# An Attendance Management System Using Face Recognition

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# Introduction

- Attendance management system using face recognition is used to take attendance automatically using a face detection method.

- The input for the system detecting the face and output is an excel sheet with the attendance of the students present in the class

- The face detection is performed and compared on the basis of accuracy of the data using the Principle Component Analysis (PCA )and Linear Discriminant ( LDA) algorithms

- We can get the face detection by using either video recording or by capturing the images with the camera which is placed inside the class covering the whole area of the class.

- The system involves mainly two methods which use face detection and face recognition

# Existing System

The existing system is the conventional method of taking attendance is time consuming and a chance for making human errors in taking attendance by spoofing the attendance by the staff. They can easily edit the attendance sheet and mark attendance.

# Disadvantages of Existing System

- Chances for fake attendance marking.

- Real time monitoring is not available.

- Difficult to manage the attendance records in manual registers.

- Traditional methods are less accurate and slower

- There is a chance of proxy attendance.

# Problem Statement

- To develop a cost effective, portable, accurate attendance management system using face recognition..

# Objectives

- To ease the process of classroom attendance marking.

- To facilitate enough time for the course coordinators to cover the course within the stipulated time

- To make attendance marking fault free and error free

# Scope of Project

- Despite the fact that this technique is used all over the world

- The scope of this study is restricted to classes at the Providence College of Engineering in Chengannur, Kerala, with a maximum of 60 students.

- The professors in the department of computer science and engineering at Providence College of Engineering in Chengannur, Kerala, will be the system's users.

# Summary of Literature

| Title | Methodology | Advantages |
|---|---|---|
| Face Recognition based Attendance Management System (Smitha et al,2020) | • Database created and stored images of students<br>• Haar -Cascade classifier used<br>• Local Binary Pattern Histogram Algorithm used | • Time saving<br>• Easy to manage |
| Attendance Management Using Facial Recognition (Bharadwaj et al,2019) | • Database used with student name, unique I'd and image<br>• Principle Component Analysis is used<br>• Local Binary Pattern Histogram Algorithm used | • Provide hazzle - free to automatically mark attendance<br>• Cost effective |

# Summary of Literature contd.

| Title | Methodology | Advantages |
|---|---|---|
| An automated student attendance management system using face recognition (Rani et al, 2020) | • Database created and stored images of students<br>• Local Binary Pattern Histogram Algorithm used<br>• High definition camera is used | • High quality images are produced |
| A real time class attendance monitoring system using smart face recognition (Trinos et al, 2020) | • Haar Cascading and Local Binary Pattern algorithms are used<br>• Offers services like metadata, editing, saving of the file<br>• OpenCV library is used | • Efficient to use<br>• Easy to maintain |

# Summary of Literature

| Title | Methodology | Advantages |
|---|---|---|
| An Automated Classroom Attendance System Using Video Based Face Recognition (Raghuwanshi et al.2019) | The face detection is performed and compared using Principle Component Analysis (PCA) and Linear Discriminant Algorithms (LDA) | • Performs well under lower light condition |
| Student Attendance Monitoring System Using Face Recognition (Sai et al 2020) | Face detection using Haar -cascade Classifier Face Recognition using Local Binary pattern histogram (LBPH) | • Accuracy upto 91%. • Reduce the time and man power |

# Summary of Literature

| Title | Methodology | Advantages |
|---|---|---|
| Student's Attendance Monitoring through the Face Recognition (Kainz et al,2019) | • Convolutional Neural Networking used<br>• Viola-Jones algorithm used<br>• SSD method<br>• Histogram of Oriented<br>• Gradients(HOG) | • Highly efficient |
| Student Attendance System Using Face Recognition (Dev and Patnik,2020) | • Haar Classifier used<br>• K-nearest neighbour algorithm used<br>• Convolutional Neural Networking used<br>• Viola-Jones Algorithm used | • Easy to handle |

# Proposed System

- The described system comprises a Web application which marks the attendance of the students by capturing the image of the class. The system's camera is utilized to identify the students' faces in the image that was captured. Each student's attendance will be noted in the.csv file following the face recognition.

