SMART ATTENDANCE SYSTEM USING

PRINCIPAL COMPONENT ANALYSIS ALGORITHM

MINI PROJECT REPORT

Submitted by

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BONAFIDE CERTIFICATE

2022-2023

Certified that this project report "**SMART ATTENDANCE SYSTEM USING PCA ALGORITHM**" is the bonafide work of **LIVYA K (422420205020)** and **YOGISHWARI R (422420205050)** who carried out the Mini Project work.

Submitted for the University Examination held on _____

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ABSTRACT

The objective of this system is to present an automated system for human face recognition for an organization or institute to mark the attendance of their students. The management of the attendance can be a great burden on the teachers if it is done by hand. To resolve this problem, smart and auto attendance management system is being utilized. By utilizing this framework, the problem of proxies and students being marked present even though they are not physically present can easily be solved. This system marks the attendance using live video stream. The frames are extracted from video using OpenCV. The main implementation steps used in this type of system are face detection and recognizing the detected face, for which dlib is used. After these, the connection of recognized faces ought to be conceivable by comparing with the database containing student's faces. This model will be a successful technique to manage the attendance of students. In my face recognition project, a computer system will be able to find and recognize human faces fast and precisely in images or videos that are being captured through a surveillance camera , Numerous algorithms and techniques have been developed for improving the performance of face recognition but the concept to be implemented here is PCA. It helps in conversion of the frames of the video into images so that the face of the student can Feature-based approach be easily recognized for their attendance so that the attendance database can be easily reflected automatically.

YOGISHWARI R

LIVYA K

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Generally, in the classroom the attendance was taken by the teachers manually at the beginning and ending of the class which is time consuming and some chances to make mistakes. The main objective the proposed system is to allot attendance to the students using face recognition-based algorithms to achieve failures through Traditional attendance system. Face detection is used for identification of human faces in digital images or video. It is defined as specific case of object-class detection. Faces are made of thousands of fine lines and features that must be matched. Python is the latest technology in Machine Learning techniques. Open CV utilizes Machine Learning algorithms to search for faces within a picture. Principal Component Analysis is a dimensionality reduction technique widely used in machine learning and data analysis. It helps in identifying the most important features or components from a dataset while minimizing the loss of information. In the context of a smart attendance system, PCA can be employed to extract relevant information from attendance data and facilitate accurate and efficient attendance tracking.

1.2 PROBLEM STATEMENT

Smart attendance system is a problem of recognizing face for taking attendance by using face recognition technology based on high definition monitor video and other information technology the human faces can be detected and recognized. Where the input image is searched to find any face in the video . The output is where the detected and processed face is compared to the dataset of known faces to decide who that person and store it in a excel sheet. The objective of this project is to create a Smart Attendance System that utilizes Principal Component Analysis to accurately recognize and record attendance in an efficient and cost-effective manner. PCA is a dimensionality reduction technique that can be applied to facial recognition tasks. By extracting the most significant features from facial images, PCA can provide a reliable basis for recognizing individuals, even in the presence of variations in lighting, pose, and facial expressions.

1.3 SCOPE

It Provides facility for the automatic attendance of students .Uses live face recognition to recognize each individual and mark their attendance automatically. Utilizes video and image processing to provide inputs to the system .Facility of marking manual attendance .The main objective of this project is to offer system that simplify and automate the process of recording and tracking students attendance. Reduces manual process errors by provide automated and reliable attendance system. flexibility in monitoring and editing the attendance records. Its easy to setup and use , helps in managing the time and attendance profiles of the students it enhances security and speed in tracking student attendance and lecture time. However, can be implemented in an educational institution, efficient algorithm which is insensitive to the lighting conditions of the classroom has to be developed .

1.4 FEASIBILITY STUDY

The goal of the feasibility study is to get a feel of the problem's extent as well as to solve it. A feasibility study evaluates the project's potential for success. The goal is to find smart attendance system examines the viability and practicality of implementing the attendance system.

1.4.1 Technical Feasibility

A technical feasibility study is conducted to examine whether a project is possible in terms of software, hardware, manpower, and skills to complete. The system is platform neutral because it is written in Python. As a result, users of the system can run on any platform and have average processing capabilities . Python is a simple and easy-to-use programming language with high developmental efficiency. It is also an open-source project. Software and tools required to create and use this system are easily available online free of cost. Downloading and installing these tools is fairly easy using a good internet connection. On the software side, we used Visual Studio code for all the coding purposes using python as the coding language. Hardware required for this system are elementary things such as a decently powerful computer/laptop with a webcam.

1.4.2 Economic Feasibility

Economic feasibility defines whether the expected benefit equals or exceeds the expected costs. It is also commonly referred to as cost/benefit analysis. This system is quite feasible economically as it does not require any paid software and all the tools, software, languages are free and available on the internet. It requires elementary things such as a laptop or a personal computer with a webcam and a stable internet connection which is nowadays in this online world available with everyone. The system is simple to comprehend and operate. As a result, there is no need to invest in training in order to utilize the system . This system has the ability to expand by including features for both students and teachers.

1.4.3 Operational Feasibility

Operational feasibility is the measure of how well a proposed system solves the problems with the users. Operational feasibility is dependent on human resources available for the project and involves projecting whether the system will be used if it is developed and implemented. The project is operationally feasible for the users as nowadays almost all the teachers/staffs are familiar with digital technology. The face recognition attendance system does not need to have any third-party software installed; it only needs the client's computer with a web browser. The system is very straight-forward and convenient for employees. Employees only need to carry out facial recognition using the system and then click to log in to check their daily attendance reports with the program. This system is easy to use with an intuitive GUI which helps people with no technical knowledge to use it without any problems. The installation of tools and software is also quite easy and people can set this system up on their PC .

CHAPTER 2

SYSTEM DESIGN

2.1 LITERATURE REVIEW

Smart attendance system using OpenCv has gained significant attention in recent years due to potential applications in various fields. Numerous studies have been introduced and conducted on this topic focusing on different aspects some of the studies include:

An approach to face recognition under uncontrolled conditions : Xin Geng,Zhi hua Zhou , smith mines (2008) . It is based on artificial intelligence In this paper he Proposed a face recognition under uncontrolled condition.

Prototype model for an intelligent system based on facial identification: Raj Malik, Praveen Kumar, Amit Verma, Seema Rawat(2006). This paper propose ADA boost algorithm with techniques PCA and LDA Hybrid algorithm which can works only for a single image of a system.

