FACE RECOGNITION ATTENDANCE SYSTEM

PROJECT SYNOPSIS

of Summer Training Project

BACHELOR OF TECHNOLOGY
COMPUTER SCIENCE AND ENGINEERING

Submitted

To

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PROJECT STUDENTS

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1. Introduction

This document contains the system requirements for Project. It is prepared by the team. This specification document includes descriptions of the functions and the specifications of the project. In this section(Section 1), a review of the entire document is provided. The reader would get familiarized with the contents before the further details are described

1.1 Problem Definition

To develop an automated attendance system using face recognition. Concept In a classroom with large number of students, it is a very tedious and time-consuming task to take the attendance manually. Therefore, we can implement an effective system which will mark the attendance of students automatically by recognizing their faces.

- Save Users Time as this refers no physical interaction
- Supplying the user a smooth and clear interface
- Configuring a fast replying server system

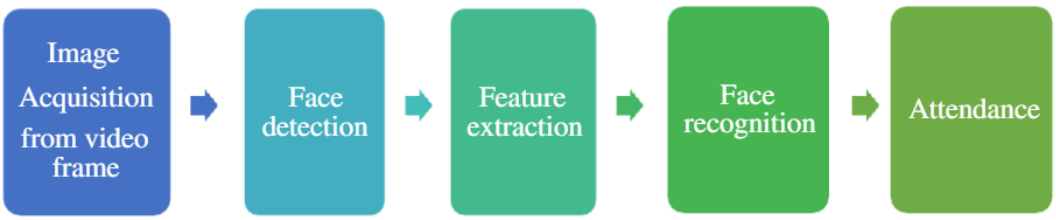
1.2 Objective

To identify the student faces accurately. To mark the attendance automatically. To reduce the time and the efforts required for manual attendance to provide a valuable attentive system for both teacher and students. It provides flexibility and reduces the time loss. There will be no chance for a proxy.

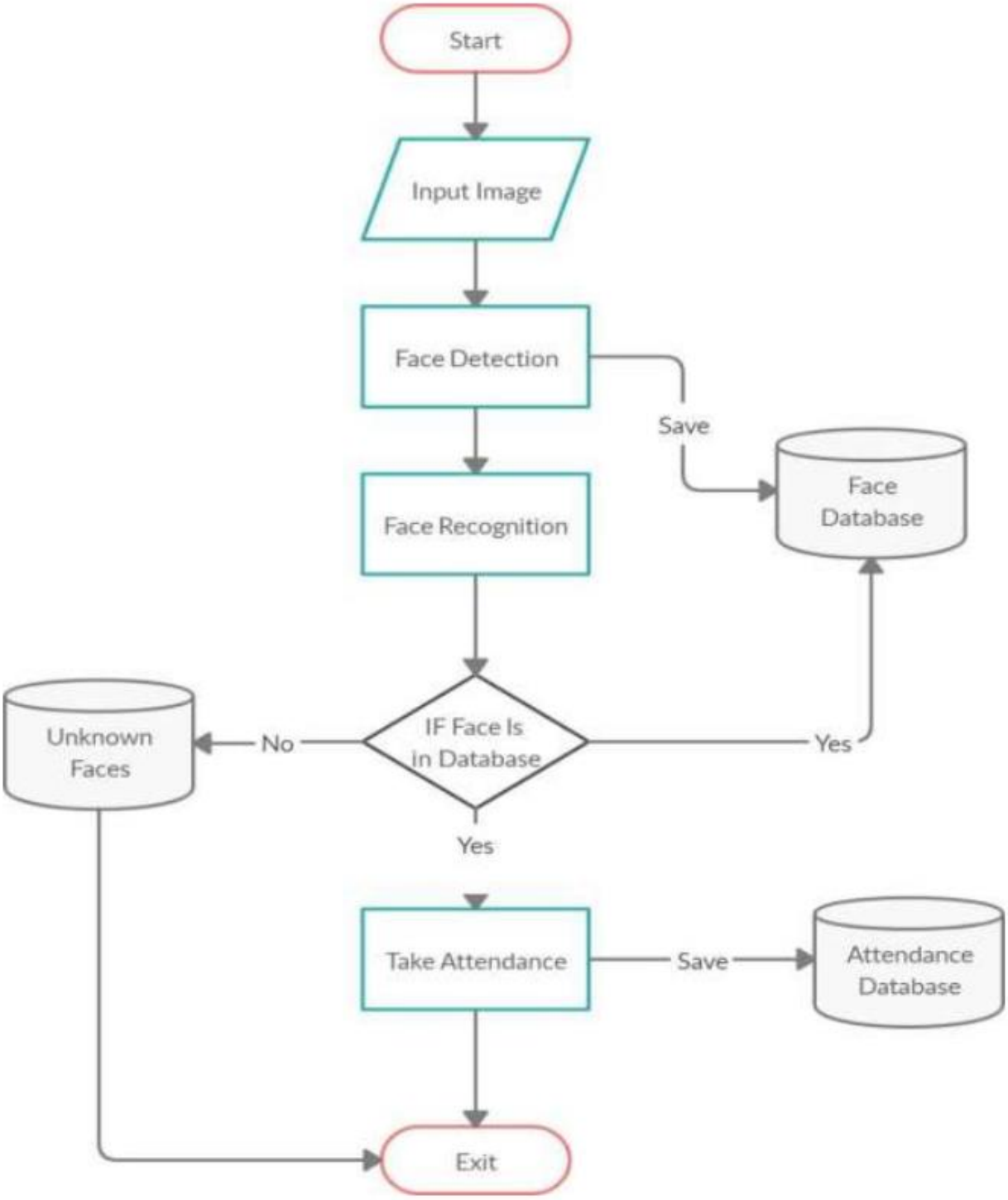
The objective of this project is to develop face recognition based automated student attendance system. Expected achievements in order to fulfill the objectives are:

