Face Recognition Based Attendance System Using Haar Cascade and LBPH Algorithm

SUBMITTED BY:

Abu Sumayes Siddiqui   ID: 16172103188

Md Abdur Rahman   ID: 16172103200

Monzurul Islam Bhuiyan   ID: 16172103201

Md Sajjad Hossin   ID: 16172103207

Md Abul Kalam Azad   ID: 16172103384

Submitted to the Department of Computer Science and Engineering

Bangladesh University of Business and Technology (BUBT), Dhaka

In partial fulfillment of the requirements for the degree of

BACHELOR OF SCIENCE

IN
COMPUTER SCIENCE AND ENGINEERING

SUPERVISED BY:

Md Saifur Rahman

Assistant Professor

Department of CSE

Bangladesh University of Business and Technology (BUBT)

Table of Contents

Declaration:

We declare that the project entitled 'Face Recognition Based Attendance System Using Haar Cascade and LBPH Algorithm' is submitted for the degree of Bachelor in Science and Engineering in the faculty of Computer Science and Engineering of Bangladesh University of Business and Technology (BUBT) is our original work and. It contains no material which has been accepted for the award to the candidates of any other degree except where due reference is made in the next of the project to the best of our knowledge, it contains no materials previously published or written by any other person except where due reference is made in this research work.

Abu Sumayes Siddiqui
ID: 16172103188   ------------------------
                                                                Signature

Md Abdur Rahman
ID: 16172103200   ------------------------
                                                                Signature

Monzurul Islam Bhuiyan
ID: 16172103201   ------------------------
                                                                Signature

Md Sajjad Hossin
ID: 16172103207   -----------------------
                                                                Signature

Md Abul Kalam Azad
ID: 1617210338   ------------------------
                                                                Signature

Approval

This research work 'Face Recognition Based Attendance System' report submitted by Md. Tanvir Rahman, Md. Sajjad Hossin, Md, Monzurul Islam Bhuyan, Abu Sumayes Seddiqui, Md. Abul Kalam Azad students of Department of Computer Science and Engineering, Bangladesh University of Business and Technology (BUBT), under the supervision of Md. Saifur Rahman, Assistant Professor, Computer Science and Engineering has been accepted as satisfactory for the partial requirements for the degree of Bachelor of Science Engineering in Computer Science and Engineering.

Signature

Acknowledgement

We would like to express our sincere gratitude and cordial respect to Md. Saifur Rahman, Assistant Professor, and Dr. Muhammad MD Shahiduzzaman, Associate Professor without whom this project would not exist in its present form.

Abstract:

Face recognition system is one of the best biometric information process of taking attendance, Its applicability is easier and working range is larger than others, i.e. fingerprint, iris scanning, signature etc. are also process of identification or taking attendance but their procedure of taking attendance is much difficult and complicated. We know face is the main identity of each and every human and here in this work we proposed an attendance system based on face recognition. In this system we split the whole process into two main sections one is face detection and other is face recognition. In face detection part we use Haar Cascade algorithm. By using Haar Cascade algorithm the system processed lots of positive and negative images the positive images are mainly the images with faces and the negative images are the images with no faces. Here it uses the both images like convolution kernel for compering the black pixel to white pixel edge to edge for accurate outcomes. In the recognition part we use LBPH (Local Binary Pattern Histogram) because it can recognize both front and side images accurately. In LBPH it convert the images into cells and constructed by surrounding pixel values clock or counter-clock wise which helps the system to recognize the faces very fast and accurately. And after successful recognition we use excel files to store attendance according to the specific date with accurate time.

List of Figure:

List of Abbreviations

ANN   Artificial Neural Network.

CNN   Convolutional Neural Network.

DNN   Deep Neural Network.

PDA   Principal Component Analysis.

LDA   Liner Discriminant Analysis.

NN   Neural Network.

OpenCV   Open Source Computer Vision Library

AdaBoost   Adaptive Boosting.

ROC   Receiver Operating Characteristic Curve.

Chapter -1

Introduction

1.1 Introduction:

Biometric has a huge range of applications in the security system field. Its performance is very much reliable, fast and secure. Because every biometric is unique. There are many biometric systems is present now such as Fingerprint, iris, signature etc. Face recognition is one of them. Generally, this biometric information's are very completed to process and use but face recognition is much simpler and easier than other biometric information system. Face recognition is a biometric method for identifying an individual by comparing live capture or digital image data with the stored face images of that person. In the 1960s face recognition was introduced by Woodrow Wilson Bledsoe. It can be regarded as a specific case of object-class detection, where the task is to find the locations and sizes of all objects in an image that belongs to a given class. The technology is able to detect frontal or near-frontal faces in a photo, regardless of orientation, lighting conditions or skin color. We can detect faces by following many process, such as: OpenCv , PDA ,LDA ,ANN , Haar-Classifier etc.

Human face model and structure is an active research area in the computer vision community nowadays. Generally we have to carry an ID card in order to get entry into any secure area. But what if we could figure out a way so that we don't need to carry any ID card to get access into any secure area face detection can solve this problem. Face Detection helps in making this process smooth and easy. The person just looks at the camera and it will automatically detect whether he/she should be allowed to enter or not. Interesting application of face detection could be to count the number of people attending an event. Instead of manually counting the attendees, we install a camera which can capture the images of the attendees and give us the total headcount.

Generally any biometric system has two phases

1. Detection Phase.

2. Recognition Phase.

In the face recognition system there also has two phases first we need to enroll the image into the system, then we have to process the image to recognize that person whenever he comes in front of the system again. Generally biometric systems are used for security purpose but in this project we will use it for a attendance system. We capture an image of an individual first then process the image using computer vision (Opencv) then if we the recognizing phase recognize that person then the will save its enrollment time into the database.

1.2 Problem Statement:

All face recognition attendance system which are available now, can take attendance by using face as input. But some of them can not recognize image with a cap on or glass on or any problem with the face. The existing system for taking attendance is pen and paper based system. As for example when a student comes late in the class during the lecture time it causes delay of class lecture. Using face recognition teacher can give lecture without any delay for taking attendance. Not every solution which are present but we can give a summary of attendance which is very much needed because some university only give permission to sit in the exam if the student has minimum 70% or more attendance in the class. Our proposed system will solve all this problem.

1.3 Problem Background:

The present field of face recognition system is dominated by the advance need of the present world. Now people are want the system which will consume less time and do the work smoothly.

All the current system are just recognize any face and take attendance but they are not able to give report based on the attendance and some of the system do not maintain any proper database. Face recognition system which are present faces problem while recognizing the face in many situation so that reason those propose systems are not suitable for fulfill the need of the current world.

