Design and Implementation of a Smart Attendance System (SAS)

by

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Supervised by
Salma Tabashum

Submitted in partial fulfillment of the requirements for the degree of Bachelor of Science in Computer Science and Engineering

DEPARTMENT OFCOMPUTER SCIENCEANDENGINEERING
SONARGAON UNIVERSITY (SU)

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APPROVAL

The Project titled **"Design and Implementation of a Smart Attendance System (SAS)"** submitted by Jahurul Islam (CSE1902017002), Md. Siamul Hoque (CSE1902017034), Md.Tahmid Ahmed (CSE191016130), Md. Rakibul Hasan (CSE191016148) and Md.Insan Mia (CSE1901016085) to the Department of Computer Science and Engineering, Sonargaon University(SU),has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of Bachelor of Science in Computer Science and Engineering and approved as to its style and contents.

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Examiner 3

DECLARATION

We, hereby, declare that the work presented in this report is the outcome of the investigation performed by us under the supervision of **Salma Tabashum, Lecturer,** Department of Computer Science and Engineering, Sonargaon University, Dhaka, Bangladesh. We reaffirm that no part of this **project** has been or is being submitted elsewhere for the award of any degree or diploma.

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ABSTRACT

To maintain the attendance record with day to day activities is a challenging task. The conventional method of calling name of each student is time consuming and there is always a chance of proxy attendance. The most demanding task in any organization is attendance marking. In traditional attendance system, the students are called by the teachers and their presently or absently is marked accordingly. However, these traditional techniques are time consuming and boring. The following system is based on face recognition to maintain the attendance record of students. The daily attendance of students is recorded subject wise which is stored already by the administrator. As the time for corresponding subject arrives the system automatically starts taking snaps and then apply face detection and recognition technique to the given image and the recognize students are marked as present and their attendance update with corresponding time and subject id. The system's major goal is to identify and recognize faces in a real-time environment, match them with data in the database, and record their attendance. This is intended to make the time-consuming manual attendance process more efficient. This also overcomes the issue of authentication and proxies because biometrics is one-of-a kind, and facial traits used for Face Recognition are one of them. For face detection and recognition, the designed system uses OpenCV, dlib, Face Recognition libraries, and One-Shot Learning, which takes just one image per person in the database and so saves space when compared to standard training-testing models. The cropped images are then stored as a database with corresponding labels. The features are extracted using LBPH algorithm.

ACKNOWLEDGMENT

At the very beginning, we would like to express my deepest gratitude to the Almighty Allah for giving us the ability and the strength to finish the task successfully within the schedule time.

We are auspicious that we had the kind association as well as supervision of **Salma Tabashum**, Lecturer, Department of Computer Science and Engineering, Sonargaon University whose hearted and valuable support with best concern and direction acted as necessary recourse to carry out our project.

We would like to convey our special gratitude to **Bulbul Ahmed,** Associate Professor and Head, Department of Computer Science and Engineering, and **Brig. Gen. (Retd) Prof. Habibur Rahman Kamal**, Dean, Faculty of Science and Engineering for their kind concern and precious suggestions.

We are also thankful to all our teachers during our whole education, for exposing us to the beauty of learning.

Finally, our deepest gratitude and love to my parents for their support, encouragement, and endless love.

LIST OF ABBREVIATIONS

AI	Artificial Intelligence
CNN	Convolution Neural Network
CRUD	Create Read Update Delete
CSS	Cascading Style Sheet
DRY	Don't Repeat Yourself
HOG	Histogram of Oriented Gradients
HTML	Hyper Text Markup Language
JS	Java Scripts
LBP	Local Binary Pattern
LBPH	Local Binary Pattern Histogram
ML	Machine Learning
MVT	Model View Template
PCA	Principal Component Analysis
RAM	Random Access Memory
RFID	Radio Frequency Identification
ROI	Region of Interest
SAS	Smart Attendance System
SCM	Source Code Management

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CHAPTER 1

INTRODUCTION TO FACE RECOGNITION AND SMART ATTENDANCE SYSTEM

1.1 Introduction:

Every organization requires a robust and stable system to record the attendance of their students and every organization have their own method to do so, some are taking attendance manually with a sheet of paper by calling their names during lecture hours and some have adopted biometrics system such as fingerprint, RFID card reader, Iris system to mark the attendance. The conventional method of calling the names of students manually is time consuming event. The RFID card system, each student assigns a card with their corresponding identity but there is chance of card loss or unauthorized person may misuse the card for fake attendance. While in other biometrics such as finger print, iris or voice recognition, they all have their own flaws and also they are not 100%   accurate [9] [6].

Use of face recognition for the purpose of attendance marking is the smart way of attendance management system. Face recognition is more accurate and faster technique among other techniques and reduces chance of proxy attendance. Face recognition provide passive identification that is a person which is to be identified does not to need to take any action for its identity [8]. Face recognition involves two steps, first step involves the detection of faces and second step consist of identification of those detected face images with the existing database. There are number of face detection and recognition methods introduced. Face recognition works either in form of appearance based which covers the features of whole face or feature based which covers the geometric feature like eyes, nose, eye brows, and cheeks to recognize the face [7].

A smart attendance system using facial recognition is computerized bio-metric software which is suited for determining or validating a person by performing comparison on patterns based on their facial appearances. Face recognition systems have upgraded appreciably in their management over the recent years and this technology is now vastly used for various objectives like security and in commercial operations. Face recognition is a powerful field of research which is a computer based digital technology. Face recognition for the intent of marking attendance is a resourceful application of attendance system.

1.2 Objectives

A smart attendance system using facial recognition is computerized bio-metric software which is suited for determining or validating a person by performing comparison on patterns based on their facial appearances. Face recognition systems have upgraded appreciably in their management over the recent years and this technology is now vastly used for various objectives like security and in commercial operations. Face recognition is a powerful field of research

which is a computer based digital technology. Face recognition for the intent of marking attendance is a resourceful application of attendance system.

1.3 Needs of Smart Attendance System

It automatically scans your face so you don't need to touch anything to mark your attendance. A face recognition attendance system provides you with real-time data and syncs the data with no time lag. It helps organizations in efficient workforce management. These systems can help reduce the time and effort required to record attendance, minimize errors, and provide more accurate and timely attendance data. They can also help improve security and prevent fraud by verifying the identity of the person present.

1.4 Face Recognition System

Face Recognition is one of the areas from Computer Vision. The practical applications for it are many, ranging from biometrical security, to automatically tagging your friends pictures, and many more. Because of the possibilities, many companies and research centers have been working on it. The performance in face verification could not always be directly related with the one in face recognition. This recognition solution is capable of uniquely identifying or verifying an object using Deep learning based AI/ML techniques. The unique advantage about this solution is the ability to do it at the source (edge) without the need for expensive streaming and storing. This is basically an Artificial Intelligence based engine for edge computing. This system uses a deep convolution network trained to directly optimize the embedding itself. To train, use triplets of roughly aligned matching / non-matching input patches generated using a novel online triplet mining method. The benefit of this approach is much greater representational efficiency. CNN are deep artificial neural networks that are used primarily to classify the image.

1.5 Related work

A. Face Recognition Based on HOG and Fast PCA Algorithm Xiang-Yu Li(&) and Zhen-Xian Lin By using hog features and PCA algorithms face is recognition. By applying recognition algorithm to cropped faces, we get similarity b/w taken image and database image. PAC algorithm used for face detection and recognition.