- When first the app launches, the faculty is presented with a display asking the user id and password to login to capture the image of the class to monitor the attendance. If the user has not yet logged in ,then there is a sign-up button. After selecting the sign-up button name, email id, user id and password should be entered and thus creating a profile. The next screen will be presented with a button to capture the image. Then the faces of the students will be detected and attendance will be marked.

# Proposed System Contd.

## Database

MongoDB is the system's database of choice. The system/cloud-installed database is accessed via the pymongo module. When the application first launches, the database is configured. It keeps track of the user's username, password, and subject. The password is hashed and saved using the SHA-256 algorithm.

## Face Recognition

This is accomplished using the Face recognition package for Python. The photos from the sample directory are initially gathered by the system. The photos that are acquired are encoded and kept within a list. Following a check and match with the list of encoded pictures, the collected photos are then identified.

# Proposed System Contd.

**Image Dataset**

Dataset is a vital component and it is critical to choose the correct input data for our purposes.

In this the dataset will contain the pictures of each student taken from all sides.

# Advantages of Proposed System

The following are the benefits of the suggested system

- More efficient.

- Works in real-time.

- No proxy attendance

- More user-friendly

- It can be used on any devices globally.

# Software Requirements

- Visual Studio Code

- Python IDE

- MongoDB

- Flask

- OpenCV

- HTML

- CSS

# Flowchart
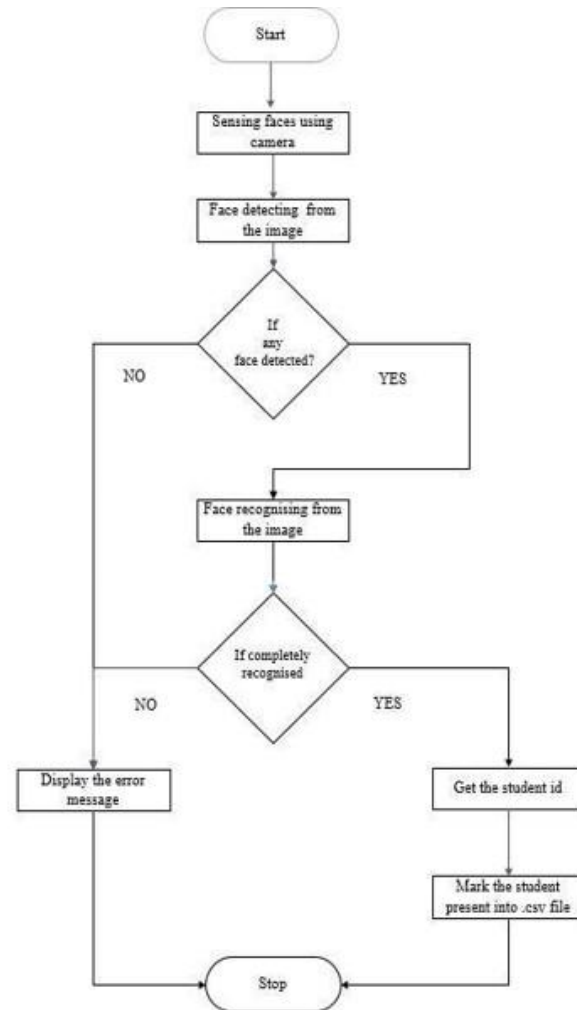
# Flowchart of Proposed System

Flow chart of an attendance management system using face recognition. Faces will be recognized from the image once it has been captured. If and only if the face was recognized in the taken image, the image will be compared to the built-in database. The built database will be used to identify the identified face. Get the student ID and record the student's attendance into a.csv file if the faces can be fully recognized. If the faces are not totally and correctly recognized, an error notice will be displayed.

