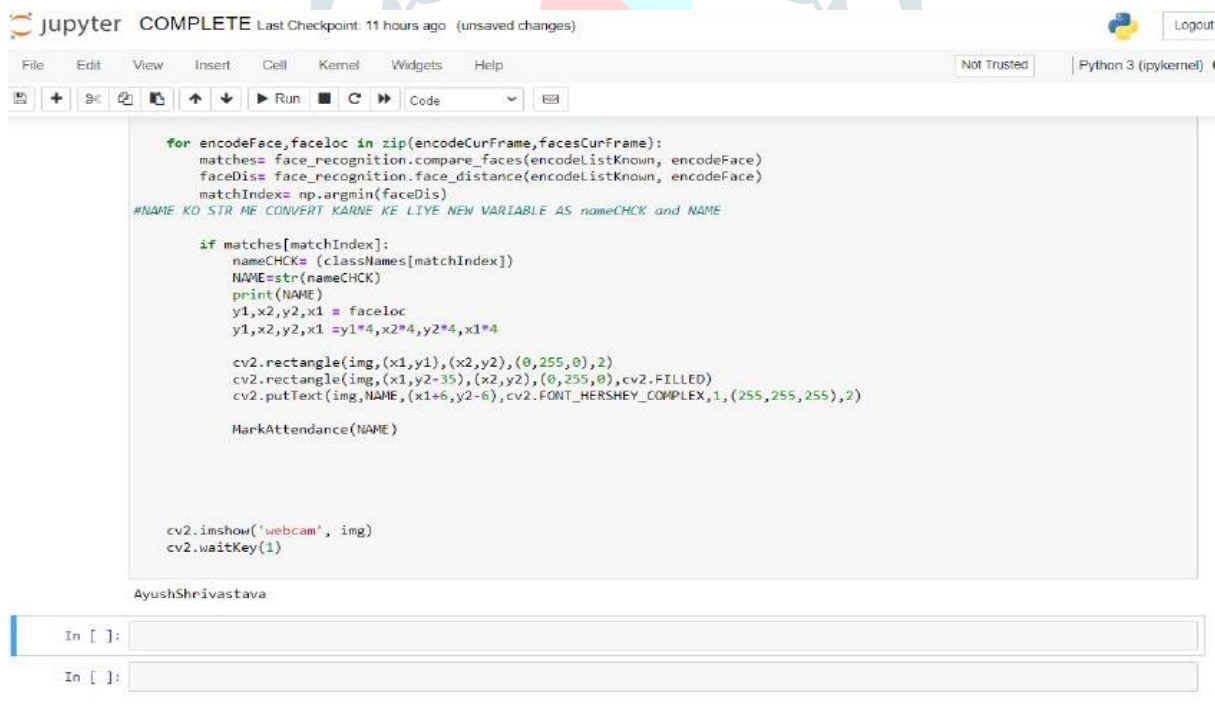
```
#NAME KO STR ME CONVERT KARNE KE LIYE NEW VARIABLE AS nameCHECK and NAME

if matches[matchIndex]:
    nameCHECK= (classNames[matchIndex])
    NAME=str(nameCHECK)
    print(NAME)
    y1,x2,y2,x1 = faceloc
    y1,x2,y2,x1 =y1*4,x2*4,y2*4,x1*4

    cv2.rectangle(img,(x1,y1),(x2,y2),(0,255,0),2)
    cv2.rectangle(img,(x1,y2-35),(x2,y2),(0,255,0),cv2.FILLED)
    cv2.putText(img,NAME,(x1+6,y2-6),cv2.FONT_HERSHEY_COMPLEX,1,(255,255,255),2)

cv2.imshow('webcam', img)
cv2.waitKey(1)
```

The output cell shows a list of "ImgAyush" repeated 15 times, indicating that the face recognition process was successful for each frame.