B. Attendance Marking System Using Biometrics Biometric are characteristics of human being that can be used to recognize an individual or verify an individual's identity. Attendance is taken electronically with the help of a fingerprint device the record is stored in the database. Attendance is marked after student Identification.

C. The Performance of the Haar Cascade Classifiers Applied to the Face and Eyes Detection The Haar Cascade is applied to the face and eyes for detection. The system is based on real time face recognition which is fast and reliable and needs improvisation of images in various lighting environments.

1.6 Methodology

Following sections deals primarily with proposed techniques, methodologies and concepts

relevant to facial recognition and image processing which is more specific and niche to a single process which uses facial recognition algorithms image processing techniques. The proposed project includes four sequential phases; namely capture detection, image matching and attendance marking.

1.6.1 Database Creation and Training

Original database containing the images of the students is created by taking a live real time video of the students, and splitting the video into thirty frames, converting them to gray scale and storing only the faces of the students as images, then we will be training the respective images using the LBPH algorithm all the while storing their respective histogram value's and then comparing the stored and trained images against the captured images to mark the attendance. The software used for splitting the video into frames is Open-CV.

1.6.2 Image Capturing Step

In following step the professor will capture a real time video of the class room or lecture hall by means of their own mobile device and making use of the DroidCam application which links the system that is running on your laptop to your mobile device and lets you use your mobile camera to capture the students present in the class room, the system can be accessed by the professors by accessing the laptop where all the data is stored.

1.6.3 Image Detection Step

In this second phase once the video has begun capturing, simultaneously the Haar Cascade algorithm is applied to the video to get individual faces of the students and obtaining the distinct features of their face(eyes, nose, ears and lips) by making use of line features and edge features, the Haar cascade algorithm basically works by giving us the parts of the face that are needed most for detection i.e, the ROI (Region of Interest) and processing and cropping out other regions of the face that do not play a role in the image processing and matching part. Once the faces are detected they are extracted and stored.

1.6.4 Image Matching Step

In this third and most crucial phase of recognizing the student, that is comparing captured image against the stored images in the database, this method is done by making use of the LBPH algorithm (Local Binary Pattern Histogram), each image stored in the database has it's histogram value calculated and is cross checked against the calculated Histogram value of the images extracted from the captured video feed. The name of the student appears above and the number indicates the confidence. Note: Lower the confidence number higher is the accuracy. The system not only detects just one face of a single student, but of multiple students or faces. As the system works for three faces at once by law of induction we can say that it will work for at least more than 15 faces at a single time.

1.6.5 Attendance Marking Phase

In this phase the attendance is marked, if the uploaded image matches the image stored in the database, then the attendance is marked present for that lecture and saved, but if any student goes

unrecognized then that particular image is stored in the secondary database and an alert is generated for the admin.
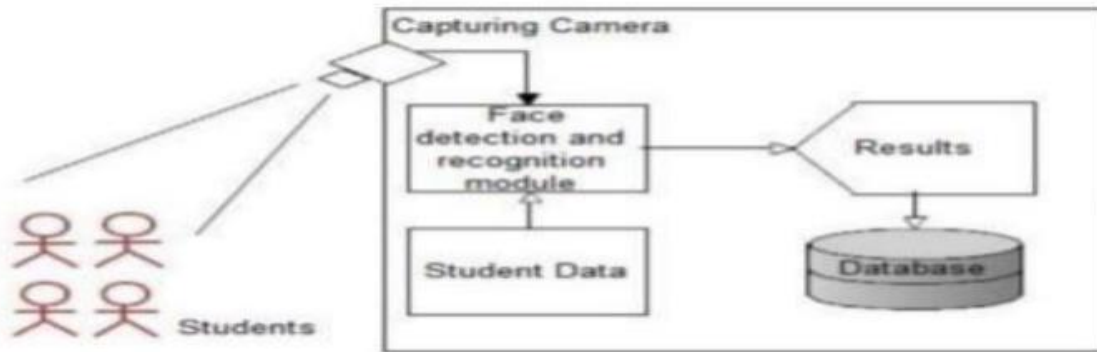
1.6.6 Proposed Architecture

Figure 1.6.6 Methodology Proposed Architecture

The architecture for the proposed system has been designed to keep it pretty straightforward and easy to understand. The steps that have to be undertaken to reach the final end step of the system which is making sure the attendance of the student is updated correctly and timely. The system can easily be accessed by anyone, where attendance of the students can easily be checked and maintained by the faculty as when required. The DroidCamap will allow easy use for capturing live video feeds of the class and simultaneously perform recognition for the students. OpenCV-Python will be used to access the Haar Cascade and LBPH algorithms and their libraries that are required for training, recognition and matching of the captured images against the stored images available in the previously acquired data sets. Algorithms being used:

1.7 HaarCascade Algorithm

The HaarCascade algorithm is a set of classifiers used for object detection. Haar Cascade is a machine learning based approach where a lot of positive and negative images are used to train the classifier. The images which we would like to be classified by the classifier are known as positive images and the images we would not want our classifier to classify are known as negative images.

1.8 Local Binary Pattern Histogram

The Local Binary Pattern is used for face recognition, which means identifying the captured image against the image already stored in the database. The algorithm makes use of four main parameters to recognise a face. The Local Binary Pattern is applied to the image and compared against the central pixel of the image, then we calculate the histogram value for the said lbp image. The value of the newly calculated histogram is then compared against the already pre-processed histogram value of the already stored image in the database. This is how the Local Binary Pattern Histogram carries out facial identification of images.

Step-by-Step

Now that we know a little more about face recognition and the LBPH, let's go further and see the steps of the algorithm:

1.8.1 Parameters: the LBPH uses 4 parameters:

- o **Radius**: the radius is used to build the circular local binary pattern and represents the radius around the central pixel. It is usually set to 1.
- o **Neighbors**: the number of sample points to build the circular local binary pattern. Keep in mind: the more sample points you include, the higher the computational cost. It is usually set to 8.
- o **Grid X**: the number of cells in the horizontal direction. The more cells, the finer the grid, the higher the dimensionality of the resulting feature vector. It is usually set to 8.
- o **Grid Y**: the number of cells in the vertical direction. The more cells, the finer the grid, the higher the dimensionality of the resulting feature vector. It is usually set to 8.

Don't worry about the parameters right now, you will understand them after reading the next steps.

1.8.2. Training the Algorithm: First, we need to train the algorithm. To do so, we need to use a dataset with the facial images of the people we want to recognize. We need to also set an ID (it may be a number or the name of the person) for each image, so the algorithm will use this information to recognize an input image and give you an output. Images of the same person must have the same ID. With the training set already constructed, let's see the LBPH computational steps.

