Face Recognition Based Attendance System

Submitted in partial fulfillment of the requirements of

**Mini Project (CSM501)**

for

Third Year of Computer Engineering

By

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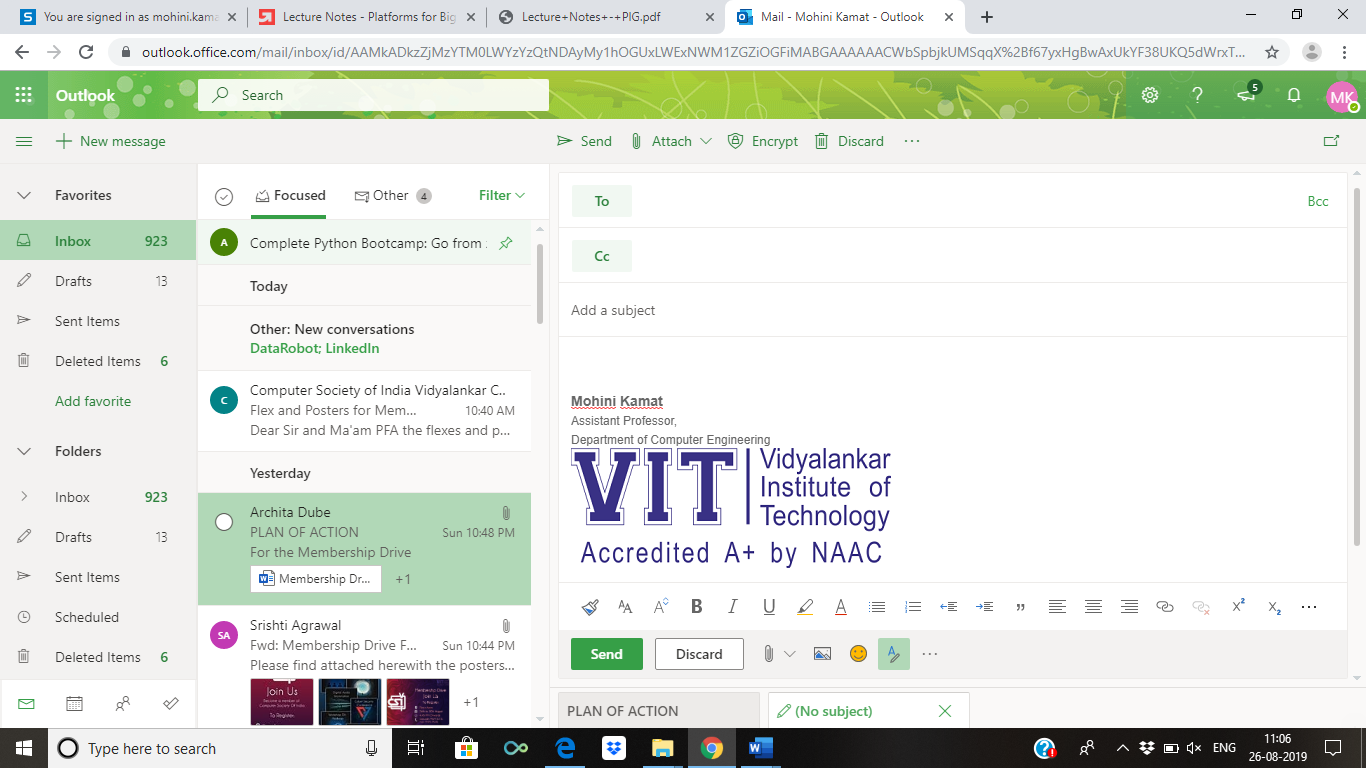
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**CERTIFICATE OF APPROVAL**

This is to certify that the project entitled

**“Face Recognition Based Attendance System”**

is a bonafide work of

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Mini Project Report Approval

This project report entitled ***Face Recognition Based Attendance System*** by

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is approved for Mini Project (CSM501) for Third Year of Computer Engineering.

|  |  |
| --- | --- |
| Internal Examiner | External Examiner |

Date:

Place:

Declaration

I declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

Name of student Roll No. Signature

1) Yash Patil 19102A0039 A picture containing text, clipart

Description automatically generated

2) Omkar Jalgoankar 19102A0051 Text, letter

Description automatically generated

3) Amey Arun Thorat 19102B0049 Text, whiteboard

Description automatically generated

4) Payas Patel 20102B2007 

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Place: Mumbai

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**Abstract**

Uniqueness or individuality of an individual face is the representation of one’s identity. In this project face of an individual is used for the purpose of attendance making automatically. Attendance of the student is very important for every college, universities and school. Conventional methodology for taking attendance is by calling the name or roll number of the student and the attendance is recorded. Time consumption for this purpose is an important point of concern. Assume that the duration for one subject is around 60 minutes or 1 hour & to record attendance takes 5 to 10 minutes. For every tutor this is consumption of time. To stay away from these losses, an automatic process is used in this project which is based on image processing. In this project face detection and face recognition is used. Face detection is used to locate the position of face region and face recognition is used for marking the understudy’s attendance. The database of all the students in the class is stored and when the face of the individual student matches with one of the faces stored in the database then the attendance is recorded.

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**Introduction**

Attendance is prime important for both the teacher and student of an educational organization. So it is very important to keep record of the attendance. The problem arises when we think about the traditional process of taking attendance in class room. Calling name or roll number of the student for attendance is not only a problem of time consumption but also it needs energy. So an automatic attendance system can solve all above problems.

There are some automatic attendances making system which are currently used by much institution. One of such system is biometric technique and RFID system. Although it is automatic and a step ahead of traditional method it fails to meet the time constraint. The student has to wait in queue for giving attendance, which is time taking.

This project introduces an involuntary attendance marking system, devoid of any kind of interference with the normal teaching procedure. The system can be also implemented during exam sessions or in other teaching activities where attendance is highly essential. This system eliminates classical student identification such as calling name of the student, or checking respective identification cards of the student, which can not only interfere with the ongoing teaching process, but also can be stressful for students during examination sessions. In addition, the students have to register in the database to be recognized. The enrolment can be done on the spot through the user-friendly interface.

**Problem Definition**

Traditional student attendance marking technique is often facing a lot of trouble. The face recognition student attendance system emphasizes its simplicity by eliminating classical student attendance marking technique such as calling student names or checking respective identification cards. There are not only disturbing the teaching process but also causes distraction for students during exam sessions. Apart from calling names, attendance sheet is passed around the classroom during the lecture sessions. The lecture class especially the class with a large number of students might find it difficult to have the attendance sheet being passed around the class. Thus, face recognition attendance system is proposed in order to replace the manual signing of the presence of students which are burdensome and causes students get distracted in order to sign for their attendance. Furthermore, the face recognition based automated student attendance system able to overcome the problem of fraudulent approach and lecturers does not have to count the number of students several times to ensure the presence of the students.

The paper proposed by Zhao, W et al. (2003) has listed the difficulties of facial identification. One of the difficulties of facial identification is the identification between known and unknown images. In addition, paper proposed by Pooja G.R et al. (2010) found out that the training process for face recognition student attendance system is slow and time-consuming. In addition, the paper proposed by Priyanka Wagh et al. (2015) mentioned that different lighting and head poses are often the problems that could degrade the performance of face recognition based student attendance system.

Hence, there is a need to develop a real time operating student attendance system which means the identification process must be done within defined time constraints to prevent omission. The extracted features from facial images which represent the identity of the students have to be consistent towards a change in background, illumination, pose and expression. High accuracy and fast computation time will be the evaluation points of the performance.

**Literature Survey**

**Student Attendance System**

Arun Katara et al. (2017) mentioned disadvantages of RFID (Radio Frequency Identification) card system, fingerprint system and iris recognition system. RFID card system is implemented due to its simplicity. However, the user tends to help their friends to check in as long as they have their friend’s ID card. The fingerprint system is indeed effective but not efficient because it takes time for the verification process so the user has to line up and perform the verification one by one. However for face recognition, the human face is always exposed and contain less information compared to iris. Iris recognition system which contains more detail might invade the privacy of the user. Voice recognition is available, but it is less accurate compared to other methods. Hence, face recognition system is suggested to be implemented in the student attendance system.