1.4 Research Objective:

This project research objectives are:

1. It will identify any face from any angle.

2. It will recognize any image from any lighting condition.

3. It will recognize any image with cap, shades, color or any effects on the image.

4. It will record real time as attendance.

5. It will store the attendance as daily, weekly, monthly.

6. It will show the daily class time, weekly class time, monthly class time.

7. It will able to detect when a student enters into the classroom and when he left so will be able to count the time of a student present in the class.

1.5 Motivation:

The current attendance systems which are present now are mostly manual which are very time consuming. And the automated system which are present now mostly fingerprint which is also time consuming and anyone have to do it person by person. Some face recognition system is available but most of them faces problem in multiple situation. For those reason we proposed the work. The proposed work may expand the boundaries of current systems, thus widening the operational possibilities of important scenarios which will improve the attendance system technology. The proposed project's primary goal is to explore the existing attendance systems. It targets the dual goals of attendance and the security. This project will fulfill it priority for less work as well as a well security which is the principles for a secured place, further instantiating these principles in specific examples. Selected technical innovations and results of the proposed work will be disseminated through specially the designed project workshops will additionally create for contributing to the relevant standardization circumstances.

1.6 Flow of Research:

The research work was carried out in multiple steps. After finalizing the research topic, we first studied the basic theory of speech and sound that is needed to carry our research work.

Figure 1.1 illustrates the overall steps of the whole working procedure in a diagram
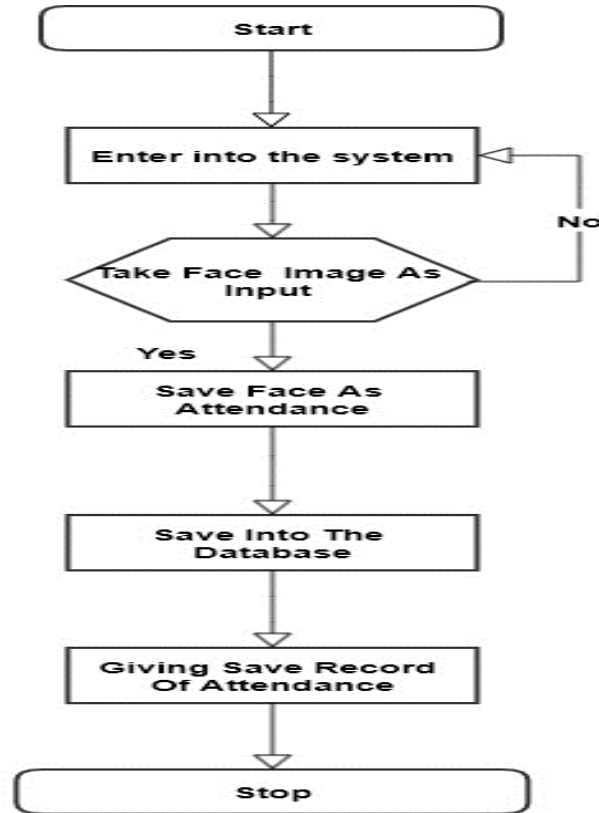
Figure: 1. 1 Flow of the research work

1.7 Significance of the Research:

The findings of this study will rebound to the benefit to the researchers that direct extraction of features from face recognition system is possible and is also promising. The study explains the extraction procedure of the most known feature properties, which are most important in identify any face properly. Also, we experiment that present properties can be explained with the extracted face recognition system properties. This work will influence the researchers to investigate the direct extraction procedure of automated face recognition system features, without sacrificing any important features of any advance systems. Further research will be suitable for the present industry level implementation of an advance face recognition system that will be suitable for the most challenging environments.

5

1.8 Research Contribution:

The overall contribution of this proposed work includes,

1. We investigate that most the state of the art architectures depends on an automated train embed face recognition system.

2. We implemented a face recognition and verification system that is independent of embedding system. • We define new feature extraction techniques from face image segments.

3. We experimented with our proposed architecture on a famous and revealed the results based on face verification as well as face identification system.

1.9 Thesis Organization:

The proposed work is organized as follows.

1. Chapter 2 highlights the background and literature review on the field of the automated face recognition system.

2. Chapter 3 consist of the proposed architecture of the face recognition system, along with a detailed walkthrough of the overall procedures.

3. Chapter 4 contains the details of the tests and evaluations that were performed to evaluate our proposed architecture.

4. Chapter 5 describes the standards and the challenges of the proposed architecture as well as the overall field of our study.

5. Chapter 6 explains the overall design and implementation constraints of our conducted thesis work.

6. Chapter 7 illustrates the time schedules that we managed while the thesis work was conducted.

7. Chapter 8 describes the overall conclusion of our thesis work.

1.10 Summary:

This chapter explains overview of the problem that we specifically target and what we want to work. The objectives of our thesis work along with the motivation of the output of the thesis work. This section also illustrates the overall steps on which we carried out in our proposed work.

Chapter-2

Background

2.1 Introduction:

Face recognition system has a wide range of application now a days. It can be used in many fields. Most of the application is mainly use for recognition and verify someone properly. In this research we try to establish a system which will recognize a person properly and take his attendance accurately in the abject time he present at that place. In this chapter we demonstrate the state of art architecture which are implemented by the research.

2.2 Literature Review:

Automated attendance management system which use face for authentication is known as biometric face recognition system which is subject to compare real time scenarios such as illumination, rotation and scaling. Which consist of a camera that captures input image, detection algorithm to detect a face from the input image, encodes it and recognize the face accurately and mark the attendance in database and convert it into a PDF file. The face recognition algorithm used here are Histogram of Oriented Gradients (HOG), with LBPH. [20][18]

Proposed an attendance system which uses faces as objects to detect and recognize as a person's accurate identity and store in a database. Here the process of capturing face images are by camera. And the face images which are stored in the database is the identification of the face object which are captured by the camera. This study uses a hybrid feature extraction method using CNN-PCA (Convolutional Neural Network - Principal Component Analysis). [19][16]

This paper describes the working process of An Automatic Attendance System inside a classroom environment. They took video clips of whole classroom and stored in the database, and those videos are converted to multiple images, then they apply Face detection algorithm Ada-boost to detect the faces in the images and then detect face by Histogram of Oriented Gradients (HOG) and Local Binary Pattern (LBP) algorithm. It first stores the faces of the students in the database then detected faces are compared with the faces stored in the database during face recognition by using Support Vector Machine (SVM) classifier. If the system recognizes faces, the attendance gets marked immediately of recognized faces. [14][15][12]