1.8.3 Applying the LBPH Operation: The first computational step of the LBPH is to create an intermediate image that describes the original image in a better way, by highlighting the facial characteristics. To do so, the algorithm uses a concept of a sliding window, based on the parameters radius and neighbors.
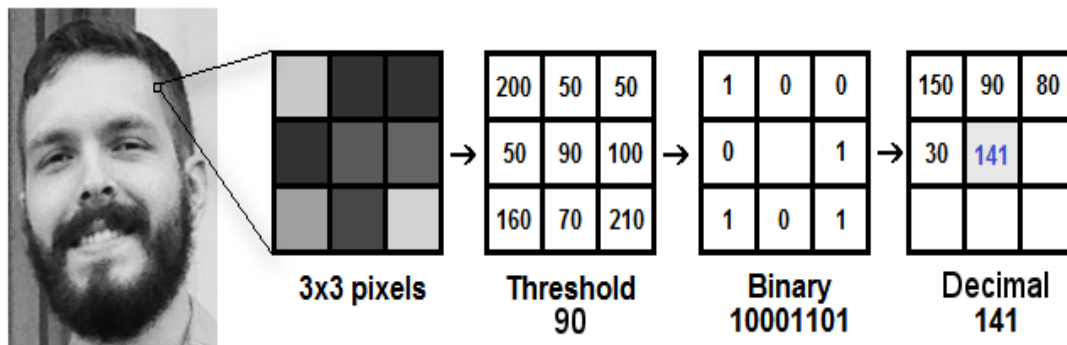
The image below shows this procedure:

Figure 1.8.3 LPBH Operation

Based on the image above, let's break it into several small steps so we can understand it easily:

- o Suppose we have a facial image in grayscale.
- o We can get part of this image as a window of 3x3 pixels.
- o It can also be represented as a 3x3 matrix containing the intensity of each pixel (0~255).
- o Then, we need to take the central value of the matrix to be used as the threshold.
- o This value will be used to define the new values from the 8 neighbors.
- o For each neighbor of the central value (threshold), we set a new binary value. We set 1 for values equal or higher than the threshold and 0 for values lower than the threshold.
- o Now, the matrix will contain only binary values (ignoring the central value). We need to concatenate each binary value from each position from the matrix line by line into a new binary value (e.g. 10001101). Note: some authors use other approaches to concatenate the binary values (e.g. clockwise direction), but the final result will be the same.
- o Then, we convert this binary value to a decimal value and set it to the central value of the matrix, which is actually a pixel from the original image.
- o At the end of this procedure (LBP procedure), we have a new image which represents better the characteristics of the original image.
- o **Note**: The LBP procedure was expanded to use a different number of radius and neighbors, it is called Circular LBP.

It can be done by using bilinear interpolation**.** If some data point is between the pixels, it uses the values from the 4 nearest pixels (2x2) to estimate the value of the new data point.

1.8.4 Extracting the Histograms: Now, using the image generated in the last step, we can use the Grid X and Grid Y parameters to divide the image into multiple grids, as can be seen in the following image:
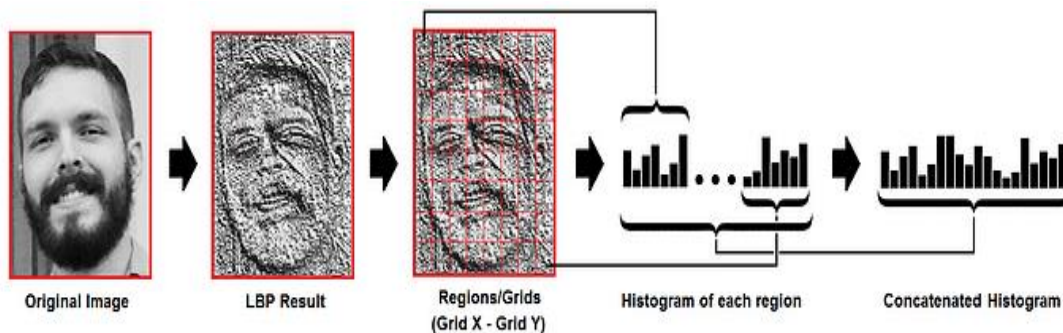

Figure 1.8.4 Extracting the Histograms

Based on the image above, we can extract the histogram of each region as follows:

As we have an image in grayscale, each histogram (from each grid) will contain only 256 positions (0~255) representing the occurrences of each pixel intensity.

Then, we need to concatenate each histogram to create a new and bigger histogram. Supposing we have 8x8 grids, we will have 8x8x256=16.384 positions in the final histogram. The final histogram represents the characteristics of the image original image.

CHAPTER 2

INTRODUCTION TO MACHINE LEARNING

2.1 Introduction:

In the real world, we are surrounded by humans who can learn everything from their experiences with their learning capability, and we have computers or machines which work on our instructions. But can a machine also learn from experiences or past data like a human does? So here comes the role of Machine Learning. Machine Learning is said as a subset of artificial intelligence that is mainly concerned with the development of algorithms which allow a computer to learn from the data and past experiences on their own. With the help of sample historical data, which is known as training data, machine learning algorithms build a mathematical model that helps in making predictions or decisions without being explicitly programmed. Machine learning brings computer science and statistics together for creating predictive models. Machine learning constructs or uses the algorithms that learn from historical data. The more we will provide the information, the higher will be the performance. A machine has the ability to learn if it can improve its performance by gaining more data.

2.2 How does Machine Learning works

A Machine Learning system learns from historical data, builds the prediction models, and whenever it receives new data, predicts the output for it. The accuracy of predicted output depends upon the amount of data, as the huge amount of data helps to build a better model which predicts the output more accurately.

Suppose we have a complex problem, where we need to perform some predictions, so instead of writing a code for it, we just need to feed the data to generic algorithms, and with the help of these algorithms, machine builds the logic as per the data and predict the output. Machine learning has changed our way of thinking about the problem. The below block diagram explains the working of Machine Learning algorithm:
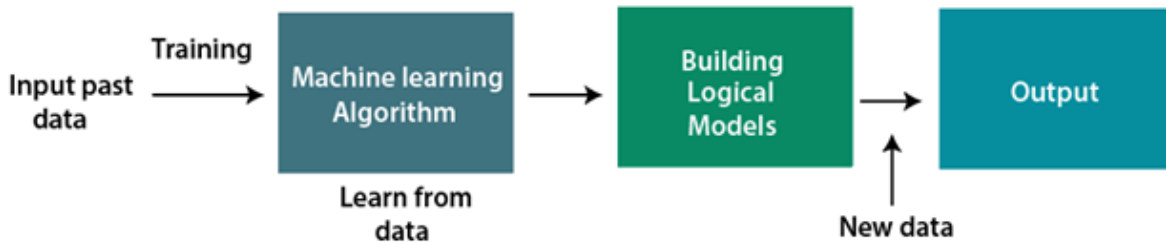

Figure 2.2 Machine Learning Works

2.3 Features of Machine Learning

- o Machine learning uses data to detect various patterns in a given dataset.
- o It can learn from past data and improve automatically.
- o It is a data-driven technology.
- o Machine learning is much similar to data mining as it also deals with the huge amount of the data.

2.4 Need for Machine Learning

The need for machine learning is increasing day by day. The reason behind the need for machine learning is that it is capable of doing tasks that are too complex for a person to implement directly. As a human, we have some limitations as we cannot access the huge amount of data manually, so for this, we need some computer systems and here comes the machine learning to make things easy for us.

We can train machine learning algorithms by providing them the huge amount of data and let them explore the data, construct the models, and predict the required output automatically. The performance of the machine learning algorithm depends on the amount of data, and it can be determined by the cost function. With the help of machine learning, we can save both time and money.

The importance of machine learning can be easily understood by its uses cases, currently, machine learning is used in self-driving cars, cyber fraud detection, face recognition, and friend suggestion by Facebook, etc. Various top companies such as Netflix and Amazon have building machine learning models that are using a vast amount of data to analyze the user interest and recommend product accordingly.