The screenshot shows a Jupyter Notebook window titled "COMPLETE". The code cell contains the following Python code:

```
for encodeFace,faceloc in zip(encodeCurFrame,facesCurFrame):
    matches= face_recognition.compare_faces(encodeListKnown, encodeFace)
    faceDis= face_recognition.face_distance(encodeListKnown, encodeFace)
    matchIndex= np.argmin(faceDis)
    #NAME KO STR ME CONVERT KARNE KE LIYE NEW VARIABLE AS nameCHECK and NAME

    if matches[matchIndex]:
        nameCHECK= (classNames[matchIndex])
        NAME=str(nameCHECK)
        print(NAME)
        y1,x2,y2,x1 = faceloc
        y1,x2,y2,x1 =y1*4,x2*4,y2*4,x1*4

        cv2.rectangle(img,(x1,y1),(x2,y2),(0,255,0),2)
        cv2.rectangle(img,(x1,y2-35),(x2,y2),(0,255,0),cv2.FILLED)
        cv2.putText(img,NAME,(x1+6,y2-6),cv2.FONT_HERSHEY_COMPLEX,1,(255,255,255),2)

        MarkAttendance(NAME)

cv2.imshow('webcam', img)
cv2.waitKey(1)
```

The output cell shows the name "AyushShrivastava" printed, indicating that the face recognition process was successful for the current frame.

As we have completed the coding of the system. Lets now understand what are the steps involved in face recognition and marking attendance.

- Find face in image
- Analyse the facial features
- Compare the face found with the known face
- Make a prediction
- Store the data in excel file

## V. RESULT

There are several steps involved in recognizing the face of the individual and marking the attendance

### Step 1: Face Detection

First we need to detect the face in the photograph before detecting it. Nowadays cameras can automatically detect the faces by focusing on it. First time Michael Jones invented a way to detect faces that could also run on cheap cameras.

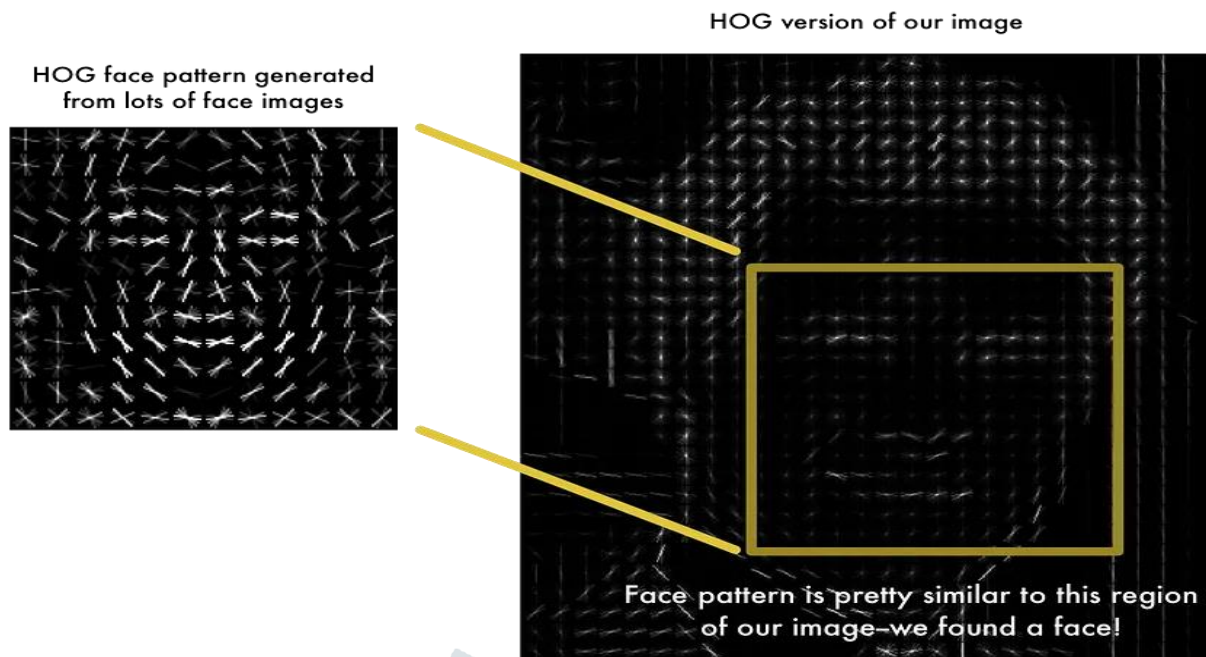
So lets take an image and detect the face



We take two images of each individual one for test purpose and other for training purpose. For face detection we look at every single pixel in our image one at a time.

