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Project and Professionalism (6CS020)

A2: Project Report

Attendance System using Face Recognition and Detection

Student Id	:	2039211
Student Name	:	Samir Husen
Group	:	L6CG3
Supervisor	:	Mr. Biraj Dulal
Cohort/Batch	:	4
Submitted on	:	May 7 th 2021

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Award Title: *BSc (Hons) Computer Science*

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Thank you!

BSc (Hons) Computer Science, Batch 4th

ABSTRACT

This report will show how we can implement algorithms for face detection and recognition in image processing to build a system that will detect and recognize front faces of students in a classroom. Different algorithm which are used for the purpose of face detection and recognition are studied in deep as well as with their mathematical derivations. The main aim of this paper is to develop a functional web-based application that will help the teachers and manage the classroom control by taking attendance of students within a few moments via live detecting and recognizing their frontal faces. Python programming language is used to handle the website aspects and algorithms as well. Machine learning which is an aspect of artificial intelligence which is divided in three types of learning supervised, un-supervised and reinforcement. Supervised is studied in detail in this paper because the problem here is related with computer vision. Computer vision is based on supervised learning. Since 1966, Face recognition is an emerging technology and challenging problem of computer vision and image analysis. It has become an extremely important tool that is majorly used for verification and identification of the human faces. Multiple researches are performed in this field. The algorithm which was used to build the system here was Histogram of Oriented (HOG) and Support Vector Machine (SVM) which has achieved about 97% of accuracy according to the researches. The use of different programming languages and tools are stated below also how it can be implemented during the system development. Overall, this paper states the well manner of developing a software or application.

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CHAPTER ONE: INTRODUCTION

1.1 Project briefing

1.1.1 Introduction to face recognition and detection

Face detection and recognition systems are biometric software applications that are designed to detect the human face through a camera and identify their identity for different purposes. Detection and recognition both work together however, they perform different tasks during the process, detection can detect human face by analyzing their facial curves or contours and recognition can match the detected face with the existing one from the database. As face recognition is a biometric software it maps facial features from a picture or video. (Li & Jain, 2004)

Face recognition is used in different other areas but generally, it is used for security purposes to make it more securable. "Face recognition is one of the primary biometrics technologies". The devices used in our daily lives also includes face recognition technology such as camera, internet, and mobile phones, etc. and increasing as the demand for security. Face recognition is a task that an individual performs regularly and effortlessly in their day-to-day lives. It is natural, non-intrusive, and easy to use. (Rouse, 2019) (techopedia, 2019)

1.1.2 Problem Domain and Solution

The main concern this project is being carried out is because of the methods, which teachers still use to take attendance during their classes. We face a lot of trouble with the traditional student attendance marking technique. The way of manually writing down in sheets or marking attendance manually in excel takes a lot of time. In the context of Nepal, this kind of system is not implemented which can take attendance of a whole class using face recognition and detection systems. However, normal biometrics systems are implemented which can take attendance records of one person at a time using a thumb and facial record.

The attendance system will be able to recognize the faces of the students in the classroom within the accuracy of 80%. The system design will be user friendly with a simple user interface that will serve as an access to the functionalities of the system. With the help of this system, teachers will be able to state that whether the student was honest or not because sometimes during the attendance period, another student fakes the attendance of the absent one. Implementing this system will avoid such kind of misconduct because it will carry every student's attendance record and state whether the student was present in the class or not. However, the system will implement both manual attendance and face recognition attendance for now.

1.2 Artificial Intelligence Aspect of Project

1.2.1 Computer Vision

Computer vision is the aspect of artificial intelligence that is a combination of approach, procedure, and ideas, which is based on capturing raw data into the extraction of image patterns and data analysis. Computer Vision is a grouping of image processing and, pattern recognition that related to machine learning. The concept of computer vision generally leads to identify the processed image or raw data. The performance of computer vision library depends upon the image quality and computer specification. The components of an image such as HDR, Contrast, Shape, and Vectors classifies and differs the images from each other. The accuracy also depends upon the strength of the algorithms, but the computer vision is not accurate as human eyes. However, the accuracy also depends on how the system application is designed. (Wiley & Lucas, 2018)

1.2.2 Supervised Learning

Machine learning or artificial intelligence both aim toward making the machine intelligent and one of the most important factors to make the machine intelligent is to make them able to learn from themselves or from their previous experiences. Basically, there are three types of learning supervised learning, unsupervised learning, and reinforcement learning. The concept of face recognition is based on supervised learning. Supervised learning is a type of learning which already has both input and output. Here, input is the training data, and the

output is the result we get from the model which classifies, predicts, or recognizes. After we get the produced output determines whether it is valid or not. Face recognition with supervised learning uses different machine learning algorithms for the classification of faces and to identify the faces. For example, we will train the system with numerous images and the algorithm will learn after that training process and finally the algorithm will be able to recognize the faces in the system. Therefore, face recognition is a supervised learning-based approach because it learns from experience.

1.3 Aims

- I. Develop a functional web-based application that will help the teachers and manage the classroom control by taking attendance of students within a few moments via live detecting and recognizing their frontal faces.
- II. The system UI should be flexible and easy to use.
- III. Build a strong authentication system for security and information purposes.

1.4 Objectives

The objectives to achieve the aim are as listed below:

- I. The system should be able to authenticate the user and provide them permission according to their level.
- II. The system should be able to detect the faces of the student within an accuracy of 70%.
- III. The system should detect one or more faces at the same time; the number of faces might vary according to the camera capability of the system.
- IV. The system should be able to recognize the detected face within a few seconds and match them with the existing one from the database.
- V. After recognition, the system should be able to display the Id number and name of the students besides their faces.
- VI. The system should be able to update the attendance of the detected and recognized student.
- VII. The system should allow the teachers to calculate the average or total attendance.

VIII. The system should allow the teachers to post the remarks of students on their profiles.

1.5 Artefact

1.5.1 FDD (Functional Decomposition Diagram)

The FDD (Functional Decomposition Diagram) below displays the subsystems of my final artefact:

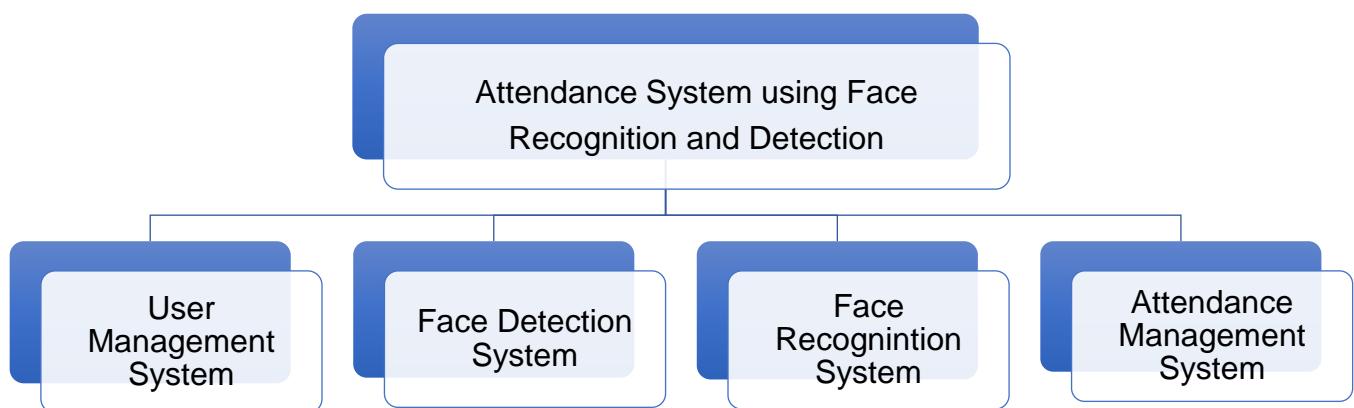


Figure 1: FDD (Functional Decomposition Diagram)

1.5.2 System as a whole

The attendance system is a huge system which has multiple actors such as students, teacher and student service staff and admin is responsible to control all their activities. Admin is provided with all functions and responsibilities like adding users to the system, managing users, replying feedbacks, viewing attendance, and approving or disapproving leave of users etc. are the job admin can perform. The teacher in this system plays the most important role which is taking attendance of students with the help of face recognition system. Teachers can take the attendance of students register to their particular or assigned class and subject. Teacher is also able to apply leave and request feedback. Teacher will be able to take attendance of students with both face recognition system and as well as with manual approach.

In Attendance system, Student also have multiple functionalities such as viewing their attendance, updating, or editing their own profile, requesting for feedback, and applying for leave. The students' images are stored in the system while admin is registering them to the system and with the help of those images the face detection and recognition system is trained, and it can recognize students during the attendance. Student images are stored securely inside system. There is also one more actor inside the system that is student services staff which is responsible for viewing student feedbacks given by admin and teachers and able to print those feedbacks. The system overall creates an easy environment for attendance during class period. Every information of users or actors inside the system it is stored in database securely only admin has permission to view all data and use them.

1.5.3 Sub Systems

- I. **User management system:** This subsystem is responsible for user authentication and user management. This subsystem will be able to authenticate the users and permit them according to their roles in the system. Users can log in to the system with the registered email address and an 8-digit password. Admin is responsible for CRUD operation in this system, user cannot register themselves instead of that some users such as teachers they can change their password.

It will also hold the records of different users of my system. It will distinguish the students and manage their profiles according to their class, stream, semester, and year. Users such as teachers, students, and student services staff will play here a different role here. In teachers will post remarks on student profiles and the student will be able to view those remarks, and student services staff will be able to print those remarks. I will be using the Django framework inbuilt authentication system to implement this system.

- II. **Face Detection System:** The face detection system will be able to detect if there are any student faces in front of the camera. It will be able to detect as many faces as possible that adjust in the window with a clear vision. I will be using the OpenCV library and the HOG algorithm for implementing this system.

- III. **Face Recognition System:** The face recognition system will be able to recognize the detected face by comparing them with the existing one from the database. With the help of a trained dataset, the system will compare the students and identify them along with the name and id tag in the live window. After the recognition, process is completed, the information will be sent to the database and the attendance of that student will be updated. I will be using the OpenCV library and the Support Vector Machine approach for implementing this system.

- IV. **Attendance management system:** This system will manage, update, and record the attendance of every student and the database will connect to this system. The attendance percentage of the students or class can calculate with the help of this system. It will manage attendance according to classes and teachers.

1.6 Academic question

- I. Which programming language are you going to use for this project?

Python is the major programming language which will be used in my project. “It is an object-oriented programming language, which is easy to learn and has efficient high-level data structures”. Python is not a complicated language because it gives more emphasis on natural language. (Rossum, 2018)

- II. Which library are you going to use for the implementation of the algorithms?

I will be using OpenCV library to implement the algorithms. OpenCV is an open-source computer vision library that is used to implement different machine learning algorithms into real-time applications. The main purpose to use this library is to process images and videos from the application. (Bradski & Kaehler, 2008)

III. What are the tools and techniques that you will use throughout this project?

The tools and techniques I will be using in my projects are as listed below:

- MySQL (Database): MySQL one of the most popular database which is used widely for the purpose of handling tables inside the database of software or application.
- Django (Framework): It is a high-level Python Web framework encouraging rapid development and clean design. (Ashwini, 2017)
- JIRA: JIRA is a software project management tool used for fault, and issue tracking during a running project and maintain a good team collaboration in each task. It is used to generate different reports of the workflow and is used to manage different tasks in the form of user stories. (Guru99, 2020)

There might be some changes in tools and techniques throughout the development process.

1.7 Scope and Limitation

The scope and limitation of project are as listed below:

Scopes

- According to the research this far their different face detection and recognition algorithm which can identify human faces.
- The main purpose of this study was to explore the findings that has be done in the field of machine learning with respect to detection and recognition aspect.
- Since 1960s, different research is done in this field to improve and explore the accuracy rate of identification, classification, or prediction.
- Algorithm such as HOG, Eigenfaces, CNN and SVM works perfectly and recognize faces even in noisy area or in noisy image.
- The study shows that there are number of systems which implements face recognition as their tool and use them as major part of the system and gained about 97% accuracy result.

- Major scope of this study was to find the suitable algorithms for face detection and recognition which are to be able to recognize and identify the faces of students with higher accuracy.

Limitations

Confering to some research and findings there are multiple challenges faced while implementing machine learning algorithm for the purpose of face recognition. The classifiers and algorithm are also tricked with the similar faced data which is a big issue. The face recognition system until this period are good enough but not as human eye it is still challenging. Few libraries used for the implementation of the algorithms are powerful and provides good accuracy. It is not about any algorithm performs better or any library, every algorithm performs better there only difference of accuracy. There are some systems that is capable of recognizing faces with high accuracy and beyond accurately which are being used by US law enforcement and not disclosed in simple kept under a deep privacy. The researchers of this field can also not cross the boundaries. Different deep learning algorithm with higher accuracy are used in our practical life. However, the more research will lead this field forward but because of some constraints it will still lack influential approach.

1.8 Report Structure

The followings are the chapters in this report.

- Introduction
- Literature Review
- Project Methodology
- Tools and Techniques
- Artefact Design
- Conclusion
- Reference and Bibliography
- Critical Evaluation of the project
- Evidence of Project Management

CHAPTER TWO: LITERATURE REVIEW

2.1 Overview of face detection and Recognition

Face detection and recognition are one of the rapidly growing technologies of this era. “Face detection and recognition are one of the rapidly growing technologies of this era”. Face recognition is the wholesome process of three principal steps Face detection, Feature’s extraction, and Face recognition as shown in Figure 2. Face detection detects faces, Feature’s extraction extracts the feature vectors from the image, and face recognition finally identifies the face. (Kortli, et al., 2020)

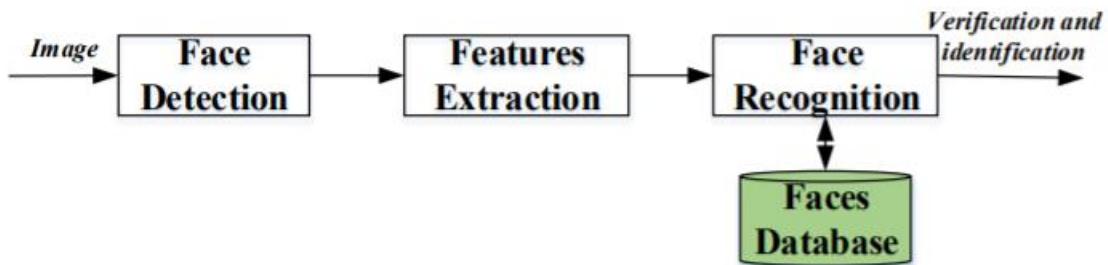


Figure 2: “Face Recognition process” (Kortli, et al., 2020)

Face detection is the first milestone of this entire process. The main goal of face detection is to determine from the input picture whether there is any face or not. (Kumar, et al., 2018) Human being's eyes are so accurate that they can easily detection recognize any face s but for computers, it is a difficult task. So, to minimize the complexity different face detection algorithms are used. Although using the best algorithms for the detection sometimes there is low accuracy because of the challenges it encounters. Some of the challenges such as old expressions, covering face with any objects, quality of images or resolution, complicated background, multiple faces in a single image, skin color tone, face in a distinct angle, etc.



Figure 3: “A Sample Faces” (Kumar, et al.,



Figure 4: “Detected Faces” (Kumar, et al.,

Different techniques and approaches are used in face detection. There are various methodologies of face detection as shown in Figure 5. (Kumar, et al., 2018)

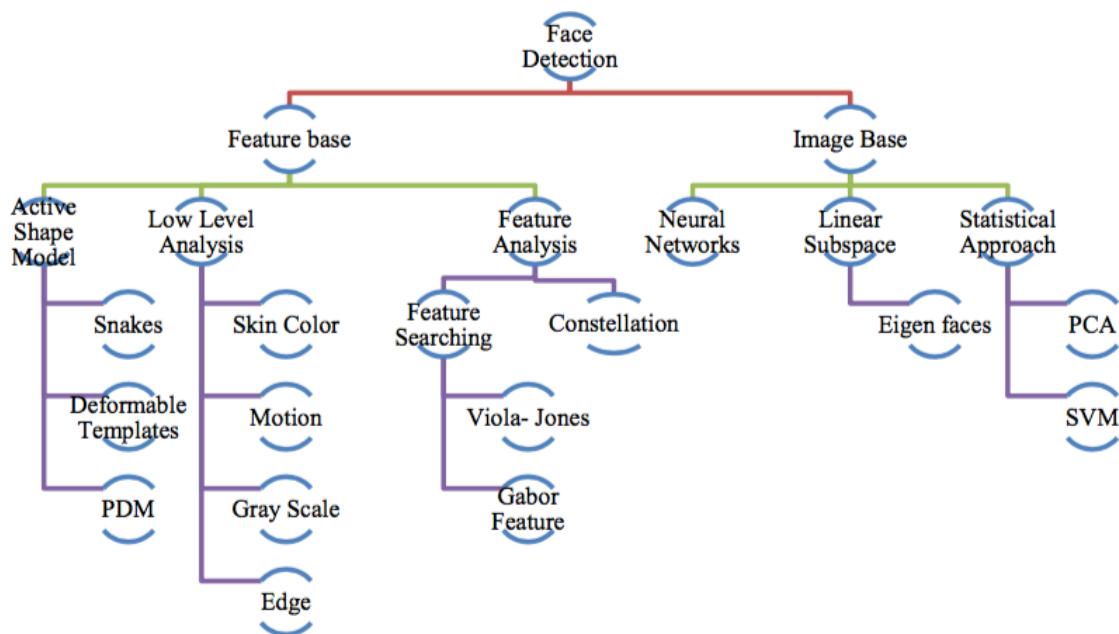


Figure 5: “Various Face Detection Methodologies” (Kumar, et al., 2018)

Since 1966, Face recognition is an emerging technology and challenging problem of computer vision and image analysis. It has become an extremely important tool that is majorly used for verification and identification of the human faces. (Masi, et al., 2018) Face recognition is categorized into three different approaches local, Holistic and Hybrid. Scale-invariant feature transform SIFT, Scale-invariant feature transform SURF, Binary robust independent elementary features BRIEF, etc. are the Key-Point-Based techniques of local approaches and Local binary pattern LBP, Histogram of oriented gradients HOG, Local phase quantization (Kortli, et al., 2020)LPQ, etc. are the Local- Appearance-Based techniques of local approaches.