2.5 Importance of Machine Learning

- o Rapid increment in the production of data
- o Solving complex problems, which are difficult for a human
- o Decision making in various sector including finance
- o Finding hidden patterns and extracting useful information from data.

CHAPTER 3

TOOLS AND TECHNIQUES

3.1 Tools and Technique
a. Django
b. CSS
c. HTML
d. JS
e. Python
f. SQLite3

a. Django

Django is a Python framework that makes it easier to create web sites using Python. Django takes care of the difficult stuff so that you can concentrate on building your web applications. Django emphasizes reusability of components, also referred to as DRY (Don't Repeat Yourself), and comes with ready-to-use features like login system, database connection and CRUD operations (Create Read Update Delete).

Django follows the MVT design pattern (Model View Template).

- Model - The data you want to present, usually data from a database.
- View - A request handler that returns the relevant template and content - based on the request from the user.
- Template - A text file (like an HTML file) containing the layout of the web page, with logic on how to display the data.

b. CSS

Cascading Style Sheets (CSS) is a style sheet language used for describing the presentation of a Document written in a markup language like HTML. CSS is a corners to new technology of the World. CSS stands for Cascading Style Sheets CSS describes how HTML elements are to be displayed on screen, paper, or in other media CSS saves a lot of work. It can control the layout of multiple web pages all at once External stylesheets are stored in CSS files CSS tutorial or CSS 3 tutorial provides basic and advanced concepts of CSS technology. Our CSS tutorial is developed for beginners and professionals. The major points of CSS are given below: CSS stands for Cascading Style Sheet. CSS is used to design HTML tags. CSS is a widely used language on the web. HTML, CSS and JavaScript are used for web designing. It helps the web designers to apply style on HTML tags.

c. HTML

HTML stands for Hyper Text Markup Language, which is the most widely used language on Web to develop web pages. HTML was created by Berners-Lee in late 1991 but "HTML 2.0" was the first standard HTML specification which was published in 1995. HTML 4.01 was a major version of HTML and it was published in late 1999. Though HTML 4.01 version is widely used but currently we are having HTML-5 version which is an extension to HTML 4.01, and this version was published in 2012.

Originally, HTML was developed with the intent of defining the structure of documents like headings, paragraphs, lists, and so forth to facilitate the sharing of scientific information between researchers. Now, HTML is being widely used to format web pages with the help of different tags available in HTML language. HTML is a MUST for students and working professionals to become a great Software Engineer specially, when they are working in Web Development Domain. I will list down some of the key advantages of learning HTML.

d. JS

JavaScript (js) is a light-weight object-oriented programming language which is used by several websites for scripting the webpages. It is an interpreted, full-fledged programming language that enables dynamic interactivity on websites when applied to an HTML document. It was introduced in the year 1995 for adding programs to the webpages in the Netscape Navigator browser. Since then, it has been adopted by all other graphical web browsers. With JavaScript, users can build modern web applications to interact directly without reloading the page every time. The traditional website uses js to provide several forms of interactivity and simplicity.

e. PYTHON

Python is a general purpose, dynamic, high-level, and interpreted programming language. It supports Object Oriented programming approach to develop applications. It is simple and easy to learn and provides lots of high-level data structures. Python is easy to learn yet powerful and versatile scripting language, which makes it attractive for Application Development. Python's syntax and dynamic typing with its interpreted nature make it an ideal language for scripting and rapid application development. Python supports multiple programming pattern, including object-oriented, imperative, and functional or procedural programming styles.

f. SQLite3

SQLite3 can be integrated with Python using sqlite3 module, which was written by Gerhard Haring. It provides an SQL interface compliant with the DB-API 2.0 specification described by PEP 249. You do not need to install this module separately because it is shipped by default along with Python version 2.5.x onwards. To use sqlite3 module, you must first create a connection object that represents the database and then optionally you can create a cursor object, which will help you in executing all the SQL statements. In SQLite, sqlite3 command is used to create a new SQLite database. You do not need to have any special privilege to create a database.

3.2 Requirement & Specifications

3.2.1 Scope of the System

We are setting up to design a system comprising of two modules. The first module (face detector) is a mobile component, which is basically, a camera application that captures student faces and stores them in a file using computer vision face detection algorithms and face extraction techniques. The second module is a desktop application that does face recognition of the captured images (faces) in the file, marks the students register and then stores the results in a database for future analysis.

3.3 SYSTEM REQUIREMENTS

3.3.1 Software Requirements

- ➢ Operating system - Windows 7, 10.
- ➢ Coding Language - Python.
- ➢ Front-End – HTML, CSS, JS.

3.3.2 Hardware Requirements

- ➢ Processor – Intel I3
- ➢ RAM - 8 GB (min)
- ➢ Hard Disk - 200 GB
- ➢ Key Board - Standard Windows Keyboard
- ➢ Mouse - Two or Three Button Mouse
- ➢ Monitor – SVGA

3.3.3 Functional Requirements

- ➢ Enrolling the students
- ➢ Taking and tracking student attendance by facial recognition in specific time.
- ➢ Mark Attendance and update the same in excel sheets
- ➢ Calculate the absentees and cumulative attendance of month.

3.4 Types of Testing

3.4.1 Unit testing

Unit testing involves the design of test cases that validate that the internal program logic is functioning properly, and that program inputs produce valid outputs. All decision branches and internal code flow should be validated. It is the testing of individual software units of the application .it is done after the completion of an individual unit before integration. This is a structural testing, that relies on knowledge of its construction and is invasive. Unit tests perform basic tests at component level and test a specific business process, application, and/or system configuration. Unit tests ensure that each unique path of a business process performs accurately to the documented specifications and contains clearly defined inputs and expected results.

3.4.2 Integration testing

Integration tests are designed to test integrated software components to determine if they actually run as one program. Testing is event driven and is more concerned with the basic outcome of screens or fields. Integration tests demonstrate that although the components were individually satisfaction, as shown by successfully unit testing, the combination of components is correct and consistent. Integration testing is specifically aimed at exposing the problems that arise from the combination of components.

3.4.3 Functional test

Functional tests provide systematic demonstrations that functions tested are available as specified by the business and technical requirements, system documentation, and user manuals. Functional testing is centered on the following items: Valid Input-identified classes of valid input must be accepted. Invalid Input-identified classes of invalid input must be rejected. Functions-identified functions must be exercised. Output-identified classes of application outputs must be exercised. Systems/Procedures: interfacing systems or procedures must be invoked. Organization and preparation of functional tests is focused on requirements, key functions.

CHAPTER 4

SYSTEM DESIGN AND IMPLEMENTATION

4.1 Introduction

In this chapter, there is a fully discussion about the project design. A general block diagram has been developed and implement according diagram. Here we describe overall project description implementation procedure and working principle. Total project flow chart is also available in this chapter.

4.2 Input Design

The input design is the link between the information system and the user. It comprises the developing specification and procedures for data preparation and those steps are necessary to put transaction data in to a usable form for processing can be achieved by inspecting the computer to read data from a written or printed document or it can occur by having people keying the data directly into the system. The design of input focuses on controlling the amount of input required, controlling the errors, avoiding delay, avoiding extra steps and keeping the process simple. The input is designed in such a way so that it provides security and ease of use with retaining the privacy.

