CA3

For

Semester Project

Bachelor of Science in Information Technology

Attendance Management System using Face Recognition

Submitted by

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1. Abstract:

The attendance system using face recognition is a computerized system that uses advanced image processing techniques to accurately identify and verify individuals based on their facial features. Some of the facial features include eyebrow, eye, nose and mouth. This system can be used in various settings such as schools, universities, and workplaces, to automatically record the attendance of students or employees without the need for manual input. Implementing a face recognition-based attendance system is beneficial in a way that it improves accuracy, efficiency, and convenience. The system has the potential to reduce administrative workload, eliminate the possibility of fraud, and ensure compliance with attendance policies. Additionally, the system can generate detailed reports that can be used for analysis and decision-making.

2. Introduction

Attendance plays an important role in education sectors be it schools or colleges all over the world. A proper attendance system not only brings students success but also for the institutions.

The current attendance system in educational institutions and workplaces involves manual methods which is time-consuming and prone to mistakes. With the increasing number of students and employees, the traditional way of taking attendance that is paper-based is less efficient, hence there is a need for a more precise and efficient attendance system.

Hence, aiming to develop an attendance system that uses deep learning algorithms to recognize the faces of students and mark their attendance automatically. The system should also have the capability to detect and prevent proxy attendance. The system should be easy to use and implement, scalable, and affordable, making it accessible to schools, universities, and organizations of various sizes

3. Algorithm

As for the algorithm we used Haar Cascade for face detection and Convolutional Neural Network (VGGFace16) for image recognition

Haar Cascade algorithm

The Haar cascade algorithm is a popular method for object detection in images and videos. It is a machine learning-based approach that uses a set of pre-defined features called Haar features, which are similar to edge detection filters. These features are calculated at different scales and positions in an image and are used to classify sub regions of the image as containing the object of interest or not

VGGFace16

VGGFace16 is a deep convolutional neural network (CNN) model designed for face recognition tasks. It was developed by the Visual Geometry Group (VGG) at the University of Oxford and is based on the VGG16 architecture.

The VGGFace16 model is known for its high accuracy in face recognition tasks and has been used in a wide range of applications, including security systems, biometric authentication, and social media.

3.1. Datasets

The dataset is collected manually that is the images of our classmates. As for the size we have 3100 images, 100 images of each person. All the images are of .jpeg or .png file in which it will be cropped later.

As for the data collection method, we have used mobile phone camera features i.e. time buffer in which we set a time and total no of photos that we are going to take of each person.

3.2. Evaluation Methods

To evaluate the performance of the model we have used Confusion matrix in which the accuracy score for our model is 93%.

A confusion matrix is a table used to evaluate the performance of a classification model. It is a matrix that shows the number of correct and incorrect predictions made by the model compared to the actual outcomes. It is typically used to evaluate the performance of binary classification models (i.e., models that classify instances into one of two classes).

4. Result and Discussion

The accuracy score using confusion matrix is 93% for now. Since we haven't trained all the data now, we are hoping for higher accuracy score after training all the data

5. Updated Features

1. Admin
    - In the prototype we have training processes shown both for students and teachers. Now there is no training process shown.
    - Moreover there is no graphical representation of teachers and students. We added some features i.e. adding and managing session.

2. Staff
    - All the features are same except that we have added another features that is apply leave. Here teachers can approve leave applied by students.
    - Teachers can also view total no of students, courses, absentees and present and total no of leave applied.

3. Students
    - All the features are same except that we have added another features that is students can apply a leave which is approved by staff.
    - They can view the total no of attendance taken, percentage of present and absentees, and total no of subjects

6. Screenshots

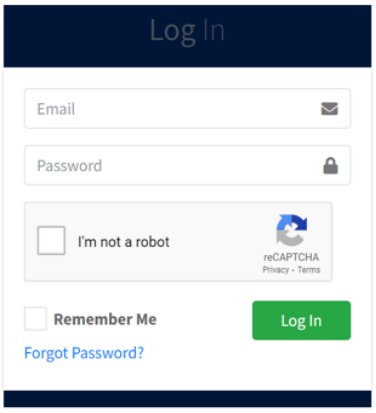


Fig.1. Login page

Login page for all the users i.e. students, staff and admin

7.1 Students Dashboard

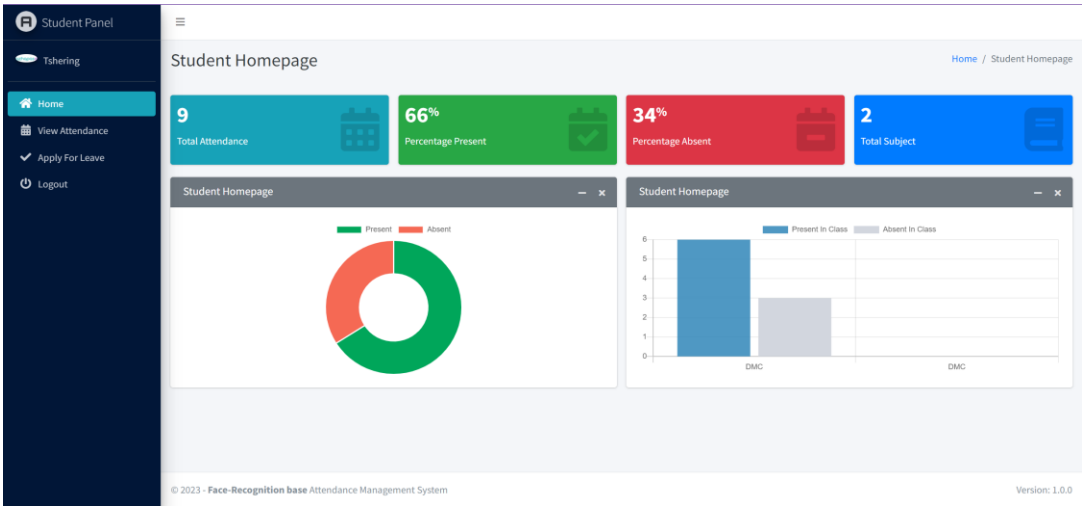


Fig.2. Home page for students

Users can view the total numbers of attendance taken till now, view the percentage of absent and present and total number of subjects they have