- To detect the face segment from the video frame.
- To extract the useful features from the face detected.
- To classify the features in order to recognize the face detected.
- To record the attendance of the identified student.

1.3 Block Diagram of the General Framework



1.4 Flow Chart



1.5 Definitions, Acronyms, and Abbreviations

The document contains words and abbreviations related to computer science. The terms and abbreviations are the following ones:

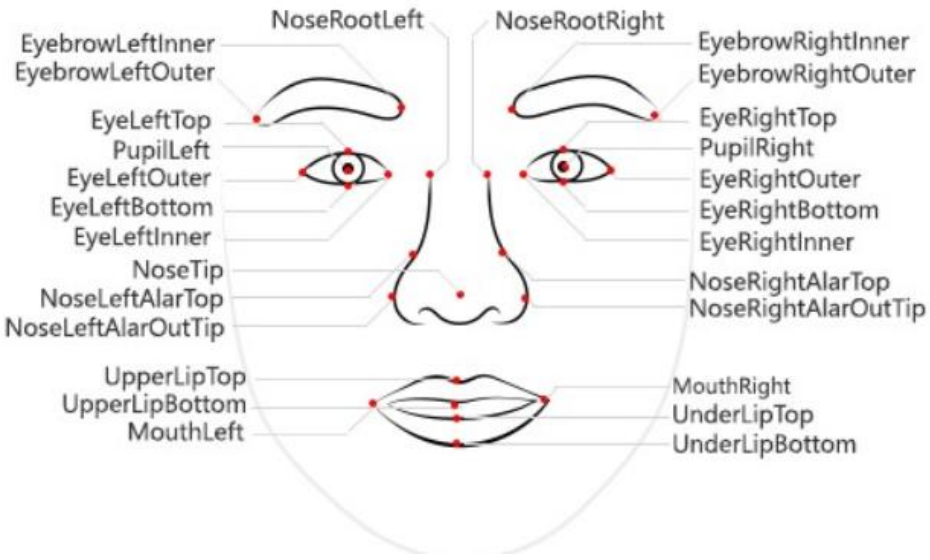
Server: A program that awaits and fulfills requests from client programs in the same or other computers.
Deep Learning: A machine learning method that stimulates the neural network in human brain
Python: One of the most commonly used programming languages.
Kernel: The lowest level of easily replaceable software that interfaces with the hardware in your compute
NLP: Natural Language Processing
API: Application Program Interface

1.6 Deep Learning for Face Recognition

Some of the widely used Deep Learning-based face recognition systems are:

- DeepFace
- DeepID series of systems
- VGGFace
- FaceNet

Face recognizers generally take face images and find the important points such as the corner of the mouth, an eyebrow, eyes, nose, lips, etc. The coordinates of these points are called facial feature points. There are 66 such points. In this way, a different technique for finding feature points give different results.