# Activity Diagram
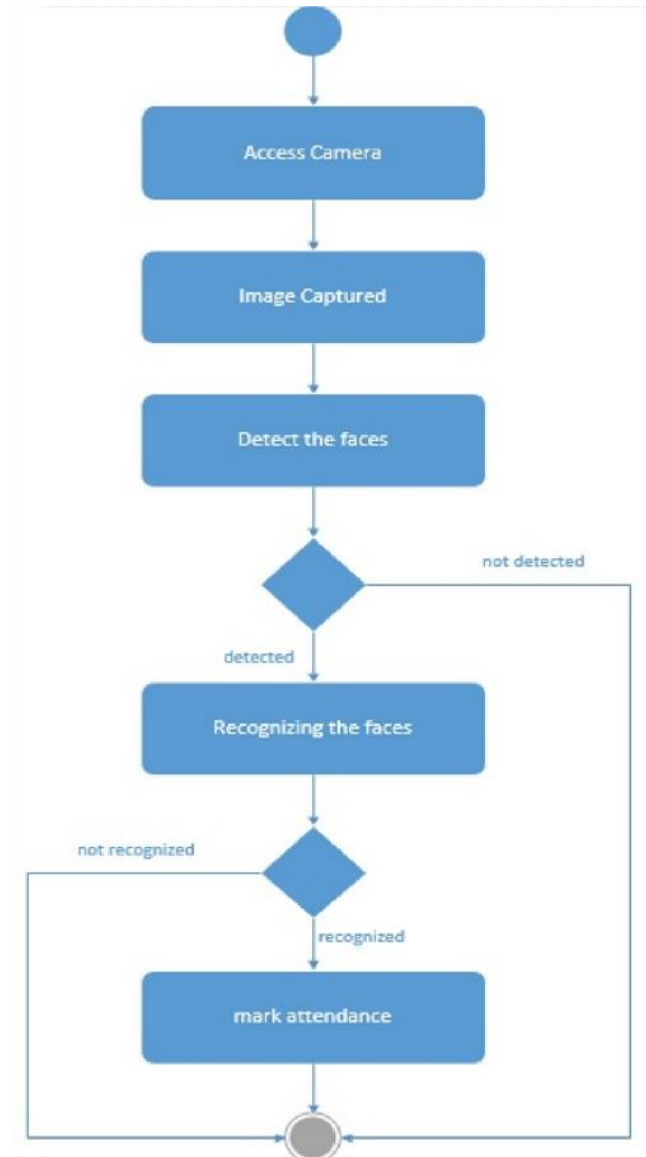


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# UI Design
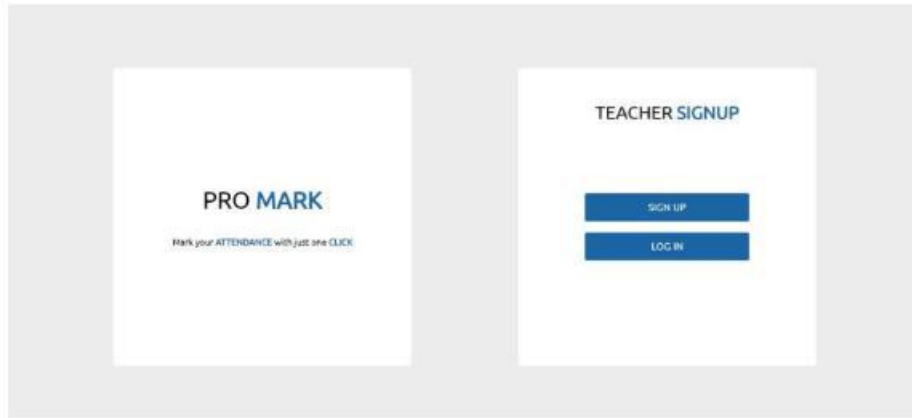