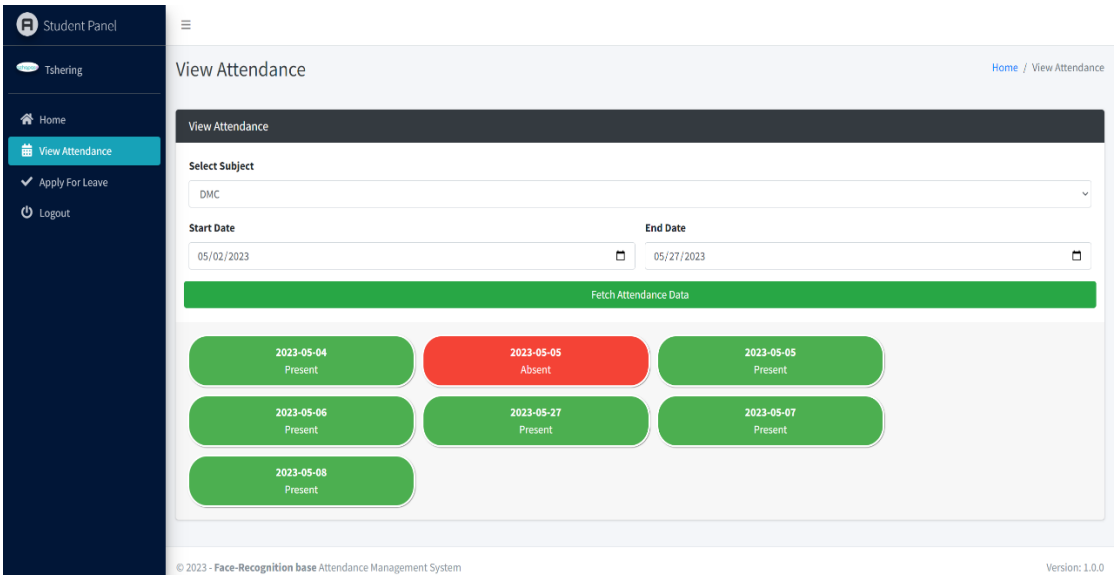


Fig.3 View Attendance

Here users can view the attendance from given time frame and for particular subject

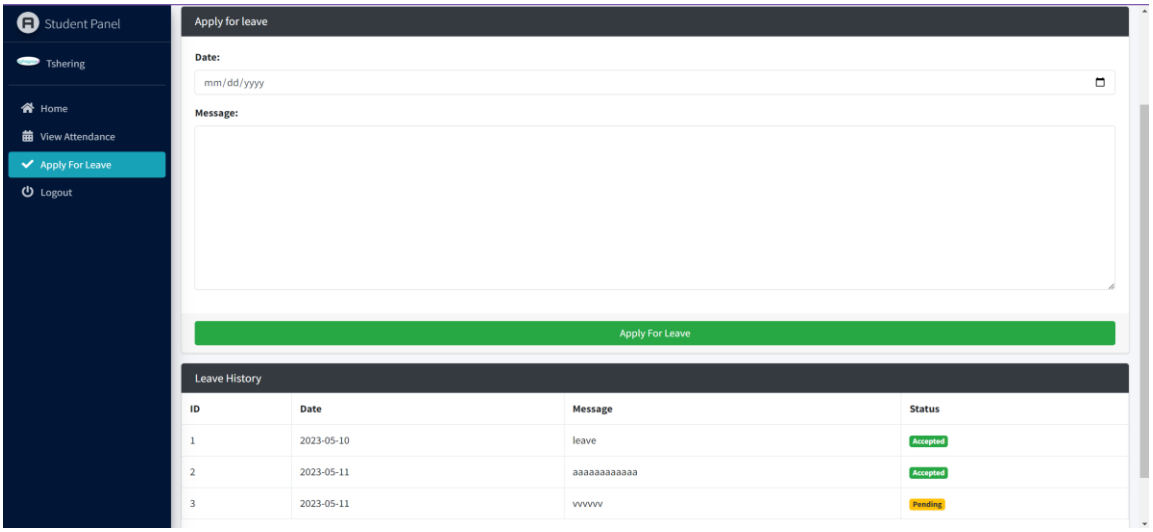
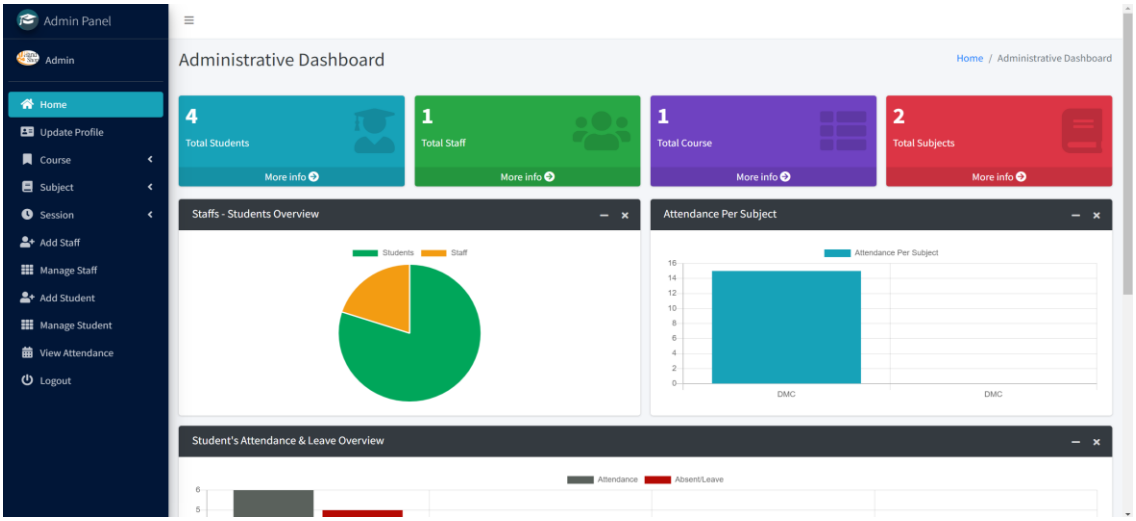