1.7 Limitation of existing system

Sr. no.	Existing System	Features	Benefits	Limitations
1.	Automated attendance management system using face recognition.	Use Eigen faces for Recognition	High accuracy	Multiple faces were not recognized.
2.	Face recognition attendance system by nevon	Stores the faces that are detected and automatically marks attendance	Used for security purposes in organizations	Doesn't recognize properly in poor light.
3.	Smart Attendance Management System Using Face Recognition	Student Registration Face Recognition Addition of subject with their corresponding time. Attendance sheet gets generated and imported to Excel (xlsx) format.	In this the data is stored in sorted manner so that it can easily accessible	Requires high-definition camera
4.	Face Recognition - A Tool for Automated Attendance	Face detection, Pre-processing, Feature extraction, and Classification stages	High accuracy	Camera should be attached at a specific position
5.	Smart Application for AMS Using Face Recognition	Uses CCTV and Android mobile	3D face recognition algorithm is used	Android phone is expensive and detect one face at time
6.	Student Attendance System in Classroom Using Face Recognition Technique	Use of Discrete Wavelet Transform and Discrete Cosine Transform.	Multiple face detection was possible	Success rate is only 82%
7.	Attendance System based on Face Recognition using Eigen face and PCA Algorithms	In this Illumination invariant algorithm is used	The problem of light intensity problem and head pose was overcoming.	Masked faces were not recognized.
8.	Algorithm for Efficient Attendance Management: Face Recognition based approach	Median filter and skin classification is used	Multiple faces can be detected at a time and no special hardware is needed	Accuracy is low only 50% faces were recognized

2. Overall Description

This section is about the requirements, constraints and the interfaces included in the project. A map of functions are also supplied. The document follows the IEEE standards, yet some of the sections are discarded as they are not compatible for this project.

2.1 Product Functions

Major functions of the product and brief descriptions of these functions can be found in this section. Also detailed diagrams and descriptions can be found in subsections of this section.

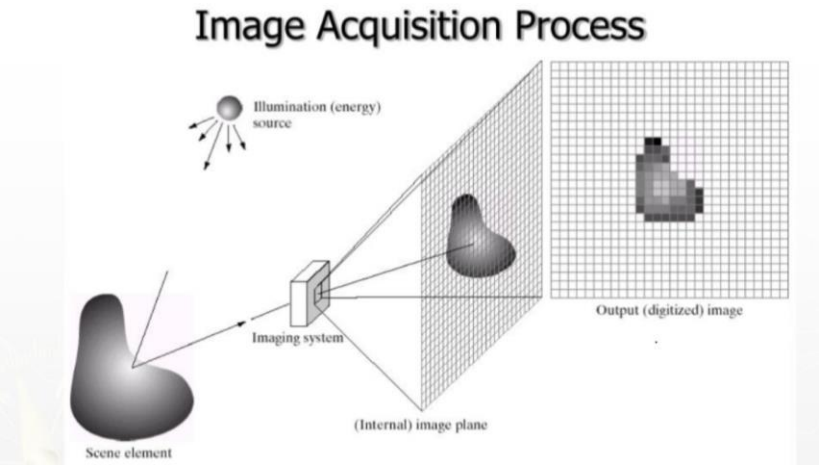
ID	Function	Description
1.	Image Acquisition from video	obtain a two-dimensional image using a single sensor
2.	Face detection	Detect the face among noise
3.	Feature Extraction	Extract features of faces that will be used for training and recognition tasks
4.	Face Recognition	Match the face from database
5.	Mark Attendance	Marking Present And save in a .csv file

2.1.1 Use Case Model Survey

This section includes use case diagrams and their detailed descriptions of the functions that mentioned in section 2.1.

- **Image Acquisition from video**

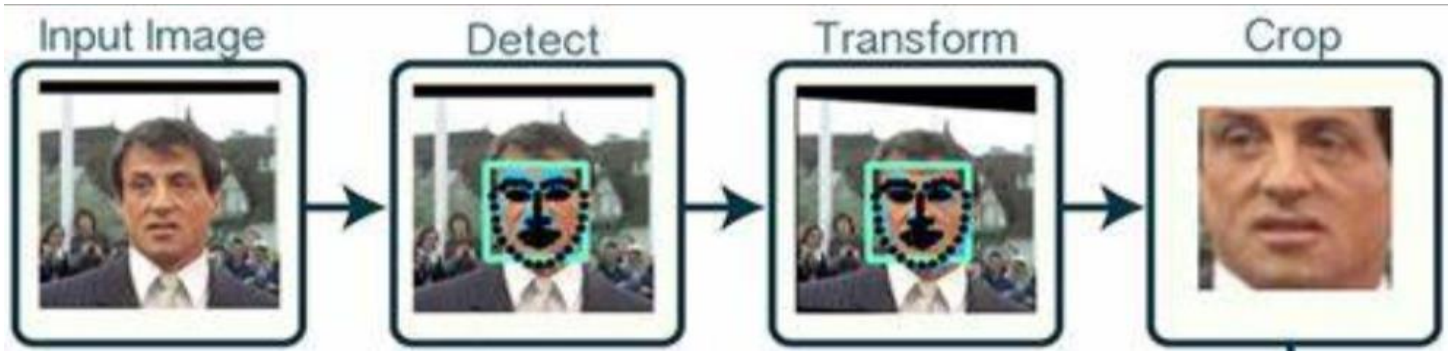
This involves capturing an image using digital camera or scanner, or importing a existing image into a computer. Image is captured for further processor like matching image's existence in database .