Home page
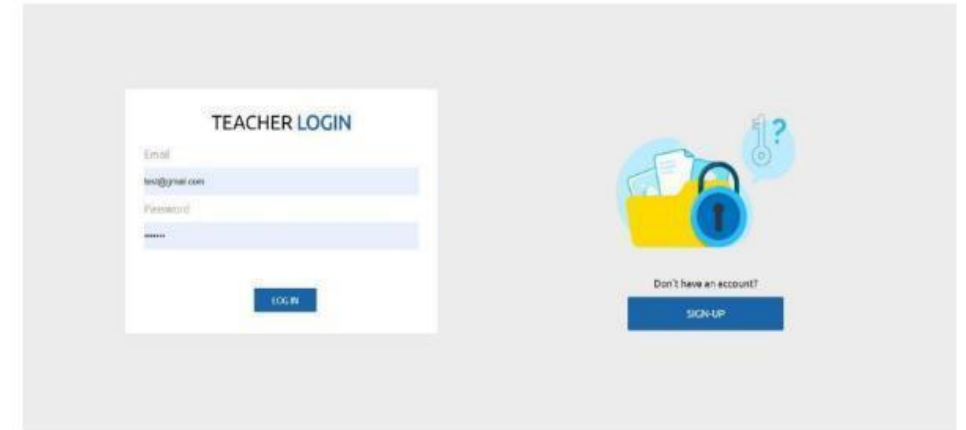


Login page
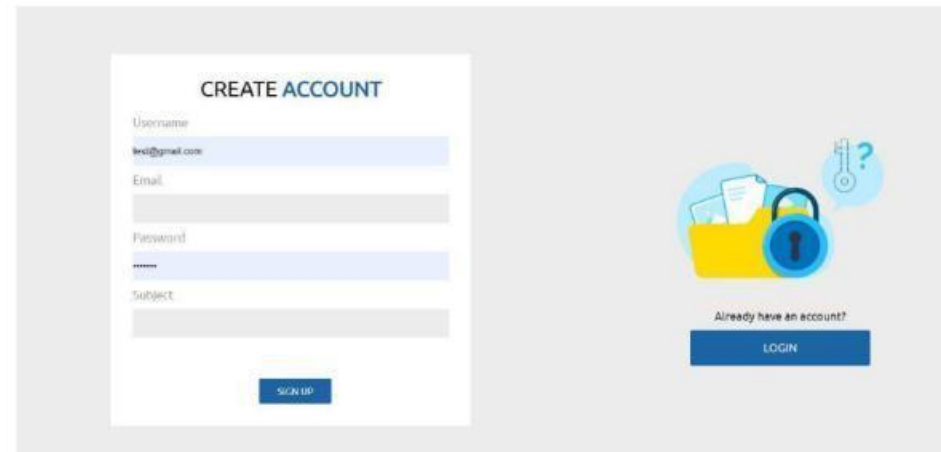


Sign up page

# Implementation

**Pre-processing Images**

The technology takes pictures of each person's face. The photographs are saved in a folder after being converted to jpeg files. A name and ID specific to that individual will be kept with the stored photographs.

# Implementation contd.

## Open CV

OpenCV is a name for a free and open-source software library for computer vision and machine learning. To hasten the inclusion of artificial intelligence into goods, OpenCV was used to develop a common infrastructure for computer vision applications. Since OpenCV is a BSD-licensed software, businesses can easily use and modify the code. The collection contains more than 2500 optimized algorithms, including several both established and cutting-edge computer vision and machine learning methods. These algorithms can be applied to a variety of tasks, including finding related images in a database of images, removing red eyes from flash-taken photos, tracking eye movements, identifying objects, classifying human actions in videos, tracking camera movements, tracking moving objects, extracting 3D models of objects, creating 3-point clouds from stereo cameras, stitching together images to create high-resolution scenes, and creating markers to overlay images. It offers C++, Python, Java, and MATLAB interfaces and supports Windows, Linux, Android, and MacOS.

# Implementation contd.

**Flask**

Flask is a small, lightweight Python web framework that makes it easier to create online applications by providing useful tools and features. It gives developers flexibility and is a more approachable framework for new developers because you can easily design a web application using just one Python file. Additionally, Flask may be expanded and doesn't require a specific directory structure or a lot of boilerplate code to use it. Flask requires Python 2.6 or higher to be installed and is based on the WSGI (Web Server Gateway Interface) toolkit. Jinja2 is also a template engine used by Flask. Start by importing the flask package into any Python IDE.