Fig .4 Apply for leave

Incase users cannot attend the class, they can apply for leave which is approved by staff

7.3 Admin Dashboard



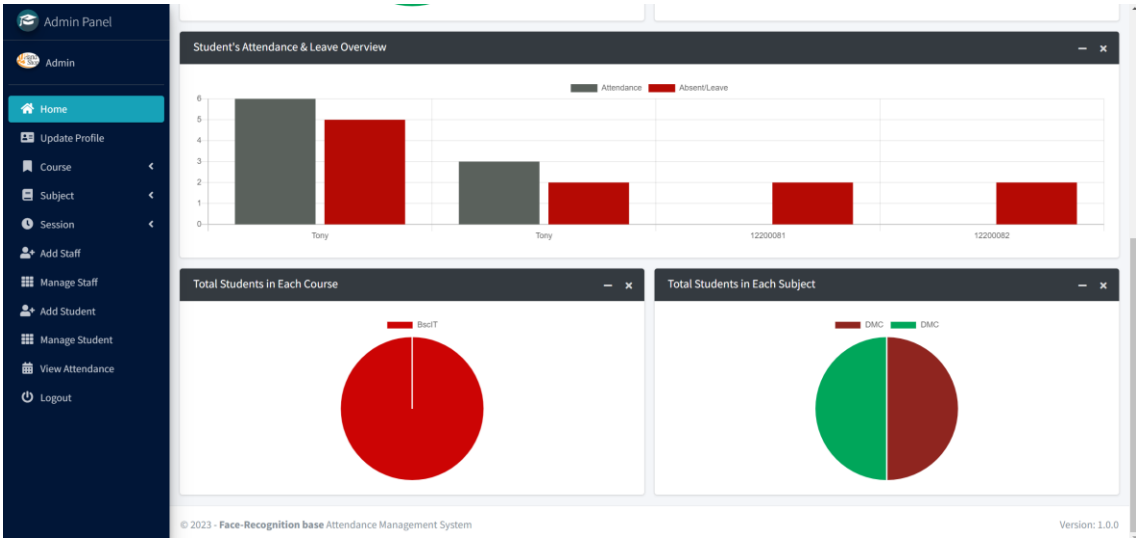


Fig.5 Admin homepage

Admin can view the total no of staff, students, courses and subjects

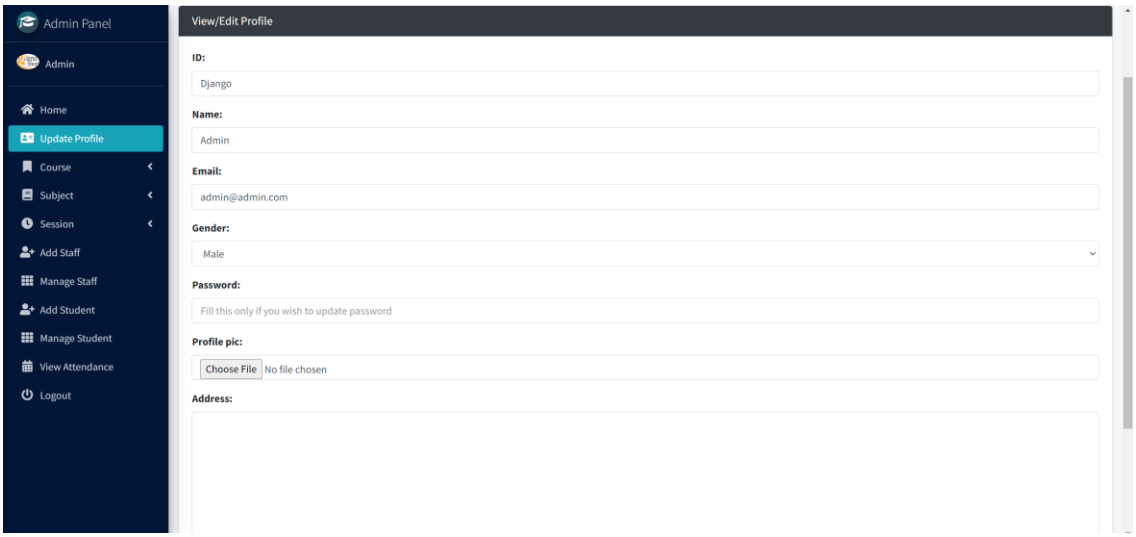


Fig.6 Admin profile page