CNN vision based student recognition System: Nusrat Mubin Aral (2017).This paper propose Alex NET CNNs and RFID Technology which can wont work on all the students until it is improved.

Face recognition based attendance system using machine learning algorithms: Radhika C. Damali(2017). This paper propose and uses the methodology of local binary pattens LDA based open cv which has issues with system performance and accuracy.

Attendance Marking system based on Face Recognition: Khem Puthea, Rudy Hartanto and Risanuri Hid(2017). This Paper Propose the attendance marking system in matlab which uses face recognition technology that identifies the human or a person and it validates the person by extracting the feature of the person.

Overall , the literature suggests that Smart attendance using pca is an Promising and emerging technology as of now.

2.2 SYSTEM ARCHITECTURE

A system architecture is a conceptual model that defines the structure, more views of system. Figure 1 states the system architecture of Smart Attendance system.

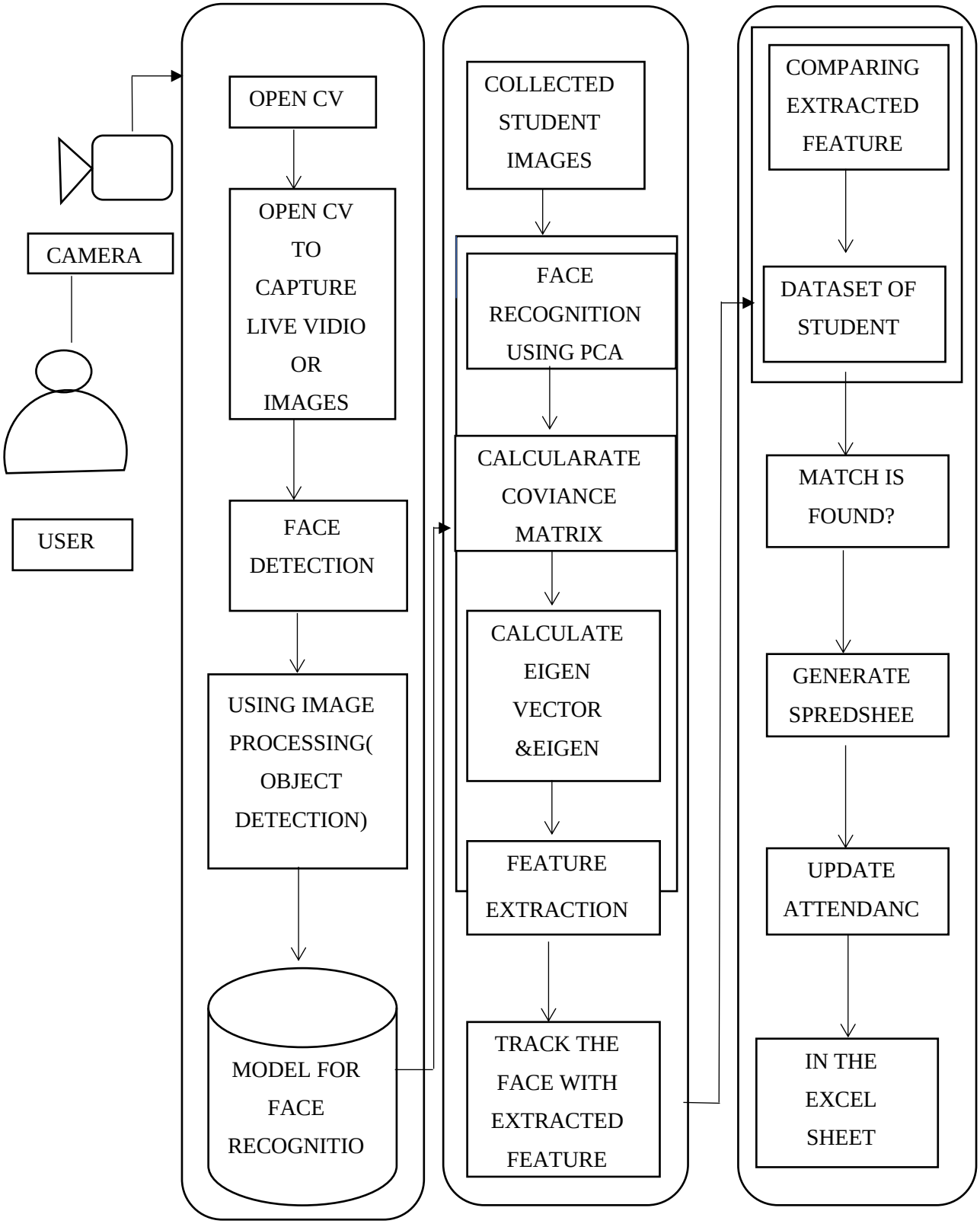

Figure 1 Smart Attendance system using PCA

2.3 DATA FLOW DIAGRAM

Data Flow Diagram Level 0

A level 0 data flow diagram (DFD) provides a high-level overview of the system and identifies the major processes involved. In the case of Smart Attendance system, a level 0 DFD would illustrate the main components and their interactions. The Figure 2 states the level 0 DFD for Smart Attendance system.

Figure 2 Data Flow Diagram level 0

Data Flow Diagram Level 1

A 1evel 1 Data Flow Diagram (DFD) for Smart Attendance System can provide an overview of the major components and data flows involved in the process. Keep in mind that the specific details and components may vary depending on the system or platform you're designing. The Figure 3 States the level 1 DFD for Smart Attendance system.

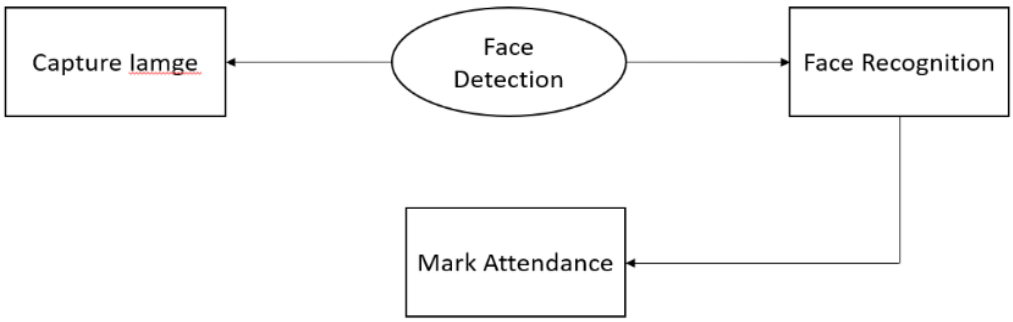

Figure 3 Data Flow Diagram level 1

Data Flow Diagram Level 2

A data flow diagram (DFD) maps out the flow of information for any process or system. It uses defined symbols like rectangles, circles and arrows, plus short text labels, to show data inputs, outputs, storage points and the routes between each destination. The following Figure 4 defines the DFD level 2 of the Smart Attendance System