The Holistic approaches is divided into two techniques linear and Non-Linear. ‘Principal component analysis PCA’, ‘linear discriminant analysis LDA’, Eigenfaces, etc. are the linear techniques and ‘Kernel principal component analysis KPCA’, ‘Convolutional neural network CNN’, ‘Support vector machine SVM’, etc. are the (Kortli, et al., 2020) non-linear techniques. Finally, the hybrid approaches are the combined approach of local and holistic techniques. (Kortli, et al., 2020)

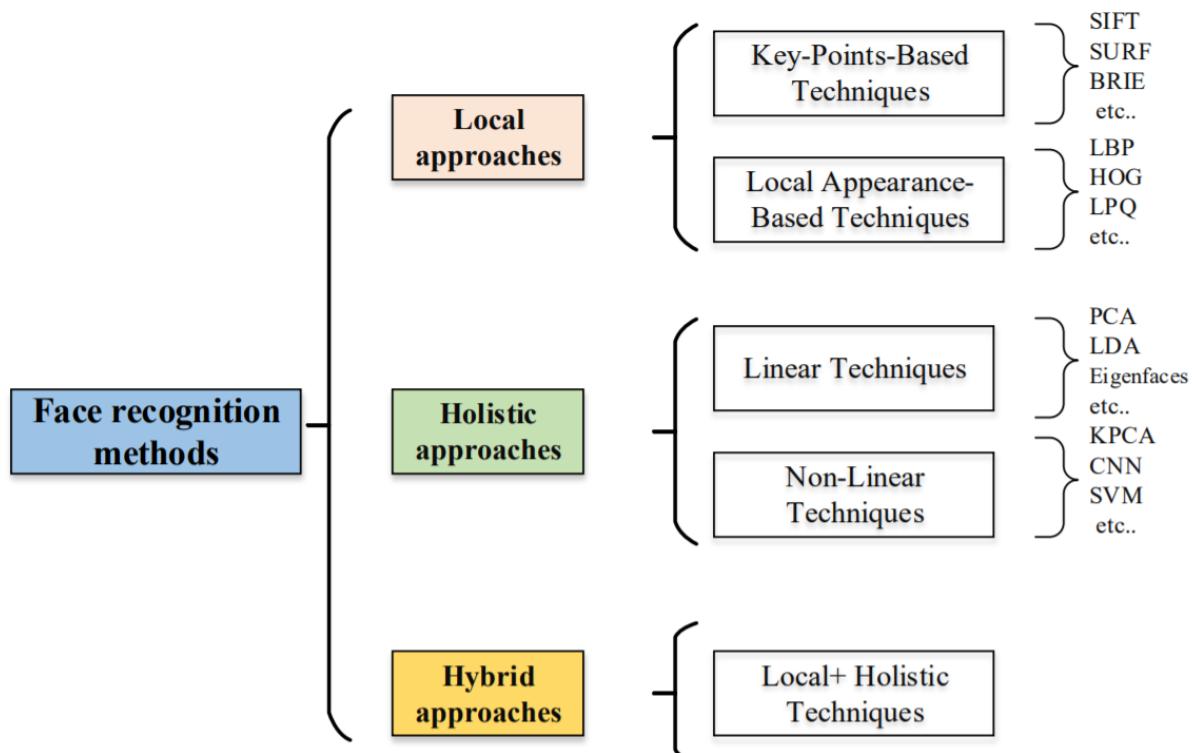


Figure 6: “Face Recognition Methods” (Kortli, et al., 2020)

2.2 Algorithms

There are different algorithms, approaches, techniques, and classifiers used for face detection, feature extraction and face recognition, which are, differentiate according to their accuracy, speed, and time. The topic below is the comparison of different techniques, based on their speed, accuracy, and efficiency.

Viola-Jones Algorithm

Viola-Jones Algorithm is a face detection algorithm that was introduced by Paul Viola and Michael Jones that is 15 times faster than any other algorithms with an accuracy of almost 95%. (Dabhi & Pancholi, 2016) This algorithm uses Haar features for detecting the face in image or video after the detection, after detection training the face feature-using cascade AdaBoost classifier, and finally, for the face detection, the trained classifier is used. The Haar feature consists of four features that are edge, linear, center, and diagonal as shown in Figure 7. (LU & YANG, 2019) These Haar features are in use to find out whether there is

any face present in input data or not. The integral image concept helps to find out the area of the rectangle. The area of the rectangle is calculated by adding each Haar feature area and adding them in total. Integral image is the summation of the pixel values of the original image. (Dabhi & Pancholi, 2016)

The sum of the image is the value of at any location (x, y) of the integral image. These Haar features are in use to find out whether there is any face present in input data or not. The integral image concept helps to find out the area of the rectangle. The area of the rectangle is calculated by adding each Haar feature area and adding them in total. “Integral image is the summation of the pixel values of the original image and the sum of the image is the value of at any location (x, y) of the integral image”. The integral image calculation is done from the original image equation. For the calculation of the value of the feature, Haar feature classifier uses the rectangle integral. In the final stage, “the stage cascading is performed where the candidate must pass all stages for the result”. (Dabhi & Pancholi, 2016)

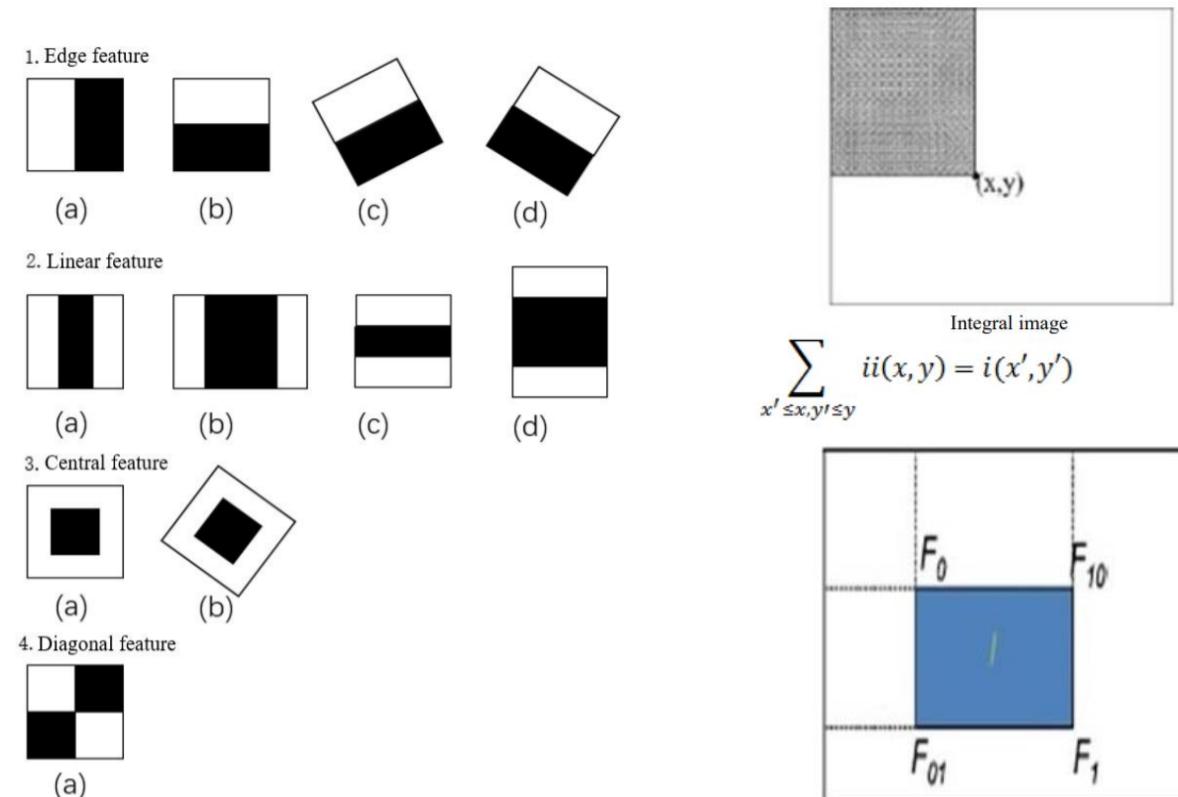


Figure 6: “Integral Image” (Dabhi & Pancholi, 2016)

Figure 7: “Haar Features” (LU & YANG, 2019)

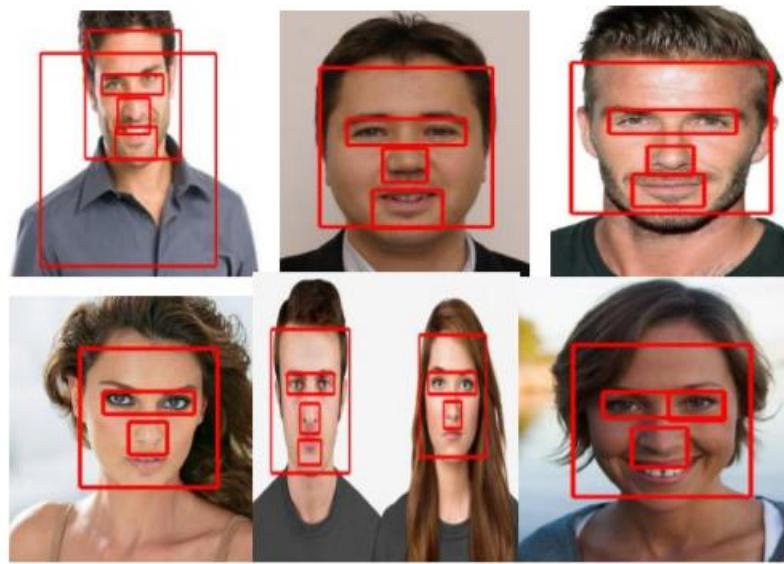


Figure 8: “Result of detected faces in VIOLA JONES ALGORITHM” (K & Padmavathi, 2017)

Convolutional Neural Network (CNN)

Convolutional Neural Network is a technique inspired by the human brain designed by simplistic artificial neurons. The artificial neurons that are also known as perceptron are attached in multiple layers. (Dang & Sharma, 2017) Convolutional neural network (CNN) in these recent days has accomplished exceptional progress in the era of computer vision. The fundamental task of CNN is image classification and face recognition that is a deep learning method of computer vision. Different researchers use deep CNNs for the face detection approach. It has a complex structure and uses cascaded CNN for face detection that makes it a time-consuming method. CNN is classified into two categories regression-based methods and template fitting approaches. (Zhang, et al., 2016)

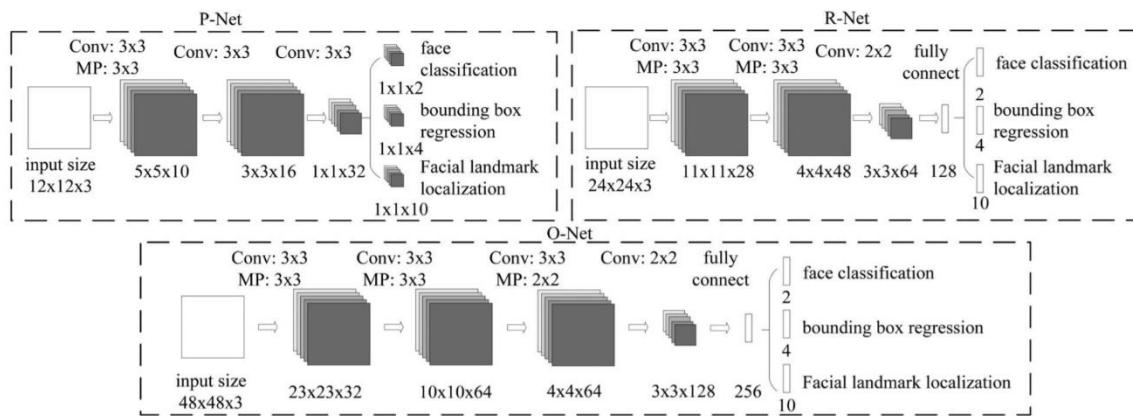


Figure 9: “Architectures of P-Net, R-Net, and O-Net” (Zhang, et al., 2016)

There are three significant stages in the cascaded CNN. Using one detection and calibration network during the process in each step and in total contains six CNNs that makes the training process considerably complicated. (Qin, et al., 2016) CNN has high accuracy in face detection and recognition both, though it is complicated and complex and consume a bit more time than different algorithm to process.

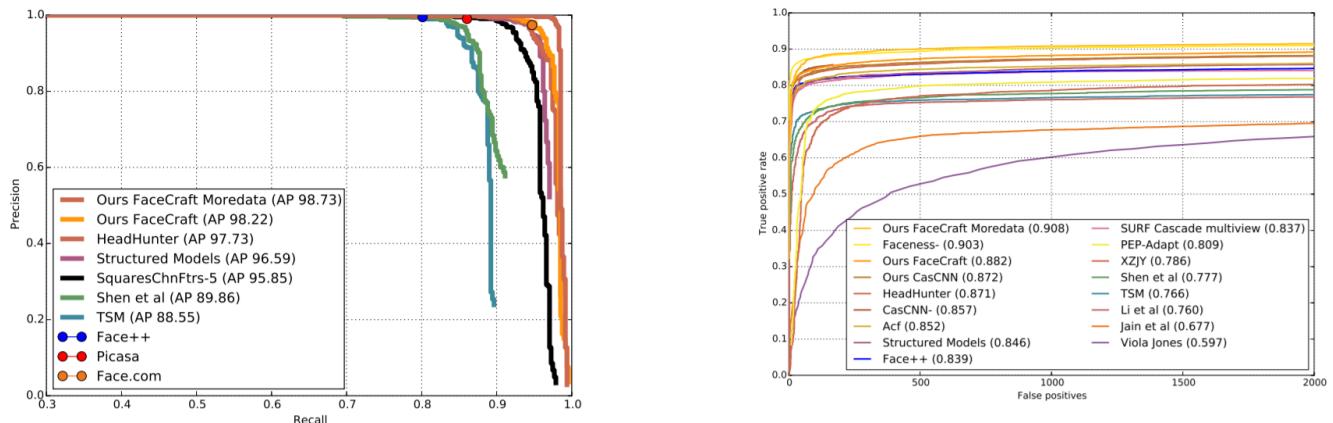


Figure 10: “Precision-Recall Comparisons with state-of-the-art methods on AFW and Comparison with state-of-the-art methods on FDDB” (Qin, et al., 2016)

Histogram of Oriented Gradients (HOG)

Histogram of Oriented Gradients is a popular algorithm for the classification of an image that is offered by Dlib. Dlib is a package for building realistic machine learning and data analysis applications. “HOG is to extract features into a vector and feed it into a classification algorithm like a Support Vector Machine (SVM)”. The process of detection is followed as at first it inputs the image, Normalizes the gamma and color, it compute gradients, weighted vote into spatial and orientation cells, it normalizes contrast above overlapping spatial blocks, and then collects HOG'S over the detection window (camera) and finally after applying linear SVM it classifies if there is any person's face. (Fabien, 2019)

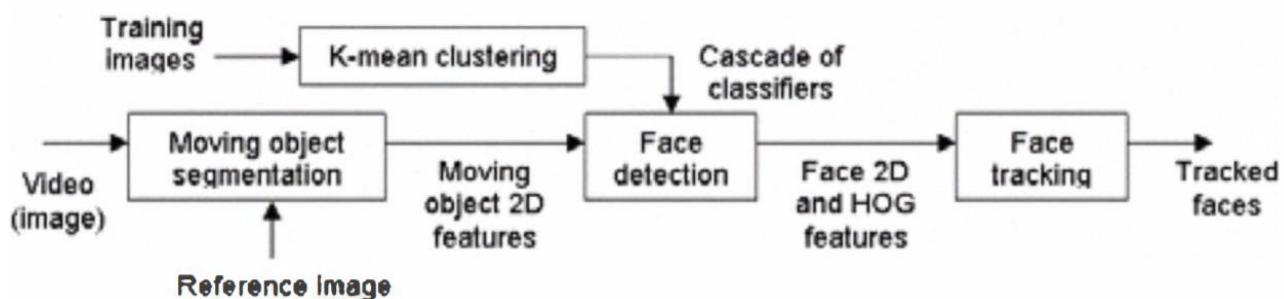


Figure 11: “Overview of the face tracking in HOG structure” (Corvee & Bermond, 2009)

All face detection algorithms have high accuracy although, in general, they all rely on one class of skin color. Kalman filtering technique can efficiently track the human faces to model face trajectories in any environment. Histogram of Oriented gradients can easily detect Strollers, human faces, and bikes using the HOG calculation. The HOG features are obtained from the face data, and then it is matched with the trained models. (Corvee & Bermond, 2009)

The face in this algorithm is designed as a set of HOG features and is calculated.

Over a set of $N_c = 9$ regular non overlapping cells

One HOG feature vector contains $N_b = 8$ bins covering the 360 degrees range of pixel gradient orientation.

After the representation during the training process, "K-mean algorithm is used to extract K clusters from the HOG features that are provided by the positive datasets". The feature vector of a sample image indexed i holding N_c cells is stated in (equation 1) and the mean vector of the k^{th} cluster is stated in (equation 2)

$$[\mathbf{h}_1^T(i), \dots, \mathbf{h}_{N_c}^T(i)]^T \quad (\text{Equation 1})$$

$$[\mathbf{m}_{1,k}^T, \dots, \mathbf{m}_{N_c,k}^T]^T \quad (\text{Equation 2})$$

An error term $E(\mathbf{i})$ relates to each model \mathbf{i} well defined as the minimum weighted squared magnitude of vector difference between the feature vector and its closest trained mean vector:

$$E(\mathbf{i}) = \min_{k=[1:k]} \left(\frac{\sum_{c=1}^{N_c} \omega_c e_{c,k}(i)}{N_c \sum_{c=1}^{N_c} \omega_c} \right) \quad (\text{Equation 3})$$

Where $e_c(i)$ is the error of the sample feature i matching to the area of cell c which is calculated by:

$$\mathbf{e}_{c,k}(i) = (\mathbf{h}_c(i) - \mathbf{m}_{c,k})^T (\mathbf{h}_c(i) - \mathbf{m}_{c,k}) \quad (\text{Equation 4})$$

Expression $E(\mathbf{i})$ gives a face error from the grouping of the HOG vectors given by all image cells. The weight w_c of a cell c states the amount of cell a positive sample cell epitomize. The weight w_c on a cell x is distinct as the minimum ratio over the cell clusters indexed K , between the numbers of positive samples that is.