Admin can edit the details of themselves

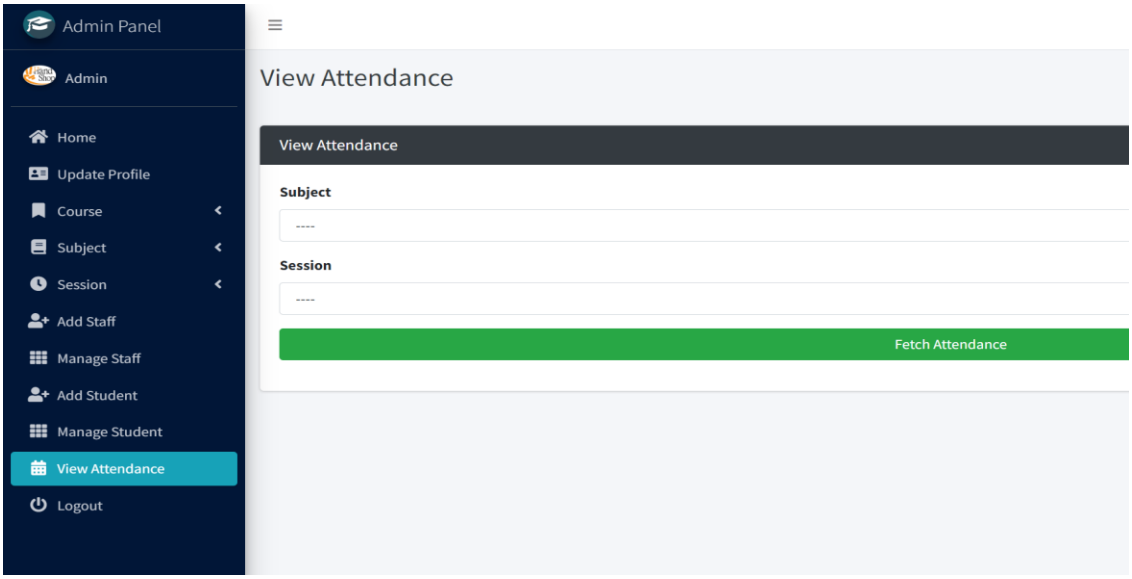


Fig.7 View Attendance

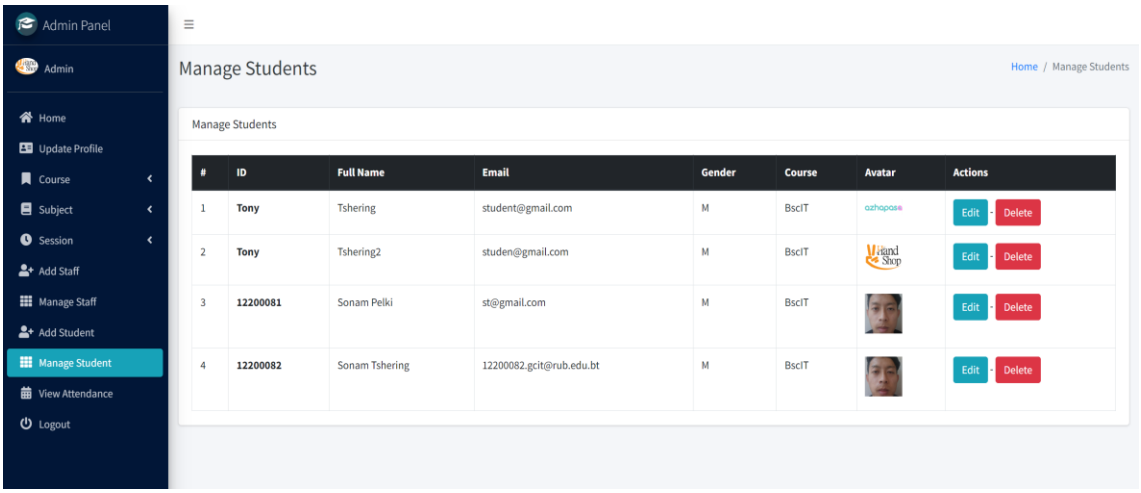


Fig.8 Manage students

Here admin can edit the details of students and also delete the students

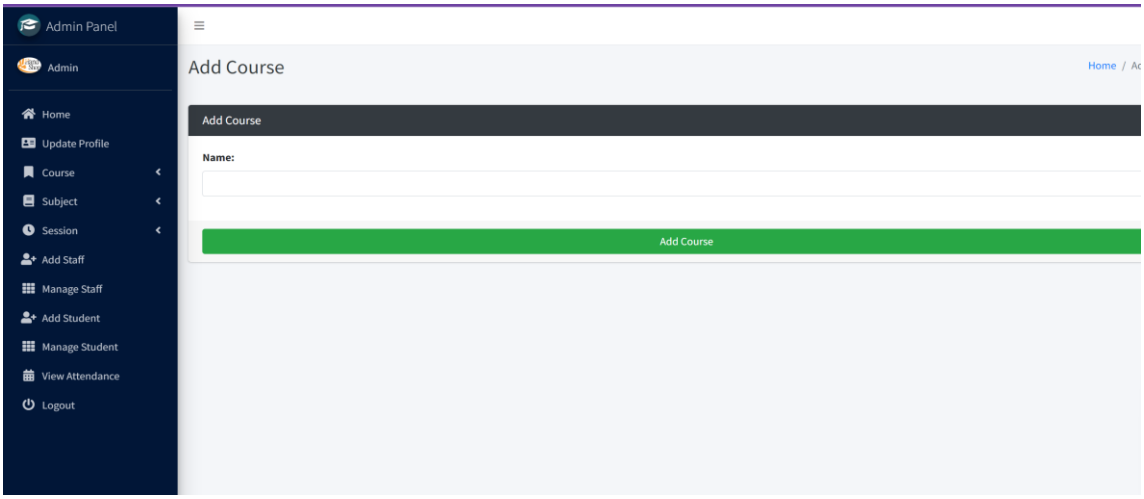


Fig.9 Add Course

Here admin can add the course available