Presented research which is aimed at developing a less intrusive, cost effective and more efficient automated student attendance management system using face recognition based on cloud computing (CC) infrastructure called FACECUBE. Which takes attendance by using IP camera mounted in front of a classroom, to acquire images of the entire class. It detect the faces in the image and compares it with the enrolled faces in the database. On identification of a registered face on the acquired image collections, the attendance register is marked as present otherwise absent. The system is developed on Open Source image processing library. [11]

Proposed paper is aimed at implementing a digitized system for attendance recording. Which take attendance using face recognition technology and store attendance. Here for taking attendance they use high definition camera for capturing images and recognizing by using PCA algorithm and after detecting the face accurately it store the attendance into excel file. [10]

Proposed a face recognition based automated student attendance system which firstly taking the video by the camera. Then from the video the face RIO is detected and segmented by Viola-Jones algorithm. The video noise is applied to convert grayscale images form conversion of color images. After that, (CLAHE) contrast-limited adaptive histogram equalization is applyed on images to enhance the contrast of images. In face recognition stage, enhanced LBP and PCA is applied to extract the features from facial images. The enhanced local binary pattern outperform the LBP by increasing the recognition rate and reducing the illumination effect. After that, the features extracted from the test images are compared with the training images. Then the facial images are classified and recognized based on the best result from the combination of algorithm, enhanced LBP and PCA. And finally, the attendance of the recognized student marked as attend and saved in the excel file. [8],[9],[1],[2]

This proposed project is an automated attendance system with a cloud base. Here the cloud services give some useful information for the attendance like attendance summary performance and visualizing the data into graph and chart. In this study, they create an online student attendance database system with a face recognition system based on raspberry pi 3 model B. A graphical user interface provides ease of use for data analysis on the attendance system. This work used open computer vision library and python for face recognition system combined with SFTP to establish connection to an internet server which runs on PHP and Node.js in the back-end.[7] [6] [5].

2.3 Problem Analysis:

Although the state of the art models performs well, but all it will face some difficulties in some particular situation. The state of art model can recognize any face and take attendance but if the person comes to the camera system again then it will take attendance again which can create problem. The model will provide attendance sheet if needed but it cannot summaries or do any operation to the taken attendance, some of the proposed system cannot recognize face in low light condition which is a big problem. Some of the system cannot process and recognize face if the person wear any hat or sunglass on the face for that reason they are not suitable for developing a automated face recognition attendance system.

2.4 Summary:

This chapter illustrates the latest implementations of face recognition systems, including the drawbacks. The target of the thesis work is to eliminate the drawbacks a much as possible and extract an automated face recognition attendance system that is stable and suitable for solve and fulfill the need and take challenge of the present world.

Chapter-3
Proposed Model

3.1 Introduction:

For completing a project properly designing the project related activities is very important. So in chapter 3 we mainly focus on designing part of the project. Here we briefly describe about the project related feasibilities, the projects requirements, project architecture, system diagram and all other related diagrams with the project use case. This chapter will help to understand the project architecture and its data flow easily.

3.2 Feasibility Analysis:

The object of this project is to detect a face and recognize it for attendance. We use web cam to collect the image and then recognize the image for every student in the classroom. In classroom we set a web cam to collect the image. Through the economic feasibility of the project isn't so costly and it's benefited through pen and paper base system with time consuming. For storing attendance, we use database. The whole system will complete by software based. Technical feasibility that current resources both software and hardware with required technology we can used for project development. The whole project can easily operate and maintainable that ensure us operational feasibility. To complete the project, we got one-year time. We are determining that we can complete the whole project in the given time and half of the work is done and others is in processing. So we think we can submit it in time that follow the schedule feasibility.

3.3 Requirement analysis:

The project has both hardware and software requirement. The user interface of the project will run on windows.

1. Hardware requirements: The face detection and recognition system required camera integrated system.

2. Software requirements:

   i. An IDE for code implementation

   ii. Open-CV library

   iii. NumPy library

   iv. Programming language Python.

   v. Pandas library

   vi. Micro soft excel Program.

3.4 System Architecture:

We store images of every student in database. To store images in database first we capture the images and detect the face. The detected face is extracted and pre-process the subject then store it in database. When a student enter into the classroom the system web cam captures some images of that student. Then face will detect and pre-processing the image. After that feature extraction of the image and the image of database also extract feature. Then image get classification with the person's name and mark the attendance of that students in the C.S.V file.
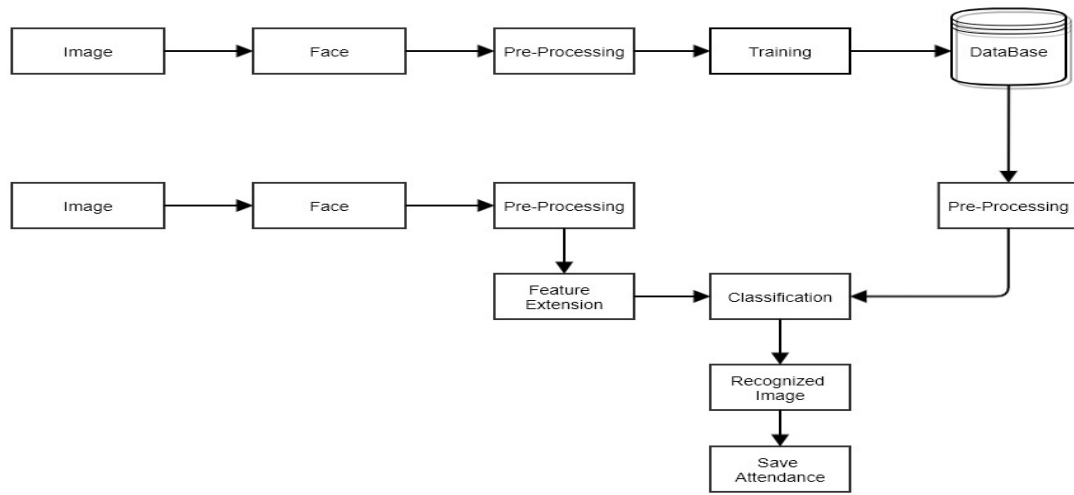
Figure: 3. 1 System Architecture

3.5 System Design:

The system firstly goes with input section, secondly detection and recognize section and finally the output section.
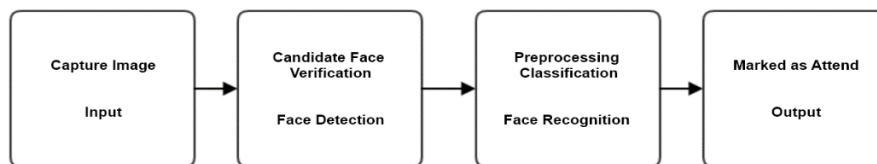

Figure: 3. 2 System Design

Input: Capturing images is performed as input. Captured the real time images then converted into digital data for performing image processing and then sent it to face detection algorithm.