**Digital Image Processing**

Digital Image Processing is the processing of images which are digital in nature by a digital computer. Digital image processing techniques are motivated by three major applications mainly:

• Improvement of pictorial information for human perception

• Image processing for autonomous machine application

• Efficient storage and transmission.

**Image Representation in a Digital Computer**

An image is a 2-Dimensional light intensity function 𝐟 (𝐱,𝐲) = 𝐫 (𝐱,𝐲) × 𝐢 (𝐱,𝐲) - (2.0) Where, r (x, y) is the reflectivity of the surface of the corresponding image point. i (x,y) Represents the intensity of the incident light. A digital image f(x, y) is discretized both in spatial co-ordinates by grids and in brightness by quantization[3]. Effectively, the image can be represented as a matrix whose row, column indices specify a point in the image and the element value identifies gray level value at that point. These elements are referred to as pixels or pels. Typically following image processing applications, the image size which is used is𝟐𝟓𝟔 × 𝟐𝟓𝟔, elements, 𝟔𝟒𝟎 × 𝟒𝟖𝟎 pels or 𝟏𝟎𝟐𝟒 × 𝟏𝟎𝟐𝟒 pixels. Quantization of these matrix pixels is done at 8 bits for black and white images and 24 bits for colored images (because of the three color planes Red, Green and Blue each at 8 bits).

**Steps in Digital Image Processing**

Digital image processing involves the following basic tasks:

• Image Acquisition - An imaging sensor and the capability to digitize the signal produced by the sensor.

• Preprocessing – Enhances the image quality, filtering, contrast enhancement etc.

• Segmentation – Partitions an input image into constituent parts of objects.

• Description/feature Selection – extracts the description of image objects suitable for further computer processing.

• Recognition and Interpretation – Assigning a label to the object based on the information provided by its descriptor.

Diagram

Description automatically generated

**Flow Chart**

**Algorithm**

**Pre-requirements**

* Installing the Required Libraries of the Python.
* Making the Folder for Database(Image) and Attendance File.
* Adding Images of Attendees with Name.png Extension in Image Folder.

**Algorithm For Dataset**

1. Start
2. Calling the “Image” Folder using OS library of Python.
3. Calling the Name of File.
4. Creating the list in which name of the file is copied without extension “.png”.
5. Display the Output with Unique ID and the List which is made.
6. Making the CSV file in which the Name, File Name, Unique ID(Roll No.).
7. Exit.

**Algorithm For Face Recognition**

1. Start.
2. Get a reference to webcam.
3. Initialize variables.
4. Reading the dataset which is made in Dataset Algorithm.
5. Loading the picture and recognize the face of it.
6. Load a sample picture and learn how to recognize it.
7. Create arrays of known face encodings and their names.
8. Create function for face\_encoding and their roll\_no.
9. Making of attendance file.
10. Grab a single frame of video and resize frame of video to 1/4 size for faster face recognition processing.
11. Find all the faces and face encodings in the current frame of video.
12. See if the face is a match for the known face and instead, use the known face with the smallest distance to the new face.
13. Display the data of recognised face and entry data into attendance file.
14. Come out of the Face Recognition Algorithm.
15. Display the name of people which is recognised by help of webcam on top left of webcam window and draw the box around face in a webcam.
16. Hit 'q' on the keyboard to quit the webcam window.
17. Sending email using yagmail library.
18. Exit.

**Code**

**Code for Dataset**

import os

import pandas as pd

#Path for images

image = os.path.join("Images")

data = []

for index, filename in enumerate(os.listdir(image), start=1):

if filename.endswith(".png"):

# Getting the real name of given sample picture

new\_name=filename.rsplit('.',1)[0]

print(new\_name)

# Making the data of given information for saving into excel csv file

data.append([new\_name, filename, index])

# Making the csv file and saving the data in it

df = pd.DataFrame(data, columns=['Name', 'Image', 'Roll no.'])

df.to\_csv("DATASET.csv" , index=False)

print("\nCSV FILE IS MADE AND DATSET IS USED FOR FACE RECOGINITION.")