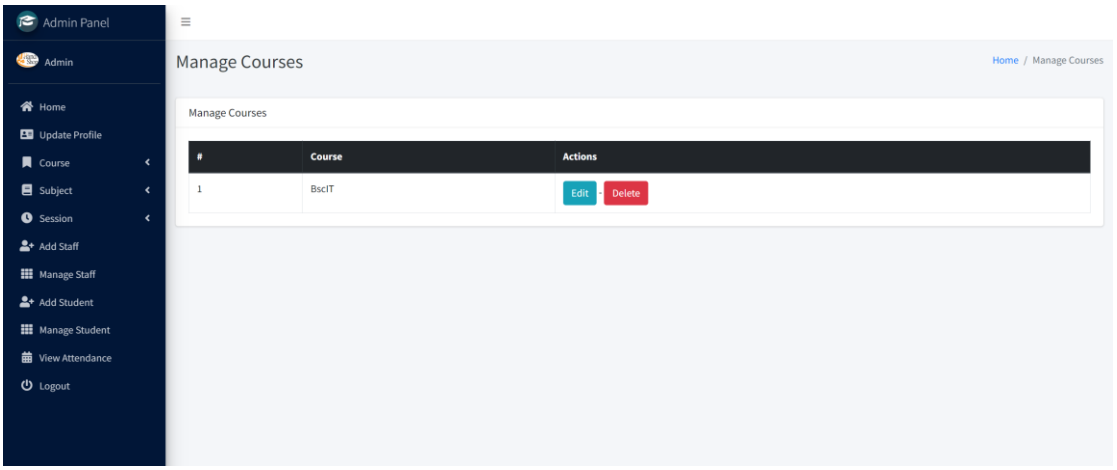


Fig.10 Manage course

Here admin can edit and delete the particular

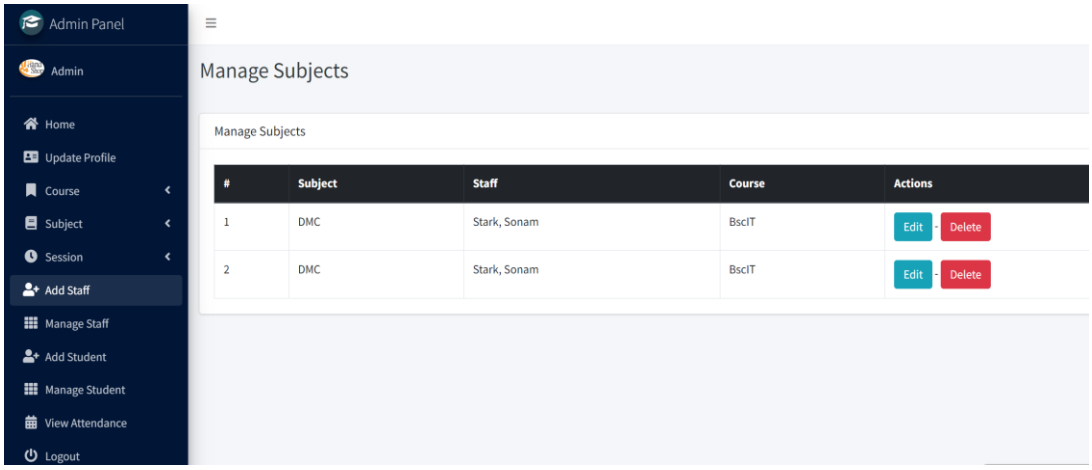


Fig.11 Mange subjects

Here admin can add, edit and delete subjects

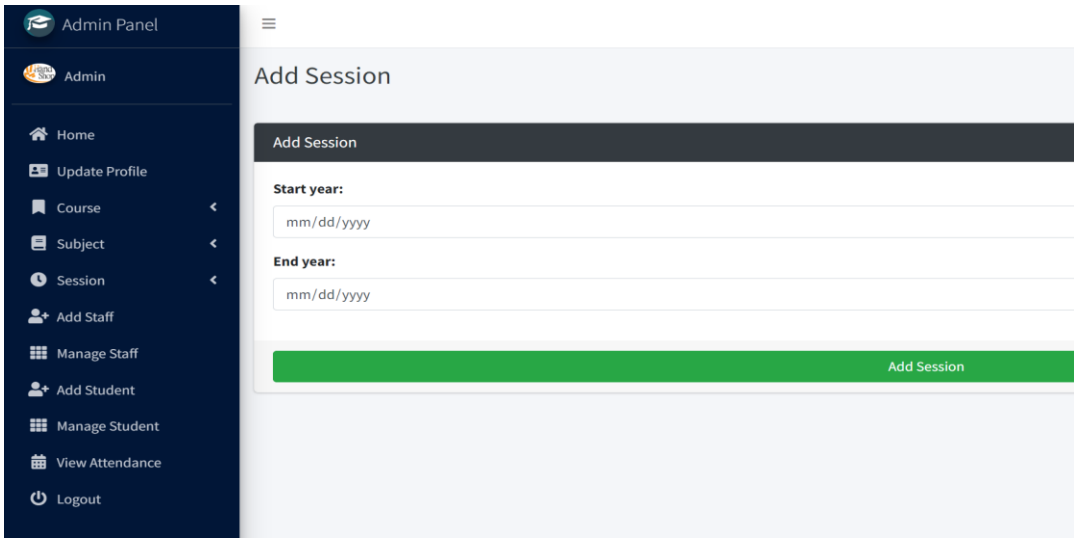


Fig.12 Add Session

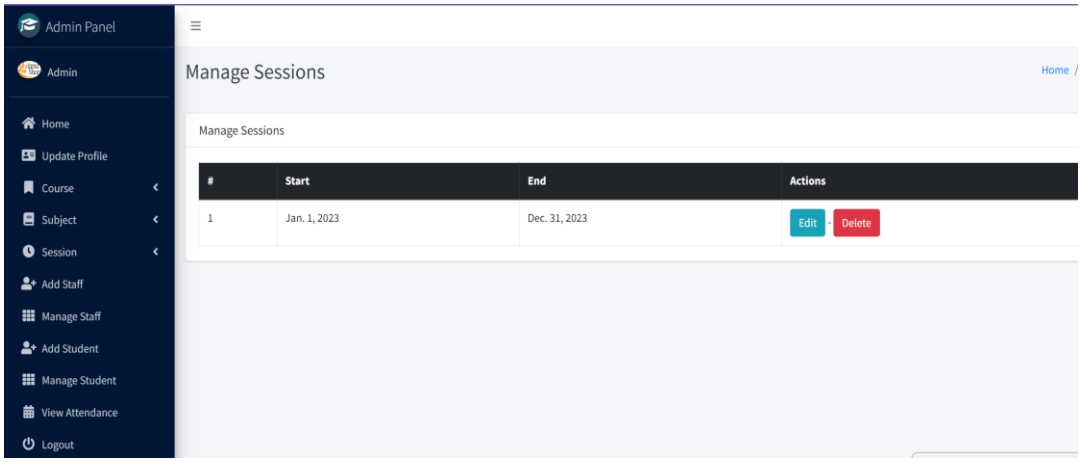


Fig.13 Manage sessions

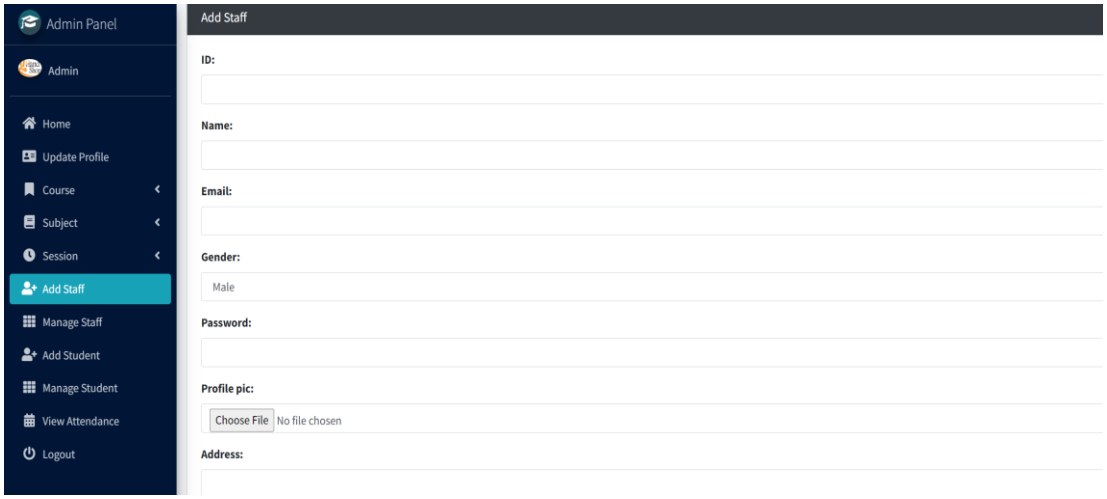