Face Detection: In face detection part we use Haar Cascade algorithm. In Haar Cascade algorithm it works with lots of positive and negative images here the positive images are mainly the images with faces and the negative images are the images with no faces. [20][21]
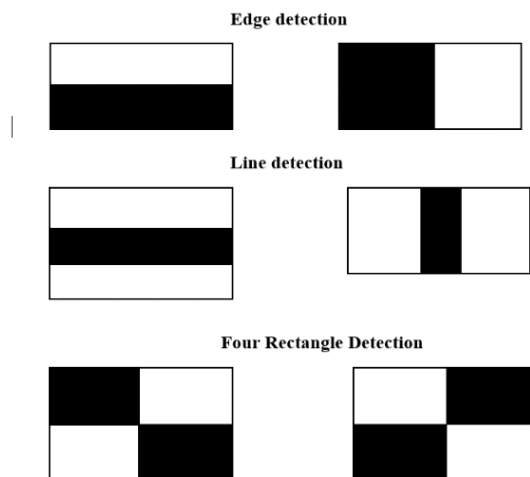
Figure: 3. 3 Haar Classifier

Here it uses the both images like convolution kernel as like the image shown in the figure-1 for compering the black pixel to white pixel edge to edge for accurate outcomes. This process is also known as Harr classification. Harr cascade algorithm focuses on eyes, nose, lips for classifying the image and compering the pixels and detect the face accurately. It also resize the image and convert it into gray images for the easier and accurate recognition.

Face Recognition: Here in face recognition section we use LBPH (Local Binary Pattern Histogram) because it can recognize both front and side images accurately.[21][5][4] In LBPH it convert the images into cells and it constructed by surrounding pixel values clock or counter-clock wise. The values of each cell is compared with the center pixel values and replaced by 0 or 1 depending on the difference if the difference is low the value will be 0 and if high the value will be 1. After applying the algorithm it can recognize face accurately.

$$LBP = \sum_{P=0}^{P-1} s(i_p - i_c)2^P$$

$$\text{Where } s(x) \begin{cases} if \ x \geq 0 \ then \ 1; \\ otherwise \ 0; \end{cases}$$

The Local Binary Pattern Histogram is calculated by the given equation. For mapping the cell and finding the accurate value of each cell and then convert the values to decimal to binary from.

Output: For attendance we use CSV (Comma Separated Value) for storing the attendance which is mainly a excel file. Here in our proposed system it will create an excel file everyday automatically naming as the current date without any human action. And the system will take an individual's attendance one time at a date. If that individual goes through the system camera more time then it will not store any attendance if it store that person's attendance once in a day. The system will also store the unknown faces if the recognition system fail to detect and recognize that individual.

3.5.1 Methodology

In the whole development process, we follow some methodologies and an alogorithm to split the

working process and reduce the complexity. We try to establish a simple algorithm and according to the algorithm we split the whole work in multiple sections.

Algorithm:

Step 1: Take faces using systems camera.

Step 2: Apply Haar Cascade algorithm.

Step 3: Take name and id for users.

Step 4: Create and train dataset.

Step 5: Store the dataset into the database.

Step 6: Take Face for recognition.

Step 7: Apply LPBH algorithm.

Step 8: Recognize face

    If (Recognize)

        Show name and id. &

        Store attendance into C.S.V.

    Else

        Store unrecognized face.

Step 9: Exit.

3.5.2 Data Flow Diagram:

In this section we show how the whole working process and how the systems data flows. So to do that we divide it into multiple sections. Which will describe the project clearly and make it very easy to understand.

Level Zero:

In the level zero data flow diagram we can see the teacher and student information firstly stored into the system with their image which is managed by the admin of the project. The admin can directly modify any information whenever he wanted. After processing the information, the attendance will be count and stored with the help of the webcam.
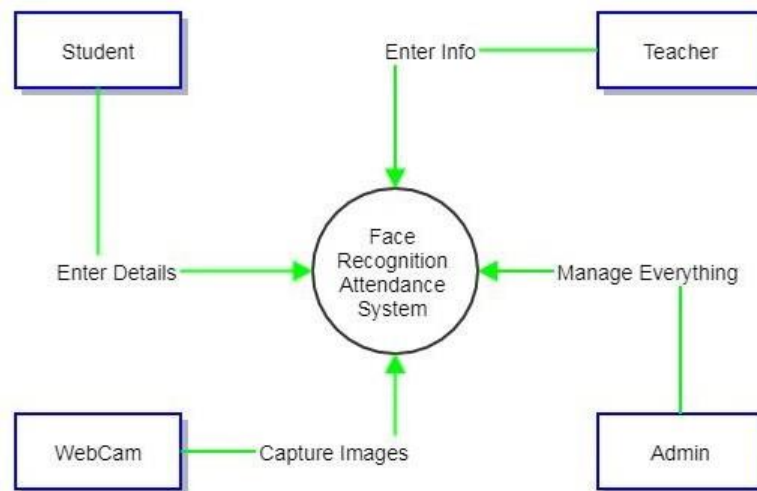

Figure: 3. 4 Level zero data flow diagram

Level-1:

In level one dataflow diagram we try to describe the project further more. He we try to describe throw the project take teacher and students login and registration information, how to capture the image the train the images and stored it into the databased. Then how with the help of the database it recognizes the image then give the attendance and stored it into the database
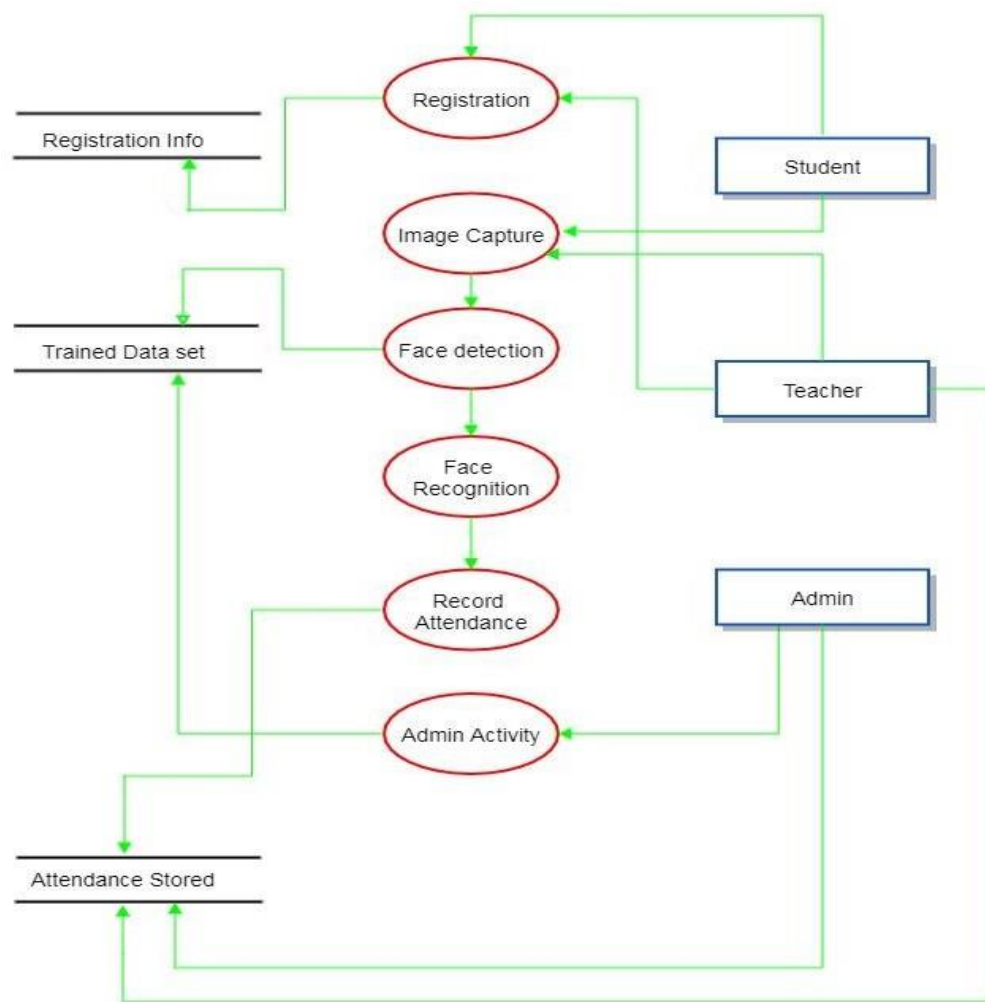

Figure: 3. 5 Level-1 Data Flow Diagram

Use Case Diagram:

In the use case diagram all activities of the software are described. Here in the software both the teacher and student can register and login into the system then after capturing and training the images the system can recognize the faces and give attendance to the respective person. Here after attendance the teacher can take the students attendance and save it to the data base. And the admin can show the attendance and also they can update delete and modify any activities in the system.
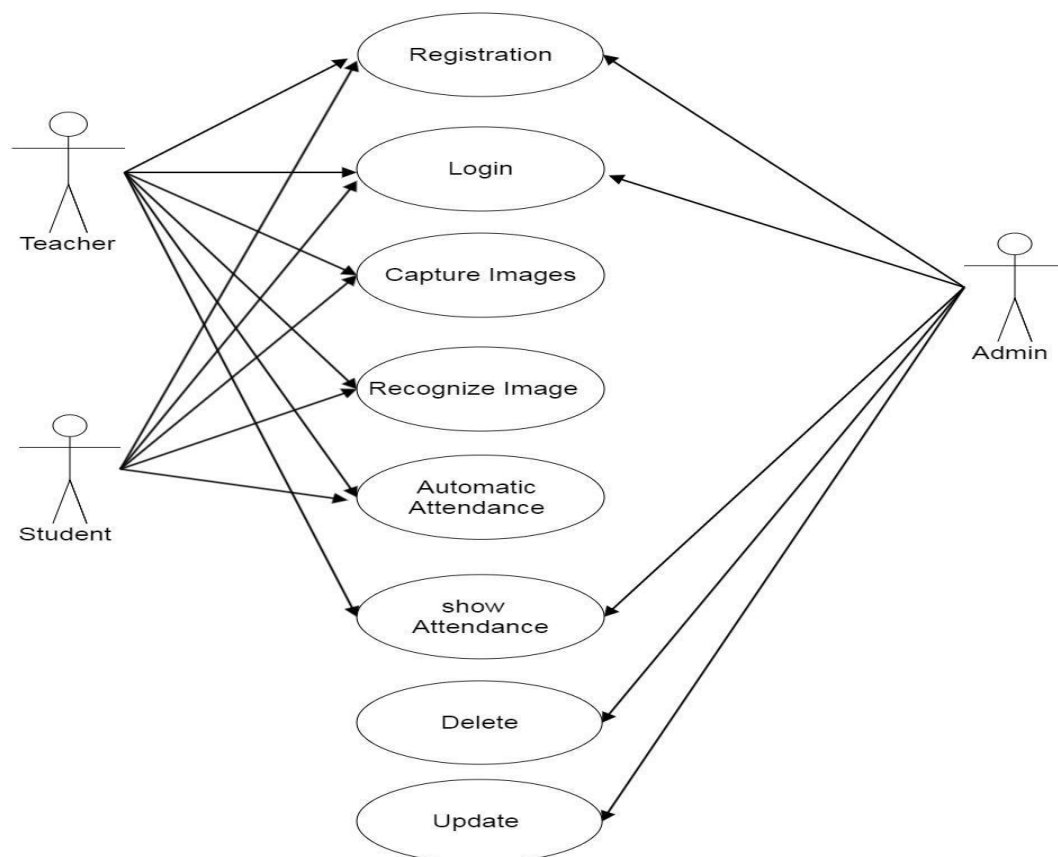

Figure: 3. 6 Use Case Diagram

3.6 Implementation:

It is a face recognition base automated attendance system so we use openCV python library for face recognition, the face recognition algorithm we use is Haar Cascade algorithm and also use face recognition module for recognize a face. For the data storage we use NumPy array that store sample photo for every face and for GUI we use TKinter python library. As programming languages for the project we use Python. And for implementing the whole project we use Pycharm and Visual studio code. We will also work for real time attendance that kept in python excel sheet and it can be seen by admin or authentication every day or every week or every month.

3.7 Summary:

In this chapter we proposed a model for recognizing human face which is automatically generate multi-dimensional images in multiple two-dimensional images. The generated images will be stored in the database and search against an input of image to identify the human face of the input. By implementing this model, the project can be delivered at low cost. We hope that our project will be challenged the current world.

