

A  
Mini Project  
On  
**SMART ATTENDANCE SYSTEM USING FACE  
RECOGNITION**

(Submitted in partial fulfillment of the requirements for the award of Degree)

**BACHELOR OF TECHNOLOGY**

In  
**COMPUTER SCIENCE AND ENGINEERING**

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**CERTIFICATE**

This is to certify that the project entitled **“SMART ATTENDANCE SYSTEM USING FACE RECOGNITION”** being submitted by **T. SAI PRANETH (197R1A0553), MOHAMMED RAFI (197R1A0532) & JUKANTI SUMITH(197R1A0517)** in partial fulfillment of the requirements for the award of the degree of B.Tech in Computer Science and Engineering to the Jawaharlal Nehru Technological University Hyderabad, is a record of bonafide work carried out by them under our guidance and supervision during the year 2022-23.

The results embodied in this thesis have not been submitted to any other University or Institute for the award of any degree or diploma.

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## **ABSTRACT**

Facial recognition system is a technology capable of matching a human face from a digital image or a video frame against a database of faces. Facial recognition systems have become famous these days and have been ruling artificial intelligence for quite a long time. In addition to the existing facial recognition system, we want to concentrate on adding a new feature i.e., prompting a voice message for every face recognized. The model can effectively predict the face and a simple message with the help of the training that the model will receive from the training data set.

The voice message would be a simple prompt like “welcome” or “hello” message based on particular images recognized. In this project we tend to implement this on a college level for management, department and students. The system would be promoting or giving out a voice message for every module of recognized faces. This project would be an extension to the facial recognition system. The model would be trained with enormous data so that the accuracy level is maintained in correct prediction.

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# **1. INTRODUCTION**

## **1.1 PROJECT SCOPE**

The importance for face detection for various purposes is increasing linearly with the advancement of the digital world. Face detection is essential because it assists humans in making strategic decisions using any footages or pictures from any of the webcams. It will also help optimize the content based on the user's interest, which can be known by detecting the results in real time, 2 compare the data to previous periods, and other techniques can also be used to get optimized results hence making it very easy for humans.

## **1.2 PROJECT PURPOSE**

This project is titled “SMART ATTENDANCE USING FACE RECOGNITION”. In this work, software for human face detection and recognition is prepared. The analysis and design are done to promote the work as product based such that it can detect faces from a webcam footage. The work is entitled as Attendance System using Face Recognition Techniques. Face Detection is application software to deal with human face. It has the provisions to collect image from the user so that they can detect the eyes, face of human in the image and return the human count. There are various advantages of developing a software using face detection and recognition in the field of authentication. It plays an important part in many biometric, security and surveillance systems.

## **1.3 PROJECT FEATURES –NOT**

The main features of this project are that this model classifies the It addresses the problem of learning hierarchical representations with a single algorithm or a few algorithms and has mainly beaten records in image recognition, natural language processing, semantic segmentation and many other real world scenarios. There are different deep learning approaches like Convolutional Neural Network(CNN), Stacked Autoencoder, and Deep Belief Network (DBN). CNN mostly used algorithms in image and face recognition.

## **2. SYSTEM ANALYSIS**

### **SYSTEM ANALYSIS—not**

System Analysis is the important phase in the system development process. The System is studied to the minute details and analyzed. The system analyst plays an important role of an interrogator and dwells deep into the working of the present system. In analysis, a detailed study of these operations performed by the system and their relationships within and outside the system is done. A key question considered here is, “what must be done to solve the problem?” The system is viewed as a whole and the inputs to the system are identified. Once analysis is completed the analyst has a firm understanding of what is to be done.

### **2.1 PROBLEM DEFINITION—not**

A general statement of face recognition problem can be formulated as the given still or video images of a scene, identify or verify one or more persons in the scene or in any live capturing devices using a stored database of those authorised faces.

### **2.2 EXISTING SYSTEM**

Most of the institute's use biometric attendance. In Biometric fingerprint acquisition, the optical or semi-conduct sensors are widely used. It happens sometimes that the user's finger is too dirty or dry and has to scan multiple times. In some situation the authentication system only recognizes traits that were entered and fail to recognize the user if their physical traits change even the slightest.

### **2.2.1 DISADVANTAGES OF EXISTING SYSTEM**

Following are the disadvantages of existing system:

- Speed of scanning the finger print is slower
- Scanning multiple of time
- Physical involvement of finger , against the covid-19 rule
- A burnt or damaged of finger can't be recognize

## **2.3 PROPOSED SYSTEM**

We propose a Advance Software technology to get attendance of the students or employees who are worked in organization .All the students of the class must register themselves by entering the required details and then their images will be captured and stored in the dataset. When entering the class it will capture the Image/face. The faces detected will be compared with images present in the dataset. If match found, attendance will be marked for the respective student.