Fig.14 Add staff

Admin can add the staff

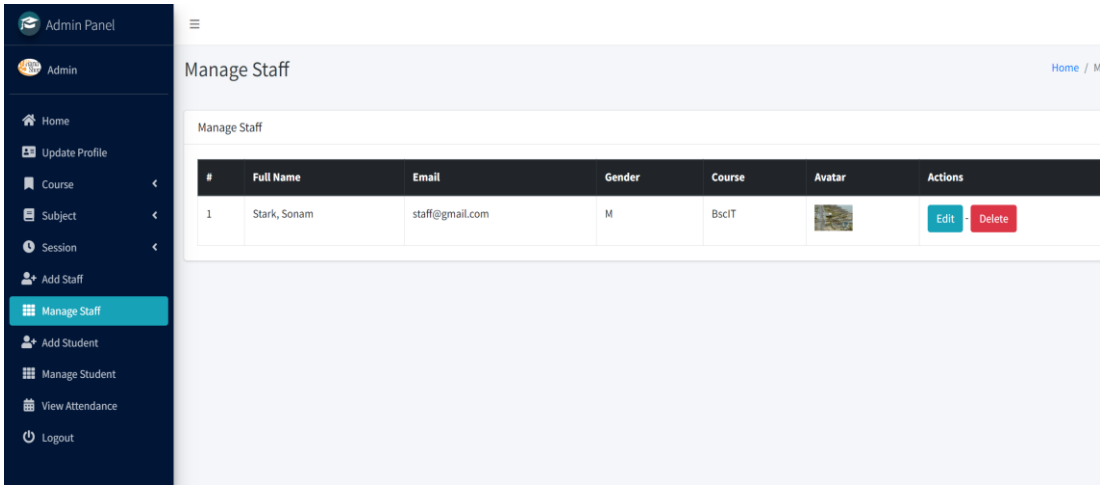


Fig.15 Mange staff

Admin and edit the details of staff and also delete the staff

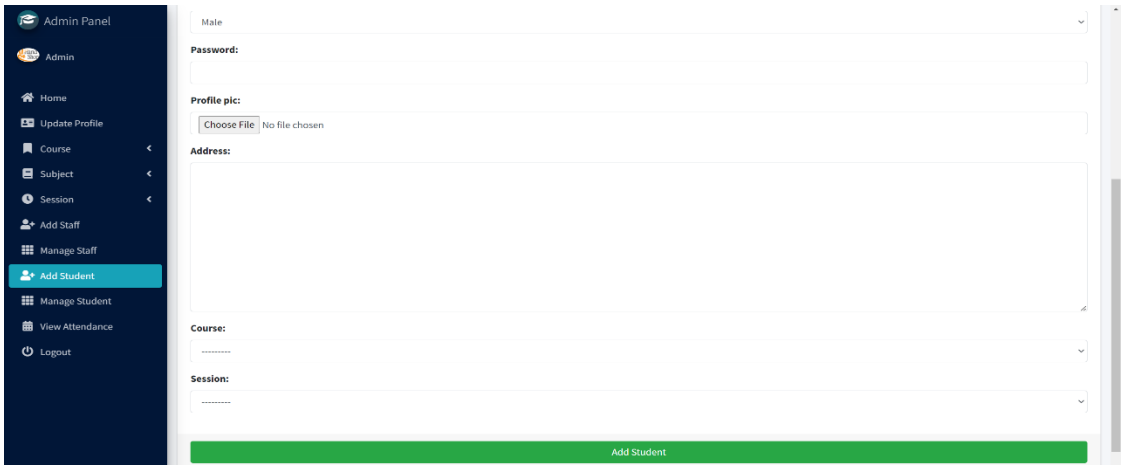


Fig.16 Add students

Admin can add students and here they give the default password to students. Students can update the password later