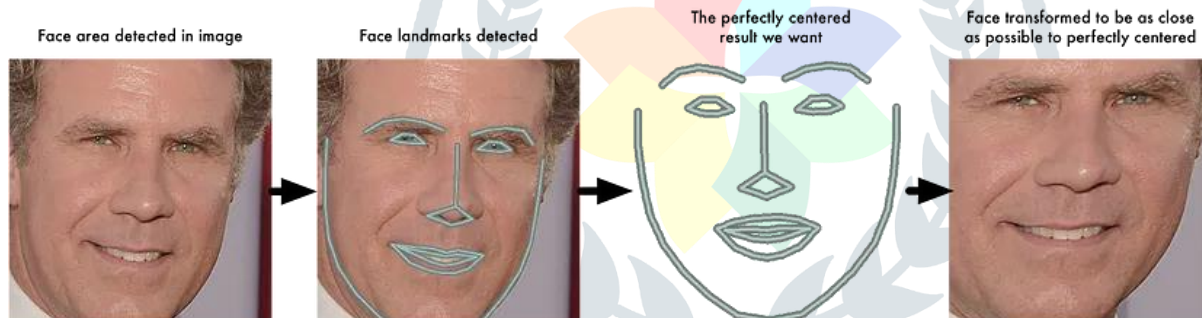


By studying every single pixel of the image we form a HOG image. This is how HOG image look like



## Step 2: Analyse the facial features

Lets take an example if there are two images one image facing front and other facing sideways



A outline around the eyes and mouth is made whether the face is facing sideways or front. This outline helps to detect the face more accurately.

## Step 3: Train the faces

When the faces are deeply analysed and encoded the comes the time to train the faces

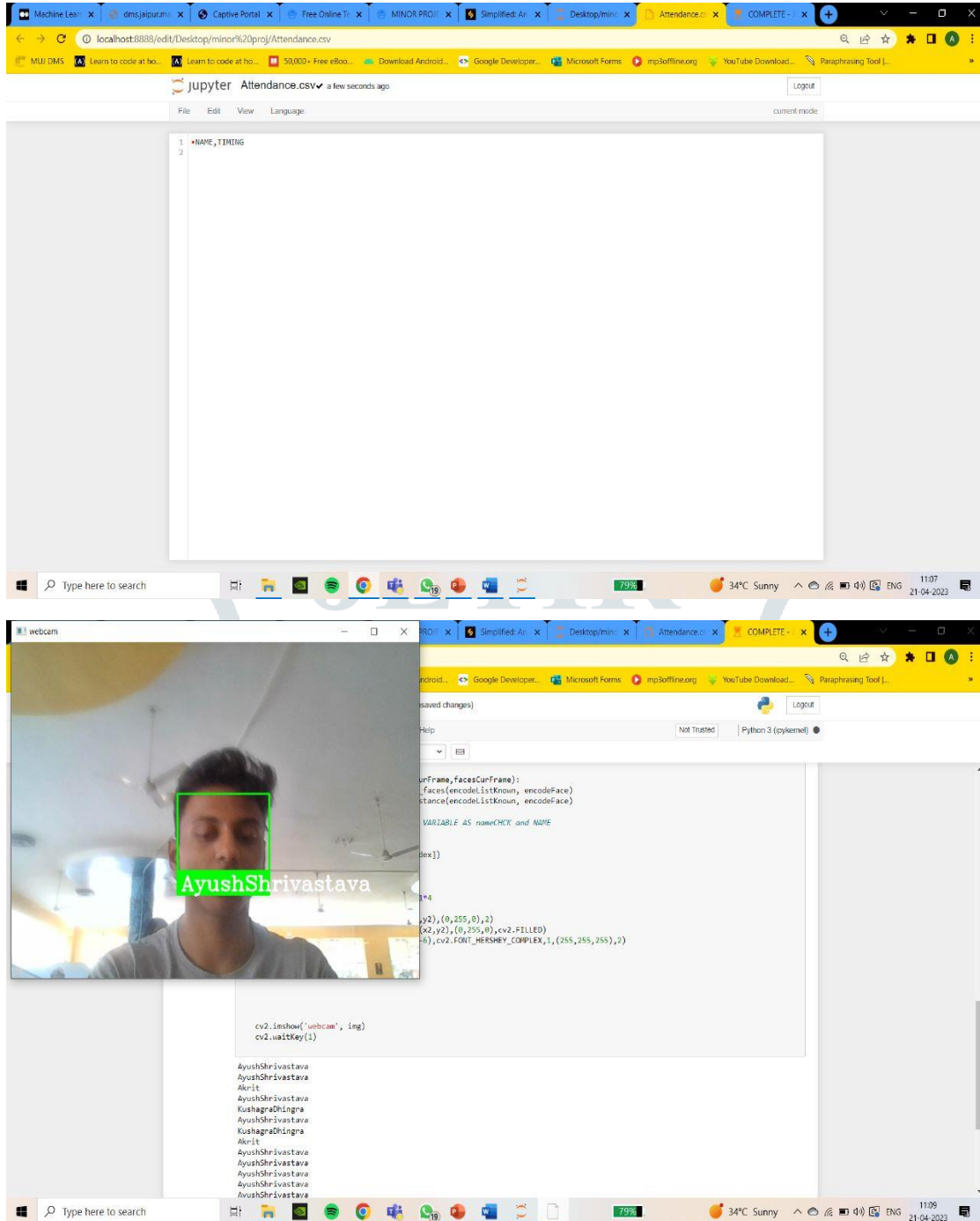
The training process work by looking at 3 face images at a time:

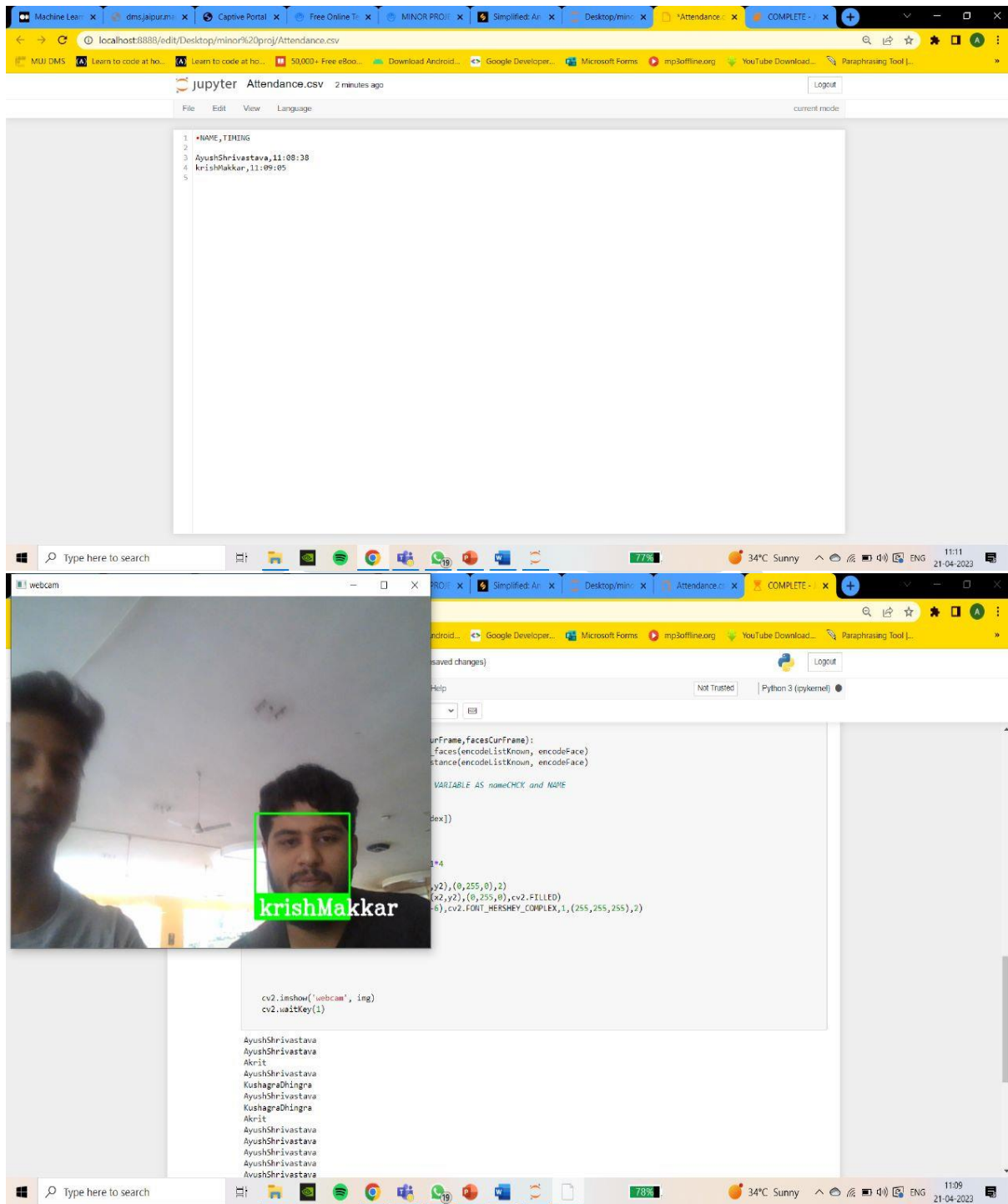
- Load a training face image of a known person.
- Load another picture of the same known person
- Load another picture of different person

