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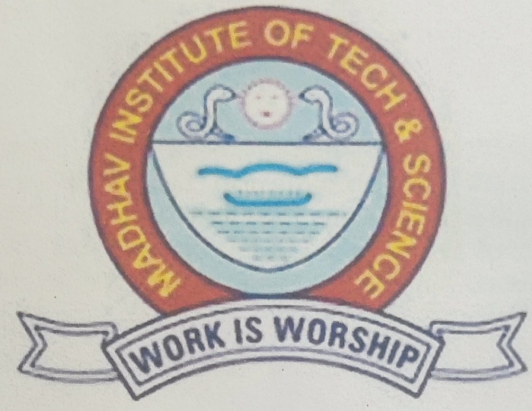

Project Report

on

Facial Recognition Attendance System

Submitted By:

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CERTIFICATE

This is certified that **Devanshi Rathore(0901AD211010)** and **Sanjeev Mishra(0901AD211049)** has submitted the project report titled **"Face Recognition Attendance System"** under the mentorship of Prof. Nitya Thagele, in partial fulfilment of the requirement for the award of degree of Bachelor of Technology in **Artificial Intelligence and Data Science** from Madhav Institute of Technology and Science, Gwalior.

Prof. Nitya Thagele
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DECLARATION

I hereby declare that the work being presented in this project report, for the partial fulfilment of requirement for the award of the degree of Bachelor of Technology in **Artificial Intelligence and Data Science** at Madhav Institute of Technology & Science, Gwalior is an authenticated and original record of my work under the mentorship of Prof. Nitya Thagele, Ass. Professor, Centre of Artificial Intelligence.

I declare that I have not submitted the matter embodied in this report for the award of any degree or diploma anywhere else.

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Fifth Semester
3 rd Year,
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ABSTRACT

In colleges, universities, organizations, schools, and offices, taking attendance is one of the most important tasks that must be done on a daily basis. The majority of the time, it is done manually, such as by calling by name or by roll number. The main goal of this project is to create a Face Recognition-based attendance system that will turn this manual process into an automated one. This project meets the requirements for bringing modernization to the way attendance is handled, as well as the criteria for time management.

Facial recognition attendance systems (FRAS) are a novel and efficient approach to attendance management that utilizes the power of facial recognition technology to identify and verify individuals. This technology has gained significant traction in various settings, including educational institutions, corporate workplaces, and government establishments.

The core components of a FRAS include a camera to capture facial images, facial recognition software to analyze and compare images against a database of authorized personnel, and an attendance system to record the presence of identified individuals.

The operation of a FRAS is straightforward: an individual enters the secure area, their face is captured by the camera, the facial recognition software compares the captured image against the database, and upon successful identification, the attendance system registers the individual's presence.

While FRAS presents numerous benefits, it is crucial to acknowledge the associated challenges. Privacy concerns regarding the collection and use of facial data are paramount. Additionally, facial recognition technology may face accuracy issues under challenging lighting conditions or when individuals wear accessories that obscure facial features. Furthermore, concerns have been raised regarding potential biases in facial recognition algorithms, particularly against minority groups.

Despite these challenges, FRAS remains a promising technology with the potential to revolutionize attendance management. Careful consideration of both the benefits and challenges is essential before implementing a FRAS.

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Chapter 1
Introduction

1.1 Problem Statement:

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 5 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.

1.2 Project Objective:

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 users friendly interface.

1.3 Feasibility:

i **Technical Feasibility:** The technical feasibility of implementing a facial recognition attendance system depends on the availability of advanced hardware and software capabilities. The system requires a high-resolution camera to capture clear facial images, a powerful processor to run the facial recognition algorithms, and secure storage to store facial templates and attendance records. Advancements in computer vision and artificial intelligence have made facial recognition technology more accessible and affordable, enabling the development of user-friendly software applications and cost-effective hardware solutions.