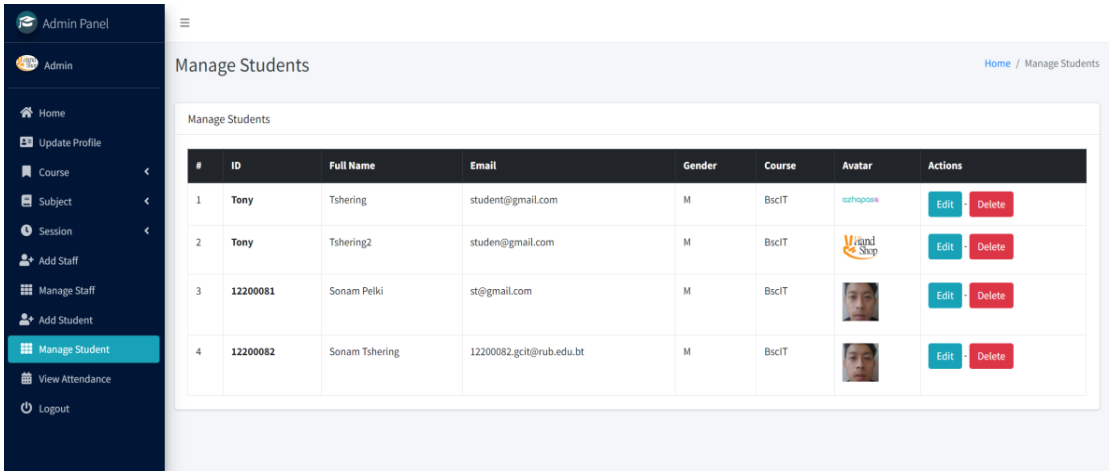


Fig.17 Mange students

Here admin can also edit and delete the students

7.3 Staff Dashboard

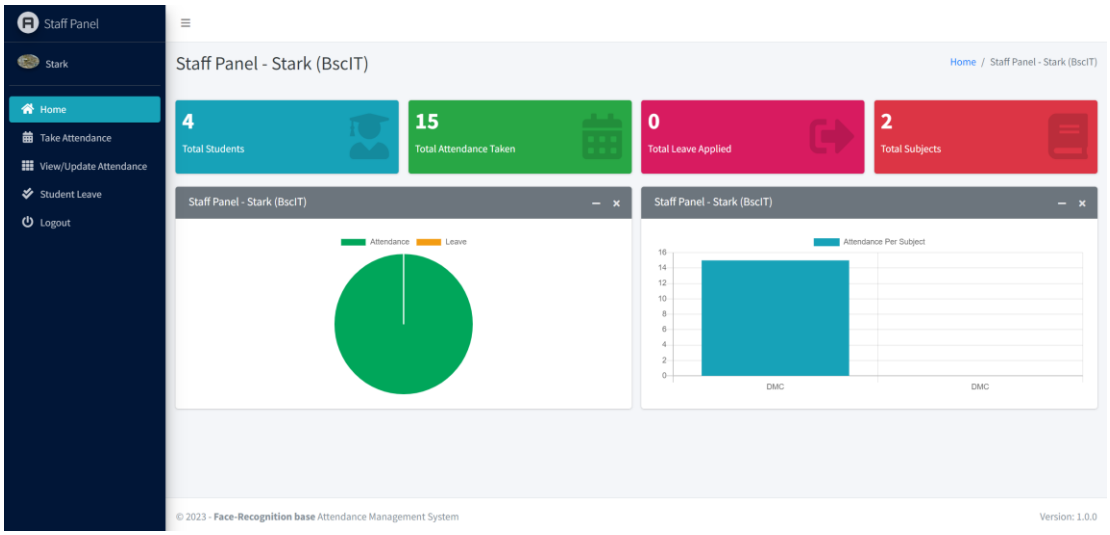


Fig.18 Staff Dashboard

Here staff can view the total no of their students, no of attendance taken, total no of leave applied, and total no of subjects they have.