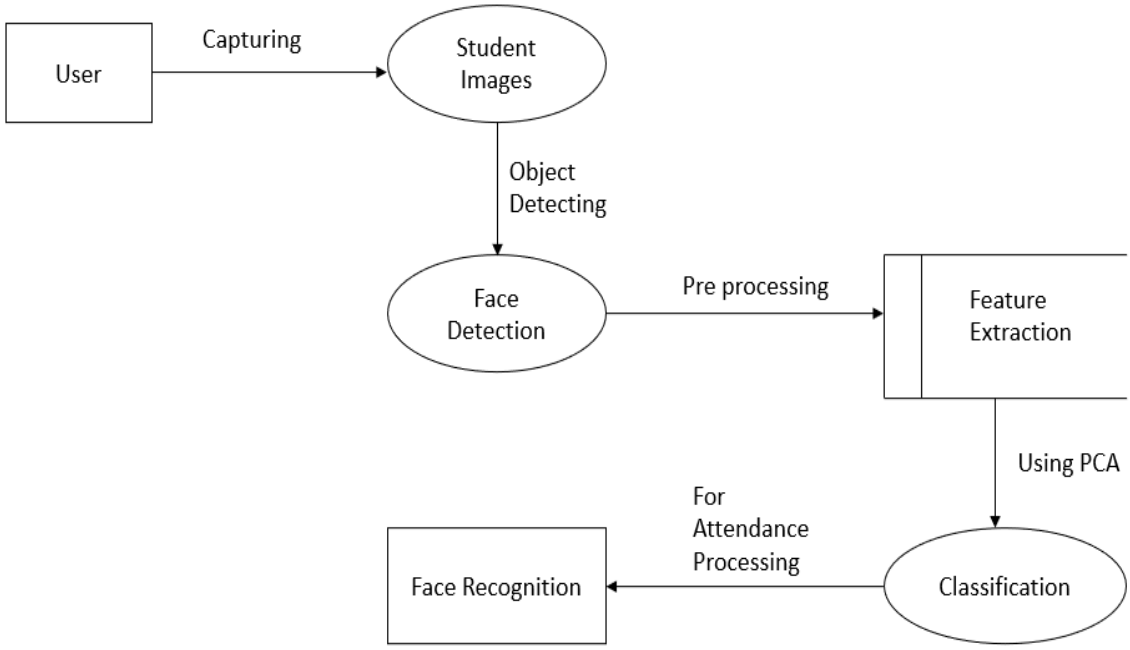

Figure 4 Data Flow Diagram For Smart Attendance System

2.4 UML DIAGRAM

UML stands for unified Modeling Language. UML is a standardized general purpose modeling language in the field of Object Oriented Software Engineering which is intended to provide a standard way to visualize the design of a system. The goal is for UML to become a common language for creating models of object oriented computer software. UML is not a development method by itself, however it was designed to be compatible with that leading object-oriented software development method. The Unified Modeling Language is a standard language for Specifying, Visualization, constructing and documenting the artifacts of software system, as well as for business modeling and other non- software systems. The UML represents a collection of best engineering practices that have proven successful in the modeling of large and complex systems. The UML very important part of developing objects oriented software and the software development process. The UML uses mostly graphical notation to express the design of software. The UML Diagrams for Face Recognition Attendance System are based on Unified Modeling Language which was used to represent the system's primary users, roles, activities, artifacts, or classes. The UML Diagrams are created to easily understand, update, maintain, and document the methodologies and development of the face recognition attendance system. The UML diagrams for face recognition attendance system were used to visualize the project. It can be done before the development begins or to document its progress once it is completed. However, these UML Diagrams can be used in any sector, not only in software engineering. Its overall objective is to help teams or developers visualize what a project is or how it will work. . UML is short for Unified Modeling Language, is a standardized modeling language consisting of an integrated set of diagrams, developed to help system and software developers for specifying, visualizing, constructing, and documenting the artifacts of software systems, as well as for business modeling and other non-software systems. The UML represents a collection of best engineering practices that have proven successful in the modeling of large and complex systems. The UML is a very important part of developing object oriented software and the software development process. design of software projects.

2.4.1 Use case Diagram

A use case diagram is a graph of actors, a set of use cases enclosed by a system boundary communication (participation) associations between the actor and users and generalization among use cases. The use case model defines the outside (actors) and inside (use case) of system's behavior. The Figure 5 Staes the usecase diagram for Smart Attendance System