4.3 Output Design

A quality output is one, which meets the requirements of the end user and presents the information clearly. In any system results of processing are communicated to the users and to other system through outputs. In output design it is determined how the information is to be displaced for immediate need and also the hard copy output. It is the most important and direct source information to the user. Efficient and intelligent output design improves the system's relationship to help user decision- making. 1. Designing computer output should proceed in an organized, well thought out manner; the right output must be developed while ensuring that each output element is designed so that people will find the system can use easily and effectively. When analysis design computer output, they should Identify the specific output that is needed to meet the requirements.
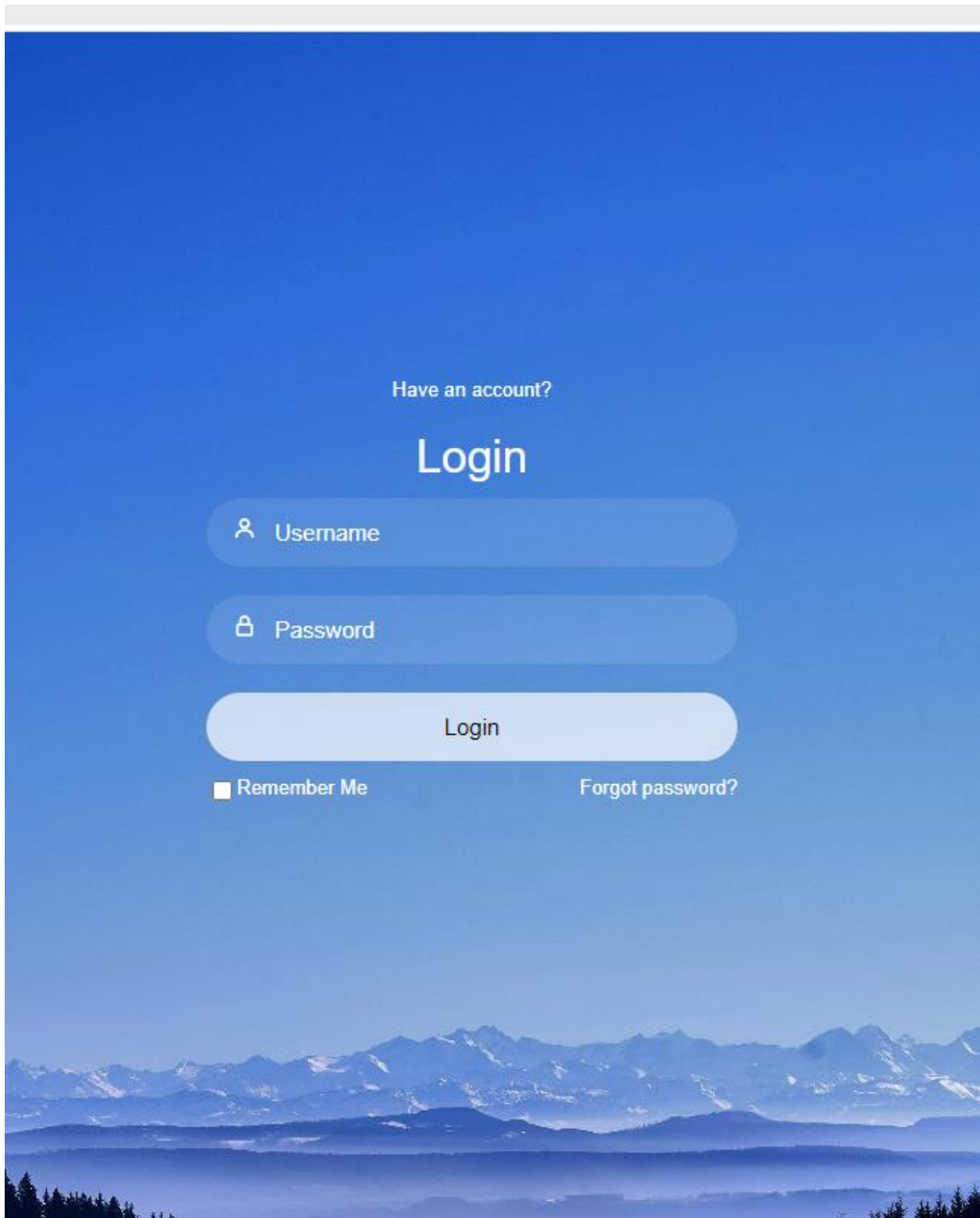
o   Login Panel