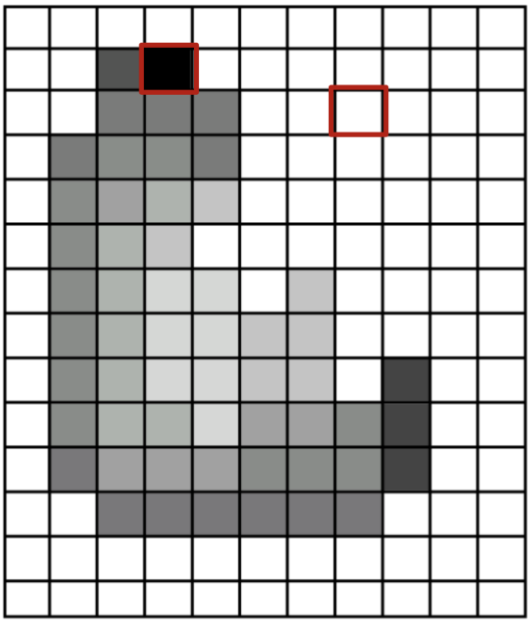


Use Case Id	1
Use Case	Image Acquisition from video
Description	This involves capturing an image using digital camera or scanner
Actor	user
Trigger	Automatic
Primary Scenario	o User must come in front of camera o Machine capture the user photo
Exceptional Scenario	None

- **Face detection**

Face detection is a computer technology being used in a variety of applications that identifies human faces in digital images **.**





=

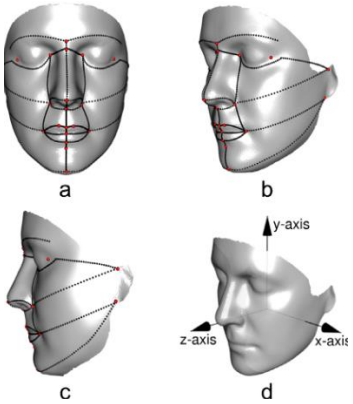
255	255	255	255	255	255	255	255	255	255	255
255	255	20	0	255	255	255	255	255	255	255
255	255	75	75	255	255	255	255	255	255	255
255	75	95	95	75	255	255	255	255	255	255
255	96	127	145	175	255	255	255	255	255	255
255	127	145	175	175	175	255	255	255	255	255
255	127	145	200	200	175	175	95	255	255	255
255	127	145	200	200	175	175	95	47	255	255
255	127	145	145	175	127	127	95	47	255	255
255	74	127	127	127	95	95	95	47	255	255
255	255	74	74	74	74	74	74	255	255	255
255	255	255	255	255	255	255	255	255	255	255
255	255	255	255	255	255	255	255	255	255	255
255	255	255	255	255	255	255	255	255	255	255

0 = black; 255 = white

Use Case Id	2
Use Case	Face detection
Description	Detects the human face among noise
Actor	Machine
Trigger	Automatic
Primary Scenario	○ Detects the face and convert it into RGB ○ RGB to digital
Exceptional Scenario	Image is not clear

- **Feature Extraction**

Facial feature extraction is the process of extracting face component features like eyes, nose, mouth, etc from human face image. Facial feature extraction is very much important for the initialization of processing techniqueslike face tracking, facial expression recognition or face recognition.



Use Case Id	3
Use Case	Feature Extraction
Description	extracting face component features like eyes, nose, mouth, etc from human face
Actor	Machine
Trigger	Automatic
Primary Scenario	Detect perfect dimensions
Exceptional Scenario	None

- **Face Recognition**

Face recognizers generally take face images and find the important points such as the corner of the mouth, an eyebrow, eyes, nose, lips, etc. The coordinates of these points are called facial feature points. There are 66 such points. In this way, a different technique for finding feature points give different results.