### **2.3.1 ADVANTAGES OF THE PROPOSED SYSTEM**

- Recognition of face is accurate and faster
- Time saving
- Easy to manage
- Touch less Sign In

## **2.4 FEASIBILITY STUDY—not**

The feasibility of the project is analyzed in this phase and a business proposal is put forth with a very general plan for the project and some cost estimates. During system analysis the feasibility study of the proposed system is to be carried out. This is

to ensure that the proposed system is not a burden to the company. Three key considerations involved in the feasibility analysis:

- EconomicFeasibility
- TechnicalFeasibility
- SocialFeasibility

#### **2.4.1 ECONOMIC FEASIBILITY—not**

The developing system must be justified by cost and benefit. Criteria to ensure that effort is concentrated on a project, which will give best, return at the earliest. One of the factors, which affect the development of a new system, is the cost it would require.

The following are some of the important financial questions asked during preliminary investigation:

- The costs conduct a full system investigation.
- The cost of the hardware and software.
- The benefits in the form of reduced costs or fewer costly errors.

Since the system is developed as part of project work, there is no manual cost to spend for the proposed system. Also all the resources are already available, it give an indication that the system is economically possible for development.

### **2.4.2 TECHNICAL FEASIBILITY—not**

This study is carried out to check the technical feasibility, that is, the technical requirements of the system. Any system developed must not have a high demand on the available technical resources. The developed system must have a modest requirement, as only minimal or null changes are required for implementing this system.

### **2.4.3 BEHAVIORAL FEASIBILITY**

This includes the following questions:

- Is there sufficient support for the users?
- Will the proposed system cause harm?

The project would be beneficial because it satisfies the objectives when developed and installed. All behavioral aspects are considered carefully and conclude that the project is behaviorally feasible

## **2.5 HARDWARE & SOFTWARE REQUIREMENTS**

### **2.5.1 HARDWARE REQUIREMENTS:**

Hardware interfaces specify the logical characteristics of each interface between the software product and the hardware components of the system. The following are some hardware requirements.

- Processor : Intel Dual Core I5 and above
- Hard disk : 8GB and above
- RAM : 8GB and above
- Camera: Either device or installed.
- Input devices : Keyboard, mouse.

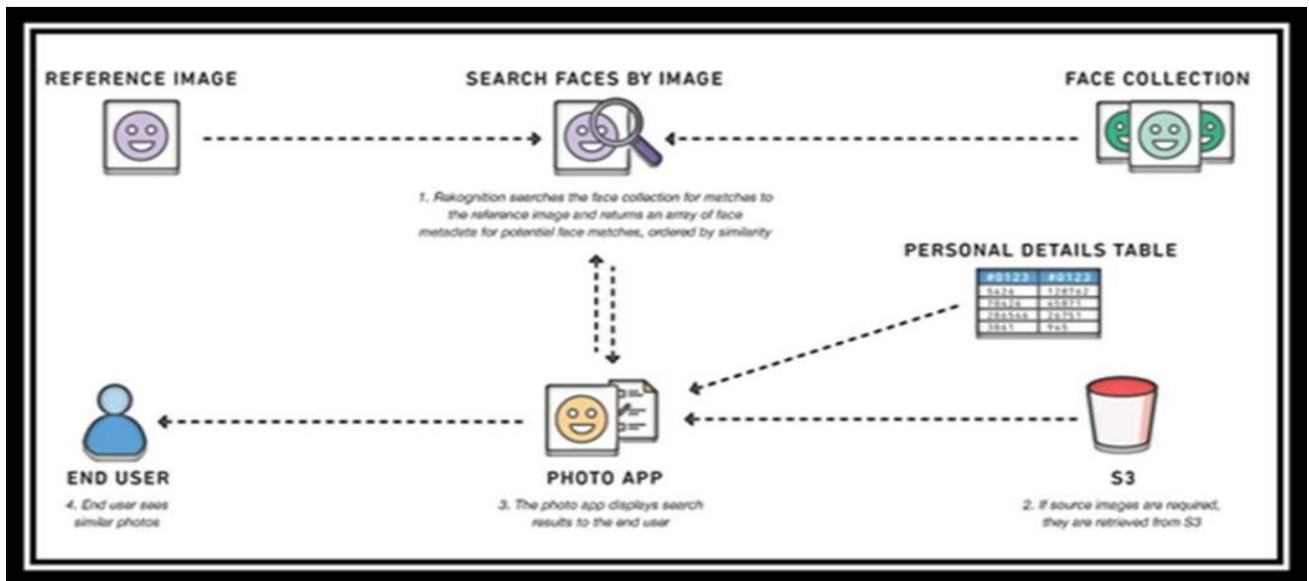
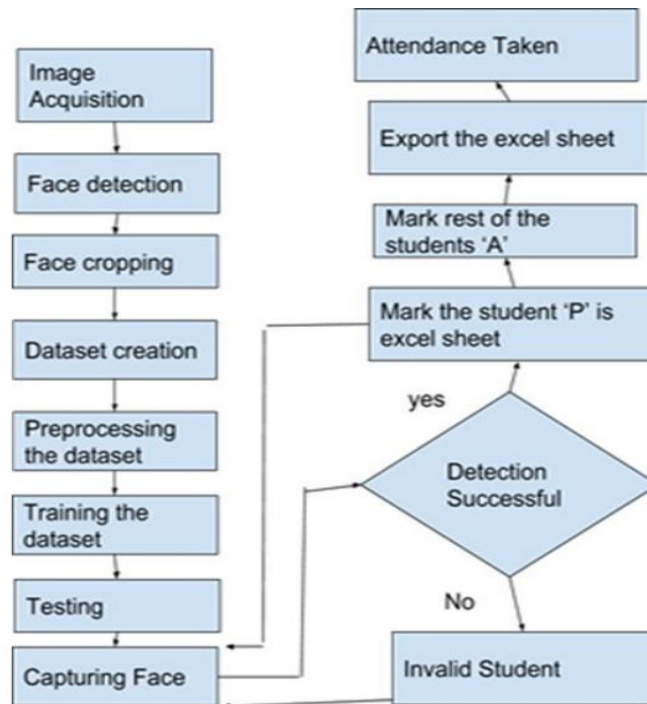
### **2.5.2 SOFTWARE REQUIREMENTS:**