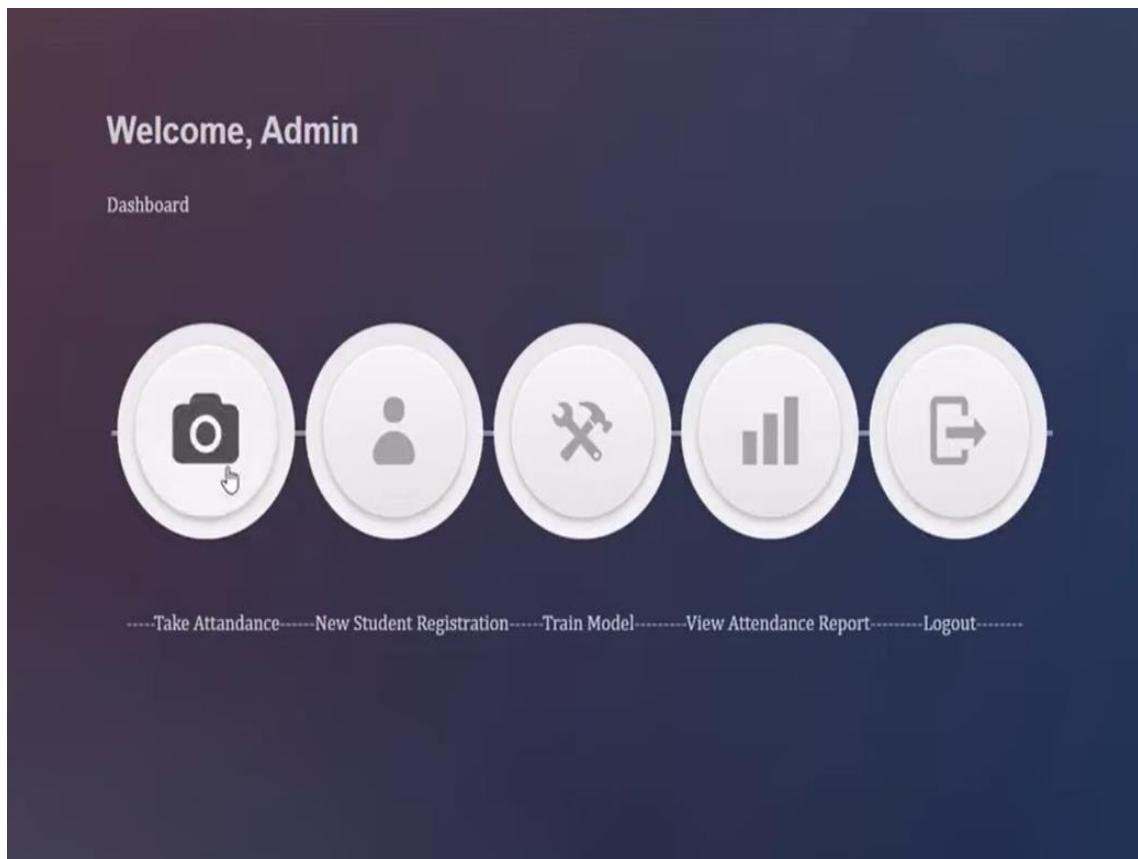**Figure 4.3.1** Login page

o   Home Interface

Figure 4.3.2 Home page

o Student Portal

Fig 4.3.3 Student portal

4.4 System Implementation

4.4.1: System Flow Chart

Start

Image Processing

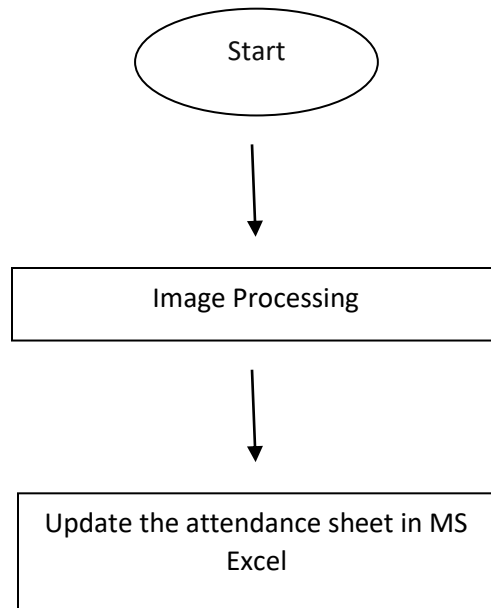Update the attendance sheet in MS Excel

Figure 4.4.1 System Flow Chart

4.4.2: Image processing procedure
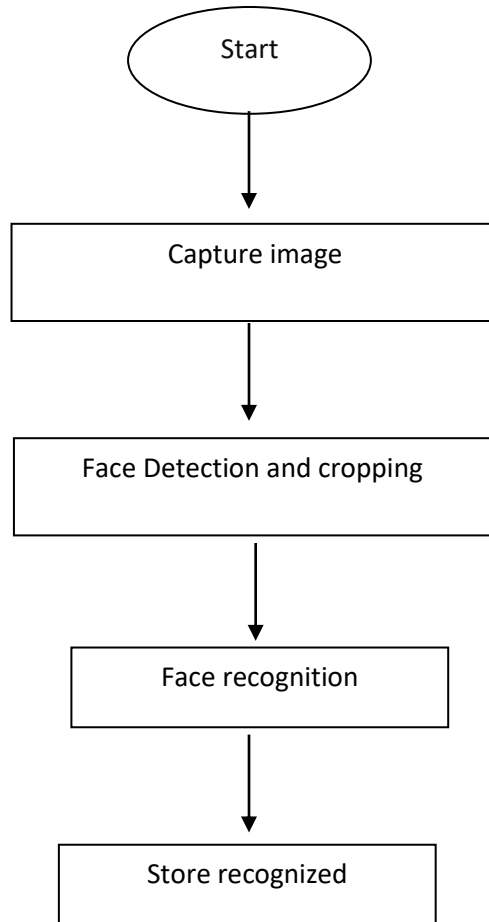
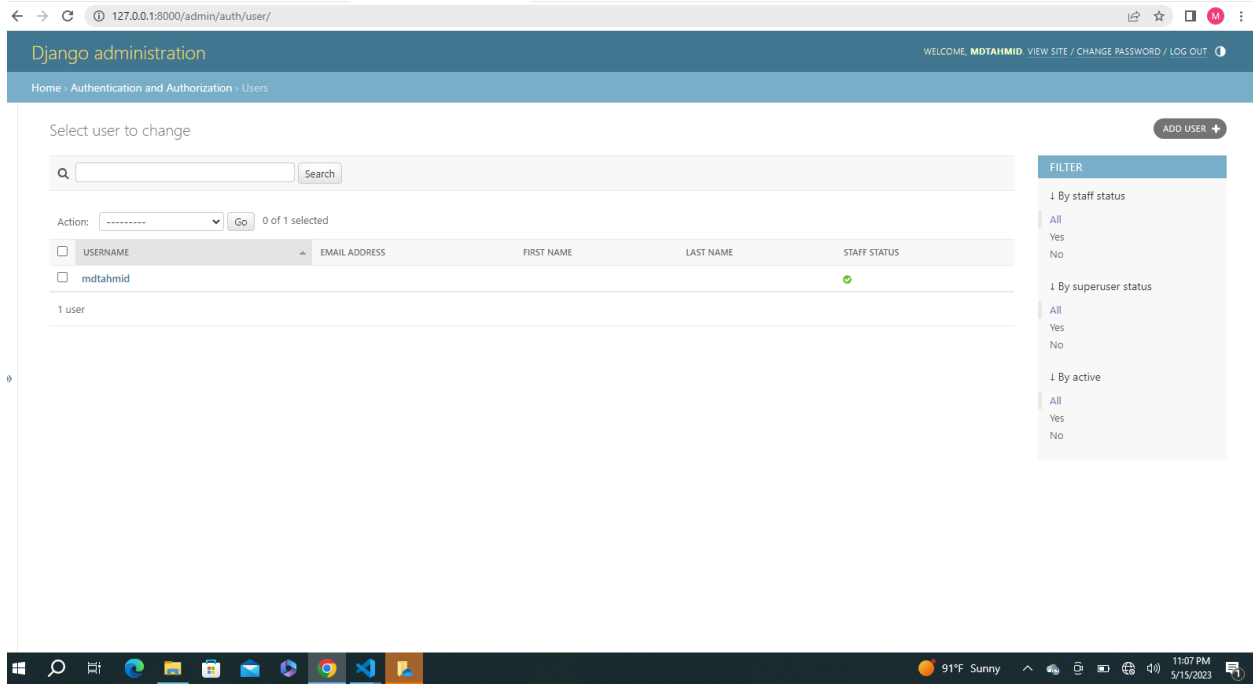**Figure 4.4.2** Image processing procedure

4.4.3 Admin Panel

Figure 4.4.3 Admin Panel

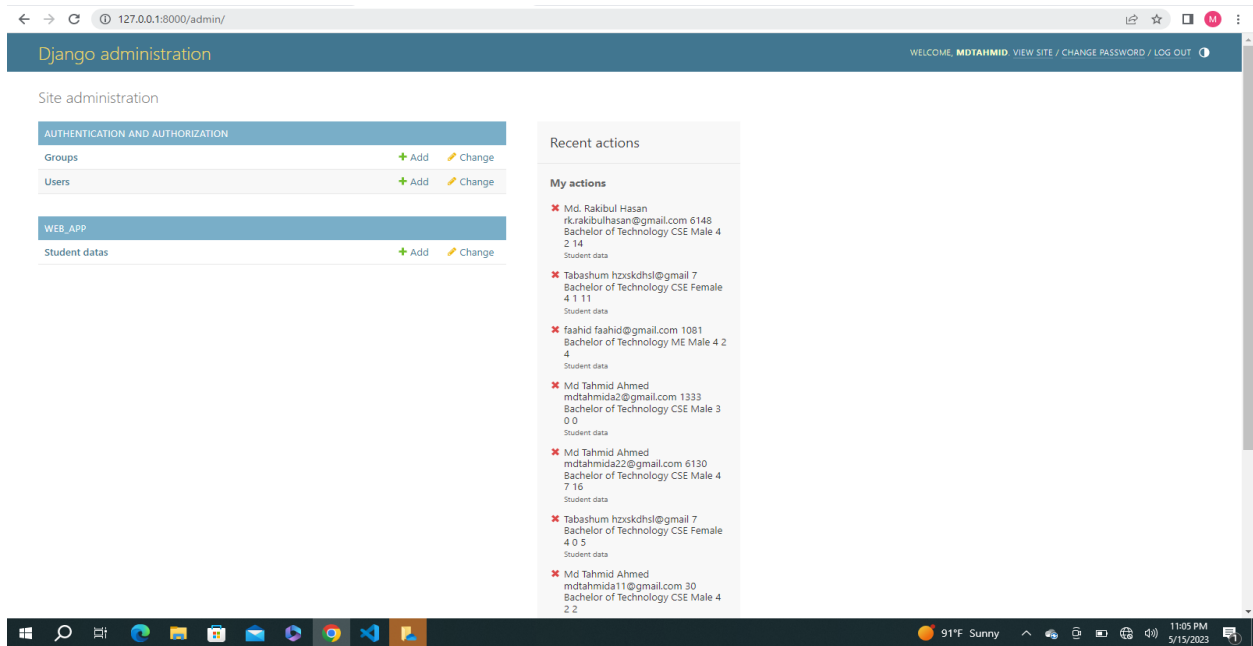### 4.4.4 Authentication and Authorization