# Implementation contd.

## Face Recognition

The easiest face recognition library in the world enables you to recognize and manipulate faces from Python or the command line. built utilizing dlib's most cutting-edge facial recognition technology. The model's accuracy on the benchmark for Labeled Faces in the Wild is 99.38 percent. In addition, an easy command line application for face recognition is included, enabling you to run face recognition on a directory of images right from the command line. With this package, real-time facial recognition using other Python packages is possible.

# Implementation contd.
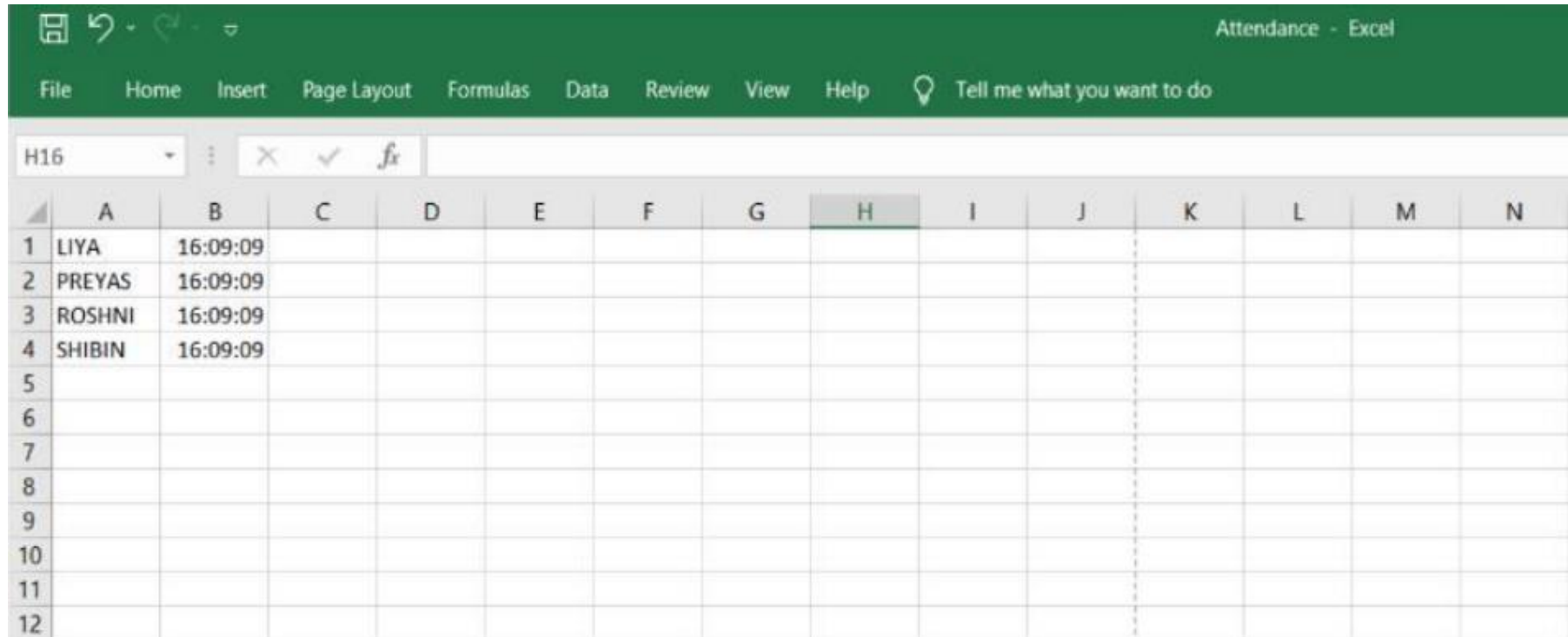
## MongoDB

MongoDB is a free and open-source NoSQL database. Since it is a non-relational database, it can handle structured, semi-structured, and unstructured data. It uses a document-oriented, non-relational data model with an unstructured query language. MongoDB's great versatility allows you to integrate and store a wide variety of data types. It also maintains and handles a greater volume of data than traditional relational databases. BSON, a more adaptable binary variant of JSON that is utilized by MongoDB, is the name of the document storage format used by this database (JavaScript Object Notation). For our project, we will utilize a real-time MongoDB database since it is adaptable, immediately updates as the content is modified, and automatically updates across the application. Additionally, it is simple to use, and using the MongoDB Compass app, users can quickly find data in the MongoDB database without using commands.

# Testing

The testing is a process of verifying and validating whether the actual results of the software is matching to the expected results and making sure that the software is free of bugs and errors. This will make the users confidence gained by the quality of the product. Verification is a set of activities that verify the correctness of the implemented software.

The various test results are shown in decision table