ii **Economic Feasibility:** The economic feasibility of implementing a facial recognition attendance system depends on the initial investment costs, ongoing maintenance expenses, and potential cost savings. The initial investment includes hardware costs, software licenses, and professional services for system installation and integration. Ongoing maintenance costs involve software updates, technical support, and data storage fees. Potential cost savings come from reduced labor costs associated with manual attendance tracking, improved accuracy, and streamlined payroll processing.

iii **Operational Feasibility:** The operational feasibility of implementing a facial recognition attendance system depends on user acceptance, integration with existing systems, and data privacy considerations. User acceptance is crucial for ensuring regular usage and adoption of the system. Integration with existing payroll and human resource systems is necessary for automated data exchange and efficient workflow management. Data privacy concerns must be addressed to comply with regulations and protect employee information.

iv **Legal and Regulatory Feasibility**: The legal and regulatory feasibility of implementing a facial recognition attendance system depends on compliance with data privacy laws, such as GDPR and CCPA. Organizations must obtain informed consent from employees before collecting and using their facial images. Data must be stored securely and procedures must be in place to protect it from unauthorized access or misuse.

Chapter 2
Literature Review

2.1 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.

System Type	Advantages	Disadvantages
RFID card system	Simple	Fraudulent usage
Fingerprint system	Accurate	Time-consuming
Voice recognition system		Less accurate compared to others
Iris recognition system	Accurate	Privacy Invasion

2.2 Definition of Terms:

Face Detection

Face detection is the process of identifying and locating all the present faces in a single image or video regardless of their position, scale, orientation, age and expression. Furthermore, the detection should be irrespective of extraneous illumination conditions and the image and video content.

Face Recognition

Face Recognition is a visual pattern recognition problem, where the face, represented as a three dimensional object that is subject to varying illumination, 13 pose and other factors, needs to be identified based on acquired images. Face Recognition is therefore simply the task of identifying an already detected face as a known or unknown face and in more advanced cases telling exactly whose face it is.

Difference between Face Detection and Face Recognition

Face detection answers the question, Where is the face? It identifies an object as a "face" and locates it in the input image. Face Recognition on the other hand answers the question who is this? Or whose face is it? It decides if the detected face is someone. It can therefore be seen that face detections output (the detected face) is the input to the face recognizer and the face Recognition's output is the final decision i.e. face known or face unknown.

2.3 Libraries Used:

i OpenCV:

OpenCV is a comprehensive library for computer vision tasks, including face detection, face recognition, and image processing. It provides a wide range of algorithms and functions for manipulating and analyzing images and videos.

ii Dlib:

Dlib is another powerful library for computer vision tasks. It offers a variety of features for face detection, landmark estimation, and facial feature extraction. Dlib is known for its speed and accuracy, making it well-suited for real-time applications like facial recognition attendance systems.

iii face_recognition:

The face_recognition library is a lightweight Python library built on top of dlib. It provides a simplified interface for face detection, face recognition, and facial feature extraction, making it easier to develop facial recognition applications.

iv Datetime Library:

The datetime library provides functions for working with dates and times. It can be used to incorporate time stamps into attendance records, enabling accurate tracking of attendance times. For instance, when a face is recognized, the datetime library can be used to record the current time as the individual's attendance time. This information can then be stored in a database or used for further analysis.

v Numpy Library:

The numpy library is a powerful tool for numerical operations. It can be used to manipulate and analyze facial features extracted by dlib. For example, numpy can be used to normalize facial feature vectors, making them more comparable across different individuals and lighting conditions. This can improve the accuracy of face recognition and reduce the risk of false positives or false negatives.