$\sum_{i=1}^N \delta_{c,k}(\mathbf{i})$ and the total number of samples i.e., $\sum_{i=1}^{N'} \delta_{c,k}(\mathbf{i})$ fit in to each cell cluster k :

$$w_c = \frac{\sum_{i=1}^N \delta_{c,k}(\mathbf{i})}{\sum_{i=1}^{N'} \delta_{c,k}(\mathbf{i})} \quad (\text{Equation 5})$$

Where $\delta_{c,k}(\mathbf{i})$ is to one when the cell c of sample i has for closest cluster, the cluster indexed K or 0 otherwise. In the previous equation, N' signifies the entirety of the training samples. Now the cascade classifier performs the entire process and proceed towards the face detection process. The job of cascade classifiers is to train the process defined in the above equations and each classifier is associated with a threshold. The dataset is used, and a particular face is outlined by a 72-dimension vector also for a 10 clusters K-mean algorithm.

The face detection algorithm can be formulated by equation 6 where an image indexed i is a face if, (Corvee & Bermond, 2009)

$$F(\mathbf{i}) = N_s \text{ Where } N_s = 100 \text{ is the number of classifiers?}$$

$$F(\mathbf{i}) = \sum_{s=1}^{N_s} C(\mathbf{i}, s) \quad (\text{Equation 6})$$

The s^{th} classifier $C(\mathbf{i}, s)$ classifies image i as a face if its face error measured in equation 3 is below the classifier threshold $TH(s)$ (defined above):

$$C(i, s) = \begin{cases} 1 & \text{if } E(i) < TH(s) \\ 0 & \text{else} \end{cases}$$

Hence, the faces are successfully detected with some false detections.

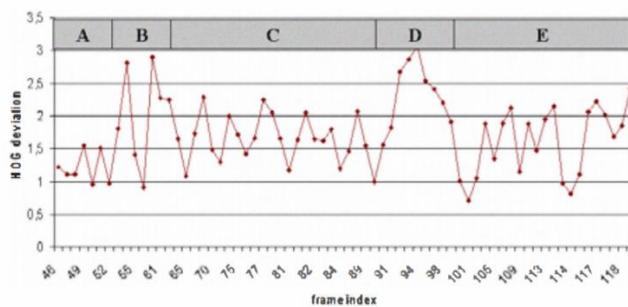


Figure 13: “HOG deviation of a tracked face” (Corvee & Bermond, 2009)

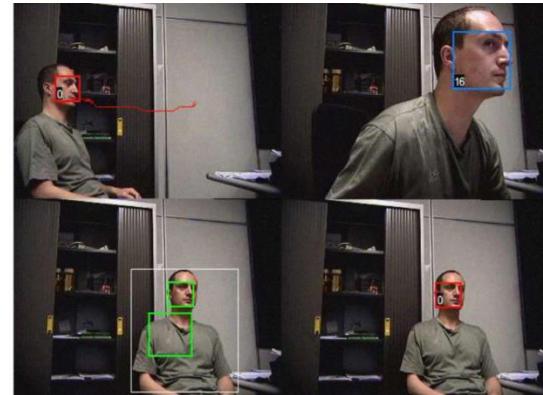


Figure 12: “Examples of a tracked face using” HOG (Corvee & Bermond, 2009)

Fisher face algorithm

Among different face recognition algorithms, Fisher face recognition is also one of the desired face recognition algorithms. Fisher face is considered better than any other algorithms, such as Eigenface and any other techniques. In this algorithm, the ‘Principal Component Analysis (PCA)’ method is used to diminish the face space dimension, then ‘Fisher’s Linear Discriminant (FDL)’ or ‘Linear Discriminant Analysis (LDA)’ method is used to achieve feature of the image frame, and the accuracy is about 93% using this algorithm for facial recognition. (Anggo & Arapu, 2018)

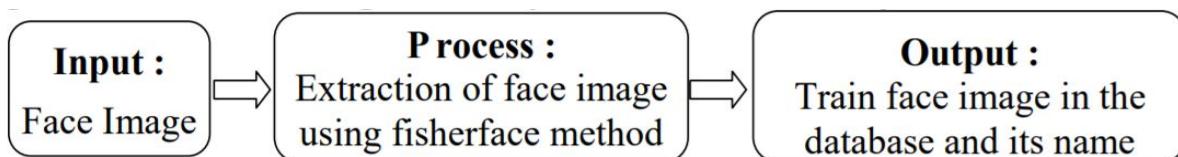


Figure 14: “Stages of system process using Fisher face algorithm.”

Using FLD in the Fisher face algorithm, the training set is classified to deal with different people and facial expressions. It is like the Eigenface algorithm but is better in performance also more complex. This algorithm is most efficient with the highest recognition rate and adequate information representation. However, some challenges faced by Fisher face are computing the covariance matrix also manipulating class scatter matrix inverse. (Saini, et al., 2014)

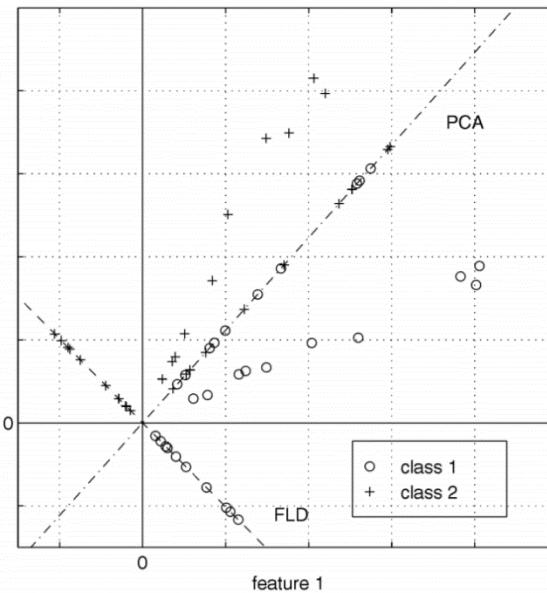


Figure 15: "Comparison of principal component analysis (PCA) and Fisher's linear discriminant (FLD) for a two-class problem where data for each class lies near a linear subspace." (Belhumeur, et al., 1997)

Eigenfaces

Eigenfaces is one of the popular algorithms used for face recognition, which is based on the Principal Component Analysis (PCA) technique. Eigenfaces is the name derived from a set of eigenvectors that is the covariance matrix of the dataset. "PCA is a statistical method used for diminishing the number of variables in face recognition where every image in the training set is represented as a linear combination of weighted eigenvectors called Eigenfaces" according to (Paul & Sumam, 2012). Eigenvectors classify the image as a point or vectors in a very high dimensional space. This algorithm extracts the information of a face from the images, encode them as efficiently as possible, and compare them with the trained model available in the database. Eigenface use principal component analysis to maximize the scatter of all projected samples. (Turk & Petland, 1991)

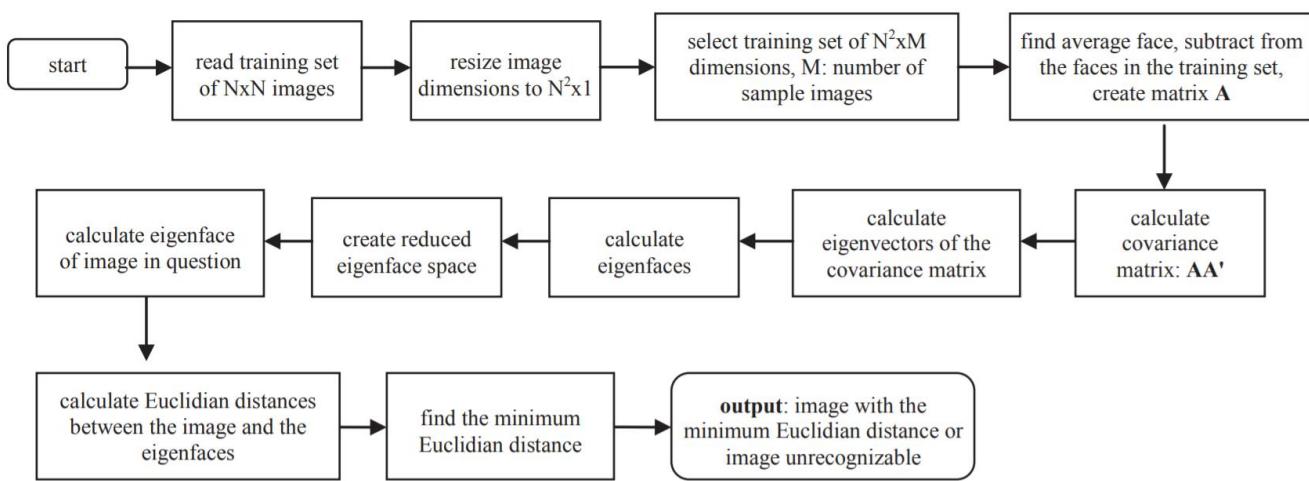


Figure 16: "Flowchart of the algorithm of the Eigenfaces method" (Çarıkçı & Özén, 2012)

SVM (Support Vector Machine)

SVM is supervised machine learning algorithm which is basically used for classification and regression analysis. This algorithm is widely used for the image-based classification problem according to different research. It can even classify images which are noisy or difficult to classified comparing to other algorithms. It classifies the extremes of the data set and draws a decision boundary also known as hyperplane near the extreme points in the dataset as shown in the figure below Figure 17: Support Vector Machine Linear Classifiers (Kim, et al., 2010) performed SVM based feature extraction where SVM classifiers is considered as a hypothesis a decision boundary according to training example. LDA (Linear discriminant analysis) was also used during implementation where the SVM is used for the exploiting the discrimination margin and LDA is considered for exploiting discriminative projection.

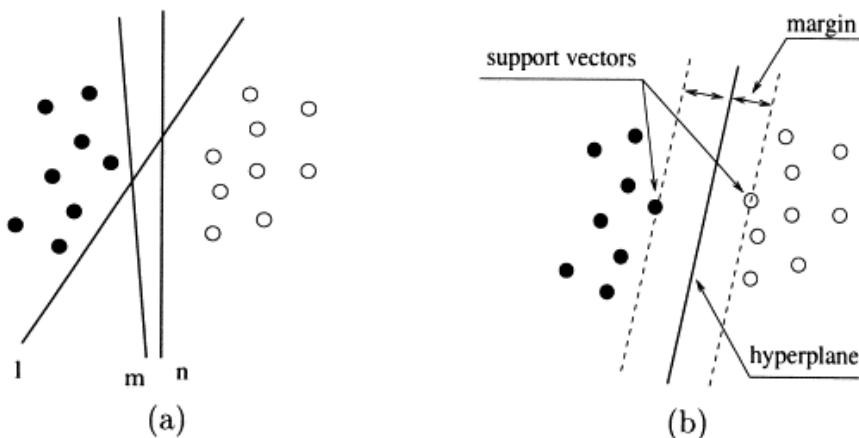


Figure 17: Support Vector Machine Linear Classifiers (Guo, et al., 2001)

SVM is a frontier which segregates the two classes, and it can be also formulated in a manageable approach without explicitly conducting out the mapping into feature space. When there is lower dimensional image, the hyperplane can be drawn easily for example when we have 1 Dimensional image, we can easily convert the image into 2 Dimensional using simple polynomial function and drawing a parabola. But when the image-based classification with higher image is performed it is computationally expensive. So, there the kernel trick is used to reduce the computational costs. So, these are few basic components and methods carried out in Support Vector Machine.

The mathematical derivation on how the SVM classifier is build and calculated are as below shown with the help of multiple mathematical functions,

Let the training dataset of 'n' factors of the form,

$$(\vec{x}_1, \vec{y}_1), \dots, (\vec{x}_n, \vec{y}_n) \quad (Eqn - 1)$$

In which the y_i are both 1 or -1, every indicating the elegance to which the point \vec{x}_i be appropriate

Each \vec{x}_i is a p-dimensional actual I vector.

We need to discover the “maximum-margin hyperplane” that divides the group of factors \vec{x}_i for which $y_i = 1$ from the group of factors for which $y_i = -1$, that is termed in order that the space between the hyperplane and the closest point \vec{x}_i from one or the other group is maximized. (Dadi & Mohan Pillutla, 2016)

Any hyperplane may be written because the set of factors \vec{x} satisfying,

$$\vec{w} \cdot \vec{x} - b = 0 \quad (Eqn - 2)$$

Where \vec{w} is the (now no longer always normalized) ordinary vector to the hyperplane in (Eqn - 2). The parameter $\frac{b}{\|\vec{w}\|}$ determines the offset of the hyperplane from starting place alongside the ordinary vector \vec{w} . (Dadi & Mohan Pillutla, 2016)

Now calculation of Soft margin this is to be achieved for extending the SVM to instances in which the statistics are not linearly distinguishable, we propose the hinge loss function,

$$\max(0, 1 - y_i(\vec{w} \cdot \vec{x}_i - b)) \quad (\text{Eqn - 3})$$

This function (Eqn- 3) is 0 if the constraint withininside the equation (Eqn - 4)

$$y_i(\vec{w} \cdot \vec{x}_i - b) \geq 1 \dots \dots \text{forall} \dots \dots 1 \leq i \leq n \quad (\text{Eqn - 4})$$

is satisfied, in different words, if \vec{x}_i lies on the accurate aspect of the margin. For statistics on the inaccurate aspect of the margin, the function's value is proportional to the space from the margin. We then desire to minimize, (Dadi & Mohan Pillutla, 2016)

$$\left[\frac{1}{n} \sum_{i=1}^n \max(0, 1 - y_i(\vec{w} \cdot \vec{x}_i - b)) \right] + \lambda \|\vec{w}\|^2 \quad (\text{Eqn - 5})$$

Now, Gaussian radial basis function

$$k(\vec{x}_i, \vec{x}_j) = \exp(-\gamma \|\vec{x}_i - \vec{x}_j\|^2), \text{ for } \gamma > 0 \quad (\text{Eqn - 6})$$

Sometimes parameterized using $\gamma = 1/2\sigma^2$

$$(\text{Eqn - 7})$$

Finally, Computing the SVM classifier quantities to diminishing an expression of the form,

$$\left[\frac{1}{n} \sum_{i=1}^n \max(0, 1 - y_i(w \cdot x_i - b)) \right] + \lambda \|w\|^2 \quad (Eqn - 8)$$

And this is how the SVM classifiers is used to classify image.

2.2.1 Comparison of algorithms

The section above was about the review of the different face detection and recognition algorithms, techniques, and approaches. The results of the accuracy from those algorithms were different according to many researchers. Some were fast but the accuracy was low, and some were slow, but the accuracy result was high. Therefore, this is the key-point by which the algorithm is distinguished from each other. The table below is the comparison of different face detection algorithms,

Table 1: Comparison of face detection algorithms

SN	Algorithms	Accuracy	Time & Speed	Comments
1.	Viola - Jones Algorithm	92% accuracy according to (K & Padmavathi, 2017)	Faster	15 faster than any previous approach but low accuracy
2.	Convolutional Neural Network (CNN)	97.5% accuracy according to (Balar, et al., 2019)	Time consuming and a bit slow than previous approaches	Fast with the use of GPU (NVidia graphic cards) and highest accuracy among all
3.	Histogram of Oriented Gradients (HOG)	95.8659 % accuracy according to (Mady & Hilles, 2018)	Faster	High accuracy, works faster and, no use of GPU

Table 2: Comparison of face recognition algorithms

SN	Algorithms	Accuracy	Techniques	Memory usage	Data Representation
1.	Fisher face	97% accuracy according to (Wahyuningsih, et al., 2019)	Principal Component Analysis (PCA) and, Fisher's Linear Discriminant (FDL) or Linear Discriminant Analysis (LDA)	Most Efficient	Efficient Data Representation
2.	Eigenfaces	96% accuracy according to (Wahyuningsih, et al., 2019)	Principal Component Analysis (PCA)	High	Powerful Data Representation
3.	Support Vector Machine (SVM)	98 % accuracy according to (Asghari, et al., 2008)	Kernel Trick and LSVM (Linear Support Vector Machine)	High and depends upon the size dataset	Dominant Data Representation

Algorithms listed above has distinct capabilities and unique accuracy, however every algorithm can perform the detection and recognition. From above comparison table, which is among the algorithms, the HOG and SVM has the highest accuracy rate and are faster approaches. The techniques used in these approaches are modern and advanced with decent data representation.

2.3 Similar Systems

- Law Enforcement – Police Department

During the 90s, Petland and Turk were working together on the Eigenfaces approach to finding a way to recognize the faces within the images. In 2002, finally, law enforcement officially applied facial recognition in critical technology testing and approaches. Since 2011, U.S. law enforcement is also using face recognition to recognize the dead bodies. (Dharaiya, 2020)

Law enforcement is using face recognition as one of its major services during the crime investigation. Police officers collect mugshots from the criminal and compare them with the against local, state, and federal face recognition databases. Once the criminal mugshot is captured, the mugshots are live on the huge databases to be scanned every time the police do the next investigation. (EFF, 2017) “A program called TACIDS (Tactical Identification System) allows law enforcement from nearly 25 agencies to stop people on the street, use their mobile phones to take a photo of them”, and then scan the snapshot images in contradiction of the county’s mugshot database. (EFF, 2017) (Winston, 2013)



Figure 18: “Face tracking from CCTV” (Ghaffary, 2019)

Face recognition is helping law enforcement in several different ways. Once in China, there was an event called Beer Festival, which ran nearly 25 days. The face recognition system took about 2.3 million face pictures through this event. The officers confirmed that 25 were wanted criminals from their previous mugshots and investigated about 190 of them. The face recognition helped the officers to arrest 19 drug addicts and evict 32 others because of

their previous criminal activity record stored in the law enforcement database. (Bhunia, 2017) The face recognition technology in law enforcement is advanced and highly accurate, which can recognize a person within a few seconds. It is an enormous system with a big database, which have almost face data of every human being. The attendance system will also be able to recognize the students within a few seconds by searching the previously trained image available on the database.