Software Requirements specifies the logical characteristics of each interface and software components of the system. The following are some software requirements,

- Operating system : Windows (7,8 and above)
- Languages : Python
- Tools : Python IDEL3.7 version, Anaconda - Jupyter, Spyder

# ARCHITECTURE

## 3.1 PROJECT ARCHITECTURE



This project architecture shows the procedure followed for classification, starting from input to final prediction.

Figure 3.1: Project Architecture

### 3.2 DESCRIPTION

The domain analysis sets the stage for how the development process can be carried out. A major role of this phase is to determine a preliminary build structure for incremental development. This can include the determination of prototyping efforts to mitigate high-risk areas and help to define obscure or poorly defined system requirements. One of the important activities of domain analysis is the identification of abstract real-world classes and objects that are common to related applications within a specific problem domain.

Attendance management is important to every single organization; it can decide whether or not an organization such as educational institutions, public or private sectors will be successful in the future. Organizations will have to keep a track of people within the organization such as employees and students to maximize their performance.

Managing student attendance during lecture periods has become a difficult challenge. The ability to compute the attendance percentage becomes a major task as manual computation produces errors, and wastes a lot of time. For the stated reason, an efficient Web-based application for attendance management system is designed to track student's activity in the class. This application takes attendance electronically and the records of the attendance are stored in a database. The system is designed in a way that can differentiate the hours of theoretical and practical lessons since the rate of them is different for calculating the percentages of the students' absence. Insertions, deletions, and changes of date in the system can be done straightforward via the designed GUI without interacting with the tables.

Different presentation of information is obtainable from the system. The test case of the system exposed that the system is working enormously and is ready to use to manage to attend students for any department of the University.



### 3.3 USE CASE DIAGRAM

In the use case diagram, we have basically one actor who is the user in the trained model.

A use case diagram is a graphical depiction of a user's possible interactions with a system. A use case diagram shows various use cases and different types of users the system has. The use cases are represented by either circles or ellipses. The actors are often shown as stick figures.

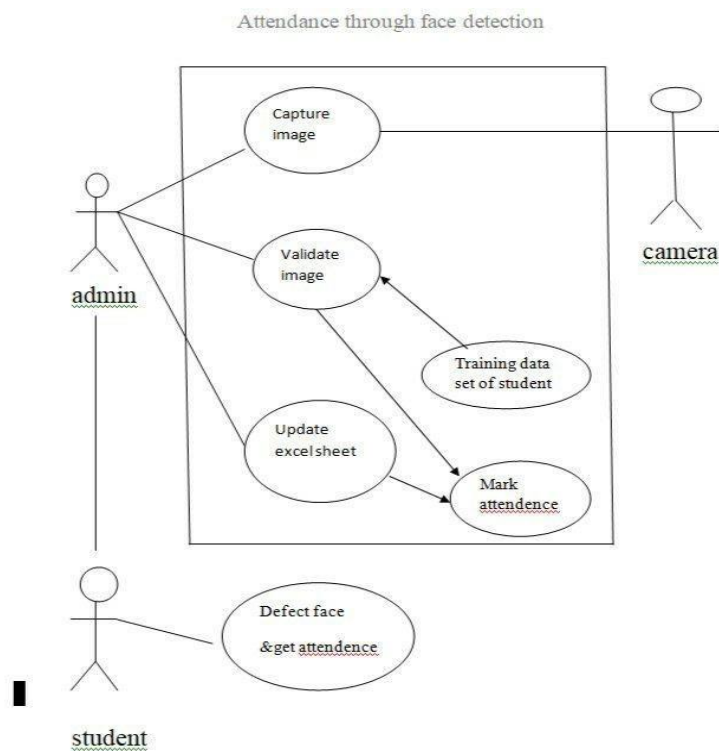


Figure 3.2: Use Case Diagram

### 3.4 CLASS DIAGRAM

Class diagram is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations(or methods), and the relationships among objects.