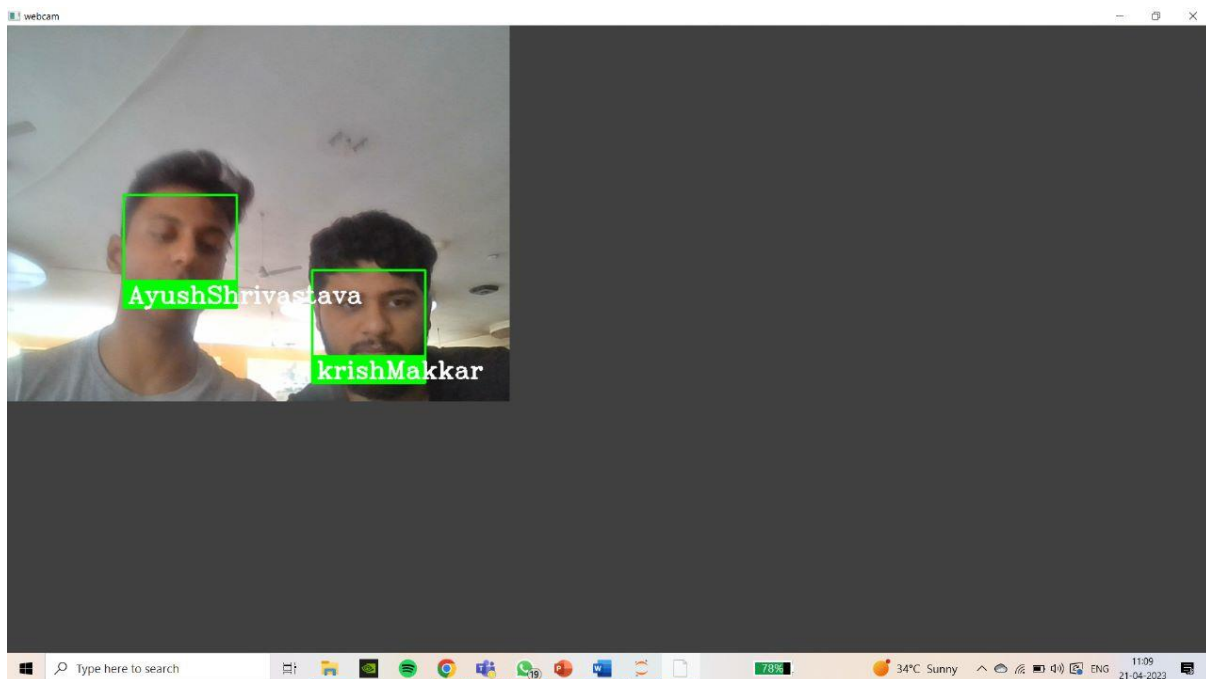
## Step 4: Compare the faces with data stored

As all the data is stored in the database after the training is completed now its time to compare the imgs with the data stored and find the result. The image of the person is captured with the camera and is the compared to the data stored in the database if the image matched the data stored the attendance is marked.









## VIII. CONCLUSION

Face recognition-based attendance automation can be a useful tool for educational institutions. It eliminates the need for manual attendance tracking, reducing errors and saves time. With the help of machine learning algorithms, the system can recognize and authenticate the identity of individuals by scanning their faces. It can also provide real-time attendance data and generate reports automatically, making it easier to manage attendance records.

However, it's important to note that the accuracy of face recognition systems can be affected by various factors, such as lighting conditions, angle of the face, and changes in appearance due to makeup, facial hair, or aging. Moreover, there are concerns about privacy and security issues related to the use of facial recognition technology. Therefore, it's essential to ensure that proper measures are taken to protect the personal data of individuals and comply with data protection laws.

In conclusion, face recognition-based attendance automation can be an efficient and convenient solution for attendance tracking.

## IX. REFERENCES

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