Chapter-4
Implementation, Testing, and Result Analysis

4.1 Introduction

In this chapter the project is tested and analyzed properly. This chapter mainly contains the projects setup which was carried out in different situation. This section mainly explains the evaluation metrics used to measure the result accuracy and a detailed analysis of the provided output given by the project.

4.2 System Setup

For this project we use OpenCV python, which is library in python for real time computer vision. We also use Haar Cascade algorithm for real time face recognition. We test this project using a simple web cam of our laptops for capturing images. OpenCV save the values onto NumPy. After capturing the images the Haar Cascade algorithm converts the images into gray images and after training it create a dataset containing 21 images with different color and angles of the faces. The proposed system is very simple and light that it can run in any device no need for high quality equipment. The system includes a high quality camera for clear image capture. The more clear the image the more accurately it can visualize the faces and recognize it. In this it train the store images and automatically create datasets.

Figure: 4. 1 Dataset

Before the detection the system needs the name and id for the individual's identification which later used for storing attendance. In the system we use SQLite 3 for database so the user need SQLite 3 install into their system. As the system sore attendance in CSV (Comma Separated Value) which is mainly excel file so to access the attendance file the user must have MS Excel installed into their machine.

4.3 Evolution:

For evaluating the systems performance we tested the system in different situation in different lighting condition and different face distance from the web cam. We fond different results in different situation. For evaluating the system performance we use a formula

$$\text{Accuracy} = \frac{Total\ Recognized\ Faces}{Total\ Faces\ infront\ of\ camera} \times 100$$

We test the system in different situation with multiple faces in front of it. Farther details will be presented in the table below.

4.4 Results and Discussion

The system is very simple and light that it can run in any system no need for high quality equipment. The system a high quality camera for clear image capture. The more clear the image the more accurately it can visualize the faces and recognize it. In this it train the store images and automatically create datasets.

Value Table:

Faces in front of Camera	Total Recognized face	Ratio
1	1	100%
2	2	100%
5	5	100%
6	5	83.33%
10	8	80%

According to the data table content we create it performance graph which is present below.
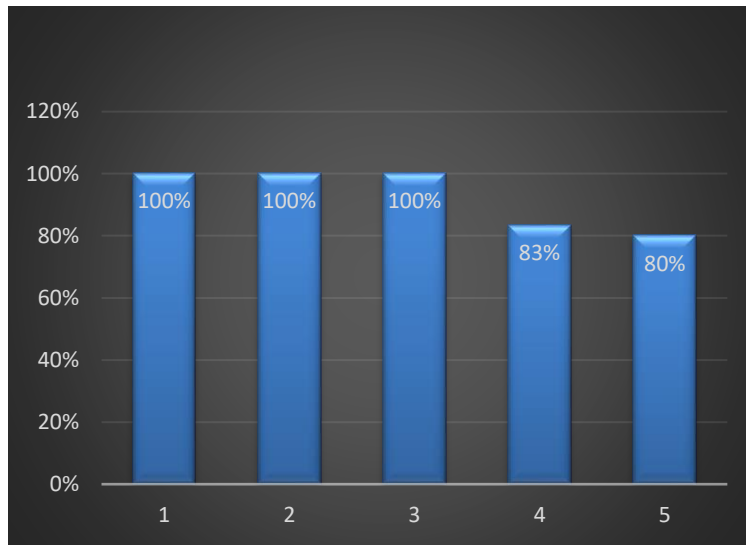

Figure: 4 1. Face Recognition graph

In the system if the faces recognized correctly then attendance will be saved accurately. So in graph 4.1 we can see that the accuracy of attendance is same as the face recognition graph as it is depends on the accuracy of accurate face recognition.

4.5 Summary

From this section of the chapter, it is showed that this projects performance is most satisfying on facial recognition based attendance system. Although the accuracy rate can be decreased in different situations.

Chapter-5
Standards, Impacts, Ethics, and Challenges

5.1 Standards

Currently all the educational institute and every employment institutes are attendance through manual book pen method which is very boring and time consuming. Or some modern institutes are taking attendance by finger print recognition it is modern but time consuming because the employee have to give attendance one by one. But current the world is facing the worst time because of COVID-19 and the virus is spreading through human contact so as the finger print consist of touching finger on the scanner so it can dangerous for the institute. Also if any institute want to take attendance through finger print quickly and want to save time then it will expansive to set multiple scanner to take multiple attendance at a time. But in our system there will no complication like this. And also it does not need any touch or other physical connection so there will less chances of spreading the deadly virus.

5.2 Impacts on Society:

In our world there are a lot of universities, college, school, industry and different types of institutions etc. In those institutions there are students, employees, workers. All of these institutions need to store attendance in daily of their workers. For storing the attendance pep and paper system is so time consuming. Also pen and paper system has a lot of draw backs and has no security. But we can use face detection system for storing attendance system. In our country almost every university, college, school follow the pen and paper-based system for attendance. But we can easily use face detection system. Almost every institution has computer and the face detection whole system was done by computer through camera. Every institution can increase their security in

attendance system using face detection. The whole system is easier to use rather than manually. Everything will be done by system automatically. In our country there are a lot of garments factory and thousands of people works there. Every day the workers come to factory and first they need to give attendance. But the garments factory follows the fingerprint system. During this covid-19 situation fingerprint using is harmful for anyone. But we can ensure the safety of workers. The works maintain the social distance and their face will capture by camera. Then the attendance system can easily handle by face detection and recognition system. The system is more effective and faster in attendance activities for every garment or every institution where attendance is important for store presence of someone.

5.3 Ethics:

The face detection system has a broader usage area in various institution such as school, college, university and different types of company who has to store the presence of their workers individually. In every school, college and university proxy can be stopped by this system. Every company can ensure their workers presence because poor attendance is toxic for that company's environment. The system must maintain personal privacy and should not be used for any bad purpose that has social or national threat. The usage of the system must be performed following the code of moral principles.

5.4 Challenges

 Face recognition is very fascinating and intriguing biometric technologies that works with human faces. During this covid-19 pandemic situation companies are getting rid of traditional fingerprint system. Because covid-19 can spread when every employee touches the fingerprint scanner they

can be infected by covid-19 virus. Also face detection can be possible wearing musk.

5.5 Summary:

Attendance system has a great effect on company's or institutions environment. Low attendance makes poor culture in the university, school or college and different types of institution. To prevent this bad culture and environment companies or institution must hire wisely formal attendance system. So our proposed system can easily handle this attendance system using face detection. This automated attendance system can easily store daily attendance and also can evaluate when attendance is below par for an employee or student. Also in this covid-19 pandemic situation automated face detection attendance system can be a well-suited than any other biometric methods such as fingerprints, iris recognition, voice recognition etc.