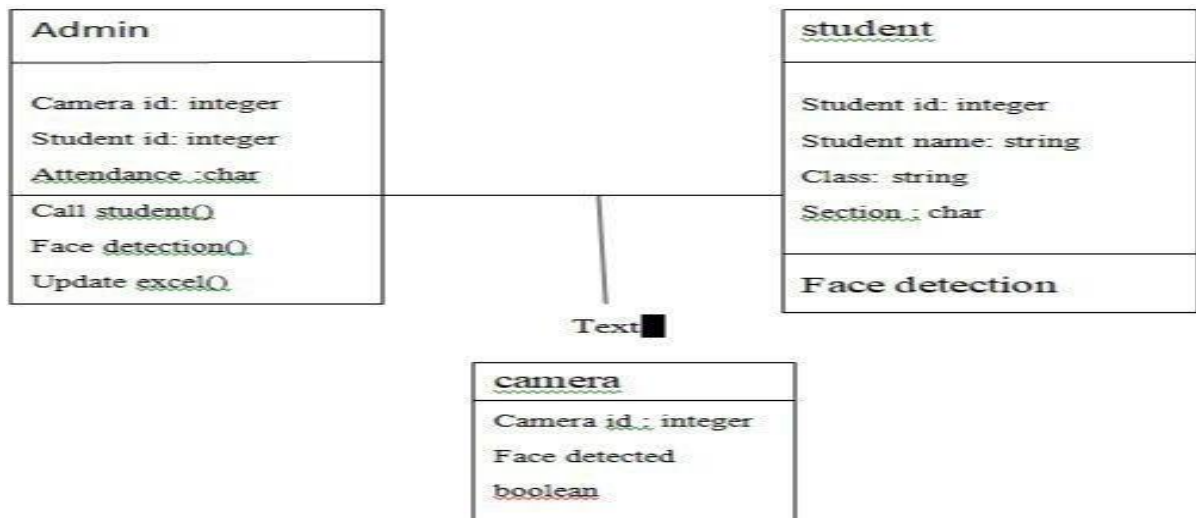


Figure 3.3: Class Diagram

### 3.5 SEQUENCE DIAGRAM

A sequence diagram shows object interactions arranged in time sequence. It depicts the objects involved in the scenario and the sequence of messages exchanged between the objects needed to carry out the functionality of the scenario. Sequence diagrams are typically associated with use case realizations in the logical view of the system under development.

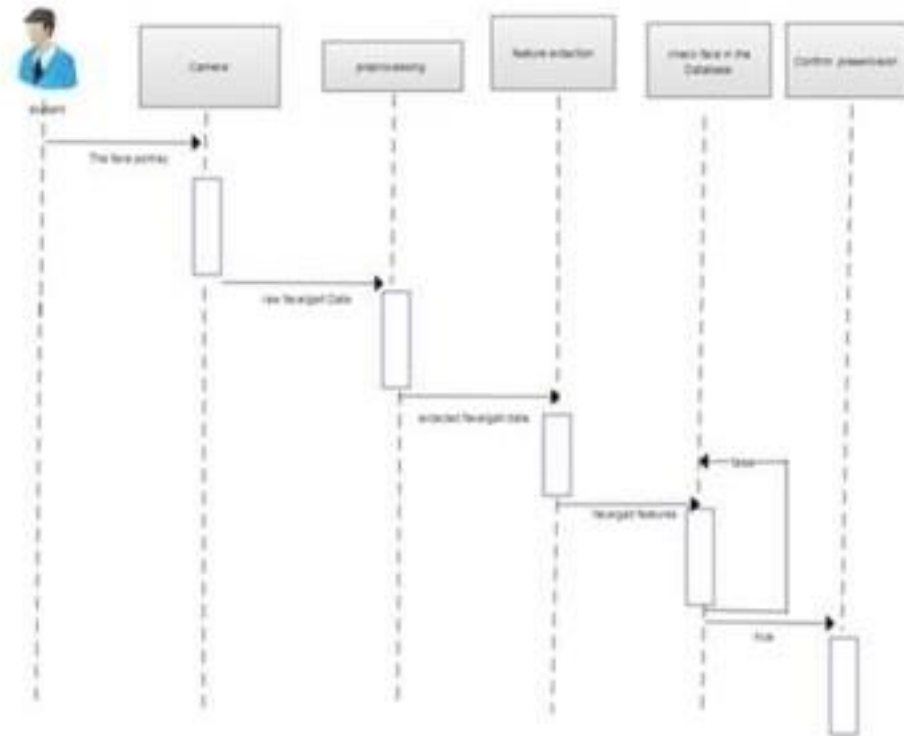


Figure 3.4: Sequence Diagram

### 3.6 ACTIVITY DIAGRAM

Activity diagrams are graphical representations of workflows of stepwise activities and actions with support for choice, iteration and concurrency. They can also include elements showing the flow of data between activities through one or more data stores.