**Code For Face Recognition**

import face\_recognition

import cv2

import numpy as np

import os

import pandas as pd

import datetime

import yagmail

# Get a reference to webcam #0 (the default one)

video\_capture = cv2.VideoCapture(0)

# Initialize some variables

known\_face\_encodings = []

known\_face\_roll\_no = []

face\_locations = []

face\_encodings = []

face\_names = []

process\_this\_frame = True

attendance\_record = set([])

roll\_record = {}

# Reading the dataset

df = pd.read\_csv("DATASET.csv")

print("Loading the picture and recognize the face in it.")

# And loading the picture and recognize the face of it.

for key, row in df.iterrows():

roll\_no = row['Roll no.']

name = row['Name']

image\_path = row['Image']

roll\_record[roll\_no] = name

# Load a sample picture and learn how to recognize it.

image = face\_recognition.load\_image\_file("Images" + os.sep + image\_path)

# Create arrays of known face encodings and their names

face\_encoding = face\_recognition.face\_encodings(image)[0]

# Create function for face\_encoding and their roll\_no

known\_face\_encodings.append(face\_encoding)

known\_face\_roll\_no.append(roll\_no)

# Making of attendence file

e=datetime.datetime.now()

d1=e.strftime("(%B %d , %Y) (%I-%M-%S %p)")

filename = "Attendance" + os.sep + "Attendance Record" + d1 + ".csv"

print("Attendance file is made!")

# Rows in attendence file

name\_col = []

roll\_no\_col = []

time\_col = []

print("Starting the Webcam for Face Recognition.\n")

while True:

# Grab a single frame of video

ret, frame = video\_capture.read()

# Resize frame of video to 1/4 size for faster face recognition processing

small\_frame = cv2.resize(frame, (0, 0), fx=1, fy=1)

# Convert the image from BGR color (which OpenCV uses) to RGB color (which face\_recognition uses)

rgb\_small\_frame = small\_frame[:, :, ::-1]

# Only process every other frame of video to save time

if process\_this\_frame:

# Find all the faces and face encodings in the current frame of video

face\_locations = face\_recognition.face\_locations(rgb\_small\_frame)

face\_encodings = face\_recognition.face\_encodings(rgb\_small\_frame, face\_locations)

# Find and manipulate facial features in webcam

#face\_landmarks\_list=face\_recoginition.face\_landmarks(rgb\_small\_frame)

face\_names = []

for face\_encoding in face\_encodings:

# See if the face is a match for the known face(s)

matches = face\_recognition.compare\_faces(known\_face\_encodings, face\_encoding, tolerance=0.5)

name = "Unknown"

# If a match was found in known\_face\_encodings, just use the first one.

# if True in matches:

# first\_match\_index = matches.index(True)

# name = known\_face\_roll\_no[first\_match\_index]

# Or instead, use the known face with the smallest distance to the new face

face\_distances = face\_recognition.face\_distance(known\_face\_encodings, face\_encoding)

best\_match\_index = np.argmin(face\_distances)

if matches[best\_match\_index]:

roll\_no = known\_face\_roll\_no[best\_match\_index]

# Add this to the file

name = roll\_record[roll\_no]

if roll\_no not in attendance\_record:

attendance\_record.add(roll\_no)

# Display the data of recogined face

print(name , roll\_no)

name\_col.append(name)

roll\_no\_col.append(roll\_no)

time = datetime.datetime.now()

clock = time.strftime("%H:%M:%S")

time\_col.append(clock)

# Entrying data into attendance file

data = {'Name': name\_col, 'Roll No.': roll\_no\_col, 'Time': time\_col}

df=pd.DataFrame(data)

df.to\_csv(filename ,index=False)

face\_names.append(name)

process\_this\_frame = not process\_this\_frame

# Display the results

for (top, right, bottom, left), name in zip(face\_locations, face\_names):