- Facebook

Since 2010, the Facebook is using face recognition approach that helped to detect people with contained faces in the picture uploaded by another user. (Dharaiya, 2020) Facebook practices the DeepFace tool that can match two photos of a similar face with implausible accuracy. “The tool is trained on a data set of about 4 million photos from a popular social network and uses three-dimensional modeling techniques and artificial neural networks to detect the similarities between two photos of the same person even when the angle, lighting, and facial expressions remain not the same”. In Facebook, Face recognition is generally used while any user uploads a picture and tag another mutual user by recognizing the images and number of people as shown in the figure below: (Lopez, 2017) (Oremus, 2014)

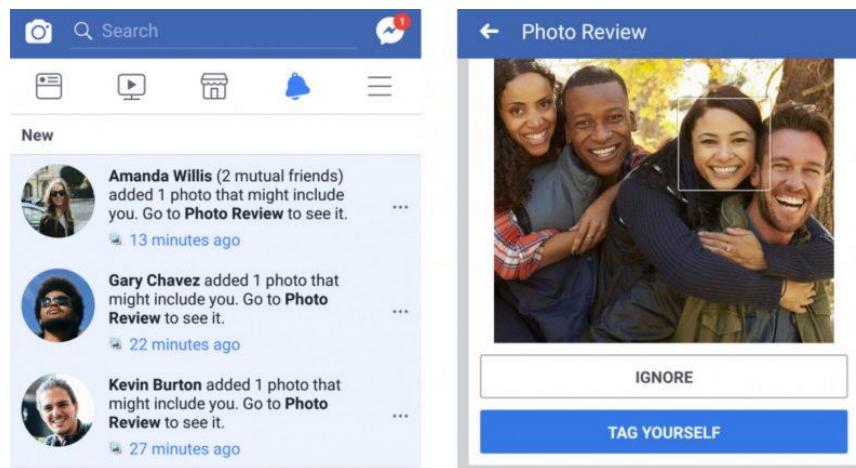


Figure 19: “Face Recognition technology in Facebook”

DeepFace is the algorithm, which is used by Facebook. DeepFace is one of the popular approaches for face recognition that has accomplished 97.25% accuracy in unconstrained face recognition. Unconstrained face recognition is the identified faces in the dense datasets. The human eye accuracy of face recognition is about 100% because a human can

easily recognize any face but the DeepFace technique has also achieved about 97.53% accuracy which has made DeepFace comparable to human-level accuracy. Some algorithms such as, “TL Joint Bayesian 96.3% and high-dimensional LBP 95.2% have reached very similar accuracy on the LFW dataset” according to (asarfraz's, 2015). The Face recognition technology in Facebook detects and recognizes the faces from the images with high accuracy. However, the attendance system will detect and recognize the students or persons live from the input camera not from the image.

CHAPTER THREE: PROJECT METHODOLOGY

3.1 Scrum Framework

Scrum framework is a modern approach of agile software development methodology where the development is divided into several phases. A scrum is a well-organized approach that provides deliverable (ready-to-use product) at the end of each phase. The developer has the flexibility of changing the requirements at any stage of the development. (Gurendo, 2015)

3.2 Why Scrum

- Can work in two or more phases at the same time.
- Developer flexibility increases.
- It is suitable for requirement changing projects.
- Easy documentation and reports.
- Easy to accomplish.
- A realistic approach to software development.
- Resource requirements are minimum. (tutorialspoint, 2020)

3.3 Scrum related to system

The phases of the scrum model parallel to system development:

➤ Product Backlog Creation

A product backlog is a list of user stories with a unique id, which is ordered by a priority. The implementation part is divided into different features that are user stories. The product backlog is a collection of all the user stories that are to be implemented during the software development process. The SRS document and elements inside such as (Functional, Non-Functional and Usability Requirements) can be considered as the product backlog creation phase of scrum.

➤ Sprint Planning and Sprint Backlog Creation

Sprint planning is the process of adding a list of user stories in a sprint backlog that can provide a possible outcome. Each sprint will contain a set of tasks. A sprint lasts about two weeks. It can also be planned for one month as the requirement of the client. During the product backlog creation, the backlog which is known as user stories or requirements are divided into different sprints. The subsystems of the system such as User Management System, Face Detection, Face Recognition, etc. are divided into different system during the planning process.

➤ Working on the Sprint: Scrum Meetings

This phase includes the development process and all tasks that were added in the sprint are executed in this phase and known as the development phase. While the sprint is running, different task takes place such as scrum meeting, daily meeting, tracking the ongoing development process, etc. Scrum meeting is the 15 minutes communication between team members to discuss the ongoing task and to track the progress. This phase basically focuses on the development part and meeting for feedback with client. Here the client is supervisor so, the supervisor provides the feedbacks on each meeting.

➤ Testing and Product Demonstration

Testing is done after the execution of all the tasks that were added in the sprint backlog. The outcome of the sprint is tested in this phase. As the scrum provides the possible outcome after each sprint execution, the demonstration from the outcome result is done in this phase. The black box testing approach is used for the testing part after the development of each subsystem.

➤ Retrospective and Next Sprint Planning

This phase leads toward reviewing the works and tasks that are completed in a sprint backlog. In this phase, the main problem and solution are highlighted. Moreover, the ways to improve works in better ways for the upcoming days. After one subsystem or sprint is

completed, the system moves forward toward next sprint planning and another subsystem.
(Gurendo, 2015)

3.4 Gantt Chart

The Gantt chart below was developed very first during the research period therefore it is not an accurate Gantt chart. The detailed and well-developed Gantt chart is listed below in “Section 8.2 under Evidence of project management”. Here, we can clearly see the workflow between sprints in the Gantt Chart below. The help of scrum methodology enables us to move back to previous sprint and make any change if needed. The final system is recognized here as fully and well-developed system.

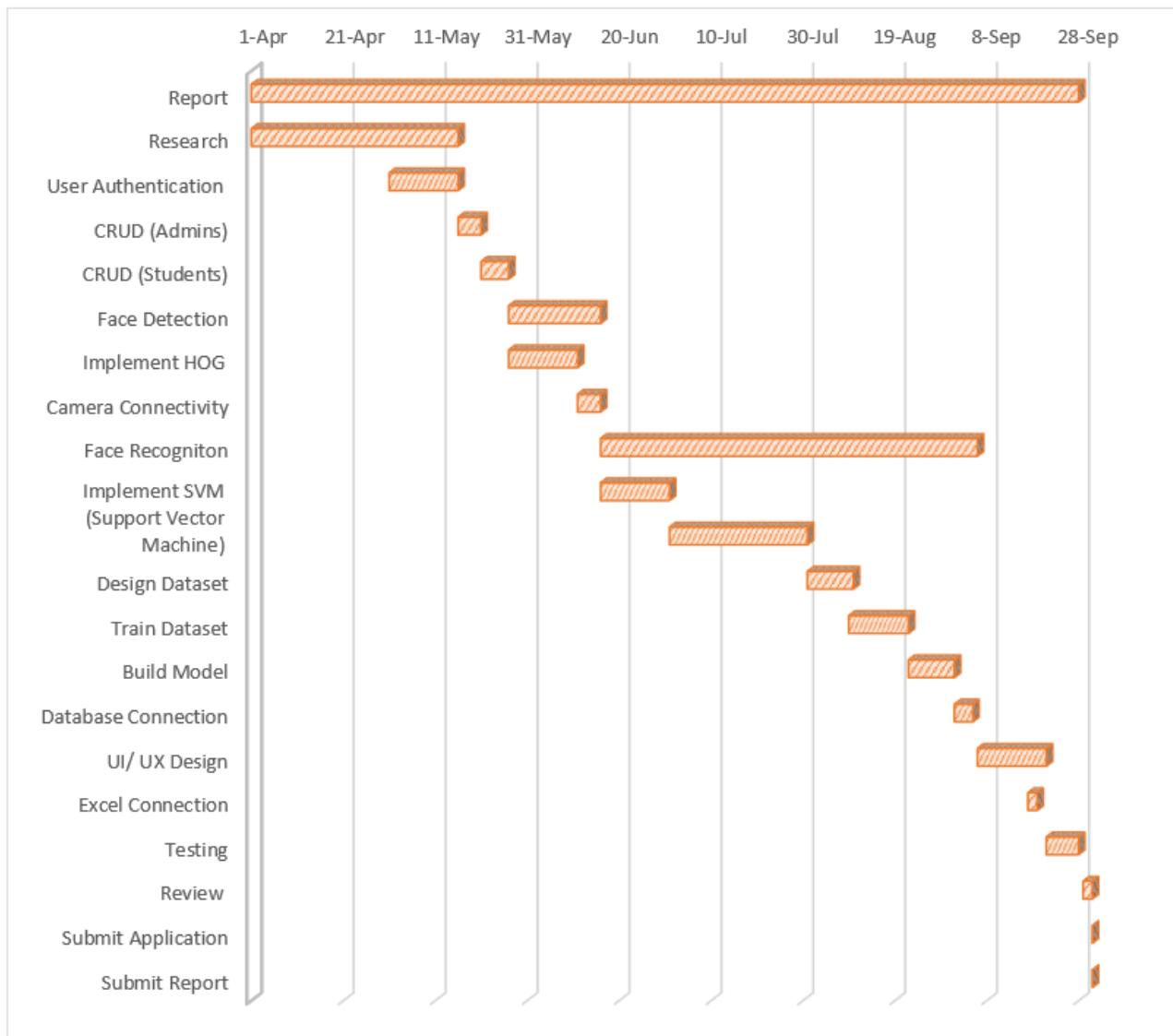


Figure 20: Short Gantt Chart

CHAPTER FOUR: TOOLS AND TECHNOLOGY

This chapter describes different tools and technologies used during the system development period and states why these tools and technologies were chosen.

4.1 Libraries

There are multiple libraries that were used during the development of face recognition and detection model. All-important libraries are listed below:

Face Recognition Library

Face recognition library is one of the most widely used libraries which can recognize or identify human faces within only some lines of code. It is also known as world easiest face recognition library and it includes Dlib as the toolkit. The reason this library is used in this system because it has many method or function to deal with faces in the picture. The `face_locations` function is responsible to locate the face's locations inside a specific image. This library interacts with different face recognition and detection libraries fluently and finds the facial features in a particular image. One of the major reasons of using this library is because it is very easy to install and work perfect with Python programming language and Anaconda. (Wolf, 2019)

Dlib

Dlib library is the part of face recognition library as a C++ toolkit which has multiple number of machine learning algorithm. The use of Dlib makes the face recognition works fine and helps for real-time face recognition. The reason of using this library during the development of the facial recognition inside this system was because the algorithm HOG and SVM practices face detection very well with Dlib. Dlib works very fast in compared to other libraries which perform recognition. During the model development part of this system the Dlib was installed in Ubuntu Linux and the speed was well but later using the Anaconda the

Dlib was installed and there was not vast difference in speed it worked good in both machines. (Ponnusamy, 2019)

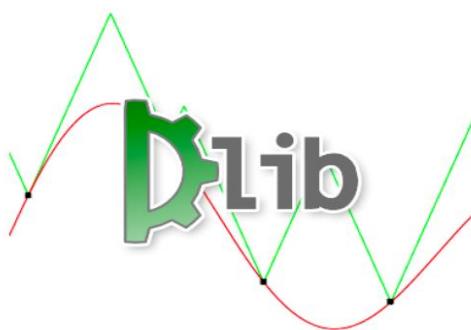


Figure 21: Dlib Library

Open Computer Vision (OpenCV)

OpenCV is a computer vision library that was introduced by Gary Bradsky of Intel in 1999 which, supports several computer vision and machine learning algorithms. OpenCV is available for multiple platforms such as Windows, Linux, OS X, Android, iOS, etc. Different tools and packages are available within this library such as Numpy, Matplotlib, etc. (Mordvintsev & K, 2017)

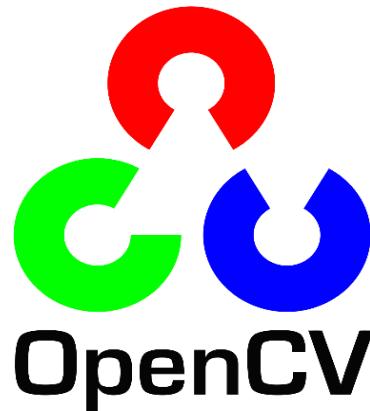


Figure 22: Open Computer Vision

OpenCV library is distributed among several modules, where each group of the module is dedicated to one group of computer vision predicaments and the classes and functions are determined within the name space cv. According to the experiment was performed by (Culjak, et al., 2012) where the OpenCV was examined to different state of art algorithms implementations utilizing the popular Middlebury Stereo Evaluation testbed. Using the

popular test images Tsukuba, Venus, Cones, and Teddy the test was performed where the OpenCV performance was quite well. (Culjak, et al., 2012) The accuracy results from the test images are in the table below:

Table 3: OpenCV performance with different datasets

SN	Method	Tskuba	Venus	Teddy	Cones
1.	Segment support	2.28	1.21	10.99	5.42
2.	Adaptive weight	4.66	4.61	12.70	5.50
3.	Variable Windows	4.10	10.66	13.90	7.24
4.	Reliability	5.14	3.86	16.96	13.52
5.	Shiftable Windows	6.53	6.60	16.16	9.55
6.	OpenCV	9.64	5.92	13.41	7.45

NumPy

NumPy is basically used for handling the numeric values and multi-dimensional arrays. In this system when the face recognition is performed the system computes the images and their pixels into multi-dimensional arrays which in the form of long feature vectors and then finally the system can identify the face by comparing those arrays with the arrays of image previously store in the system. NumPy is known as Numerical Python and is easy to use and implement with the help of python programming language. (Oliphant, 2006)



Figure 23: NumPy

4.2 Programming language and framework

The programming language and the framework used during the system development are listed below with specific reasons:

Python

As we know python is a high level of programming language which is widely used for multiple purpose, it can perform different task from creating html page to implementing advanced artificial intelligence aspects. Python uses MVT pattern and has easy syntax which are not difficult. MVT stands for Model, View and Templates where model file helps us to create and handle database tables or component of system, view help us to create multiple function for the system, and template help us to render that all file and view them using basic language such as HTML, CSS, and JS. Therefore, it very easy to work with python with the help of these feature and this is the major reason it was used as a main programming language for this system.



Figure 24: Python

Django

Django is a web development framework offered by Python, which uses MVT (Model View Template) design pattern for high-level web application development. Model is the abstraction layer provided by Django which, structure and handle the data of web applications. The view layer is used for the encapsulation of the bonded logic for processing the user's request and delivering the response. The template layers help by implementing the designer-friendly syntax to render the data for the users. Django provides an in-built authentication system for the admin panel from where the admin can manage the

application, users, and information it contains. For the making of forms and the manipulation of form data, Django renders a vibrant framework and for security, it provides various assurance tools and mechanisms. (Django Software Foundation, 2020)



Figure 25: Django Framework

HTML

HTML is used to handling the webpages and content included by the webpages. It stands for Hyper Text Mark-Up Language. As the attendance system is web-based application so, for structuring the pages inside the system HTML is used. It handles different information and means inside, such as which web page to display first, the work of button etc. So, these kinds of task are accomplished with the help of HTML..



Figure 26: HTML

CSS

Cascading Style Sheet (CSS) is the key language which is fully dependent upon HTML when working with web-based application. It basically controls the presentation, formatting, and layout of web pages such as their colors, layout, and fonts. So, for these purposes it was used inside the system. (World Wide Web Consortium (W3C) , 2016)



Figure 27: CSS

JS (JavaScript)

The main use of JavaScript is to control the behavior of different elements present inside the webpages. It helps us to add interactive actions to pages and contains low threshold to get started. Js basically creates function and assign work to each element. (Hack Reactor, 2018)



Figure 28: JavaScript

AJAX (Asynchronous JavaScript and XML) and jQuery

AJAX is a combination of multiple programming languages and jQuery is tool of ajax. The main reason of using ajax is it help us to load the data and information present inside the database without reloading the web page so, therefore it has asynchronous in the name. Basically, ajax function returns the XML Http Request that create normal jQuery which handles the object. (OpenJS Foundation, 2021)



Figure 29: AJAX and jQuery

4.3 Tools

GIT and GitHub

GIT is one of the famous tools that is used to backup and store every single file and code. It stores files by creating multiple repositories and differentiate each code inside the folder. It creates a very safe environment for developers so that if in case any damages happened to our pc or laptop the backup file is stored safely inside GIT. This tool helps us to minimize the risk during system development process. GitHub is the web-based and desktop-based tool of GIT which helps to store the clone file of the project folder in cloud in case we need backup.



Figure 30: GIT and GitHub

PyCharm

PyCharm is IDE which is mostly used by Python developers because we can create multiple interpreters and used them indifferent projects. PyCharm is fantastically compatible with Python programming language. So, PyCharm is used in this project because the system is developed using Python programming language. We can use Anaconda environment variables and their libraries with the help of PyCharm. it was very easy during the model development because all the necessary needed libraries that were installed in Anaconda environment variable were visible in PyCharm too.

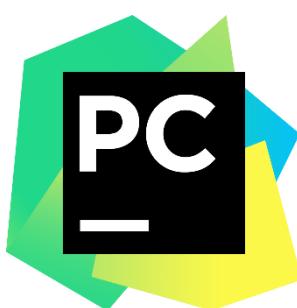


Figure 31: PyCharm IDE

MySQL Workbench

MySQL workbench is provided by MySQL database which helps to interact with the database system in a will manner. MySQL is one of the most popular databases used in today's context of world. It displays the tables inside the database in will order and we can easily perform the CRUD operation using the workbench. The workbench was used for the purpose of handling and managing the database table inside the attendance system. It is very easy to use, and it automatically generates queries for the overseeing rows and columns present inside the tables.



Figure 32: MySQL Workbench

Anaconda

The use of anaconda was for implementing different libraries which were used during the development of face detection and recognition system. Anaconda is a tool that helps us to create multiple virtual environments. The PyCharm IDE locates and can use every virtual environment created with the help of anaconda. The main reason of using this tool was because the windows was unable to install few libraries such as Dlib but with the help of anaconda it was successfully installed. Therefore, for using multiple environments this tool was used in this system.



Figure 33: Anaconda

CHAPTER FIVE: ARTEFACT DESIGNS

This chapter provides a brief detail about the system requirements and detailed diagram of each sub system inside the system:

5.1 Testing Approach

The testing approach I will be using to test my system is Black Box Testing approach.