Use Case Id	4
Use Case	Face Recognition
Description	Recognise the face and match from train data
Actor	Machine
Trigger	Automatic
Primary Scenario	Detect and match correct face
Exceptional Scenario	None

- **Mark Attendance**

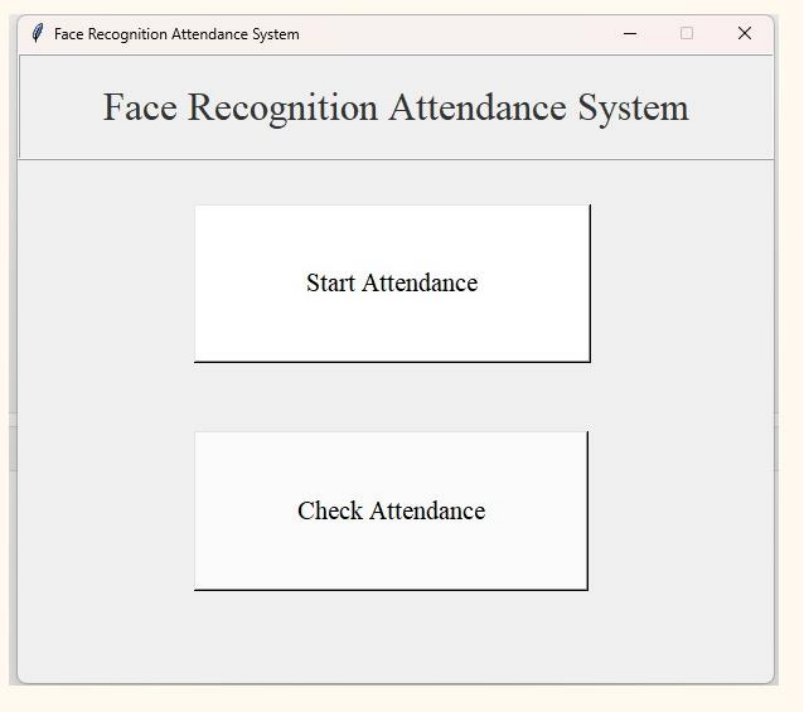
After all the process have done then it will automatically mark the attendance as present, and save the name, time and date in a csv file for future use.

Use Case Id	5
Use Case	Mark Attendance
Description	mark the attendance as present
Actor	Machine
Trigger	Automatic
Primary Scenario	Write Attendance of user
Exceptional Scenario	DO Nothing

2.2 Interfaces

2.2.1 User Interfaces

The user interfaces will be an GUI window . the window will appear after executing the program and used whenever it wants . The prototype interface is the following :



2.2.2 Hardware Interfaces

Not applicable.

2.2.3 Software Interfaces

The system will use High - definition Camera for scanning a Face .

2.2.4 Communications Interfaces

The only communication is between the program and the server and database .