Figure 4.4.4 Authentication and Authorization

CHAPTER 5

RESULT AND DISCUSSION

5.1 Introduction

This chapter contains the results obtained and discussion about the full project. The Result and Discussion about Smart attendance system using Facial Recognition system using HaarcascadeOpencvHaarcascadeOpencv (Object Detection) and LBPH Local Binary Pattern (LBP) algorithms.

5.2 Result

The section shows the result in the form of screenshots (step by step working of system).
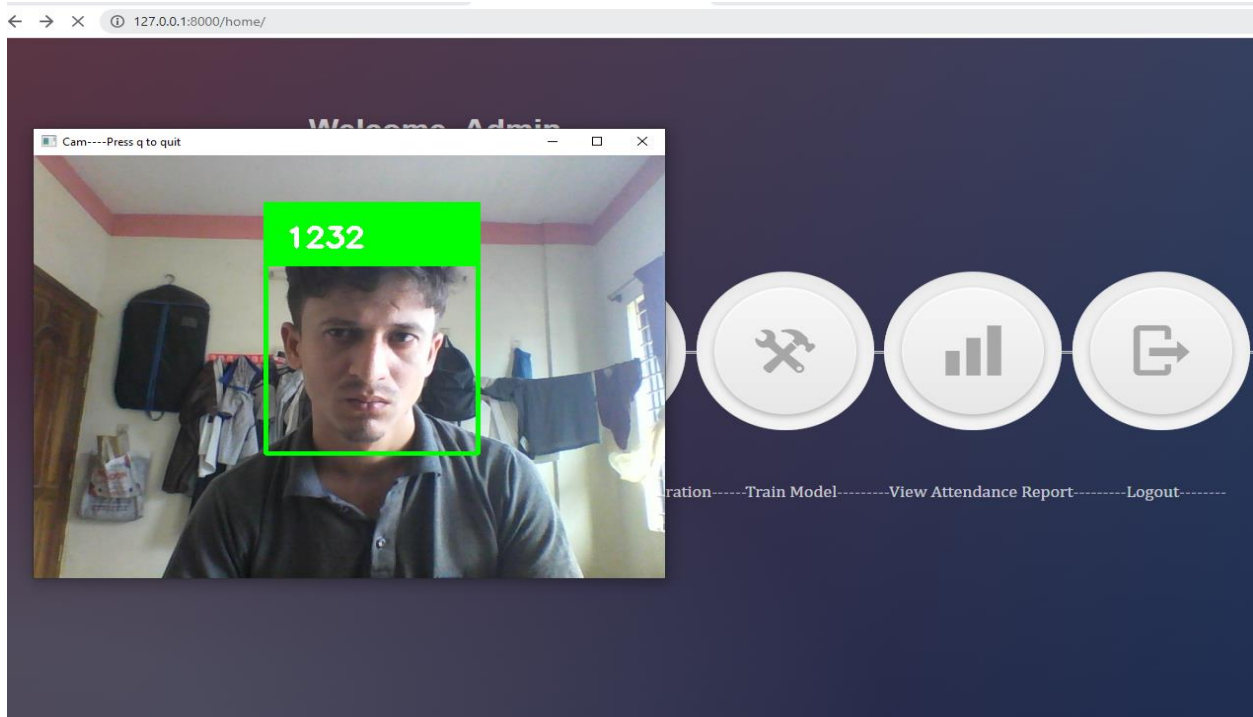
o   Take Attendance