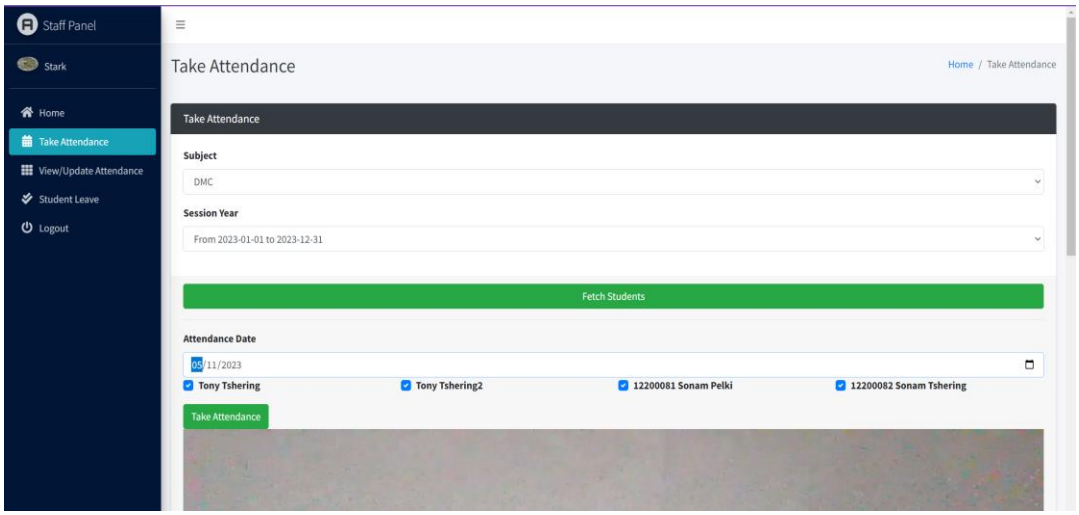


Fig .19 Take Attendance

The web camera will show on clicking on take attendance button order to take attendance

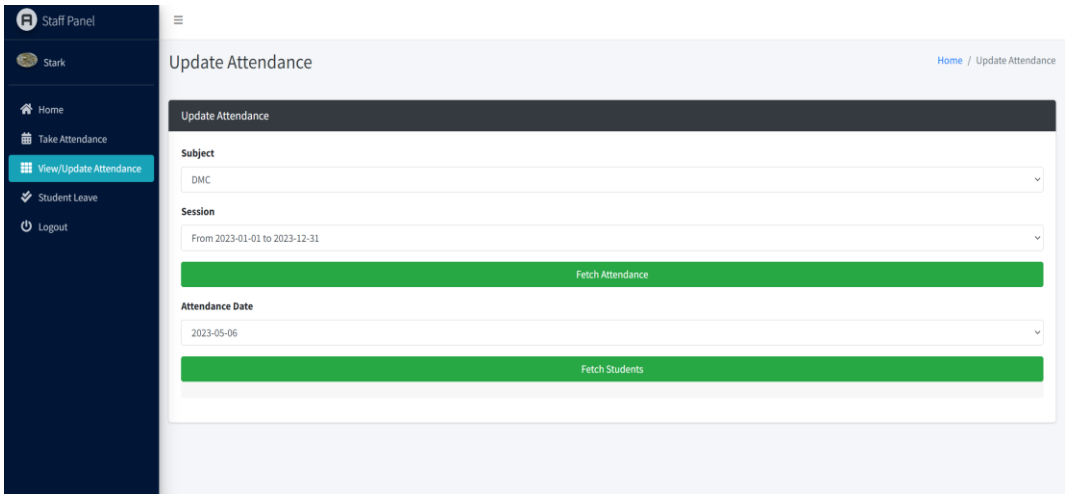


Fig.20 Update attendance

Here staff can edit the attendance

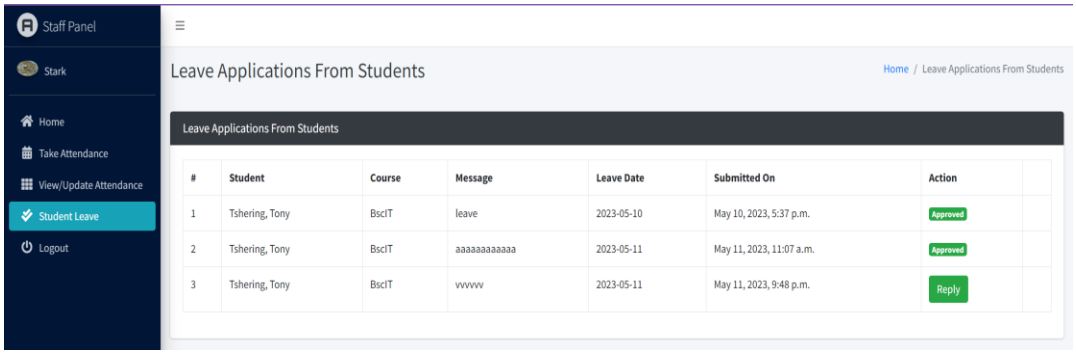


Fig.21 Leave applications

Staff can view and approve the leave applied by the students

Gitlab model link: https://gitlab.com/3b-group10-ams/attendance-management-system/-/blob/main/Machine-Learning-Model001/AMS-Model.ipynb

7. Conclusion

This system aims to build an effective class attendance system using face recognition techniques. The proposed system will be able to mark the attendance via face Id. It will detect faces via webcam and then recognize the faces. After recognition, it will mark the attendance of the recognized student and update the attendance record. Currently the system has attained an accuracy up to 9 3%.