- Black Box Testing

“Black Box Testing is a type of testing that just focuses on the inputs and output of the software system without bothering about internal knowledge of the software program”. It just focuses on the functional requirement of the software applications. The figure below shows the working process of black box testing:

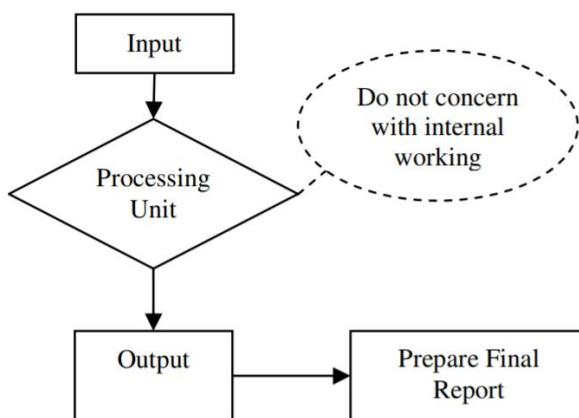
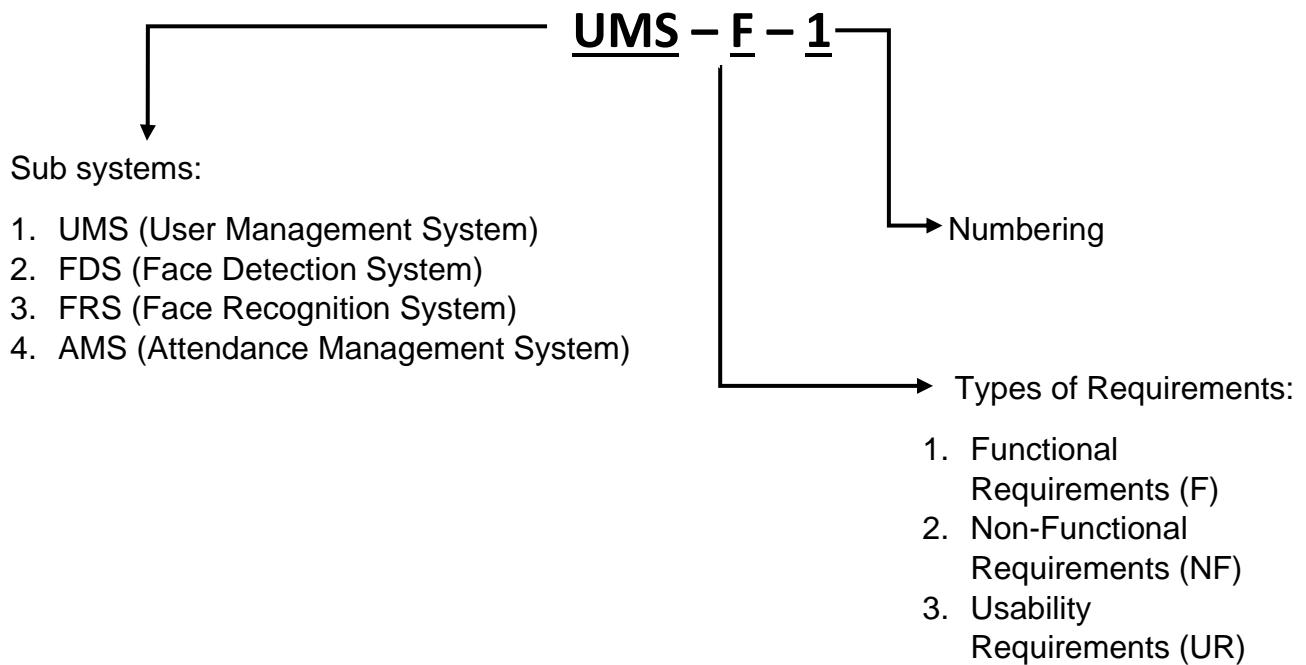


Figure 34: “Working process of black box testing technique” (Khan, 2011)

Black Box Testing generally tests all the requirements and functionality of the system and provides remarks based on their results. The functionality of the application is divided into different test cases and tests them sequentially. This testing approach is good for large systems and test cases can be designed as soon as the functional specifications are complete. (Khan, 2011)

5.2 SRS Legend



5.3 User Management System

5.3.1 SRS

Requirement ID	Requirement Specification	Use Case	Moscow
Admin			
UMS – F – 1	The log in portal of system should allow users to log in to the dashboard.	Log in	Must have
UMS – NF – 1.1	Password should be at least 8 characters with symbols, numeric and a special character.		Should have
UMS – NF – 1.2	System should let the users to logout from the system using logout button.		Must have

UMS – UR – 1.1	The password field of login portal will have an option to make password visible or hide.		Should have
UMS – F – 2	As an Admin, I want to manage students, so that I can create, view, update and, delete their profile and details.	Manage Students	Must have
UMS – F – 3	As an Admin, I want to manage teachers, so that I can create, view, update and, delete their profile and details.	Manage Teachers	Must have
UMS – F – 4	As an Admin, I want to manage Student Service Staffs, so that I can create, view, update and, delete their profile and details.	Manage Student Service Staffs	Must have
UMS – F – 5	Admin should be able to send the notifications to the students and teachers on the system.	Send Notifications	Could have
UMS – F – 6	Admin should be able to manage course and subjects according to teachers and staffs.	Manage Course & Subjects	Must have
UMS – F - 7	Admin Should be able to update their profile details.	View Profile (Admin)	Must have
UMS – F – 8	Admin Should be able to manage the session year.	Manage Session Year	Must have

UMS – F – 9	Admin should be able to view and reply feedback of students.	View and Reply Feedbacks (Students)	Must have
UMS – F – 10	Admin should be able to view and reply feedback of teachers.	View and Reply Feedbacks (Teachers)	Must have
UMS – F – 11	Admin should be able to view and approve or disapprove student leave request.	View and Approve / Disapprove Leave (Students)	Must have
UMS – F – 12	Admin should be able to view and approve or disapprove teacher leave request.	View and Approve / Disapprove Leave (Students)	Must have
Teacher			
UMS – F – 13	As a Teacher, I want to register to the system.	Register (Teacher)	Should have
UMS – F – 14	The system should allow teachers to view their profile details.	View Profile (Teachers)	Must have
UMS – F – 15	Teachers should be able to update their profile details.	Update Profile Details	Must have

UMS – F – 16	The system should allow teachers to view student profile.	View Student Profile	Could have
UMS – NF – 16.1	The system should not let the teachers to change or update student profile details.		Should have
UMS – F – 17	Teacher should be able to view and approve or disapprove student leave request.	View and Approve / Disapprove Leave (Students)	Should have
UMS – F – 18	Teacher should be able to request for feedback from admin.	Request Feedback (Teachers)	Must have
UMS – F – 19	Teachers should be able to post the feedbacks on student profile.	Send Feedbacks	Should have
UMS – UR – 19.1	The feedback field should contain maximum space of 1500 characters.		Should have
UMS – UR – 19.2	The feedback section should also contain an image section of a minimum 1024 X 760 while not exceeding 10mb of file size where teachers can post images.		Could have
UMS – F – 20	Teacher should be able to add result of students	Add Result	Must have
UMS – UR – 20.1	System should be able to assign student with pass or fail tag.		Should have

UMS – NF – 20.1	If the student mark is below 40 then system should be able to mark them fail.		Should have
UMS – F – 21	Teacher should be able to edit result of students	Edit Result	Must have
UMS – F – 22	Teachers should be able to apply for leave.	Apply for Leave (Teacher)	Must Have
UMS – F – 23	System should allow teachers to send notice to students.	Send Notice	Could Have
Student			
UMS – F – 24	As a Student, I want to register to the system.	Register (Student)	Should have
UMS – F – 25	Students should be able to apply for leave.	Apply for Leave (Student)	Should Have
UMS – F – 26	The system should allow students to view their profile details.	View Profile (Student)	Must have
UMS – F – 27	Students should be able to update their profile details.	Update Profile Details	Must have
UMS – F – 28	Students should be able to apply for leave.	Apply for Leave (Student)	Must Have

UMS – F – 29	Students should be able to view their own result.	View Result (Student)	Must have
Student Service Staff			
UMS – F – 30	As a Student Service Staff, I want to register to the system.	Register (Student Service Staff)	Should have
UMS – F – 31	The system should allow Student Service Staff to view their profile details.	View Profile (Student Service Staff)	Must have
UMS – F – 32	Student Service Staff should be able to update their profile details.	Update Profile Details	Must have
UMS – F – 33	Student service staff should be able to view the feedbacks posted on student profile by the teachers.	View Feedbacks	Must have
UMS – NF – 33.1	System should allow student service staff to forward the feedbacks to student parent in their email.		Could Have
UMS – F – 34	Student service staff should be able to print out the feedbacks.	Print Feedbacks	Must have
UMS – UR – 34.1	The feedbacks must be stored in (.pdf) format in the system and the database.		Could have

5.3.2 Design/modelling diagrams

I. Activity Diagram

- User login:

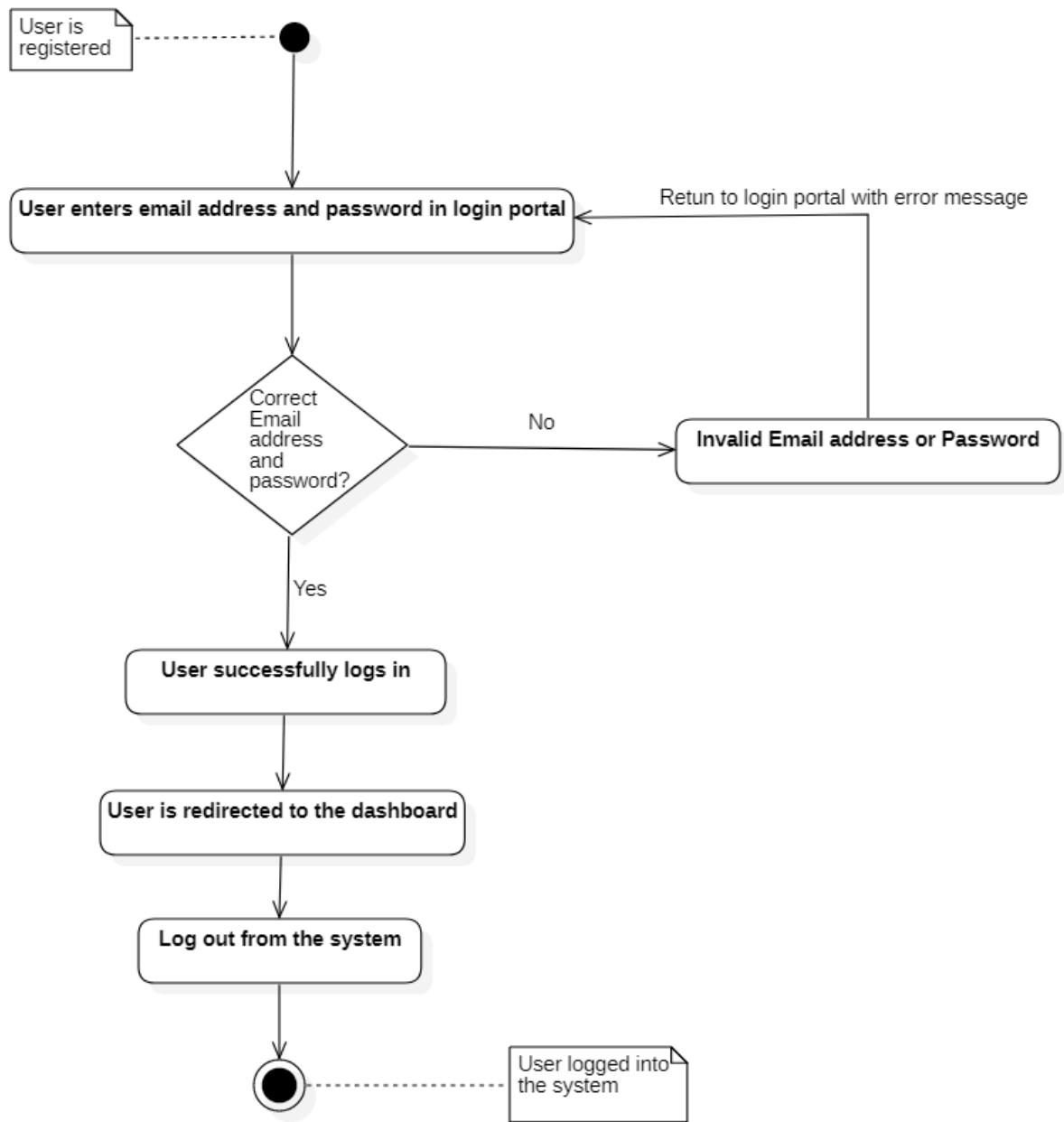


Figure 35: Activity Diagram of user login

- Manage Students:

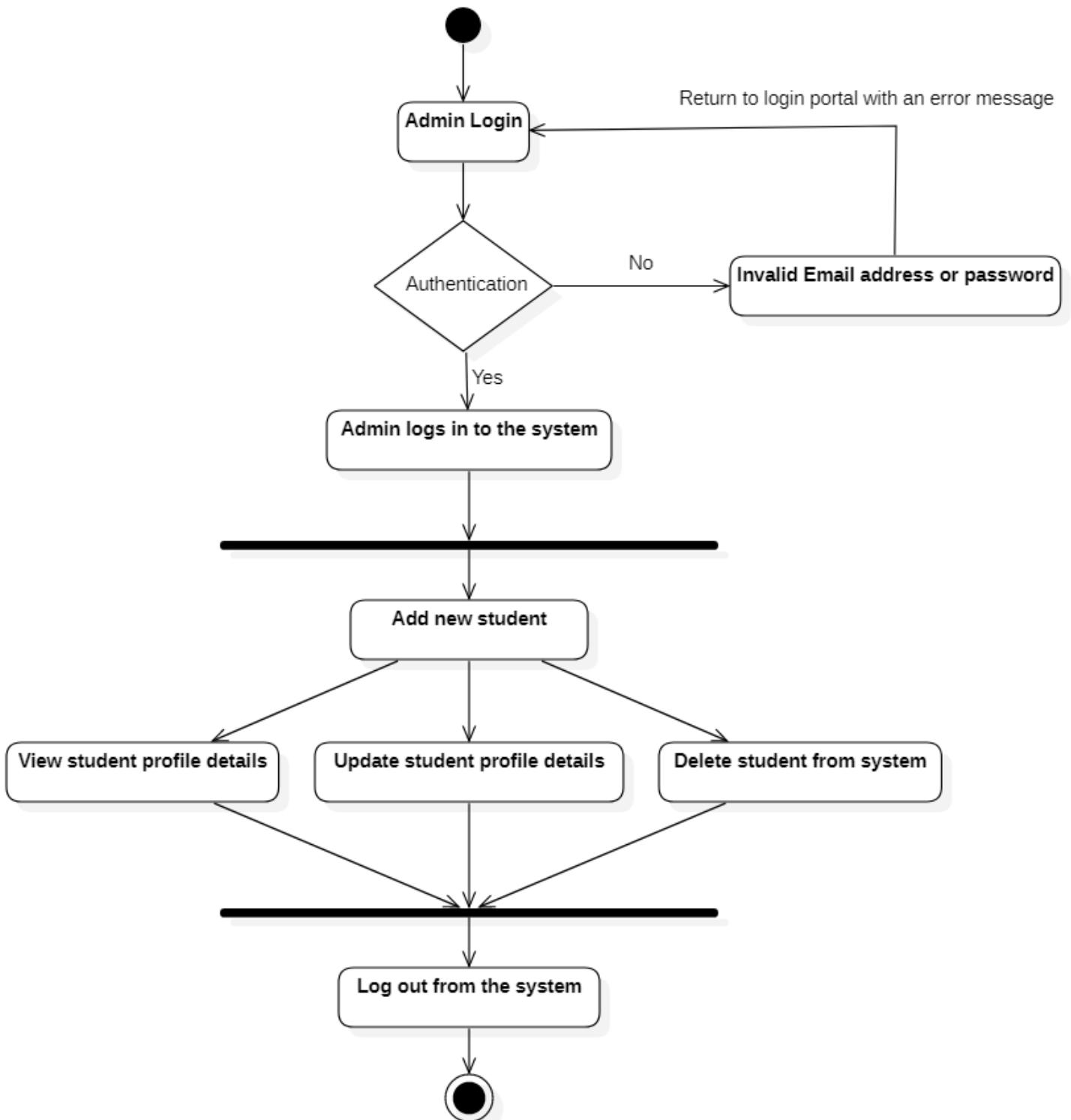


Figure 36: Activity Diagram of manage students

- Manage Teachers:

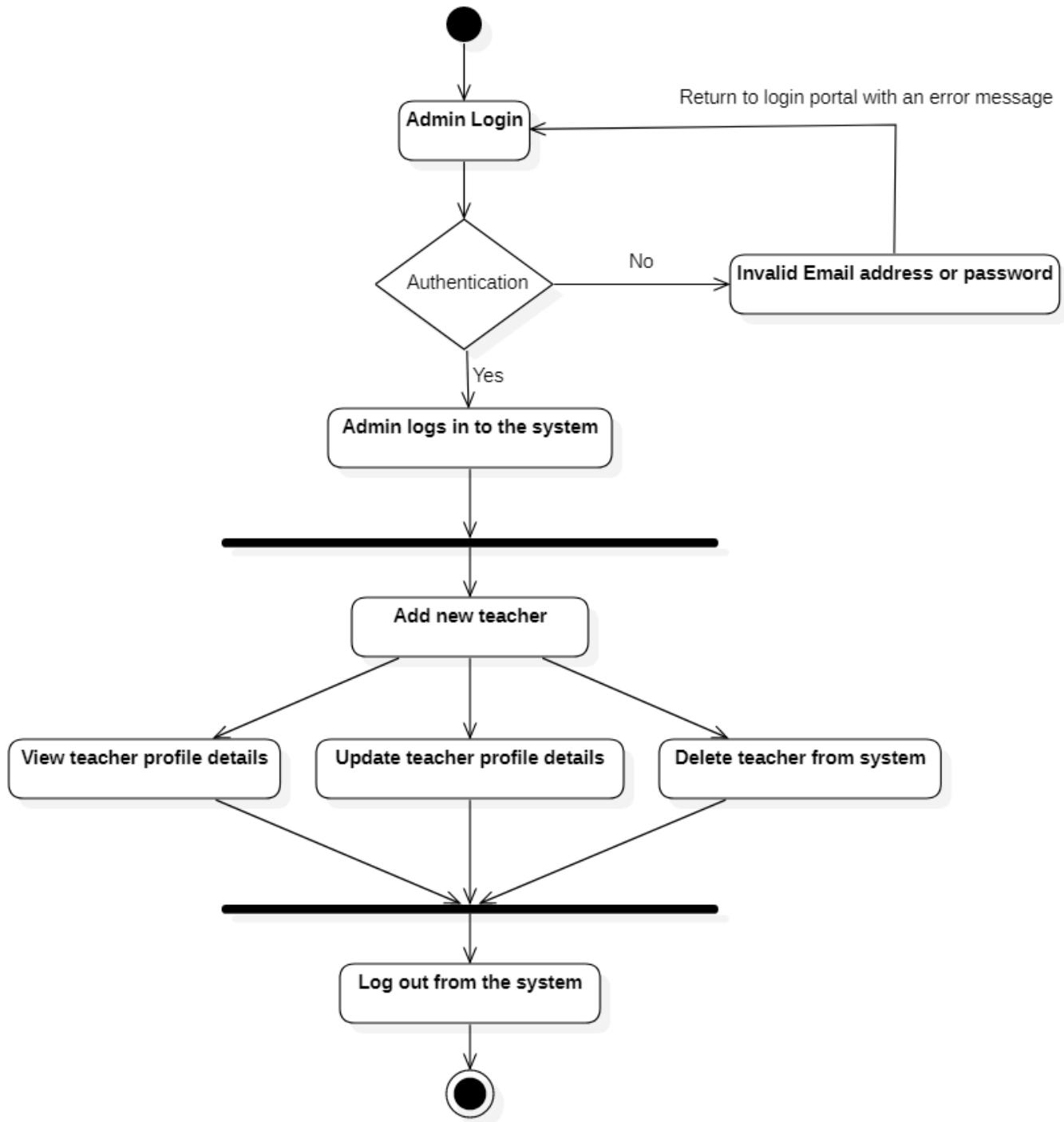


Figure 37: Activity Diagram of manage teachers

- Manage Student Service Staff:

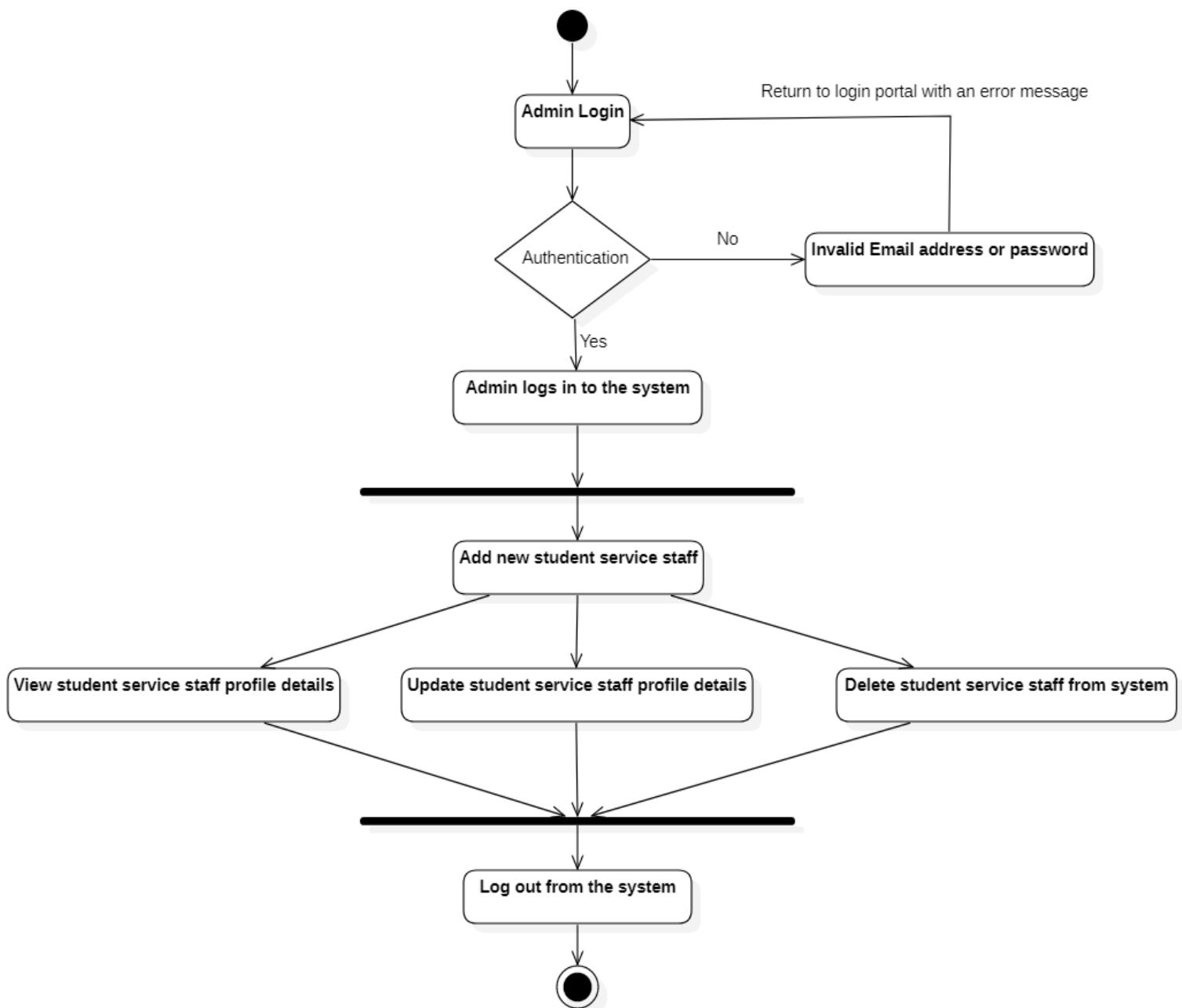


Figure 38: Activity Diagram of manage student service staff

- Send Notifications:

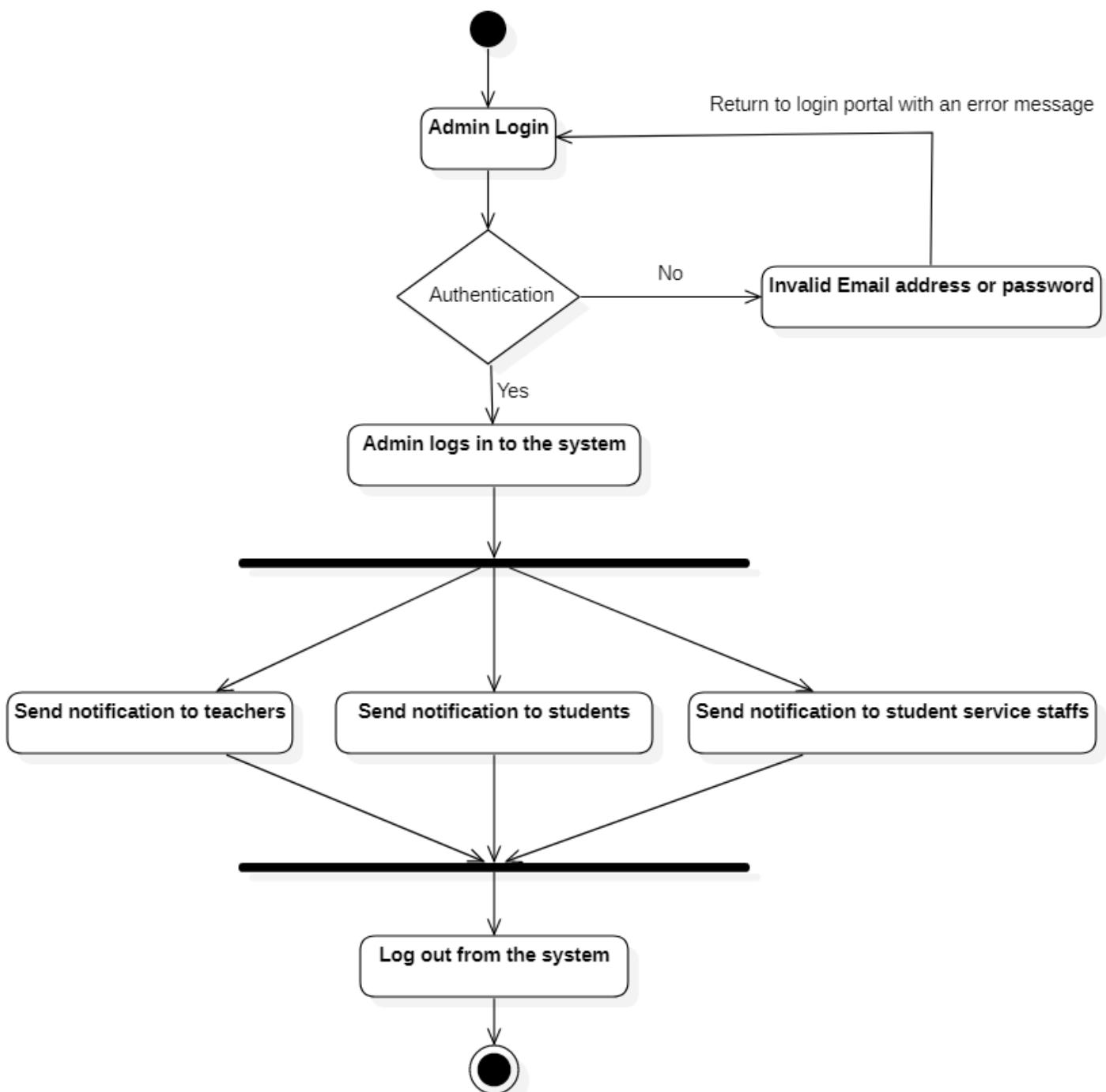


Figure 39: Activity Diagram of send notifications to users

- Manage Course and Subjects:

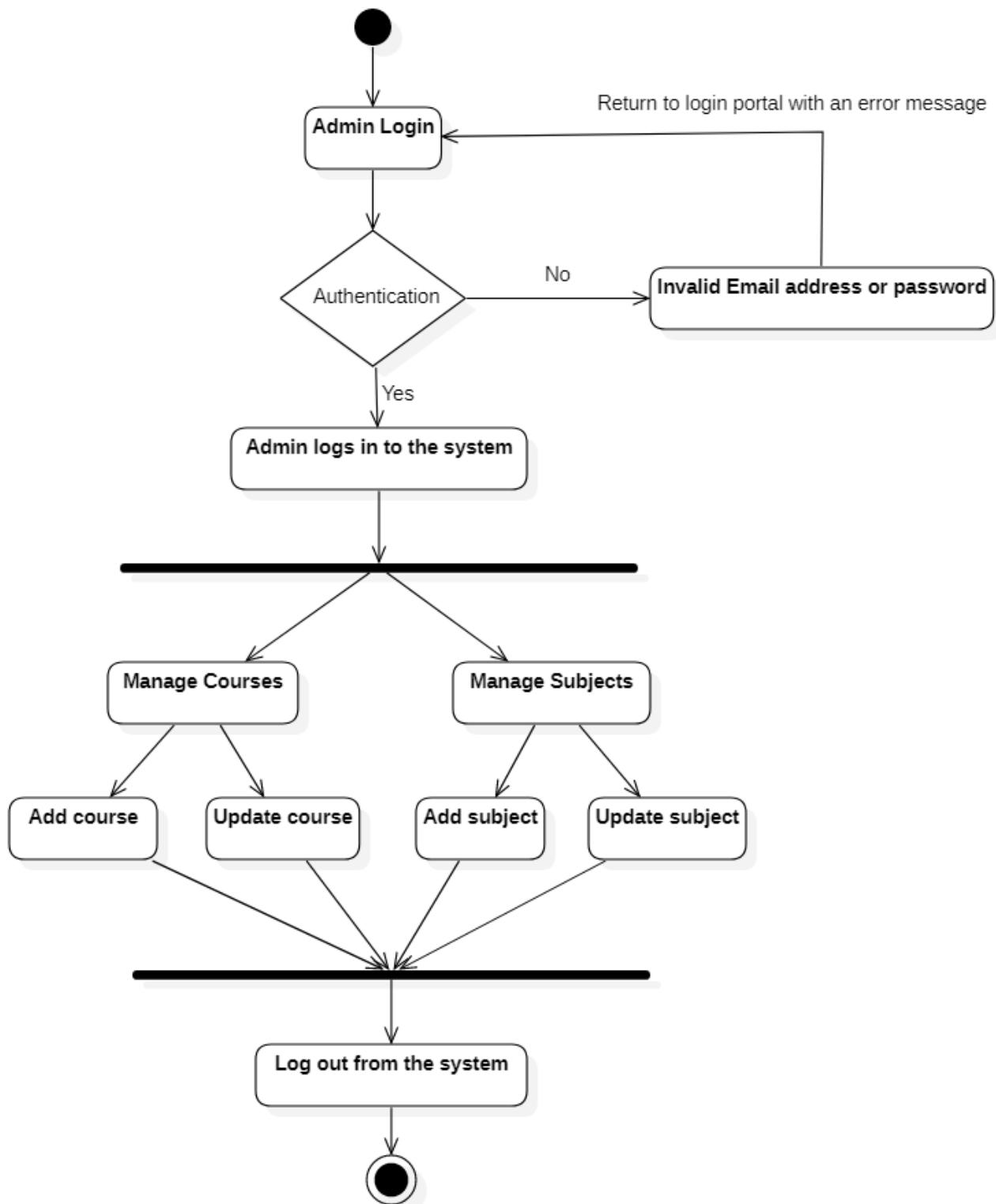


Figure 40: Activity Diagram of manage courses and subjects

- View Profile (Teachers):

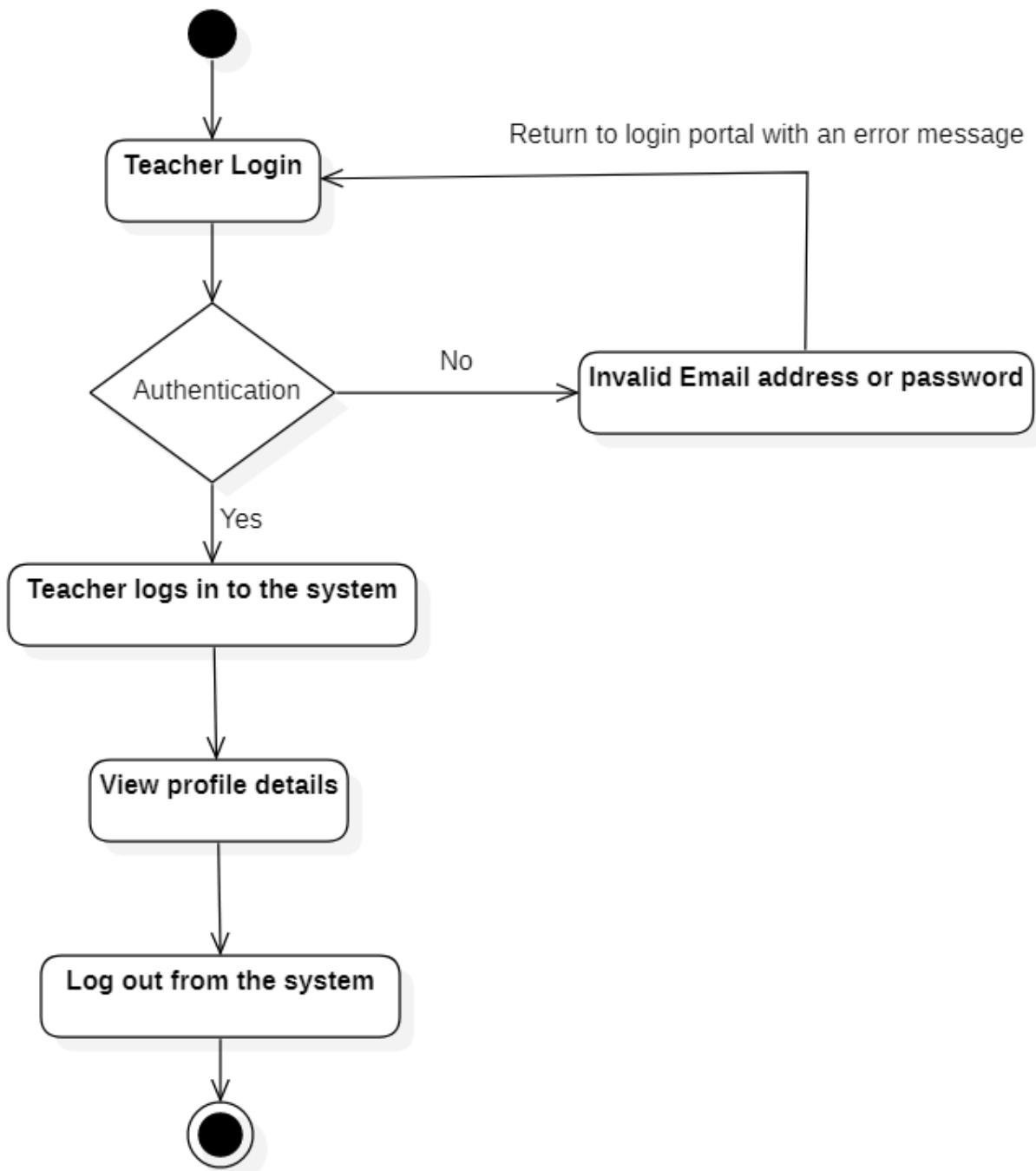


Figure 41: Activity Diagram of view profile of teachers

- Update Profile Details (Teachers):