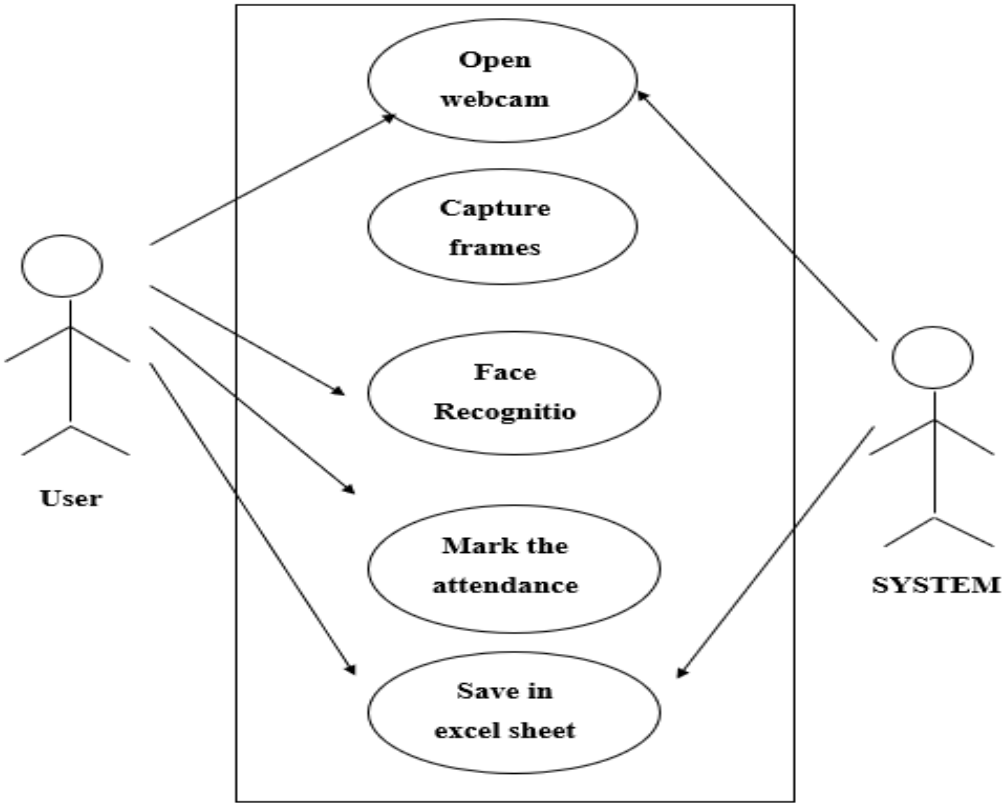

Figure 5 Use case diagram for Smart Attendance System

2.4.2 Class Diagram

Class diagram shows the static structure of the model. The class diagram is a collection of static modeling elements, such as classes and their relationships, connected as a graph to each other and to their contents. Public visibility allows all other classes to view the marked information. Protected visibility allows child classes to access information they inherited from apparent class. Private visibility hides information from anything outside the class partition Protected visibility allows child classes to access information they inherited from a parent class. The Figure 6 States the Class Diagram for Smart Attendance System.

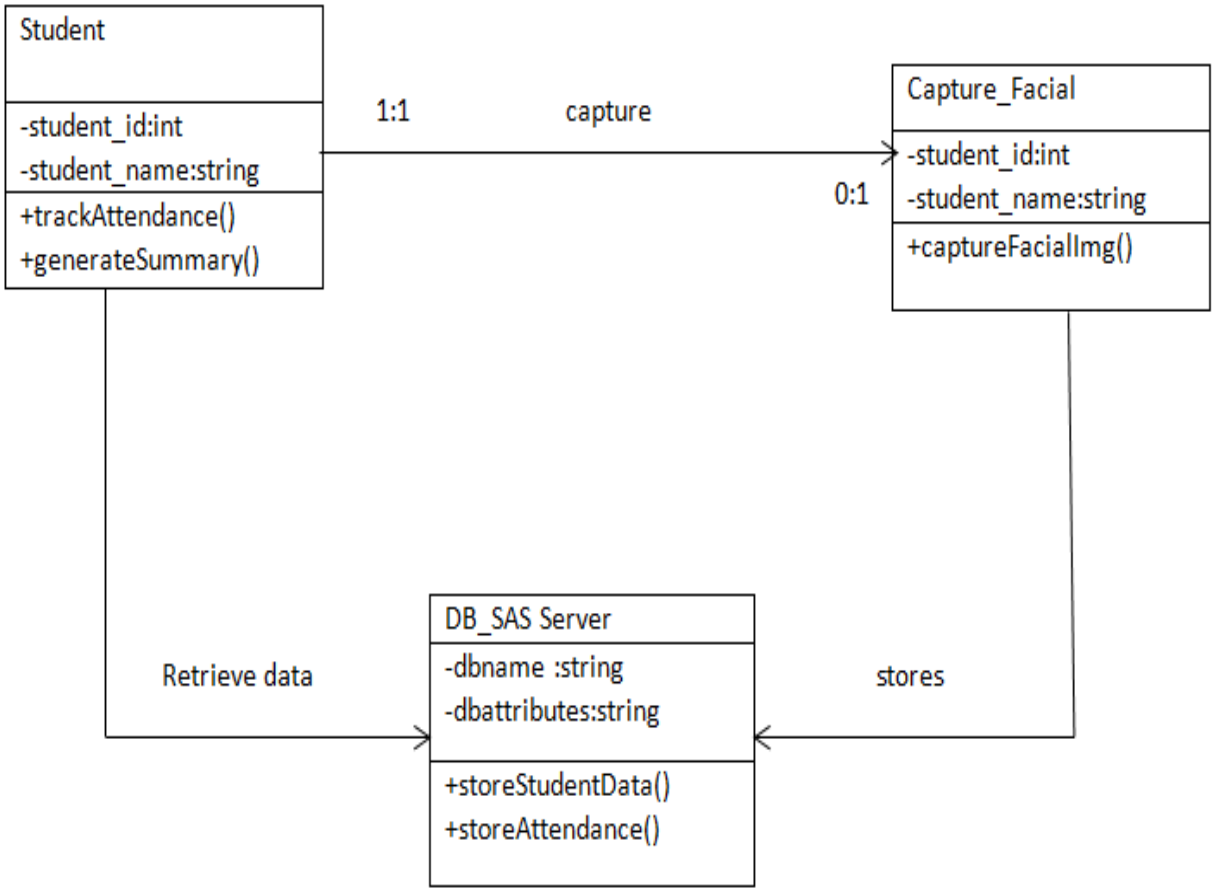

Figure 6 Class Diagram for Smart Attendance System

2.4.3 Sequence Diagram

Sequence diagram are an easy and intuitive way of describing the behavior of a system by viewing the interaction between the system and its environment. A Sequence diagram shows an interaction arranged in a time sequence. A sequence diagram has two dimensions: vertical dimension represents time; the horizontal Dimension represents different objects. The vertical line is called is the object's life line. The Figure 7 States the Sequence Diagram for Smart Attendance System.