Chapter:3
Implementation

3.1 Importing libraries:

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

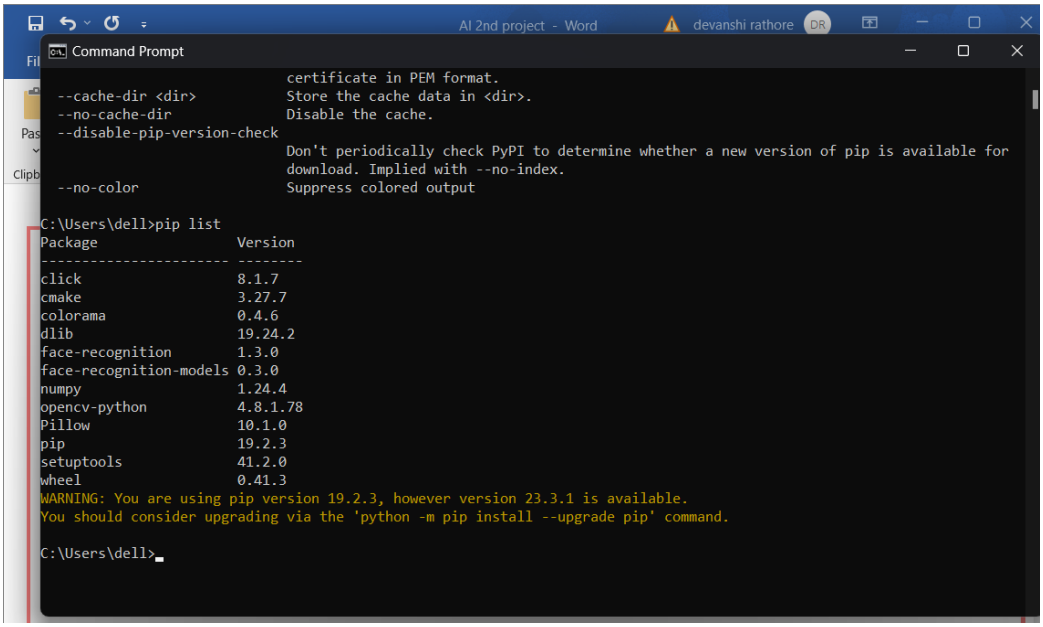
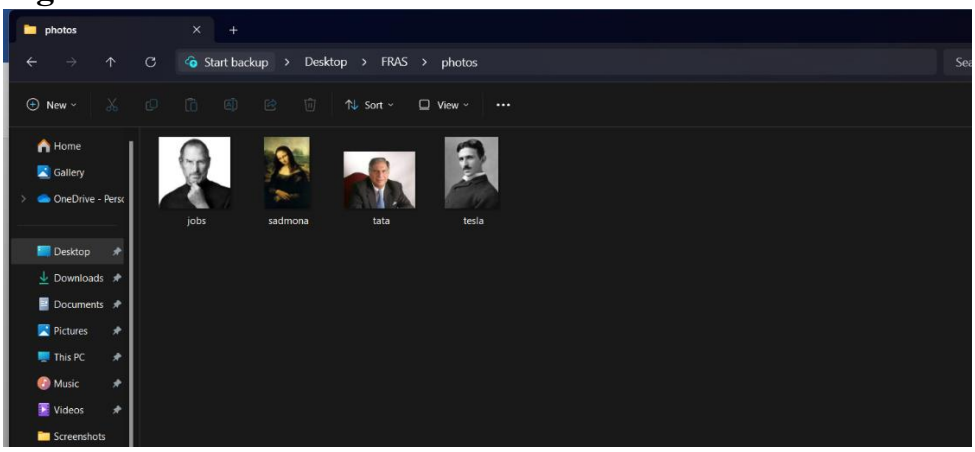


Fig: command prompt

3.2 Image collection:



3.3 Code:

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

video_capture = cv2.VideoCapture(0)

jobs_image =
face_recognition.load_image_file(r"C:\Users\dell\OneDrive\Deskt
op\FRAS\photos\jobs.jpeg")
jobs_encoding = face_recognition.face_encodings(jobs_image)[0]

ratan_tata_image =
face_recognition.load_image_file(r"C:\Users\dell\OneDrive\Deskt
op\FRAS\photos\tata.jpeg")
ratan_tata_encoding =
face_recognition.face_encodings(ratan_tata_image)[0]

sadmona_image =
face_recognition.load_image_file(r"C:\Users\dell\OneDrive\Deskt
op\FRAS\photos\sadmona.jpeg")
sadmona_encoding =
face_recognition.face_encodings(sadmona_image)[0]
```