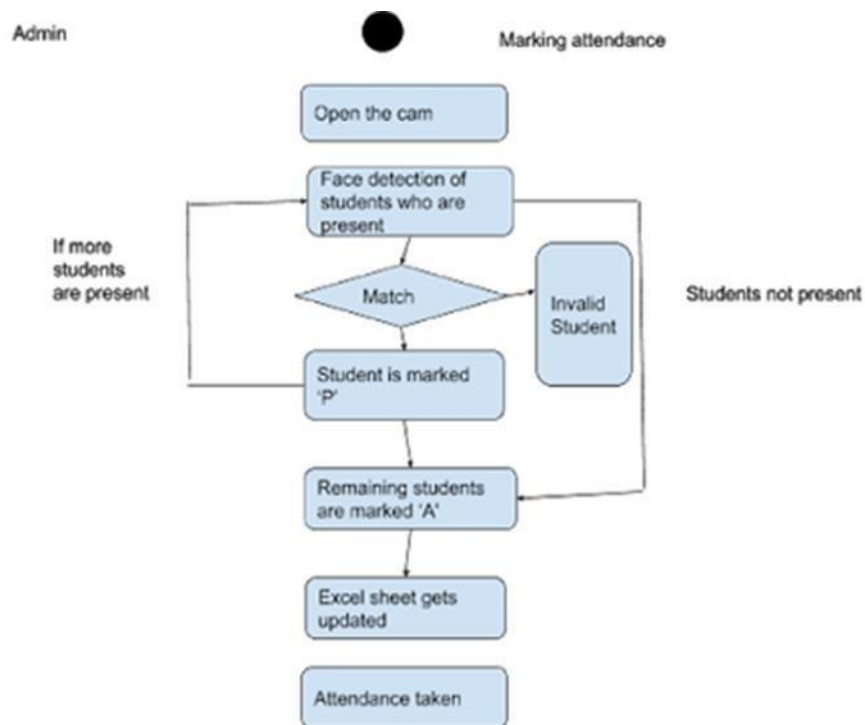


Figure 3.5: Activity Diagram

## 4.1 SAMPLE CODE

```
import numpy as np
import pymysql
import face_recognition
import cv2
import os
from datetime import datetime

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

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

def markAttendance(name):

    conn=pymysql.connect(
        host='localhost',
        user='root',
        password='@Sai553@',
        db='db',
        CMRTC
```

```

    )
    cur=conn.cursor()
    now=datetime.now()
    checkUsername = cur.execute('SELECT name FROM attendance WHERE name=%s',name)
    if checkUsername == 0:
        cur.execute("insert into attendance(name,entry) values(%s,%s)",(name,now))
    else:
        cur.execute('update attendance set entry=%s where name=%s',(now,name))
    conn.commit()
    #for r in cur:
        # print(r)
    '''with open('attendance1.csv','r+') as f:
        myDataList=f.readlines()
        nameList=[]
        for line in myDataList:
            entry=line.split(',')
            nameList.append(entry[0])
        if name not in nameList:
            now=datetime.now()
            dtstring=now.strftime('%H:%M:%S')

            f.writelines(f'\n{ name },{ dtstring} ')
        '''

    encodeListKnown = findEncodings(images)
    #print("its working on it")

    cap=cv2.VideoCapture(0)
    while True:
        success,img=cap.read()
        #print("jgjjhg")
        imgS=cv2.resize(img,(0,0),None,0.25,0.25)
        imgS=cv2.cvtColor(img,cv2.COLOR_BGR2RGB)
        facesCurrFrame=face_recognition.face_locations(imgS)
        encodesCurrFrames=face_recognition.face_encodings(imgS,facesCurrFrame)