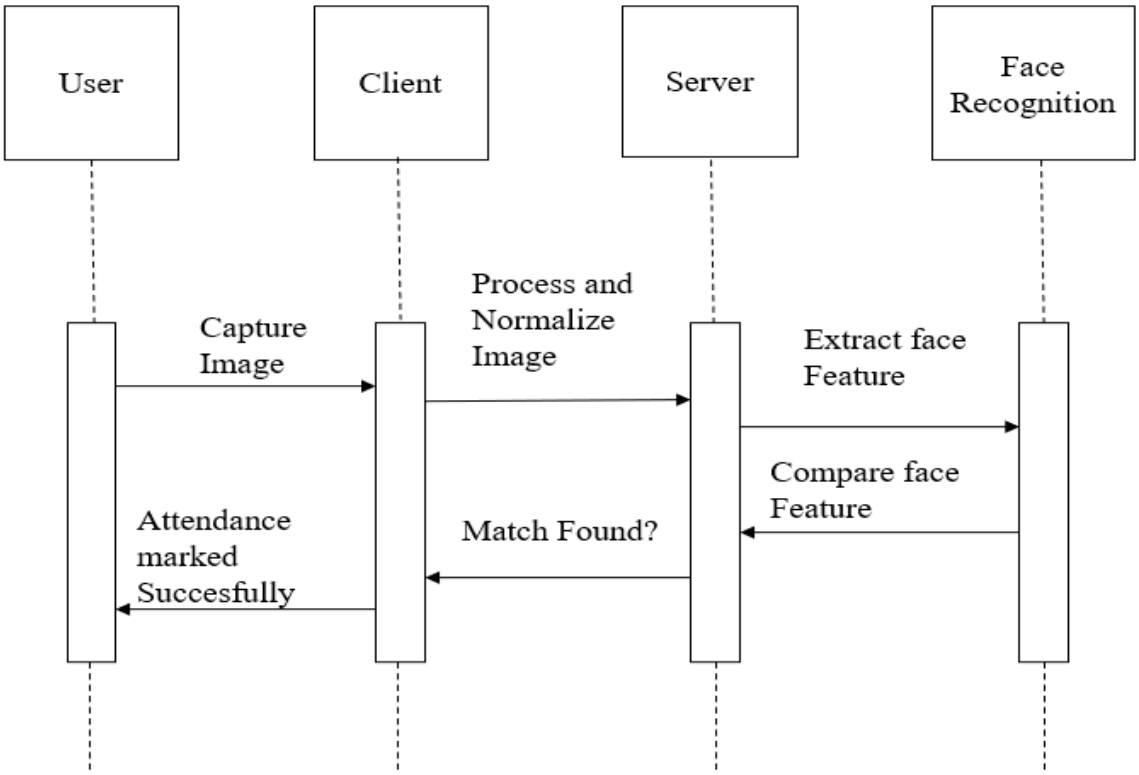

Figure 7 Sequence Diagram for Smart Attendance System

2.4.4 Activity Diagram

Activity diagrams are graphical representations of workflows of stepwise activities and actions with support for choice, iteration and concurrency. In the UML activity diagrams can be used to describe the business and operational step by-step workflows of components in a system. An activity diagram shows the overall flow of control. An activity is shown as a rounded box containing the name of the operation.The Figure 8 States the Activity Diagram for smart Attendance System.

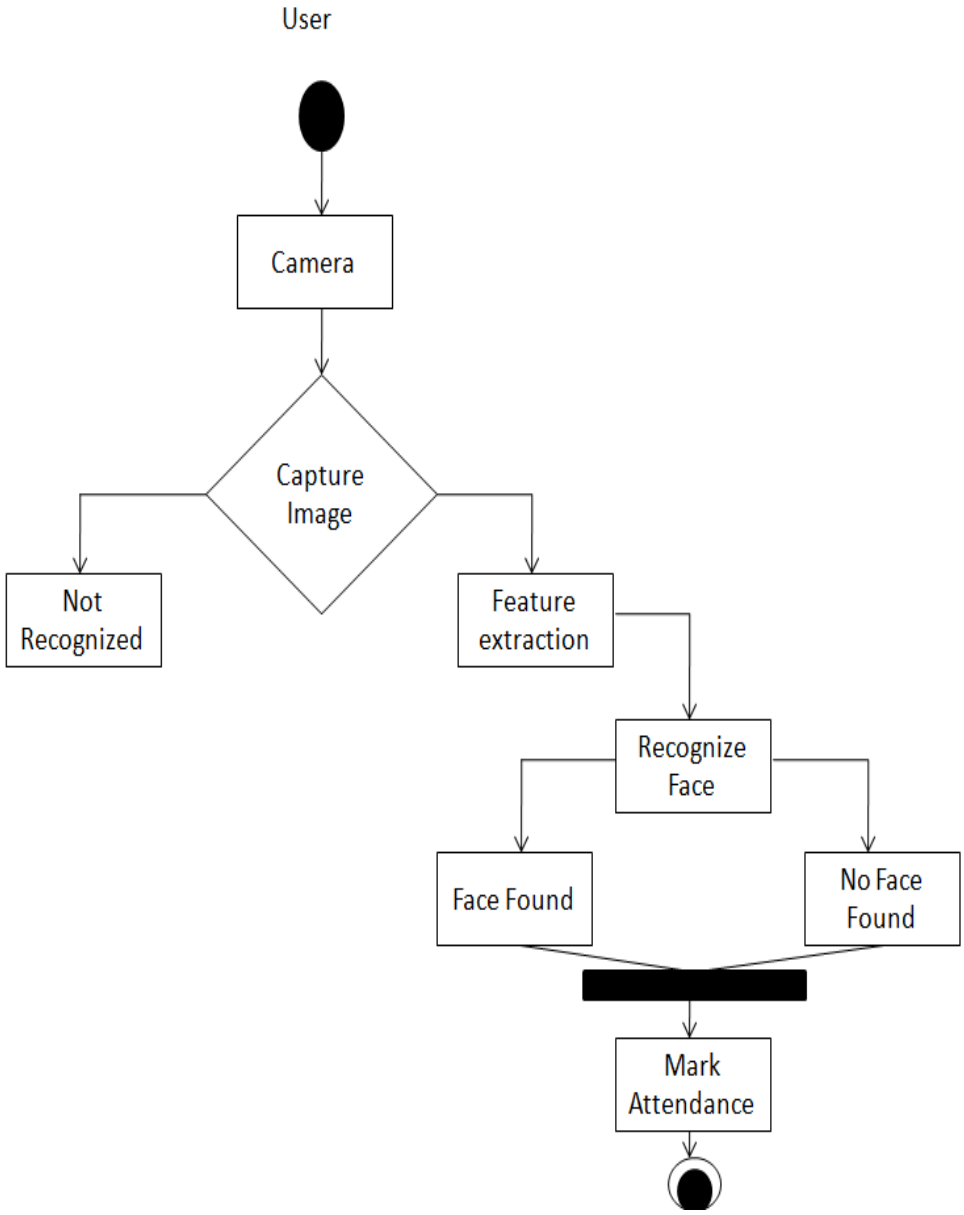

Figure 8 Activity Diagram for Smart Attendance System

CHAPTER 3

MODULE

3.1 MODULE

In software development, a module is a self-contained unit of code that performs a specific function or set of functions within a larger program. A module can be a single file or a collection of files, and it can be written in any programming language.