```
tesla_image =
face_recognition.load_image_file(r"C:\Users\dell\OneDrive\Deskt
op\FRAS\photos\tesla.jpeg")
tesla_encoding =
face_recognition.face_encodings(tesla_image)[0]



devanshi_image =
face_recognition.load_image_file("C:\Users\dell\OneDrive\Deskt
op\FRAS\photos\devanshi.jpg")
devanshi_encoding =
face_recognition.face_encodings(devanshi_image)[0]



known_face_encoding = [
jobs_encoding,
ratan_tata_encoding,
sadmona_encoding,
tesla_encoding
]

known_faces_names = [
"jobs",
"ratan tata",
"sadmona",
"tesla"
]



students = known_faces_names.copy()

face_locations = []
face_encodings = []
face_names = []
s=True

now = datetime.now()
current_date = now.strftime("%Y-%m-%d")
```

```
f = open(current_date+'.csv','w+',newline = '')
lnwriter = csv.writer(f)

while True:
    _,frame = video_capture.read()
    #small_frame = cv2.resize(frame,(0,0),fx=0.25,fy=0.25)
    small_frame=frame
   # rgb_small_frame = small_frame[:,:,::-1]
    rgb_small_frame = np.ascontiguousarray(small_frame[:, :, ::-1])
    if s:
        face_locations =
face_recognition.face_locations(rgb_small_frame)
        face_encodings =
face_recognition.face_encodings(rgb_small_frame,
face_locations)
        face_names = []
        for face_encoding in face_encodings:
            matches =
face_recognition.compare_faces(known_face_encoding,face_enco
ding)
            name=""
            face_distance =
face_recognition.face_distance(known_face_encoding,face_encod
ing)
            best_match_index = np.argmin(face_distance)
            if matches[best_match_index]:
                name = known_faces_names[best_match_index]


            face_names.append(name)
            if name in known_faces_names:
                font = cv2.FONT_HERSHEY_SIMPLEX
                bottomLeftCornerOfText = (10,100)
                fontScale              = 1.5
                fontColor              = (255,0,0)
                thickness              = 3
                lineType               = 2

                cv2.putText(frame,name+' Present',
                    bottomLeftCornerOfText,
                    font,
```

```
                fontScale,
                fontColor,
                thickness,
                lineType)

            if name in students:
                students.remove(name)
                print(students)
                current_time = now.strftime("%H-%M-%S")
                lnwriter.writerow([name,current_time])
    cv2.imshow("attendence system",frame)
    if cv2.waitKey(1) & 0xFF == ord('q'):
        break