Chapter-6
Constraints and Alternatives

6.1 Design Constraints

The whole structure of our proposed system architecture can be implemented based on human faces. The model requires devices camera that can capture the images with different angles and in different conditions such as wearing musk or low light conditions etc. The devices should contain high processing ability to capture images and recognition of human faces. The model does not need any GPU support.

6.2 Component Constraints

Minimum requirement of the component for the proposed model architecture are,

- Processor: Intel i3 include 7th generation with 3GHz clock speed.

- Memory: 4GB DDR3 with 1600 bus speed.

- Camera or webcam: which is accessible using DirectShow interface

6.3 Budget Constraints

The overall component for the proposed model the estimated budget is to be calculated by the current market price for each component.

6.4 Summary

For implementing the proposed model we avoid deep learning (CNN). That's why the model doesn't required a heavyweight devices and that are cost-effective.
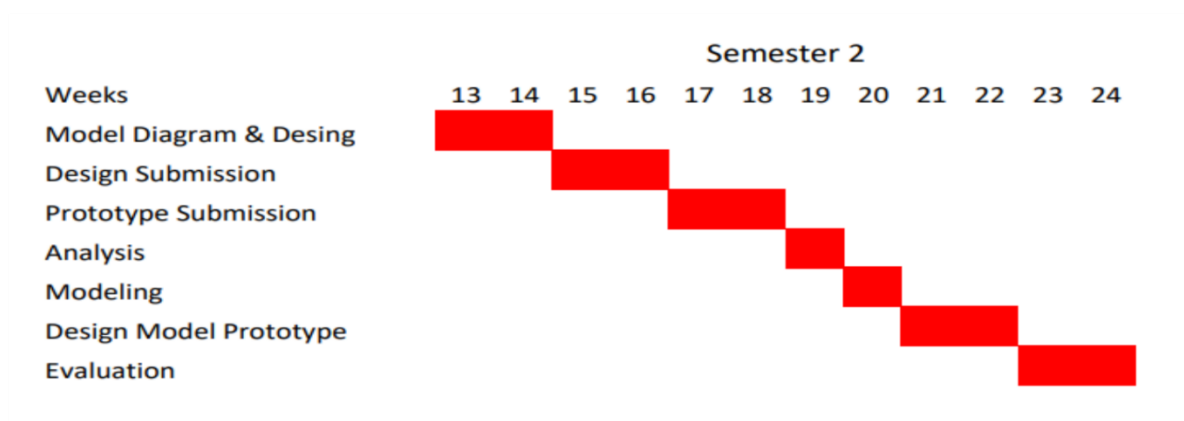
Chapter-7
Schedules, Tasks, and Milestones

7.1 Timeline

Total duration for the thesis work is one year that dived into three sections which contains three semesters. The first semester contains work topics are selection, planning and the reviewing the existing or related work of the thesis work. The second semester work contains to create some design and then analysis those prototype design to select one. In the final semester we implemented and tested the whole model. After the test result we reported the whole thesis work procedure.

7.2 Gantt chat

The timeline section contains the Gantt chart that describing the whole thesis work process. The thesis works contain three semesters which we divide into thirty-six weeks. Each semester contains twelve weeks long.
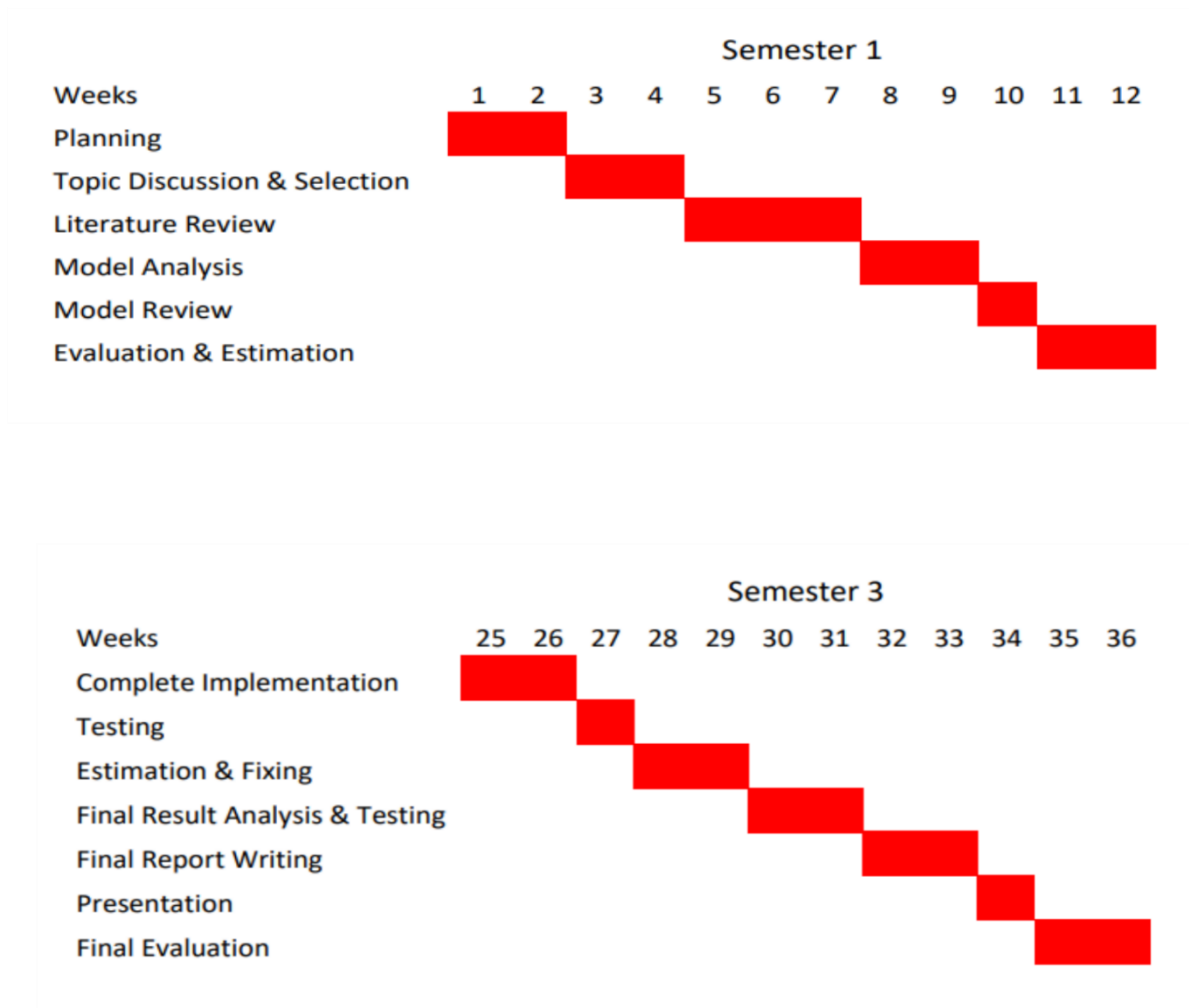
Figure: 7. 1 Gantt chart of work Completion Process