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# Testing contd.

| Test case ID | Test Case | Test Step | Test Data | Expected Result | Result Obtained | Status (Pass/Fail) |
|---|---|---|---|---|---|---|
| T1 | User enters the wrong user id or password and gets alerted. | User enters the incorrect user id or password | <User Id and password> | Alert showing incorrect user id or password | Alert showing incorrect user id or password | Pass |
| T2 | User enters the correct user id and password | User enters the correct user id or password | <user id and password> | Redirect the user to his/her dashbord | User login successfully | Pass |
| T3 | New user creates a new account using create new account tab | New user creates a new account by entering new user id and password using create new account tab | <new user id and password> | Give message as user as successfully created the account | Successfully created the account | Pass |
| T4 | User captures the images and system recognizes the people in image and mark the attendance | User capture the image | <image of the students> | People present in the image was identified and attendance was marked | People present in the image was identified and attendance was marked | Pass |
| T5 | Attendance displaying in a csv file | User capture the image | <input image> | Displays the attendance of students in a csv file | Displays the attendance of students in a csv file | Pass |
| T6 | User Download the marked attendance of students | User click the Download attendance tab | <input csv file> | User can easily download the file | Download the file | Pass |

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# Results

We have implemented a web application for attendance management where the user marks the attendance using face recognition. They can also download the marked attendance as a .csv file.
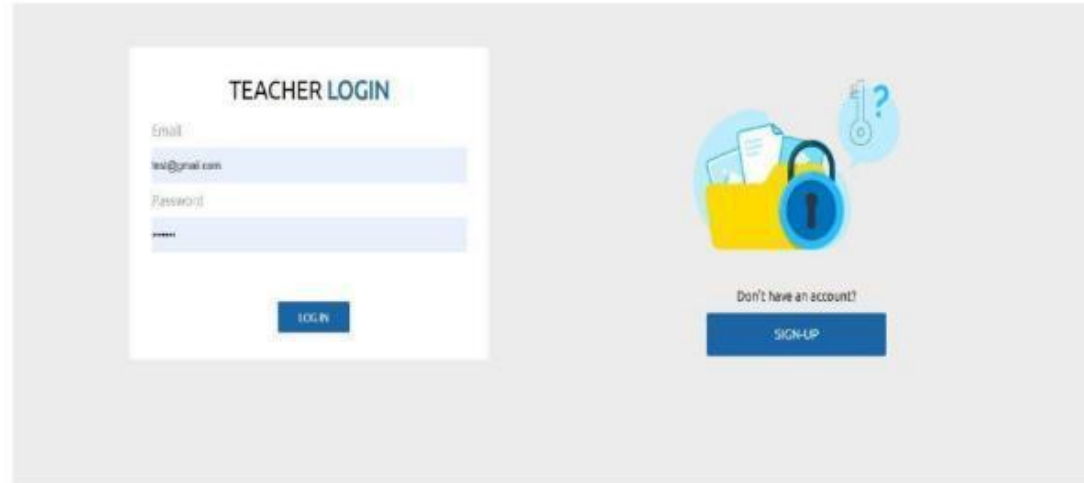
At first, the user can see the homepage of the web app.
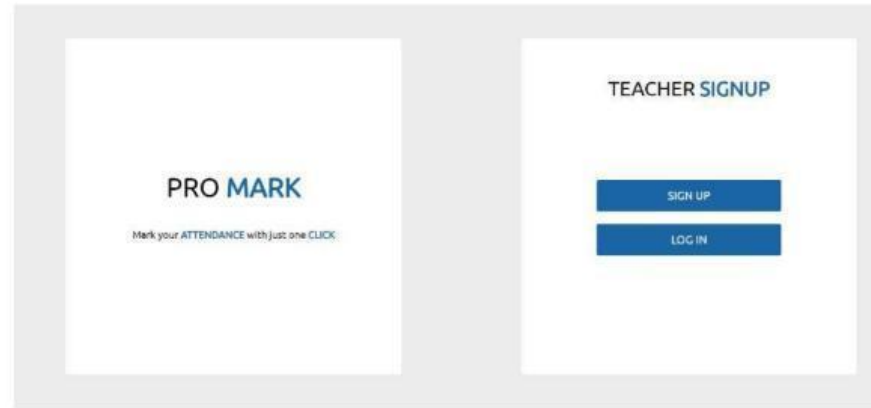