```

```

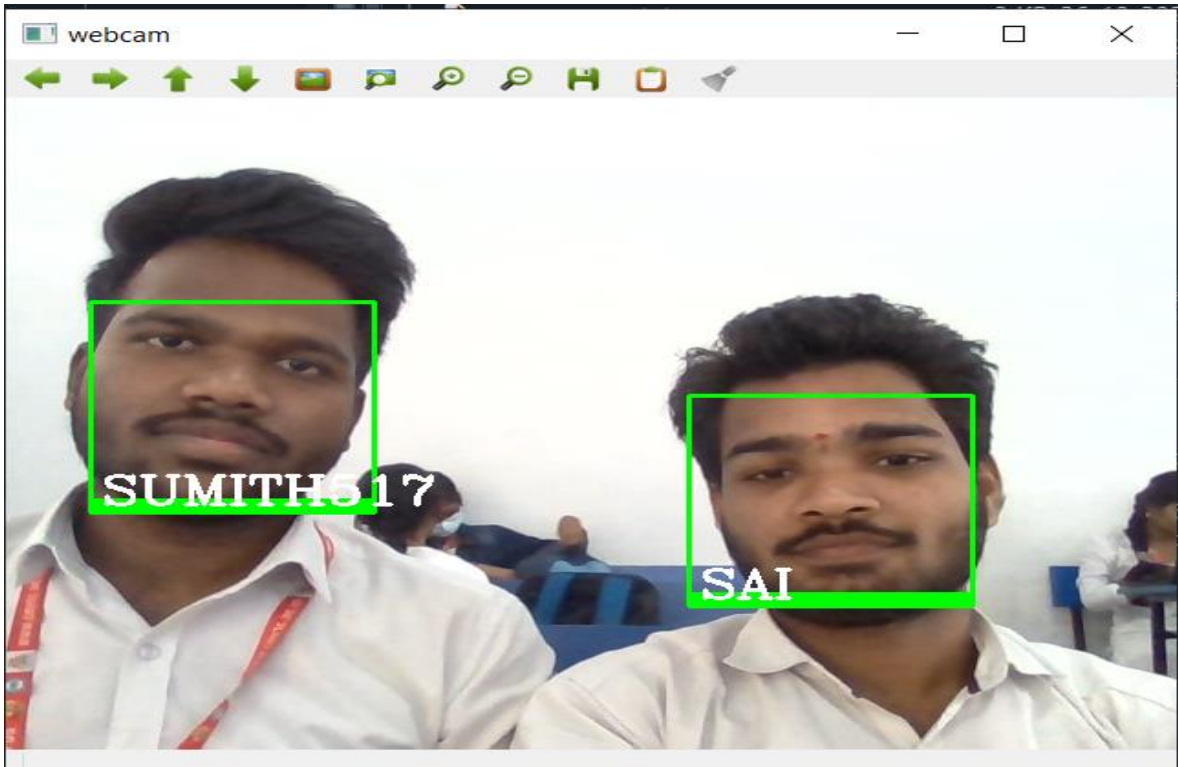
#print(encodesCurrFrames)
for encodeFaces,faceLoc in zip(encodesCurrFrames,facesCurrFrame):
    matches=face_recognition.compare_faces(encodeListKnown,encodeFaces)
    #print(matches)
    faceDis=face_recognition.face_distance(encodeListKnown,encodeFaces)
    #print(faceDis)
    matchIndex=-1;
    "if faceDis.any() < 0.80000000:
        matchIndex=np.argmin(faceDis)
        print(faceDis)"
    for val in faceDis:
        if val < 0.4000000:
            matchIndex=np.argmin(faceDis)
            #print(faceDis)
            break

#print(matchIndex)
if matchIndex!=-1 and matches[matchIndex]:
    name=classNames[matchIndex].upper()
    #(faceDis)
    y1,x2,y2,x1=faceLoc
    cv2.rectangle(img,(x1,y1),(x2,y2),(0,255,0),2)
    cv2.rectangle(img,(x1,y2-10),(x2,y2),(0,255,0),cv2.FILLED)
    cv2.putText(img,name,(x1+6,y2-
6),cv2.FONT_HERSHEY_COMPLEX,1,(255,255,255),2)
    #print('ggggggg')
    markAttendance(name)
else:
    name='Not Found'
    #print(faceDis)
    y1,x2,y2,x1=faceLoc
    cv2.rectangle(img,(x1,y1),(x2,y2),(0,255,0),2)
    cv2.rectangle(img,(x1,y2-10),(x2,y2),(0,255,0),cv2.FILLED)

```

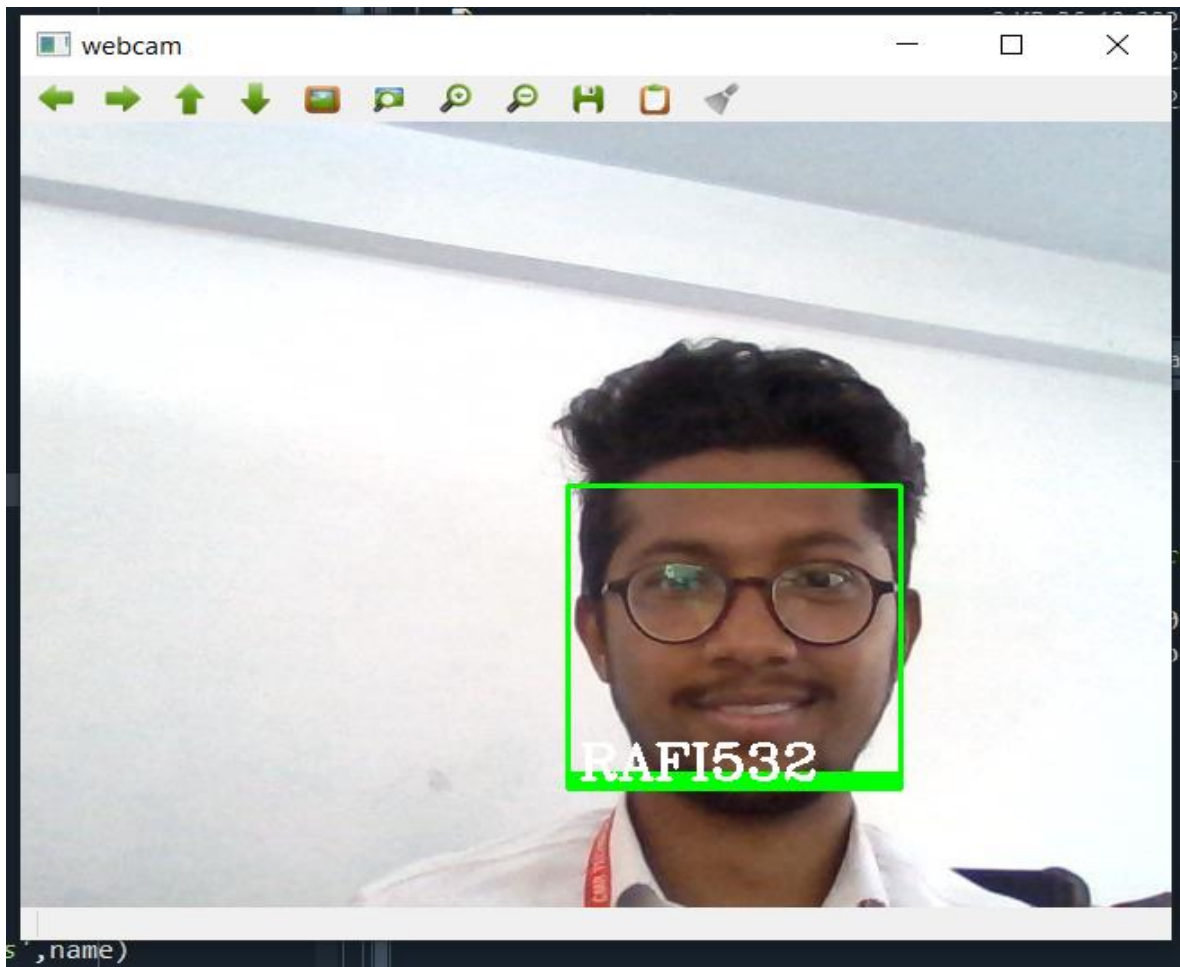
```
cv2.putText(img,name,(x1+6,y2-  
6),cv2.FONT_HERSHEY_COMPLEX,1,(255,255,255),2)  
cv2.imshow('webcam',img)  
cv2.waitKey(1)
```