3. Code

```
import dlib
import sys
import cv2
import face_recognition
import os
import numpy as np
from datetime import datetime
import pickle

def AttenCall():
    path = 'C:\\Users\mayan\Project\dada_set'


    images = []
    classNames = []
    mylist  = os.listdir(path)

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


    def findEncodings(images):
        encodeList = []
        for img in images:
            img = cv2.cvtColor(img, cv2.COLOR_BGR2RGB)
            encoded_face = face_recognition.face_encodings(img)[0]
            encodeList.append(encoded_face)
        return encodeList
    encoded_face_train = findEncodings(images)


    def markAttendance(name):
        with open('Attendance.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()
                time = now.strftime('%I:%M:%S:%p')
                date = now.strftime('%d-%B-%Y')
                f.writelines(f'{name}, {time}, {date},\n')
```

```
    # take pictures from webcam
    cap  = cv2.VideoCapture(0)
    while (True):
        success, img = cap.read()
        imgS = cv2.resize(img, (0,0), None, 0.25,0.25)
        imgS = cv2.cvtColor(imgS, cv2.COLOR_BGR2RGB)
        faces_in_frame = face_recognition.face_locations(imgS)
        encoded_faces = face_recognition.face_encodings(imgS, faces_in_frame)
        for encode_face, faceloc in zip(encoded_faces,faces_in_frame):
            matches = face_recognition.compare_faces(encoded_face_train, encode_face)
            faceDist = face_recognition.face_distance(encoded_face_train, encode_face)
            matchIndex = np.argmin(faceDist)
            print(matchIndex)
            if matches[matchIndex]:
                name = classNames[matchIndex].upper().lower()
                y1,x2,y2,x1 = faceloc
                # since we scaled down by 4 times
                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,y2-5), cv2.FONT_HERSHEY_COM-
PLEX,1,(255,255,255),2)
                markAttendance(name)
        cv2.imshow('webcam', img)
        if cv2.waitKey(1) & 0xFF == ord('q'):
            break
    cap.release()
    cv2.destroyAllWindows()

import pandas as pd
df=pd.read_csv("Attendance.csv")
df
row_count = df.shape[0]
print(row_count)
print(df)
path = 'C:\\Users\mayan\Project\dada_set'

images = []
classNames = []
mylist  = os.listdir(path)

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

from tkinter import *
from tkinter.ttk import *
import tkinter as tk
```

```
import tkinter.font as tkFont
import csv
filepath= 'C:\\Users\mayan\Project\Attendance.csv'
File = open(filepath)
Reader = csv.reader(File)
Data = list(Reader)
class App:

    def __init__(self, root):
        #setting title
        root.title("Face Recognition Attendance System")
        #setting window size
        width=600
        height=500
        screenwidth = root.winfo_screenwidth()
        screenheight = root.winfo_screenheight()
        alignstr = '%dx%d+%d+%d' % (width, height, (screenwidth - width) / 2, (screenheight -
height) / 2)
        root.geometry(alignstr)
        root.resizable(width=False, height=False)

        GLabel_72=tk.Label(root)
        ft = tkFont.Font(family='Times',size=23)
        GLabel_72["font"] = ft
        GLabel_72["fg"] = "#333333"
        GLabel_72["justify"] = "center"
        GLabel_72["text"] = "Face Recognition Attendance System"
        GLabel_72["relief"] = "ridge"
        GLabel_72.place(x=0,y=0,width=601,height=85)

        GButton_343=tk.Button(root)
        GButton_343["bg"] = "#ffffff"
        ft = tkFont.Font(family='Times',size=16)
        GButton_343["font"] = ft
        GButton_343["fg"] = "#000000"
        GButton_343["justify"] = "center"
        GButton_343["text"] = "Start Attendance"
        GButton_343.place(x=140,y=120,width=315,height=126)
        GButton_343["command"] = self.GButton_343_command

        GButton_303=tk.Button(root)
        GButton_303["bg"] = "#fbfbfb"
        ft = tkFont.Font(family='Times',size=16)
        GButton_303["font"] = ft
        GButton_303["fg"] = "#000000"
        GButton_303["justify"] = "center"
        GButton_303["text"] = "Check Attendance"
        GButton_303.place(x=140,y=300,width=313,height=127)
        GButton_303["command"] = CheckAttenWindow
```

```
    def GButton_343_command(self):
        AttenCall()



def CheckAttenWindow():
    top = Toplevel()
    top.title("Attendance")

    list_of_entries = []
    for x in list(range(0,len(Data))):
        list_of_entries.append(Data[x][0])
    listbox1 = Listbox(top)
    for x,y in enumerate(list_of_entries):
        listbox1.insert(x,y)
    listbox1.grid(row=0,column=0)

if __name__ == "__main__":
    root = tk.Tk()
    app = App(root)
    root.mainloop()
```

4. CONCLUSION

Face recognition systems are part of facial image processing applications and their significance as a research area are increasing recently. Implementations of system are crime prevention, video surveillance, person verification, and similar security activities. The face recognition system implementation can be part of Universities. Face Recognition Based Attendance System has been envisioned for the purpose of reducing the errors that occur in the traditional (manual) attendance taking system. The aim is to automate and make a system that is useful to the organization such as an institute. The efficient and accurate method of attendance in the office environment that can replace the old manual methods. This method is secure enough, reliable and available for use. Proposed algorithm is capable of detect multiple faces, and performance of system has acceptable good results

5. Future Recommendations

The system can be made more flexible and scalable using these recommendations. Please note that the system implemented here is just a prototype of idea presented via this project. The recommendations are as follows:

- The system can be extended to more number of students with freedom to change list of students according to class changes.
- The system can be made more flexible to allow updating of templates in case student incurs significant amount of change in his facial features.
- The system can also be extended to allow better face recognition algorithm in which even rotational features of face can be detected efficiently.