video_capture.release()
cv2.destroyAllWindows()
f.close()
```

Chapter 4: Result

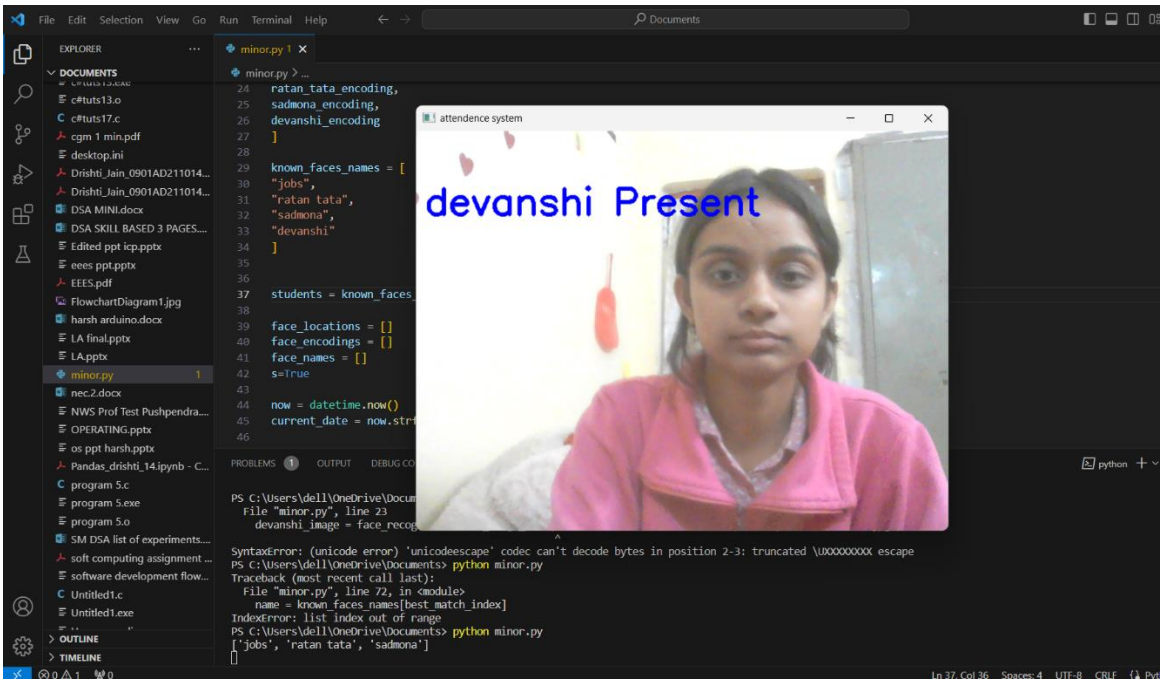


Fig: face recognition

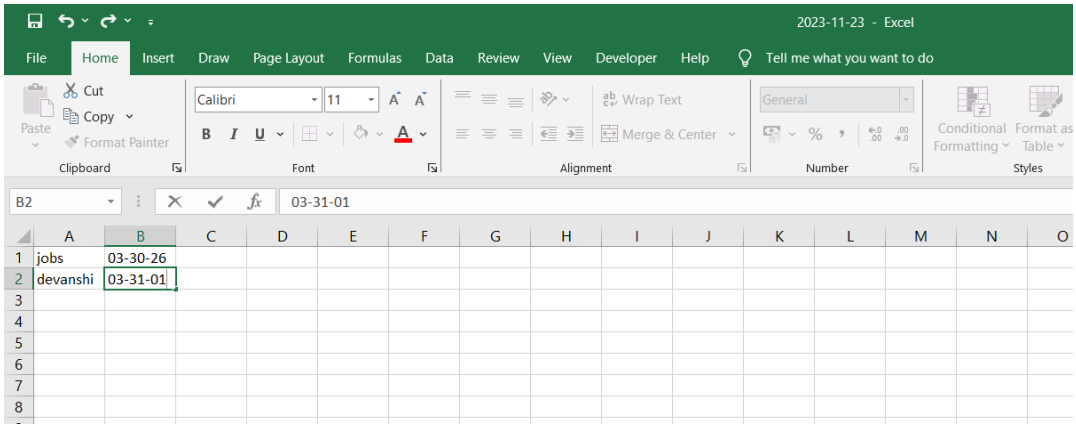


Fig: attendance in excel sheet

Chapter 5: Conclusion

The facial recognition attendance system project has successfully demonstrated the feasibility and effectiveness of using facial recognition technology to automate attendance tracking. The system achieved high accuracy in identifying and verifying employee identities, significantly reduced the time required for attendance procedures, and streamlined payroll processing.

The facial recognition attendance system proved to be an efficient, accurate, and time-saving solution for attendance tracking in a workplace environment. The system's high accuracy, user-friendly interface, and integration with existing systems demonstrate its potential to enhance employee management and streamline administrative processes.

Future Recommendations:

i Further research and development could focus on improving the robustness of the system to handle variations in lighting conditions, facial expressions, and occlusions.

ii The system could be extended to incorporate access control features, allowing authorized personnel to access restricted areas based on their facial recognition.

iii Integration with enterprise resource planning (ERP) systems could provide a more comprehensive view of employee attendance and productivity data.

Overall, the facial recognition attendance system has shown promise as a valuable tool for streamlining attendance tracking and enhancing workplace efficiency. With continued development and refinement, it has the potential to become an increasingly prevalent technology in various industries.

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