## 5.SCREENSHOTS

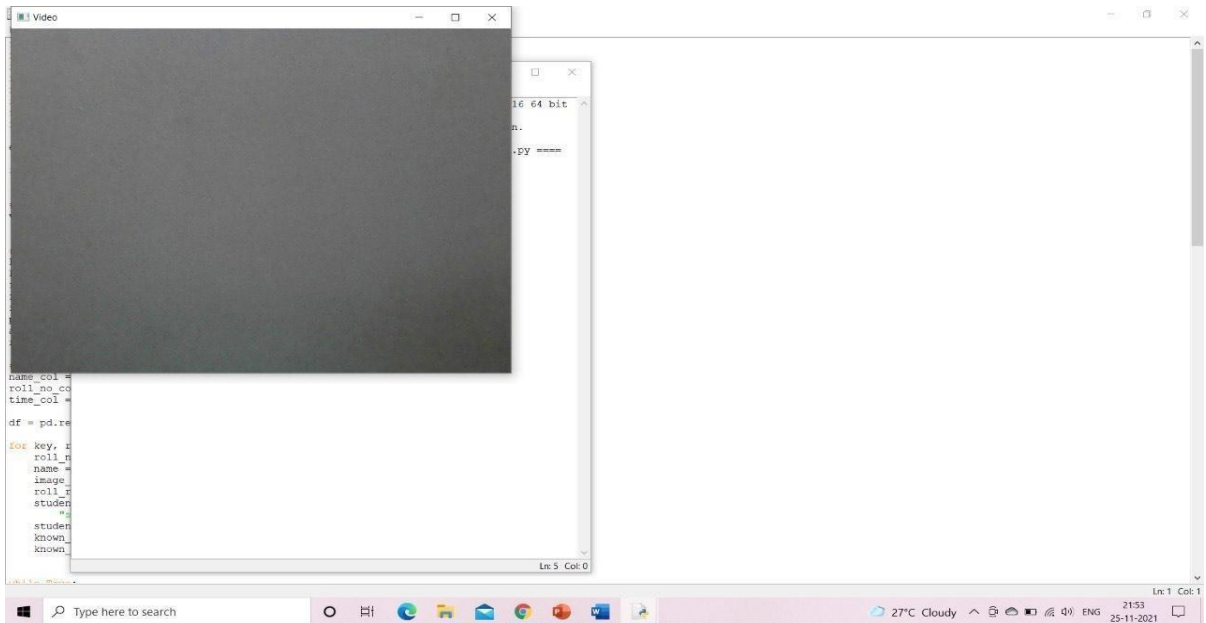


Screenshot 5.1: Student recognized

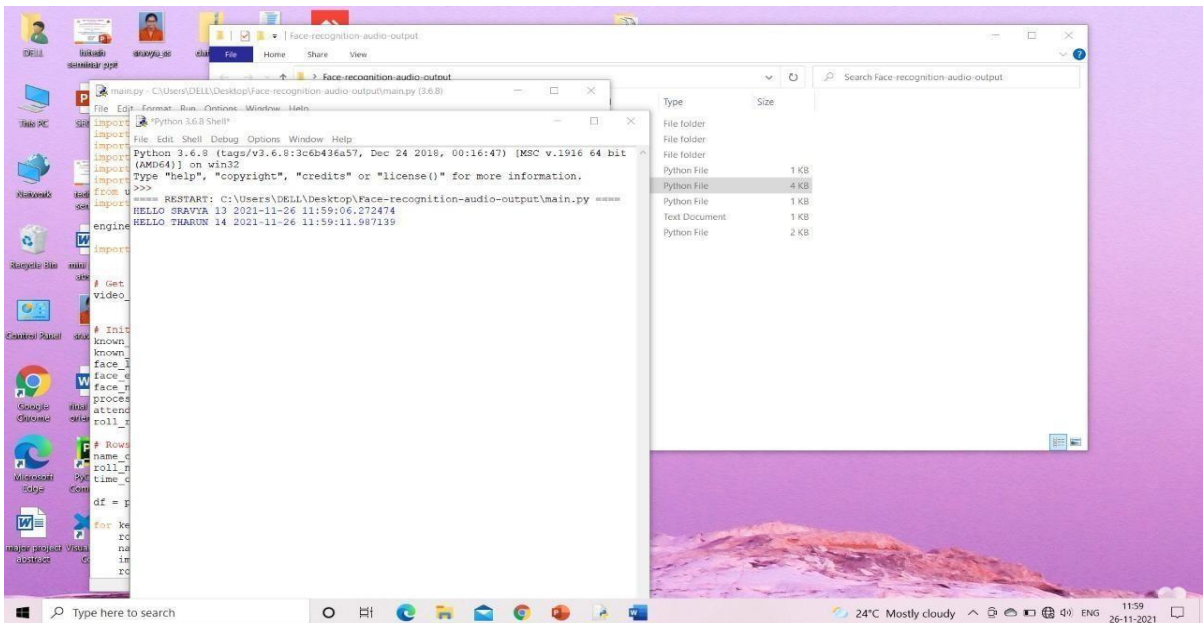




Screenshot 5.2: Student recognised and displayed with a message



Screenshot 5.3: Camera Dialogue Box



Screenshot 5.4: Data stored in log fil

## **6.**

## **TESTING**

### **6.1 INTRODUCTION TO TESTING**

The purpose of testing is to discover errors. Testing is the process of trying to discover every conceivable fault or weakness in a work product. It provides a way to check the functionality of components, subassemblies, assemblies and/or a finished product. It is the process of exercising software with the intent of ensuring that the Software system meets its requirements and user expectations and does not fail in an unacceptable manner. There are various types of tests. Each test type addresses a specific testing requirement.

### **6.2 TYPES OF TESTING**

#### **6.2.1 UNIT TESTING**

Unit testing involves the design of test cases that validate that the internal program logic is functioning properly, and that program inputs produce valid outputs. All decision branches and internal code flow should be validated. It is the testing of individual software units of the application .It is done after the completion of an individual unit before integration. This is a structural testing that relies on knowledge of its construction and is invasive. Unit tests perform basic tests at component level and test a specific business process, application and/or system configuration. Unit tests ensure that each unique path of a business process performs accurately to the documented specifications and contains clearly defined inputs and expected results.

### **6.2.2 INTEGRATION TESTING**

Integration tests are designed to test integrated software components to determine if they actually run as one program. Integration tests demonstrate that although the components were individually satisfactory, as shown by successfully unit testing, the combination of components is correct and consistent. Integration testing is specifically aimed at exposing the problems that arise from the combination of components.

### **6.2.3 FUNCTIONAL TESTING**

Functional tests provide systematic demonstrations that functions tested are available as specified by the business and technical requirements, system documentation, and user manuals.

Functional testing is centered on the following items:

Valid Input : identified classes of valid input must  
be accepted.

Invalid : identified classes of invalid input must  
Input be rejected.

Functions : identified functions must be exercised.

Output : identified classes of application outputs  
must be exercised.

Systems/Procedures: interfacing systems or procedures must be invoked. Organization and preparation of functional tests is focused on requirements, key functions, or special test cases.

## 6.3 TEST CASES

### 6.3.1 CLASSIFICATION

Test case ID	Test case name	Purpose	Input	Output
1	Face Recognition	To detect Faces.	The user gives the input in the form of a video using open cv.	An output is voice using Face Recognition
2	Face Recognition	To detect Faces.	The user walks in a motion towards entry	An output is voice using Face Recognition

## **7. CONCLUSION & FUTURE SCOPE**

### **7.1 PROJECT CONCLUSION**

The potential benefit of using our trained model is that it can detect as many faces at very fast rates and recognises the faculty, students and all other members belonging to that particular institution or an organization. In addition to that particular recognised face there is a voice message as the identity of any person who is recognised with a welcome or a hello message with the identified persons name.

### **7.2 FUTURE SCOPE**

The potential idea behind the idea of the project is the additional feature, “voice based output”, the future enhancement would be integrating with the video sequencing. From this project the advancement to the facial recognition system can be a great use in many applications like shopping malls, institutes, universities, home applications. The model can effectively deliver voice messages to various faces and an application to look out for.

### **7.3 REFERENCES**

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