Modules are used to break down complex systems into smaller, more manageable parts, making the software easier to develop, test, and maintain. Modules can also be reused across different projects or within the same project, saving time and effort.

The project comprises of the following modules:

- Image Capturing Module
- Face Detection Module
- Feature Extraction Module
- Face Recognition Module

3.2 MODULE DESCRIPTION

3.2.1 Image Capturing Module

This Proposed system improve the attendance management system using of our unique characteristics of there face. For the purpose of confirmation and documentation face acknowledgment technique is used. The algorithm which use for biometric facial recognition follow different steps of image processing. Capture- The first step of this system is to gather physical or communication tests in predefined situations and through the state period of that time. Extraction- In this step, all data will be extracted from the sample created to make template using facial recognition. Comparison- After finishing the extraction step collected data is compared with existing that templates .Matching-In this last stage of face recognition, the face features of a gathered samples are matching with the one from a facial database or not. It will take just a second. In this system we

can use Haar Cascade method. A Haar Cascade is used in image recognition and image processing that us specially designed for pixel data. In this where camera will open and student's video is captured on screen. Details of each frame are shared is sent to other modules for processing and analysing with trained model. The student face image is acquired using the camera and the image is acquired from a certain uniform distance the face of the student should clearly be visible on the screen having a good resolution of the image with sufficient lighting for learning and classification. The image capturing phase is where the Finding of image or objects or Human Face in the video frame which can be captured by the web camera. Initially the system is trained that is the cropped images are saved to the database and they undergo detection and recognition.

3.2.2 Face Detection Module

Face detection is a computer technology being used in a variety of applications that identifies human faces in digital images. Face detection also refers to the psychological process by which humans locate and attend to faces in a visual scene. Face detection can be regarded as a specific case of Object class detection. In attendance management system initially detention images enroll by the student and that Image patterned in our database created by the management side. Registered image matched to every database image if that is existing in system database then that student patent as a present either marked as a absent. Face detection is done with OpenCV It is closely related to the recognition of human faces by detecting and recognizes faces in dataset images with Al-enabled technology. It provides the location of the detected faces and can perform facial matches to find target subjects.be used for face detection. This is called feature extraction. This is the ability to recognize human face in an image System uses for its face detection. face recognition algorithm trained with numerous human faces with various face positions, gestures and lighting condition. System uses this algorithm to detect multiple faces in an image and drew a rectangle on each detected face. The face images are extracted and resized .Face detection is the ability to identify the person's faces within the digital images. This system identifies the human face present in an image or video. We need to define a general structure of a face to determine certain picture orvideo contains a face (or several). Human faces have the same features

such as eyes, nose, forehead, mouth, and chin. Therefore, the objective of face detection is to find the location and size of the face in an image. The located face is then used by the facial recognition algorithm.

3.2.3 Feature Extraction Module

Detecting facial feature is a crucial role in a wide variety of application such as human computer interface, facial animation and face recognition, etc. The major objective of this paper is to review the recent developments on the methods of facial feature extraction. This study summaries different method for feature point extraction and their applications on face image identification and highlight the performance regarding these methods. The major goal of the paper is to provide a summary reference source for the researchers involved in facial feature extraction. In this phase, we are extracting the features from the detected face.

3.2.4 Face Recognition Module

Face recognition is a form of artificial intelligence (AI) that mimics a human capability to recognize human faces. Just like when a human recognizes a face, facial recognition software captures facial features and creates a pattern of facial features which it uses to identify or group a face. Face Recognition is being able to uniquely identify and verify a person's face by comparing and analyzing a biometrics person's face. A face recognition system is an application that is used for identifying or verifying a person from a digital image. System uses Eigen-face algorithm that uses Eigen matrix for face recognition. The algorithm is used to determine if enrolled face template stored in the database is found in the captured classroom image.

3.2.4 Attendance Updation

Attendance Marking After the recognition process the students recognized are searched in the database and their attendance is marked, If given face matches with face from database then the students attendance will mark as present along with the name and time. It will save in .csv file (excel file) as an attendance for the student.

3.3 ALGORITHM

Import the necessary libraries:

```
import face_recognition, cv2,csv, datetime
```

Initialize variables:

```
face_locations ,face_encodings,face_names
```

Get the current date:

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

Set up video capture:

```
video_capture = cv2.VideoCapture(0)
```

Capture a frame from the video stream:

```
ret, frame = video_capture.read()
```

Resize the frame for faster processing:

```
small_frame = cv2.resize(frame, (0, 0), fx=0.25, fy=0.25)
rgb_small_frame = small_frame[:, :, ::-1] # Convert BGR to RGB
```

Perform face detection:

```
face_encodings = face_recognition.face_encodings(rgb_small_frame)
```

Perform face recognition:

```
name = "Unknown" # Default name if no match is found
Check if there is a match for the current face:
if True in matches:
first_match_index = matches.index(True)
name = known_face_names[first_match_index]
```

End

CHAPTER 4

CODING AND TESTING

4.1 CODING

The coding stage involves implementing the different modules of the project using a programming language such as Python. Here are some possible coding best practices to follow:

- Use clear and descriptive variable and function names.
- Write code that is easy to read and understand by others.
- Use comments to document the code and explain what it does.
- Break down complex tasks into smaller functions or classes.
- Write reusable code that can be used in other parts of the project.
- Follow coding standards and guidelines, such as PEP8 for Python.

4.2 DEVELOPING METHODOLOGIES

There are different development methodologies we can follow for our projects that depends on the scope and requirements of the project. Here are some common methodologies used in software development:

- Agile: It focus on iterative development, with frequent feedback and collaboration between the development team and stakeholders.
- Waterfall: It follows a linear approach to development, with each stage of the project get completed before moving on to the next one.
- Devops: It involves collaboration between development and operations teams to improve the delivery and quality of software.

4.3 SYSTEM TESTING

Software testing is a critical element of software quality assurance and represents the ultimate reviews of specification, design and coding. Testing is vital to the success of the system. Errors can be injected at any stage during development. System testing makes logical assumptions that if all the parts of the system are incorrect, it will handle successfully. During testing, the program to be tested is executed with set of data and output of the program for the test data is evaluated to determine if the programs are performing as expected. A series of testing are performed for the proposed system before the system is ready for user acceptance testing. The testing are

4.3.1 Unit Testing

In this different test modules are tested against the specification of the modules. Unit testing was done for the verification of the code produced during the coding phase to test the internal logic or modules. It refers to the verification of the single program module in installed environment. In the unit testing we test each module individually and integrate with the overall system . This testing is carried out during programming stage itself. In the testing step each module is found to work satisfactorily as regard to expected output from the module.