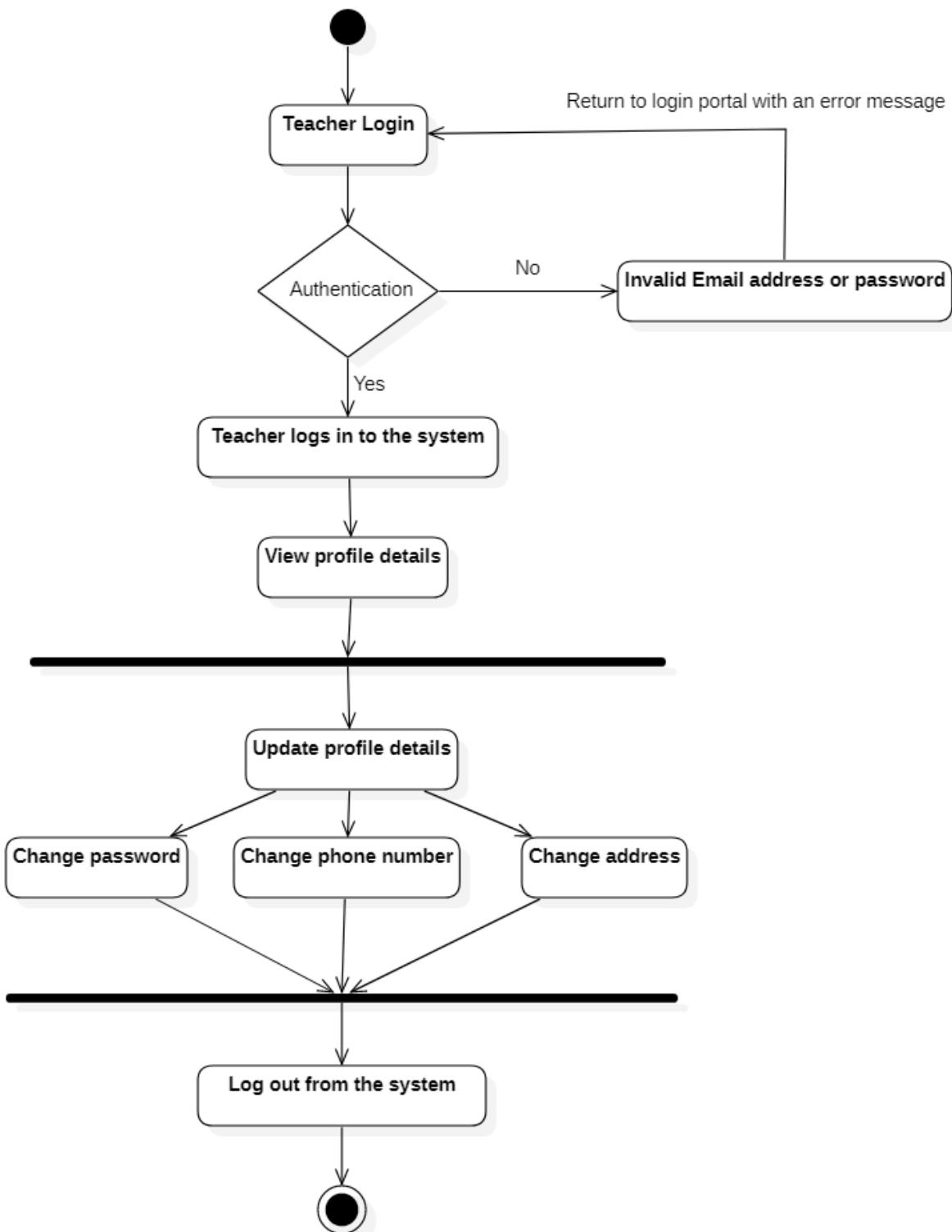


Figure 42: Activity Diagram of update profile details of teachers

- View Student Profile (Teachers):

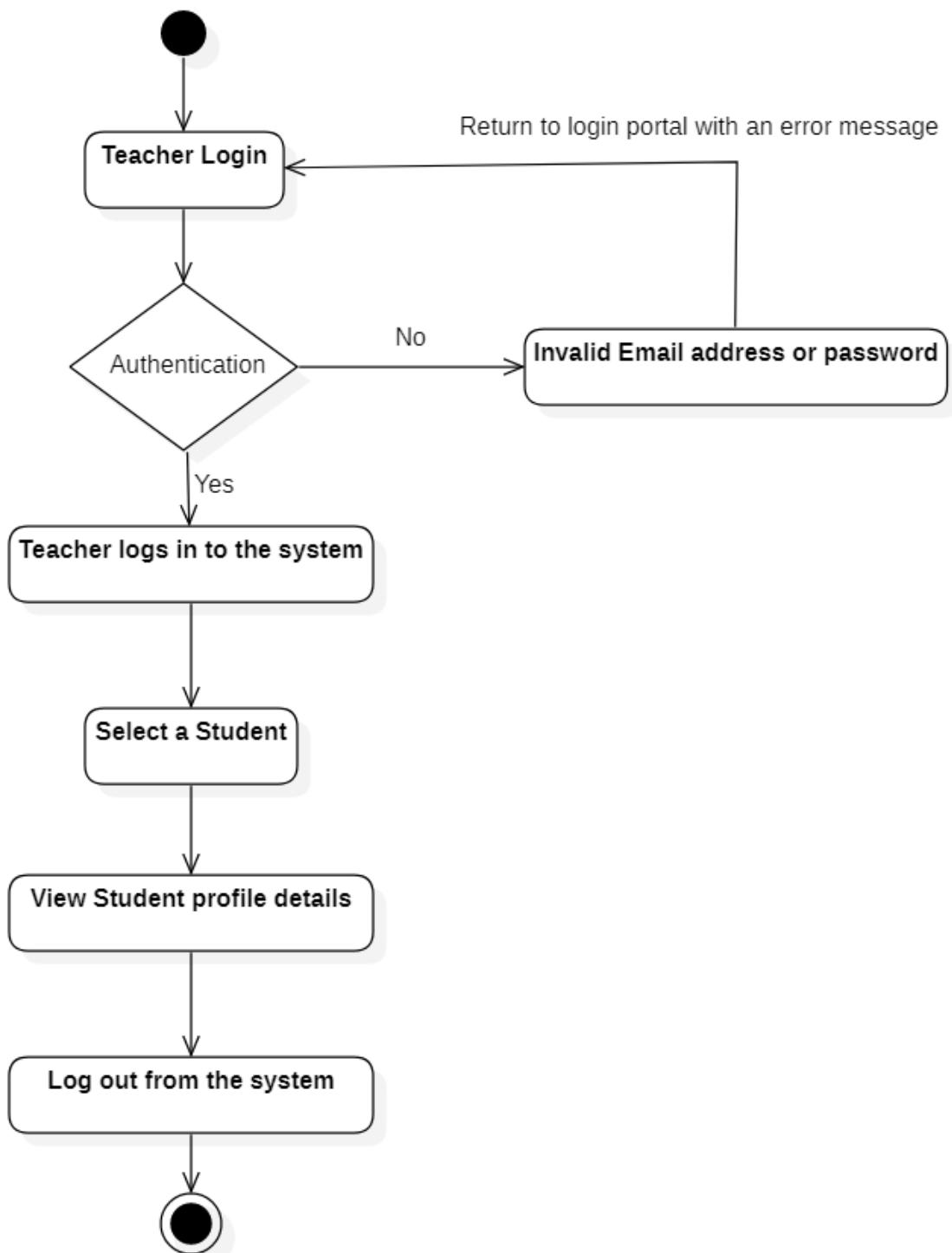


Figure 43: Activity Diagram of view student profile details by teachers

- Send Feedbacks:

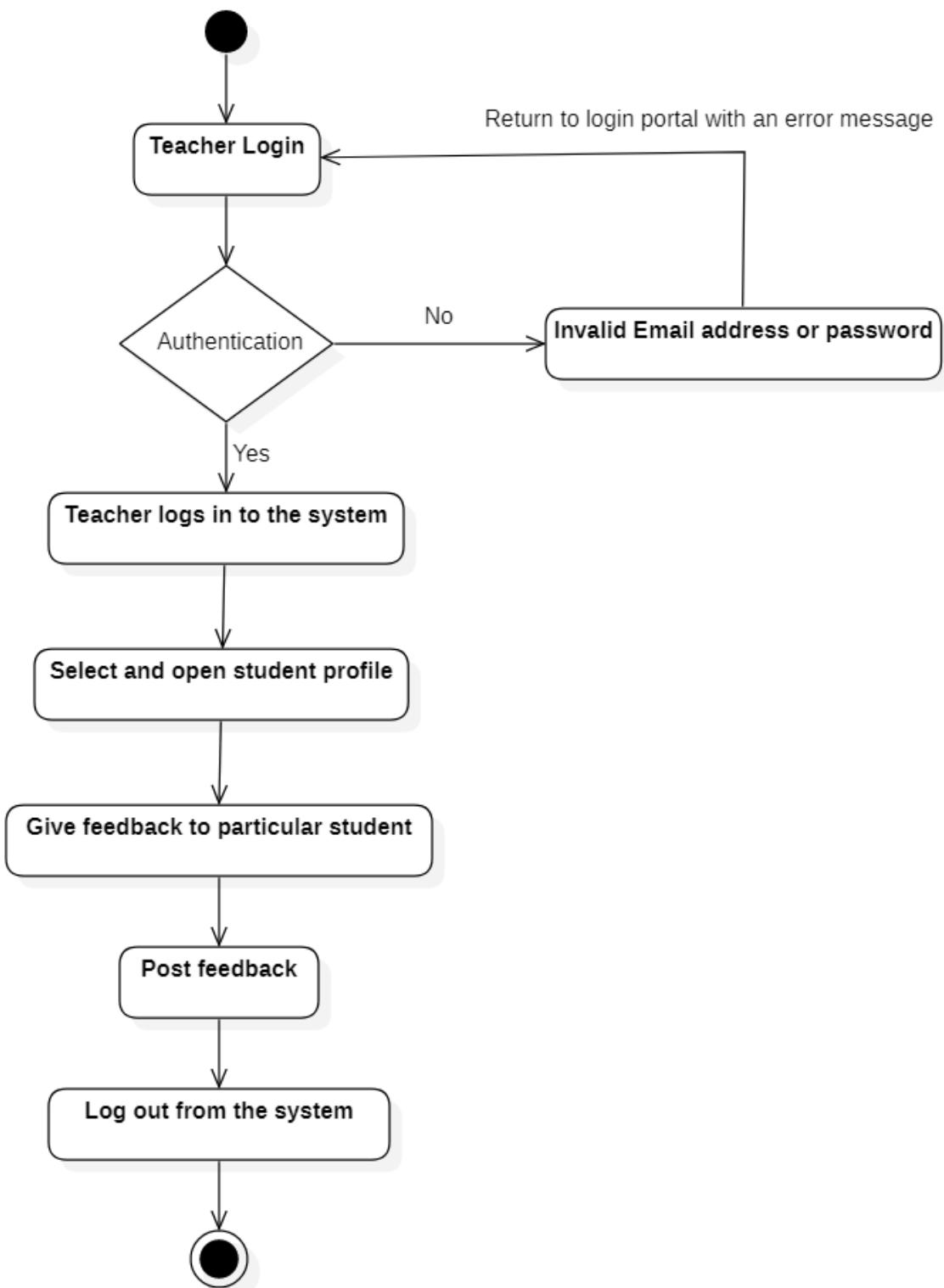


Figure 44: Activity Diagram of send feedbacks to students

- Apply for Leave (Teacher):

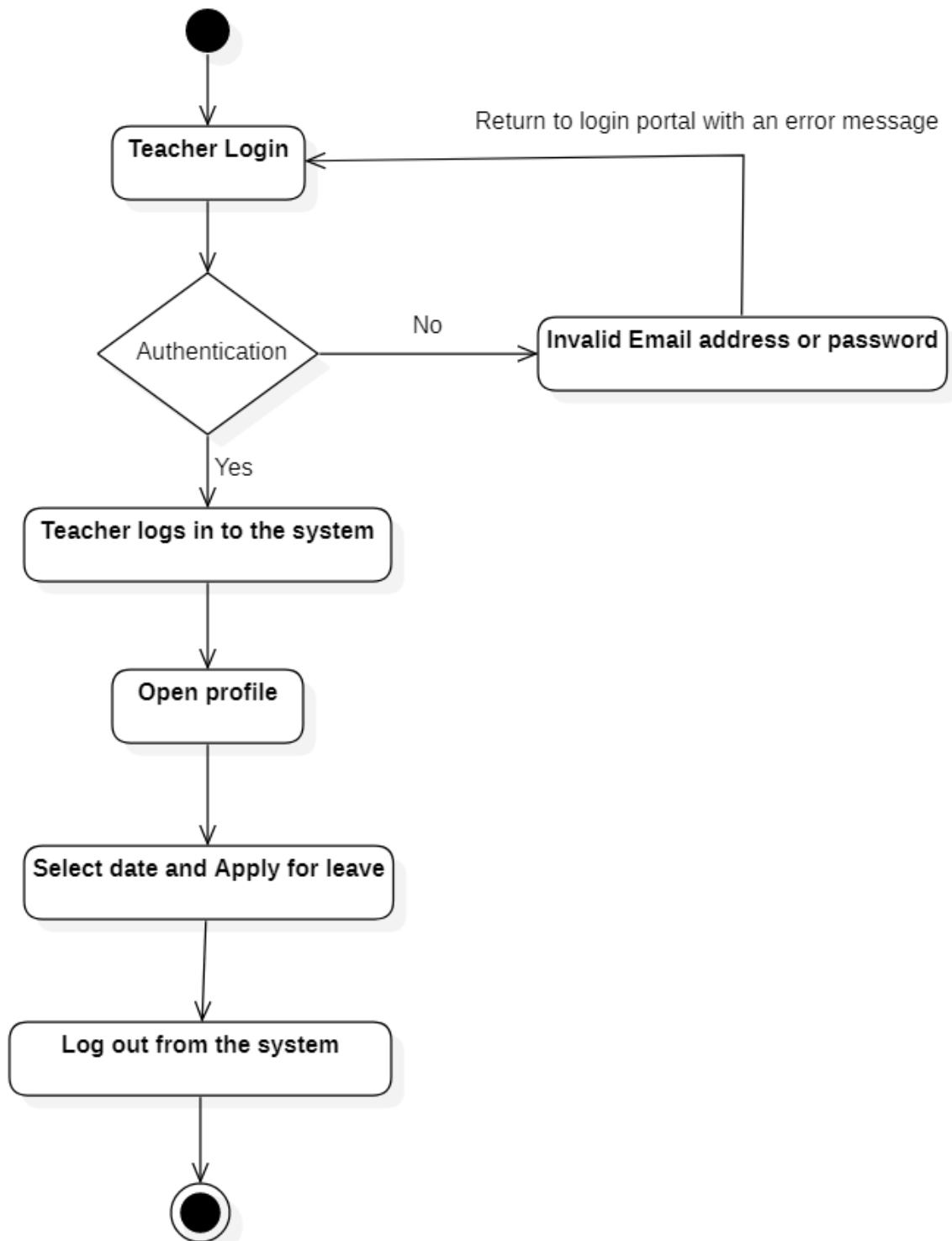


Figure 45: Activity Diagram of apply for leave (Teachers)

- Send Notice:

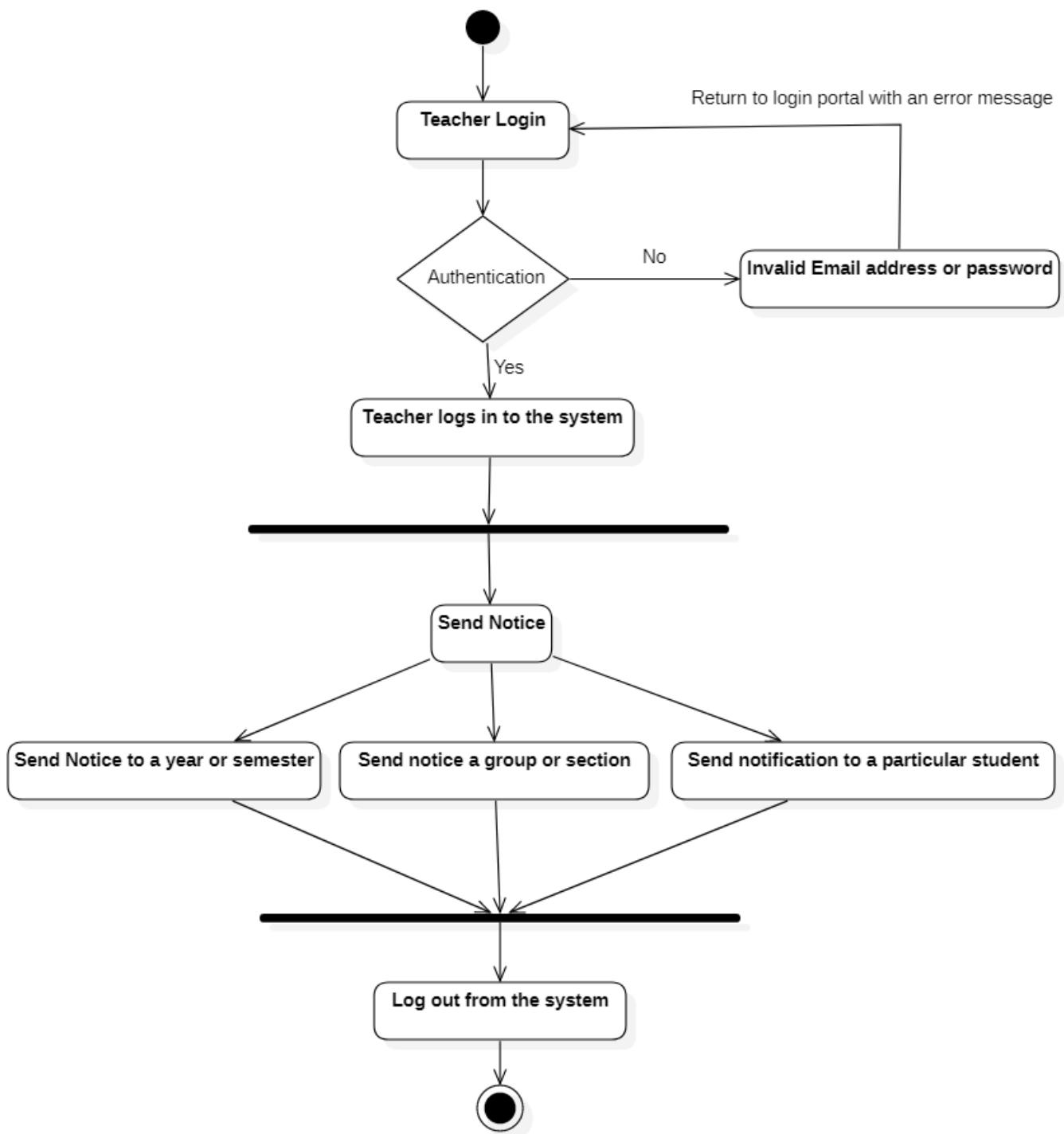


Figure 46: Activity diagram of send notice

- Apply for Leave (Student):