# Scale back up face locations since the frame we detected in was scaled to 1/4 size

# top \*= 2

# right \*= 2

# bottom \*= 2

# left \*= 2

# Draw a box around the face

cv2.rectangle(frame, (left, top), (right, bottom), (0, 255, 0), 2)

font = cv2.FONT\_HERSHEY\_COMPLEX

# Display the name of people which is recognised by help of webcam on top left of webcam window

cv2.putText(frame, name, (10 , 40) ,font , 1.0 , (255, 255, 0) , 1)

# Display the roll no. of people which is recognised by help of webcam on top right of webcam window

# And For displaying the number on webcam screen please convert number from int into str(string)

# if name != "Unknown" :

# cv2.putText(frame, str(roll\_no), (600 , 40),font , 1.0 , (255, 255, 0) , 1)

# Display the resulting image

cv2.imshow('WEBCAM', frame)

# Hit 'q' on the keyboard to quit!

if cv2.waitKey(1) == ord('q'):

break

# Release handle to the webcam

video\_capture.release()

cv2.destroyAllWindows()

# Attendance is register successful and file is made and saved

print("Attendance is registered Successful!\n")

#Sending email using yagmail library with help of smtp

yag=yagmail.SMTP('yash.patil1@vit.edu.in','Zxcos@6601' ,host='smtp.office365.com', port=587, smtp\_starttls=True, smtp\_ssl=False)

#Make your account enable for less secure apps

#Copy this for account enable :- https://www.google.com/settings/security/lesssecureapps

name=input('Enter the Email id for receiving the attendance sheet : ')

receiver=name.split(' , ')

d=datetime.datetime.now()

d2=d.strftime("%B %d , %Y (%I-%M-%S %p)")

yag.send(to = receiver, subject = 'Attendance Using Face Recognition via yagmail' , contents = 'Attendance Sheet with time - ' + d2 , attachments = filename)

print("\nGmail is Sended to all given mail id!")

Output

Dataset

Graphical user interface, application, Word

Description automatically generated

Graphical user interface, application, table, Excel

Description automatically generated

Face Recognition

Graphical user interface, application

Description automatically generated

Mail Sent

Graphical user interface, text, application, email

Description automatically generated

Mail Recieved

Graphical user interface, text, application, email

Description automatically generated

**Conclusion**

This chapter of the report contains the results that we achieved throughout the course of using this system. Results Achieved From initiation through conclusion of developing this system the following results has been achieved.

They are as follows:

• The system can be administered by a non-IT technician.

• The system is market ready for commercial use.

• The system has the capacity to carry up to a thousand faces to recognize.

• The system can serve as much people as they want within an organization.

This chapter has covered the different types of results that we have managed to obtain throughout the course of using this system.

**Future Scope**

There are so many future scope on this project.

Some of them are

* Can improve security .
* Can used in big factory or employee attendance.
* Can build on fully web based system.
* In future, we are going to make our project online.
* To make almost accuracy we need to use more powerful hardware and also need more resources.

**References**

* **Article** [**https://www.researchgate.net/publication/323390774\_Face\_detection\_and\_Recognition\_A\_review**](https://www.researchgate.net/publication/323390774_Face_detection_and_Recognition_A_review)
* **Blog**

[**https://www.mygreatlearning.com/blog/face-recognition/**](https://www.mygreatlearning.com/blog/face-recognition/)

* **Websites**

[**https://www.eff.org/pages/face-recognition**](https://www.eff.org/pages/face-recognition)

[**https://us.norton.com/internetsecurity-iot-how-facial-recognition-software-works.html**](https://us.norton.com/internetsecurity-iot-how-facial-recognition-software-works.html)

[**https://face-recognition.readthedocs.io/en/latest/readme.html**](https://face-recognition.readthedocs.io/en/latest/readme.html)

* **Youtube Links**

[**https://youtu.be/uwJltCOrpEI**](https://youtu.be/uwJltCOrpEI)

[**https://youtu.be/xaDJ5xnc8dc**](https://youtu.be/xaDJ5xnc8dc)