4.3.2 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 is spotlighted at the following items: Valid Input : Identified classes of valid input must be accepted. Invalid input : Identified classes of invalid input must be rejected. Output: Identified classes of application output must be exercised. Systems/Procedures: Interfacing systems or procedures must be invoked.

4.3.2.1 Performance Testing

It determines the amount of execution time spent in various parts of the unit, program throughput and response time and device utilization by the program unit. Evaluate the collected performance data and compare it against the predefined

objectives. Identify any bottlenecks or areas of improvement. Use PCA to analyze the data and identify principal components that contribute the most to system performance. This can help in understanding which factors have the greatest impact on the system's efficiency.

4.3.3 Integration Testing

In this project modules are integrated properly, the emphasis being and testing interfaces between modules. Internal interfaces and external interfaces are tested as each module is incorporated into the structure. This test is designed to uncover errors associated with local or global data structures. It is also designed to verify performance levels established when software design is conducted. Thus all these modules are combined, verified and the information about the item is properly carried on to the next module and then it is checked.

4.3.4 Usability Testing

At the culmination of integral testing, software is completely assembled as a package, interfacing errors have been uncovered and corrected, and a final series of software tests validation may begin. Validation can be defined in many ways but a simple definition is that validation succeeds when software function in a manner that can be reasonably expected by the customer.

4.3.5 Output Testing

After performing the validation, next step is the output testing of the proposed system. Since no system could be useful if it does not produce the output in the specified formats. The output generator or displayed by the system under consideration is tested for user acceptance by constantly keeping touch with perspective system and user at the time of developing and making changes whenever required.

4.3.6 User Acceptance Testing

Acceptance Testing is a critical phase of any project and requires significant participation by the end user. It also ensures that the system meets the functional requirements. This is done regarding to the following points.

CHAPTER 5

CONCLUSION AND FUTURE ENHANCEMENT

5.1 CONCLUSION

In conclusion, the implementation of a smart attendance system using Principal Component Analysis offers several advantages and benefits. PCA is a dimensionality reduction technique that can effectively analyze and extract relevant features from a large dataset, making it suitable for processing attendance data. By utilizing PCA in the attendance system, the following key conclusions can be drawn:It has Improved Efficiency PCA helps reduce the dimensionality of the attendance data while preserving the essential information. This reduction in dimensions leads to faster processing times, making the attendance system more efficient and responsive. And Accurate Recognition PCA facilitates the identification and extraction of significant features from the attendance data. This feature extraction process enhances the accuracy of recognizing and matching attendance records, reducing the chances of errors or false identifications.Robustness to Variations PCA can handle variations and noise present in attendance data, such as changes in lighting conditions or different camera angles. By capturing the principal components that capture the most variation in the data, the attendance system becomes more robust and reliable, even in challenging conditions.

PCA enables the attendance system to handle large datasets without compromising performanc. By reducing the dimensionality of the data, PCA makes it feasible to process attendance records from a large number of individuals, allowing for scalability and accommodating growing organizational needs.

Enhanced Security The use of PCA in the attendance system helps enhance security by accurately identifying individuals based on their unique features. This feature extraction technique adds an additional layer of protection against potential attendance fraud or impersonation.

Overall, a smart attendance system incorporating PCA offers improved efficiency, accurate recognition, robustness to variations, scalability enhanced system For Smart Attendance System.

5.2 FUTURE ENHANCEMENT

Improved Feature Selection PCA can be utilized to reduce the dimensionality of the feature set used for attendance recognition. However, in the future, you can explore advanced feature selection techniques that go beyond PCA. Consider employing algorithms like genetic algorithms, recursive feature elimination, or information gain-based methods to identify the most relevant features for attendance recognition.

Enhanced Data Preprocessing PCA is often applied after standardizing or normalizing the data. In the future, you can experiment with different data preprocessing techniques, such as data augmentation, outlier detection, and handling missing values, to further enhance the accuracy and robustness of the attendance system.

Real-time Attendance Tracking If the current system is not real-time, you can focus on implementing real-time attendance tracking in the future. This can involve integrating the attendance system with real-time data sources like video feeds or sensors, enabling automatic attendance capture without manual intervention.

User Authentication and Security Consider incorporating user authentication mechanisms into the attendance system to ensure that the attendance records are accurate and reliable. Implementing secure protocols and encryption techniques can also enhance the security and privacy of the attendance data.

User-Friendly Interface Enhance the user interface of the attendance system, making it intuitive, easy to use, and visually appealing. Consider developing mobile applications or web interfaces that provide a seamless experience for both administrators and users.

APPENDICES

APPENDIX-1

SAMPLE CODING

```
// Importing our Required libraries
import face_recognition
import cv2
import numpy as np
import csv
import os
from datetime import datetime
// cv2 is a open cv python pakage
// video capture is a method of open cv that takes input
video_capture = cv2.VideoCapture(0)
//load_image_file is used to load images face_encodings will create encoded data for that image that face_recognition package will use for performing operations, we have 4 faces in our example to recognize, known_face_encoding is the list of encoding of all the 4 faces
jobs_image = face_recognition.load_image_file("photos/jobs.jpg")
jobs_encoding = face_recognition.face_encodings(jobs_image)[0]

ratan_tata_image = face_recognition.load_image_file("photos/tata.jpg")
ratan_tata_encoding = face_recognition.face_encodings(ratan_tata_image)[0]
sadmona_image = face_recognition.load_image_file("photos/sadmona.jpg")
sadmona_encoding = face_recognition.face_encodings(sadmona_image)[0]
tesla_image = face_recognition.load_image_file("photos/tesla.jpg")
```

```
tesla_encoding = face_recognition.face_encodings(tesla_image)[0]
// known_faces_names is name of all of them
 known_face_encoding = [
jobs_encoding,
ratan_tata_encoding,
sadmona_encoding,
tesla_encoding
]

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

// students is a copy of known face  that we use to mark the attendance
students = known_faces_names.copy()
//Empty list for input image
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)
 rgb_small_frame = small_frame[:,:,::-1]
 if s:
// face location anf face encoding stroes the incoming frames
     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_encoding)
       name=""

face_distance=face_recognition.face_distance(known_face_encoding,face_encoding)
            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 is updated in csv file
                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()

//destroy all the opened windows
f.close()
```