Chapter 8
Conclusion

8.1 Introduction

In this project, we present a work that uses faces, that is hardly used in any other attendance taking method. The project is tested in a busy place there it works perfectly. Although the project almost fails in the situation if the faces are out of focus from the camera. The project accuracy can be improved if the camera regulation get the image accurately more accurately. In recent pandemic situation COVID-19 is spreading all over the world. As we know the virus is spreading through physical contact most of the institute are using finger print as taking attendance and authentication were physical touch is must and the chances of spreading COVID-19 is more. Therefor in this situation our project work will help to take attendance without any physical connection and we hope it will help to reduce the attack of the deadly virus.

8.2 Future work And Limitation

The project is now working fine but in future we will try to work inside the face recognition algorithm more and try to increase the accuracy. We will modify the GUI (Graphical User Interface) to look it more attractive. We will also try to increase some features which will help the user to manage the system easily.

References:

[1] Jadhav, A., Jadhav, A., Ladhe, T., & Yeolekar, K. (2017). Automated attendance system using face recognition. *International Research Journal of Engineering and Technology (IRJET)*, *4*(01).

[2] Sutabri, T., Pamungkur, A. K., & Saragih, R. E. (2019). Automatic Attendance System for University Student Using Face Recognition Based on Deep Learning. *International Journal of Machine Learning and Computing*, *9*(5), 668-674.

[3] Elias, S. J., Hatim, S. M., Hassan, N. A., Abd Latif, L. M., Ahmad, R. B., Darus, M. Y., & Shahuddin, A. Z. (2019). Face recognition attendance system using Local Binary Pattern (LBP). *Bulletin of Electrical Engineering and Informatics*, *8*(1), 239-245.

[4] Winarno, E., Al Amin, I. H., Februariyanti, H., Adi, P. W., Hadikurniawati, W., & Anwar, M. T. (2019, December). Attendance System Based on Face Recognition System Using CNN-PCA Method and Real-time Camera. In *2019 International Seminar on Research of Information Technology and Intelligent Systems (ISRITI)* (pp. 301-304). IEEE.

[5] Katara, A., Kolhe, M. S. V., Zilpe, M. A. P., Bhele, M. N. D., & Bele, M. C. J. (2017). Attendance System Using Face Recognition and Class Monitoring System. *International Journal on Recent and Innovation Trends in Computing and Communication*, *5*(2), 273-276.

[6] Joseph, J., & Zacharia, K. P. (2013). Automatic attendance management system using face recognition. *International Journal of Science and Research (IJSR)*, *2*(11), 327-330.

[7] Jayant, N. K., & Borra, S. (2016, June). Attendance management system using hybrid face recognition techniques. In *2016 Conference on advances in signal processing (CASP)* (pp. 412-417). IEEE.

[8] Ahmedi, A., & Nandyal, S. (2015). An automatic attendance system using image processing. *The International Journal Of Engineering And Science (IJES)*, *4*(11).

[0] Shrivastava, K., Manda, S., Chavan, P. S., Patil, T. B., & Sawant-Patil, S. T. (2018). Conceptual model for proficient automated attendance system based on face recognition and gender classification using Haar-Cascade, LBPH algorithm along with LDA model. *International Journal of Applied Engineering Research*, *13*(10), 8075-8080.

[10] Varadharajan, E., Dharani, R., Jeevitha, S., Kavinmathi, B., & Hemalatha, S. (2016, November). Automatic attendance management system using face detection. In *2016 Online International Conference on Green Engineering and Technologies (IC-GET)* (pp. 1-3). IEEE.

[11] Tamimi, A. A., AL-Allaf, O. N., & Alia, M. A. (2015). Real-time group face-detection for an intelligent class-attendance system. *International Journal of Information Technology and Computer Science*

(IJITCS), *7*(6), 66-73.

[12] Yusof, Y. W. M., Nasir, M. M., Othman, K. A., Suliman, S. I., Shahbudin, S., & Mohamad, R. (2018). Real-time internet based attendance using face recognition system. *International Journal of Engineering & Technology*, *7*(3.15), 174-178.

[13]Liang, Q., & Fang, W. (2018, December). College Student Attendance System Based on Face Recognition. In *IOP Conference Series: Materials Science and Engineering* (Vol. 466, No. 1, p. 012107). IOP Publishing.

[14] Khan, M., & Gopale, A. (2017). Automated attendance management system using face recognition.

[15] Kowsalya, P., Pavithra, J., Sowmiya, G., & Shankar, C. K. (2019). Attendance monitoring system using face detection & face recognition. *Inter Res J EngTechnol (IRJET)*.

[16] Madhu, S., Adapa, A., Vatsavaya, V., & Padmini, P. (2019). Face recognition based attendance system using machine learning. *Int J Mang, Tech and Engr*, *9*.

[17] Iffandi, M. D., Adiningrat, R. N., Pandapota, J. R., Ramadhan, J. F., Kanigoro, B., & Irwansyah, E. (2020, October). Attendance System with Face Recognition. In *Proceedings of the Computational Methods in Systems and Software* (pp. 751-757). Springer, Cham.

[18] Godswill, O., Osas, O., Anderson, O., Oseikhuemen, I., & Etse, O. (2018). Automated student attendance management system using face recognition. *International Journal Educational Research and Information Science*, *5*.

[20] Chin, H. (2018). *Face recognition based automated student attendance system* (Doctoral dissertation, UTAR).

[21] Pu, J., Zhang, L., Zhang, J., Xue, Z., Zhang, X., & Yang, J. (2020, August). Research on Classroom Attendance   System Based on Face Recognition. In *Journal of Physics: Conference Series* (Vol. 1616, No. 1, p. 012095). IOP Publishing.

[22] Singh, A. P., Kumar, S., Manvi, S., Nimbal, P., & Shyam, G. K. (2019). Face Recognition System Based on   LBPH Algorithm. *International Journal of Engineering and Advanced Technology (IJEAT)*.