Home page

Then the user can move into the signup or login page where the user has the option to login and register by filling the credentials needed.

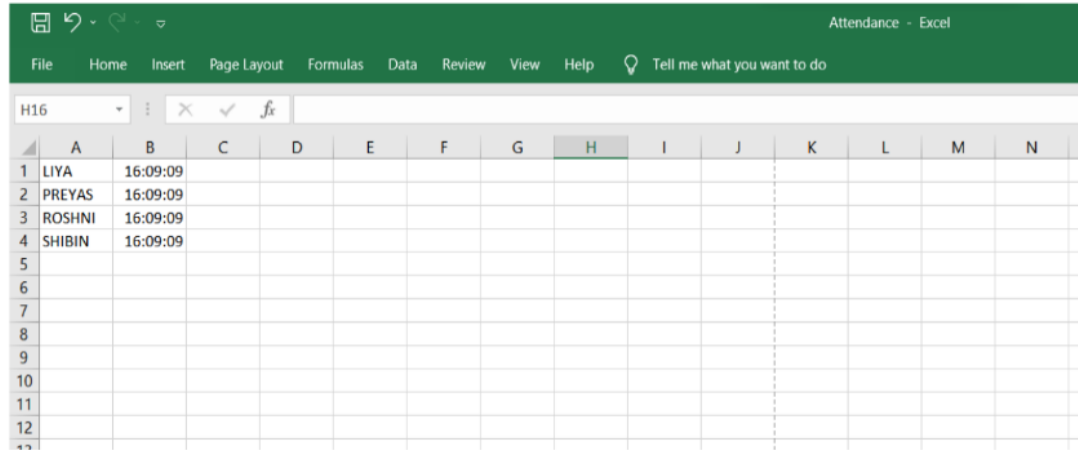# Results



Signup page



Login page

# Results



Dashboard

Here the user can take the attendance by clicking "Capture Image" and the camera is opened in a window to capture the image of the student.

# Result



By clicking on the "Show attendance" button the user can see the marked attendance and clicking the "Download file" will download the marked attendance as .csv format into the device.

# Conclusions

We have created a web application to manage attendance. It provides the option to take a photo of each student in a class to record their attendance. The collected faces will be recognized by the machine vision training module, which will be running in the background. Additionally, the Web application will record their attendance and show it to the user in a.csv file. As a result, the users of our suggested model will be able to note the students' attendance in class and show that information together with the current time. The system is accurate up to 94% of the time, according to the results of our experiments. As a result, our Web application helps the institutions that manually record attendance.

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# THANK YOU

An Attendance Management System Using Face Recognition