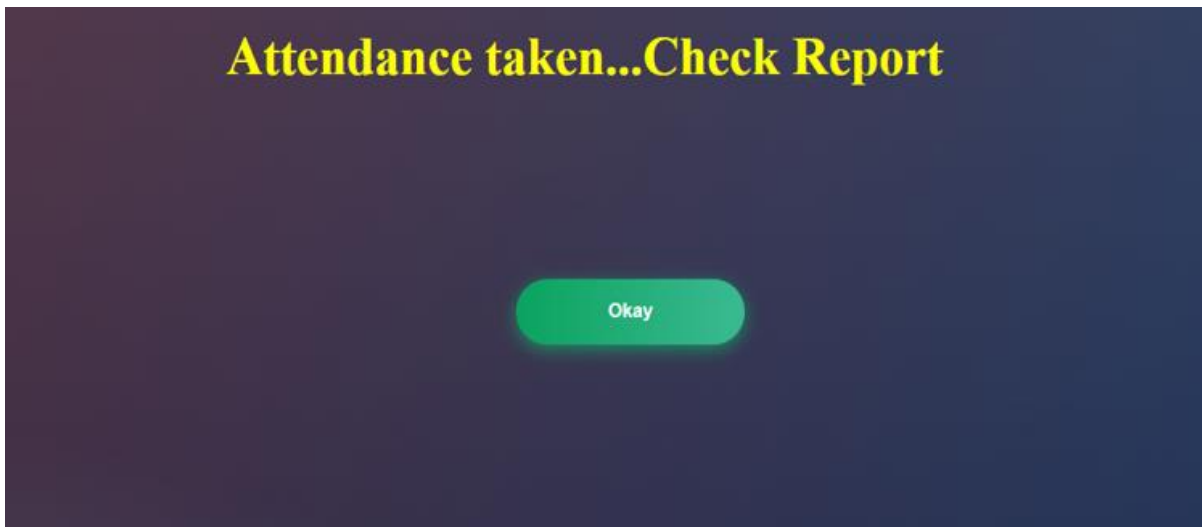

Figure 5.2.1 Take Attendance

o   Attendance Taken

Figure 5.2.2 Attendance Taken
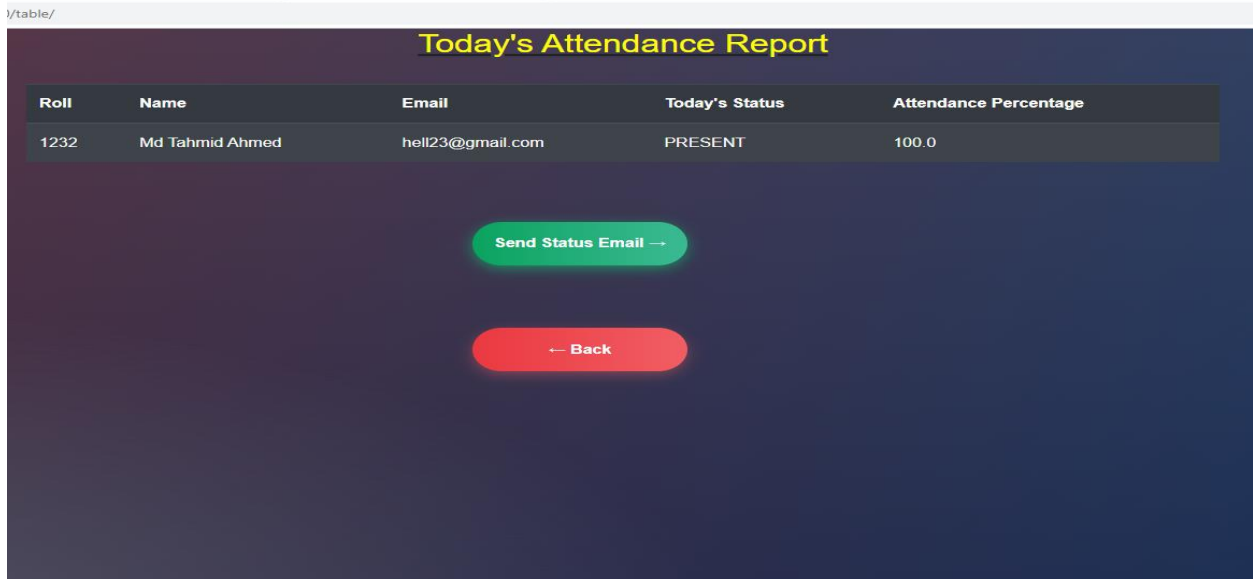
○ Attendance Report

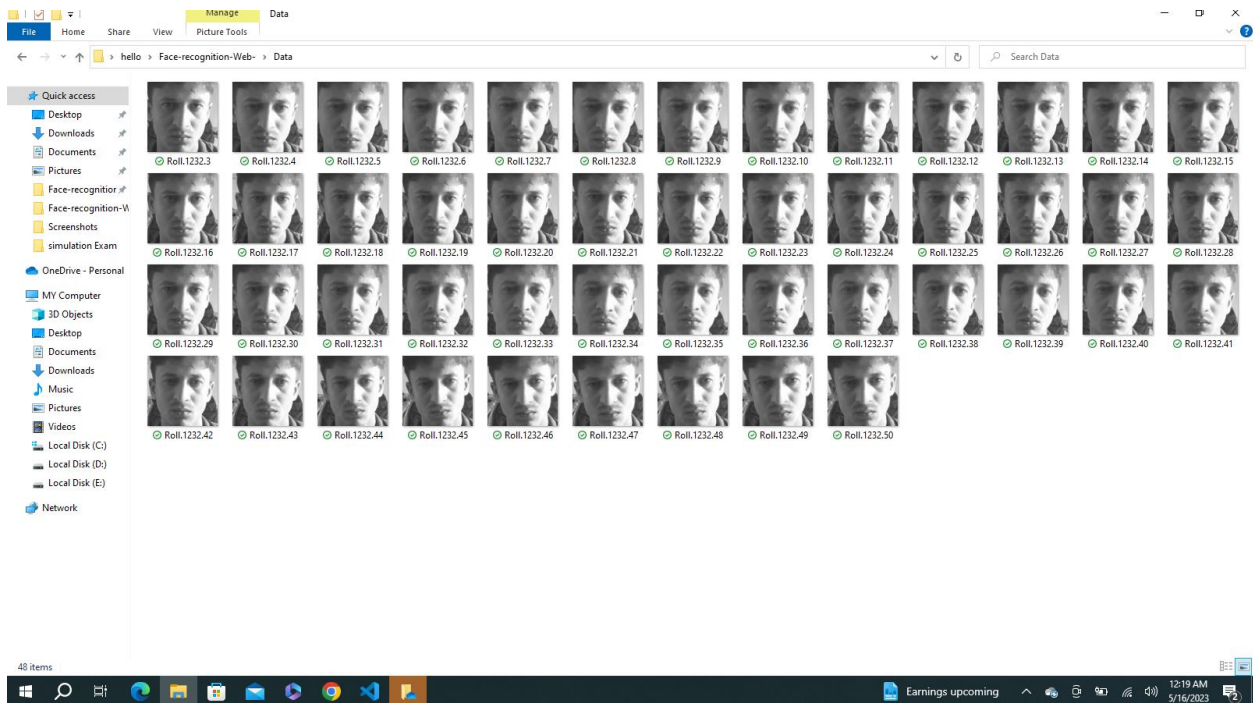**Fig 5.2.3** Attendance Report

○ Dataset

Figure 5.2.4 Dataset

5.3 Discussion

This proposed approach provides a method to perform face recognition for student attendance system, which is based on the texture based features of facial images. Face recognition is the identification of an individual by comparing his/her real-time captured image with stored images in database of that person. Thus, training set has to be chosen based on the latest appearance of an individual other than taking important factor for instance illumination into consideration.

CHAPTER 6
CONCLUSION AND FUTURE WORKS

6.1 Conclusion

Individual classroom attendance is currently feasible using the system we developed. It can be widely used at the collegiate level with the necessary enhancements and the creation of a proper database containing all of the details of each student in the college or university. This system can be used to manage not only students, but also faculty, staff, and nonstaff members' students. Another development that to make sure of is the system's complete automation. To avoid any discrepancies, such as tampering with the devices, the system must currently be supervised. Our goal is to completely automate the process by using a real-time live feed captured by a CCTV camera to mark students' attendance without the need for manual supervision,resulting in legitimate and untampered attendance report.

6.2 Limitations

- The face recognition system can't tell the difference between identical twins.
- Affected by the environment.
- Facial recognition can be expensive.
- Privacy concerns related to facial recognition.
- High false o match range.
- Technology is not mature yet.
- Can take away freedom and fun from people.
- Potential for primary abuse.
- Can be misused by the government.
- Rules and regulations against facial recognition in some regions.
- Problem with false rejection when people change their hairstyles.
- Sensitive data may get stolen by hackers.
- Lack of regulations in the AI in face recognition systems.
- Facial recognition can lead to higher unemployment rates.
- The general public may not accept this technology.
- Excessive reliance on facial recognition can be dangerous.
- Storage of data can be problematic.
- The general public may not accept this technology.

6.3 Future Work:

In future, the work can be expanded to process face recognition technique on various degree of angle up to which the system can be recognize. This work can also be expanded to mark attendance for similar twins where a minute change can be noted from the face of the similar ones. The system that we have developed is currently viable for individual classroom attendance. With the required enhancements and creation of a proper database consisting of all the details of each student in the college or university it can be widely used at the collegiate level. This system can also be used to manage the students of not only the students but also the faculty members, staff, and non-staff members as well. Another development which we wish to ensure is the complete automation of the system. Currently, the system has to be supervised to avoid any discrepancies such as tampering with the devices. Our goal is to completely automate the process by using a real-time live feed capture using a CCTV camera, which can mark the attendance of students without any manual supervision, thereby producing legitimate and untampered attendance reports.

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