APPENDIX: 2

SCREENSHOT

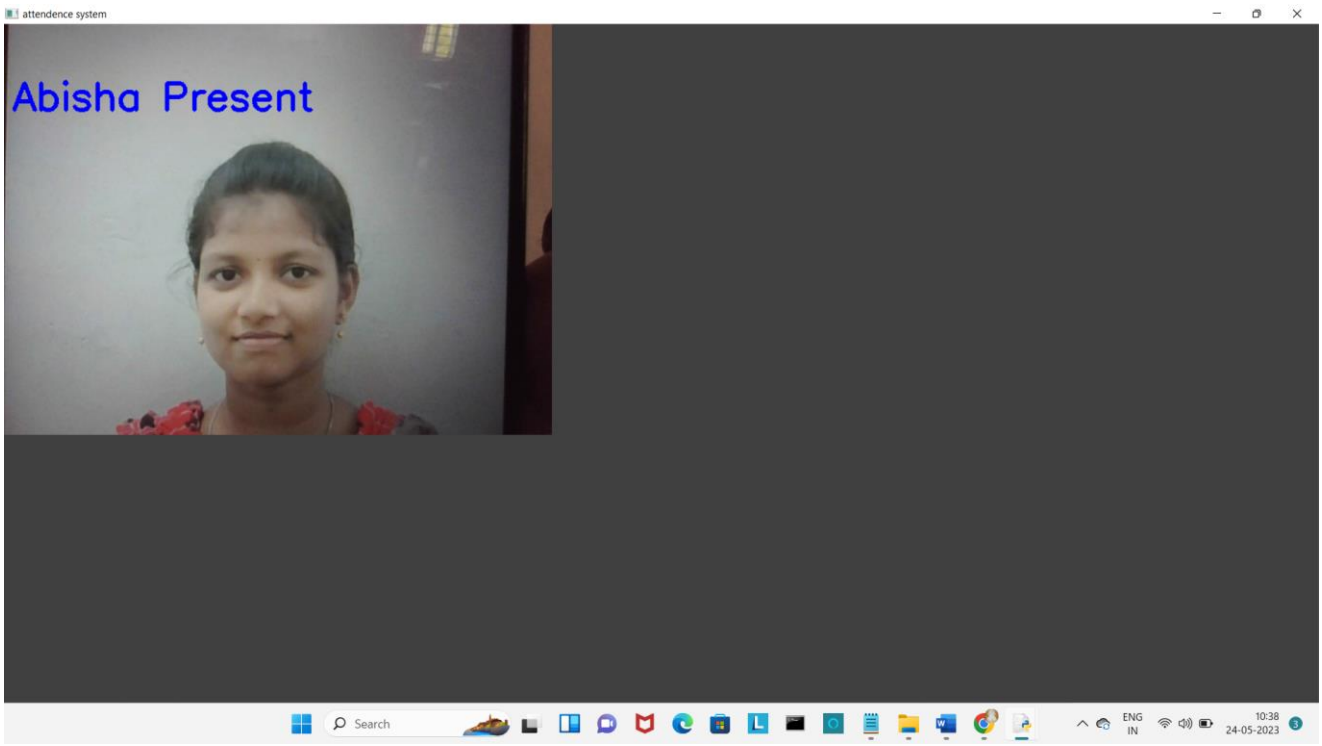

Figure A 2.1 Detector

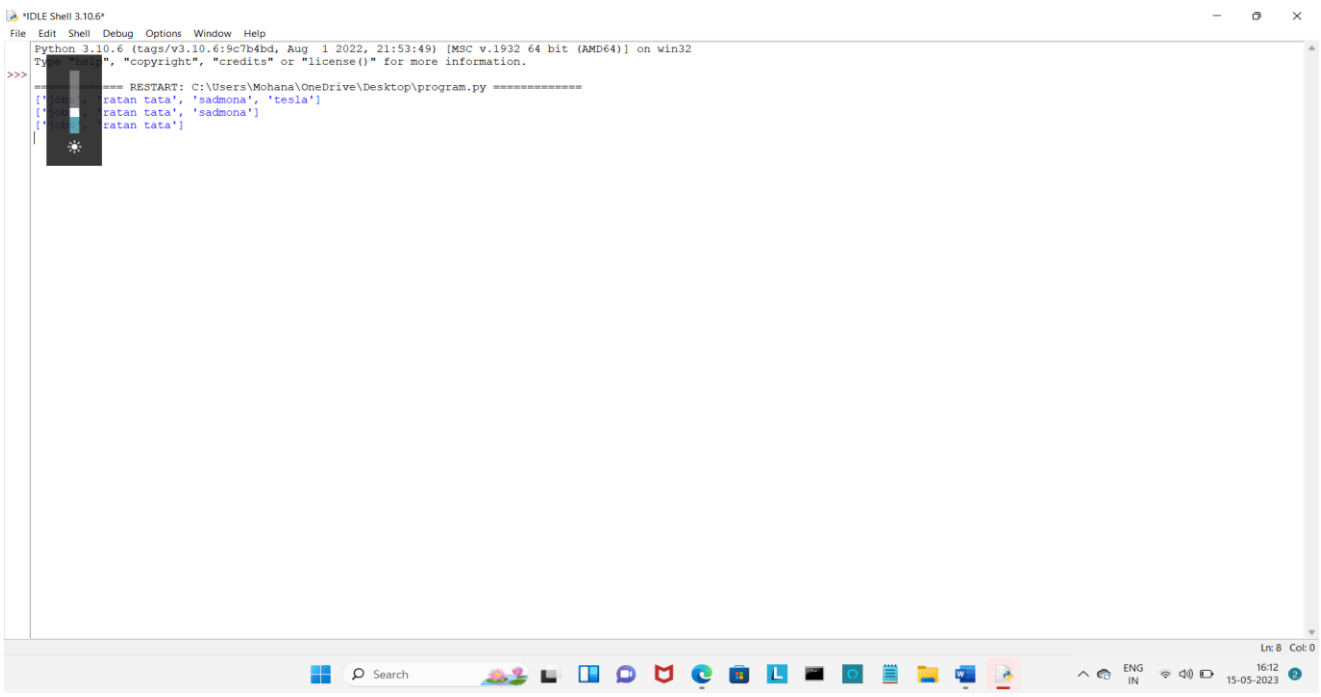

Figure A 2.2 Terminal

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