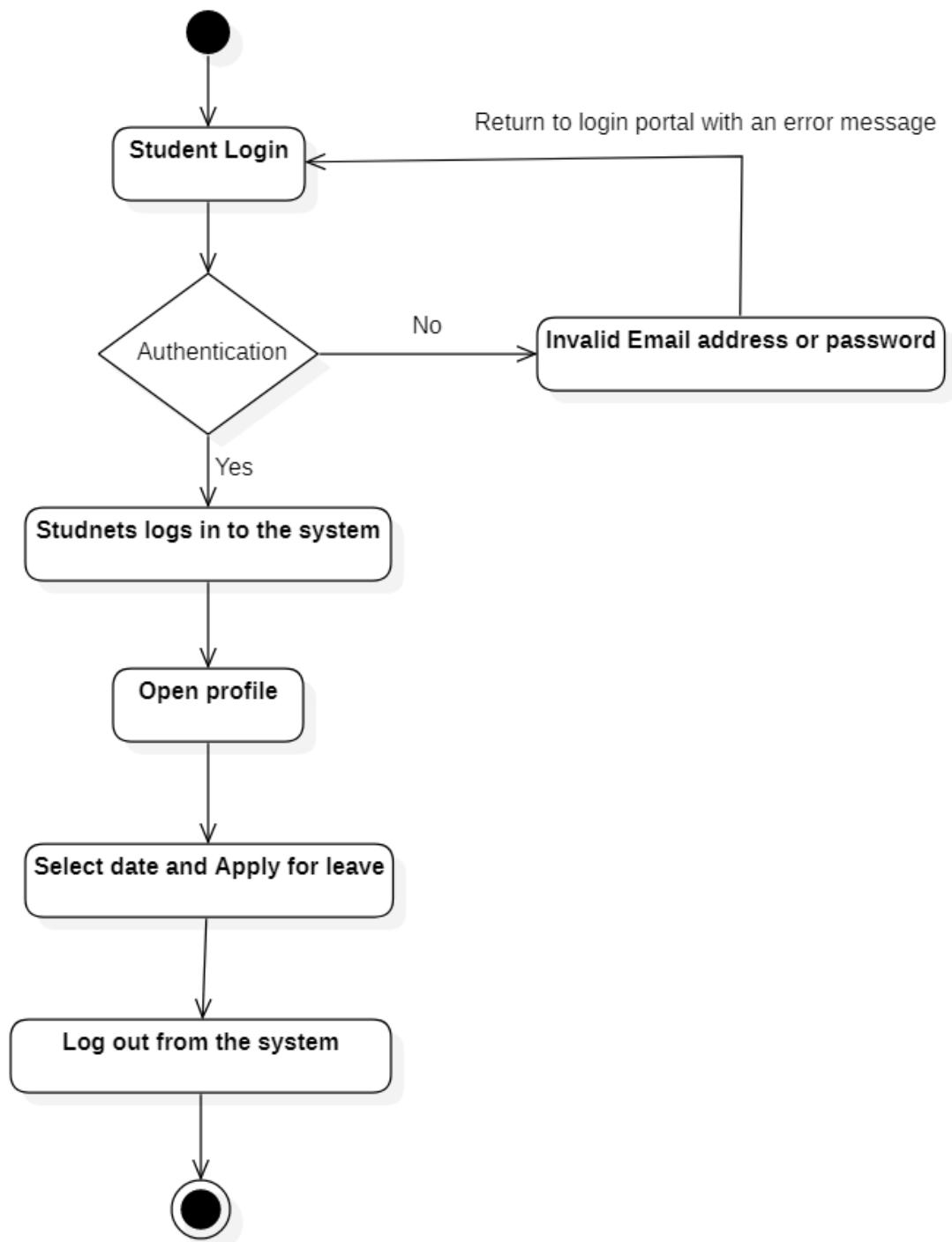


Figure 47: Activity Diagram of apply for leave (Students)

- View Profile (Student):

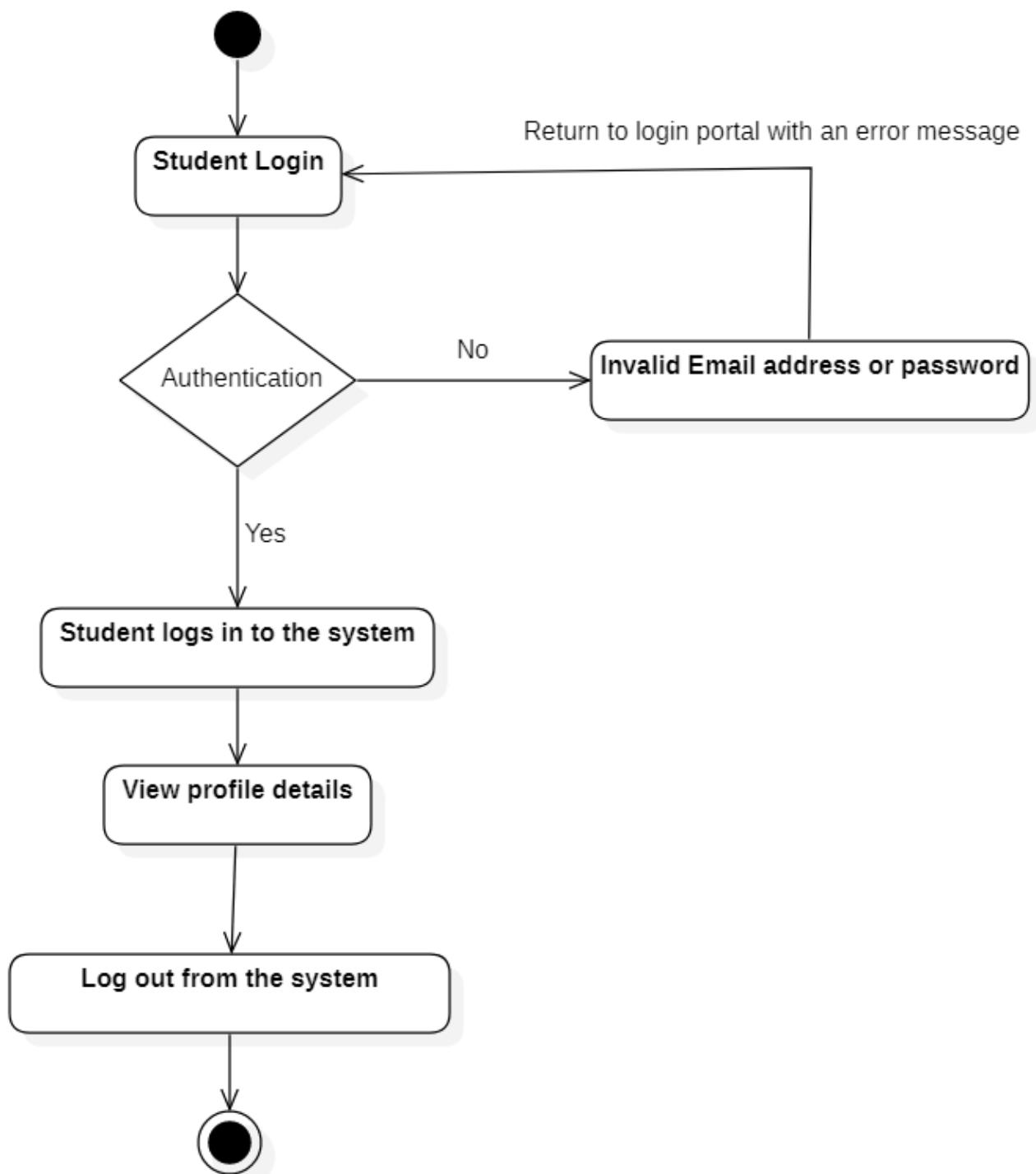


Figure 48: Activity Diagram of view profile details of students

- Update Profile Details (Students):

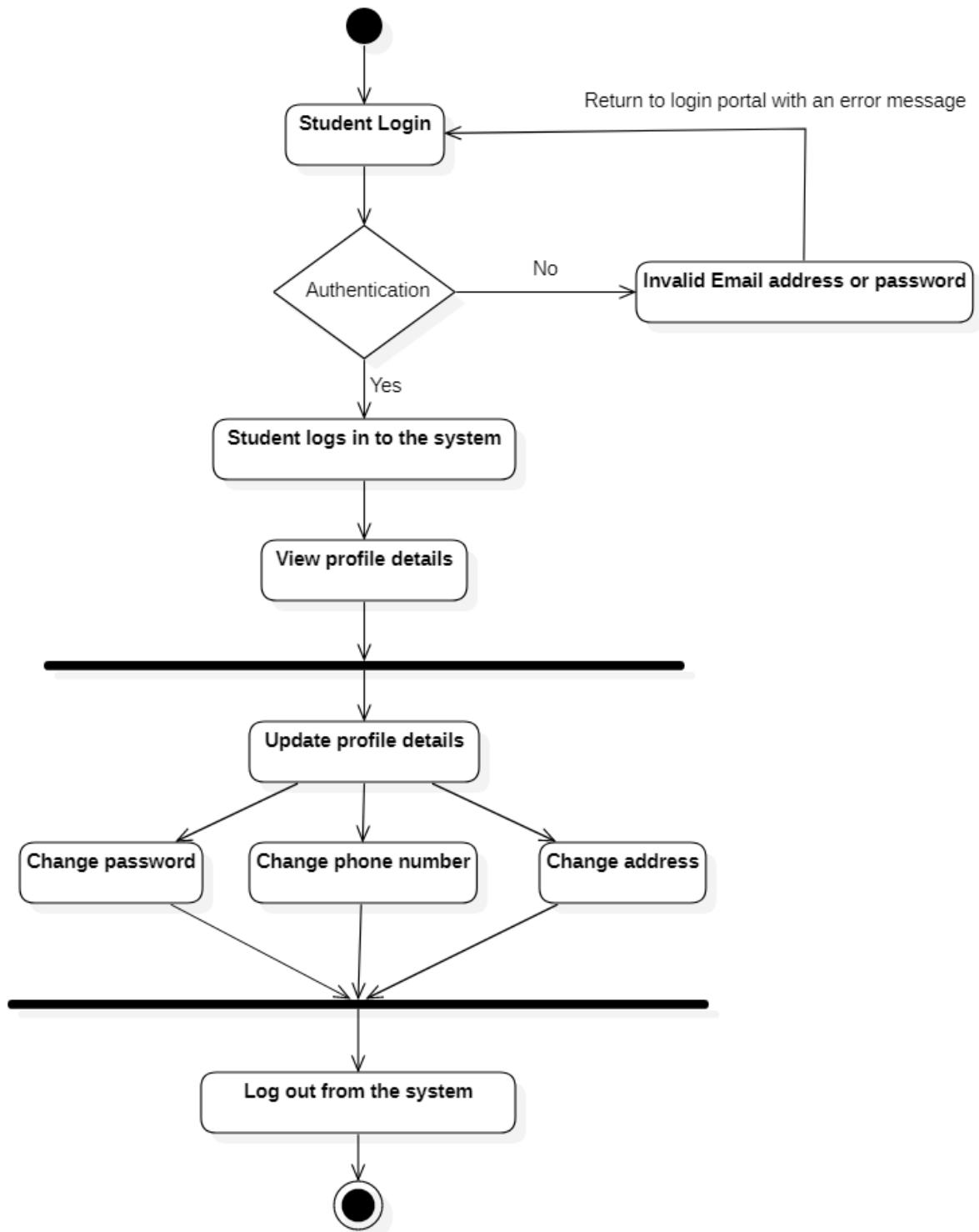


Figure 49: Activity Diagram of update profile details of students

- View Feedbacks:

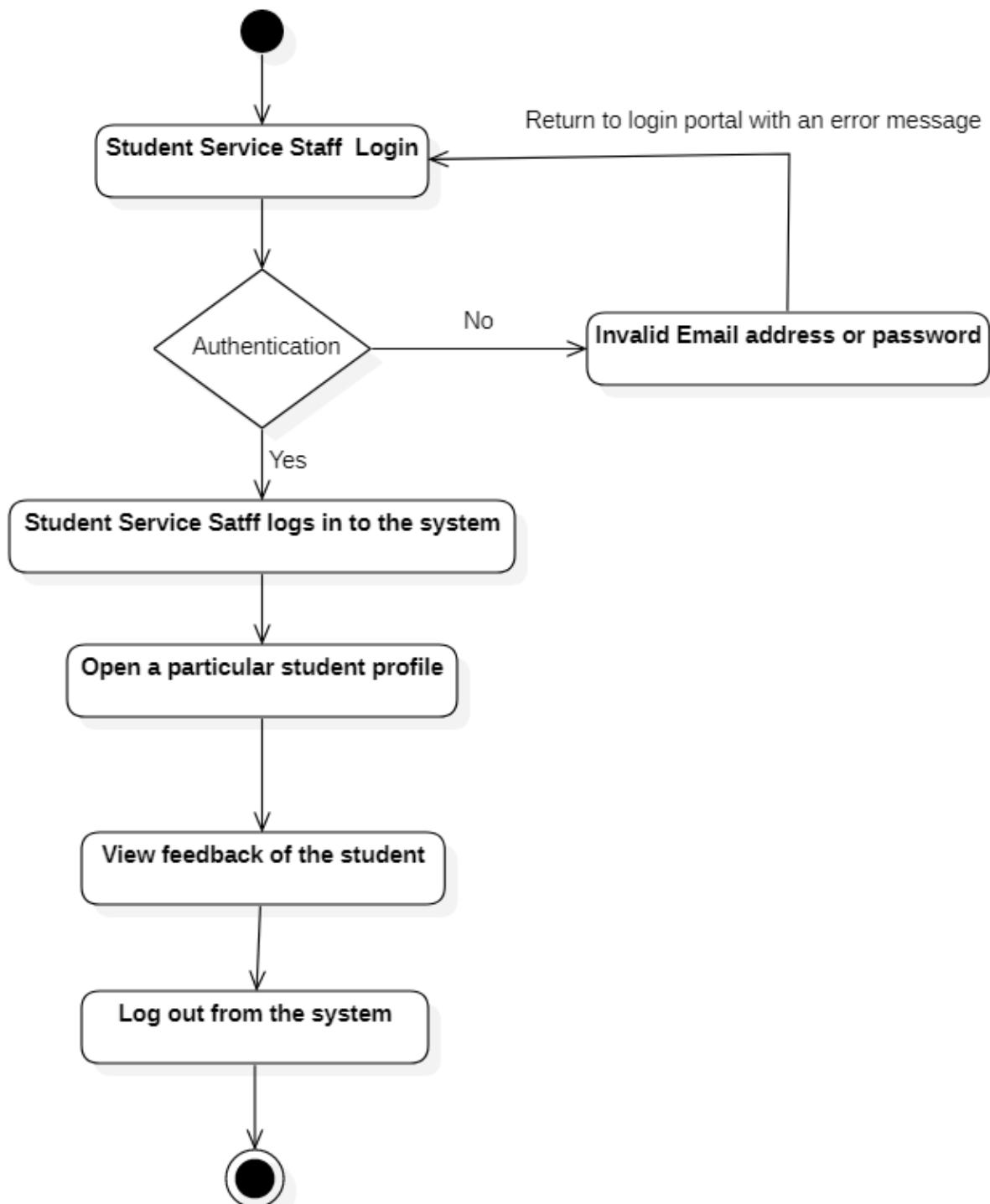


Figure 50: Activity Diagram of view feedbacks

- Print Feedbacks:

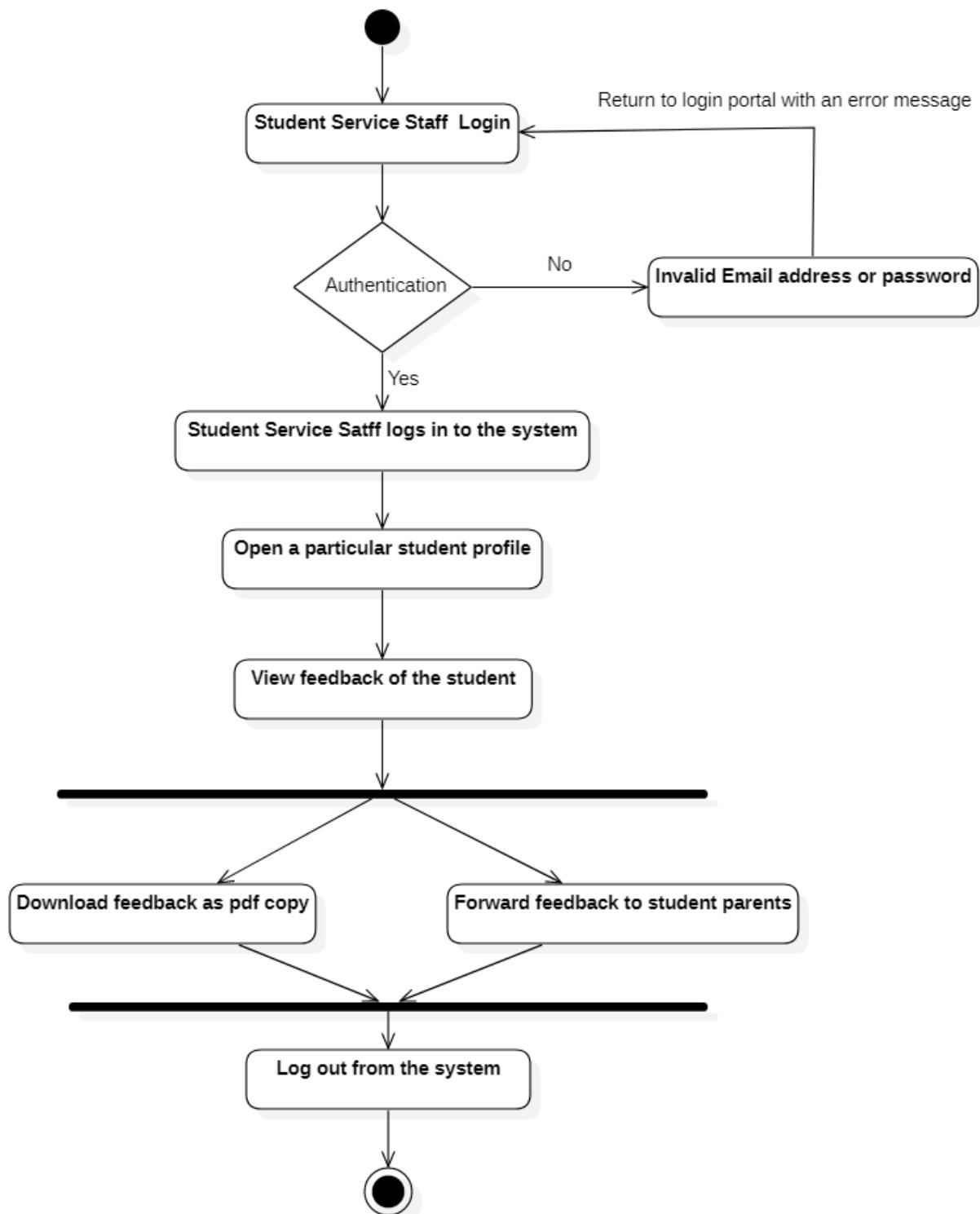


Figure 51: Activity Diagram of print feedbacks

II. Use Case Diagram

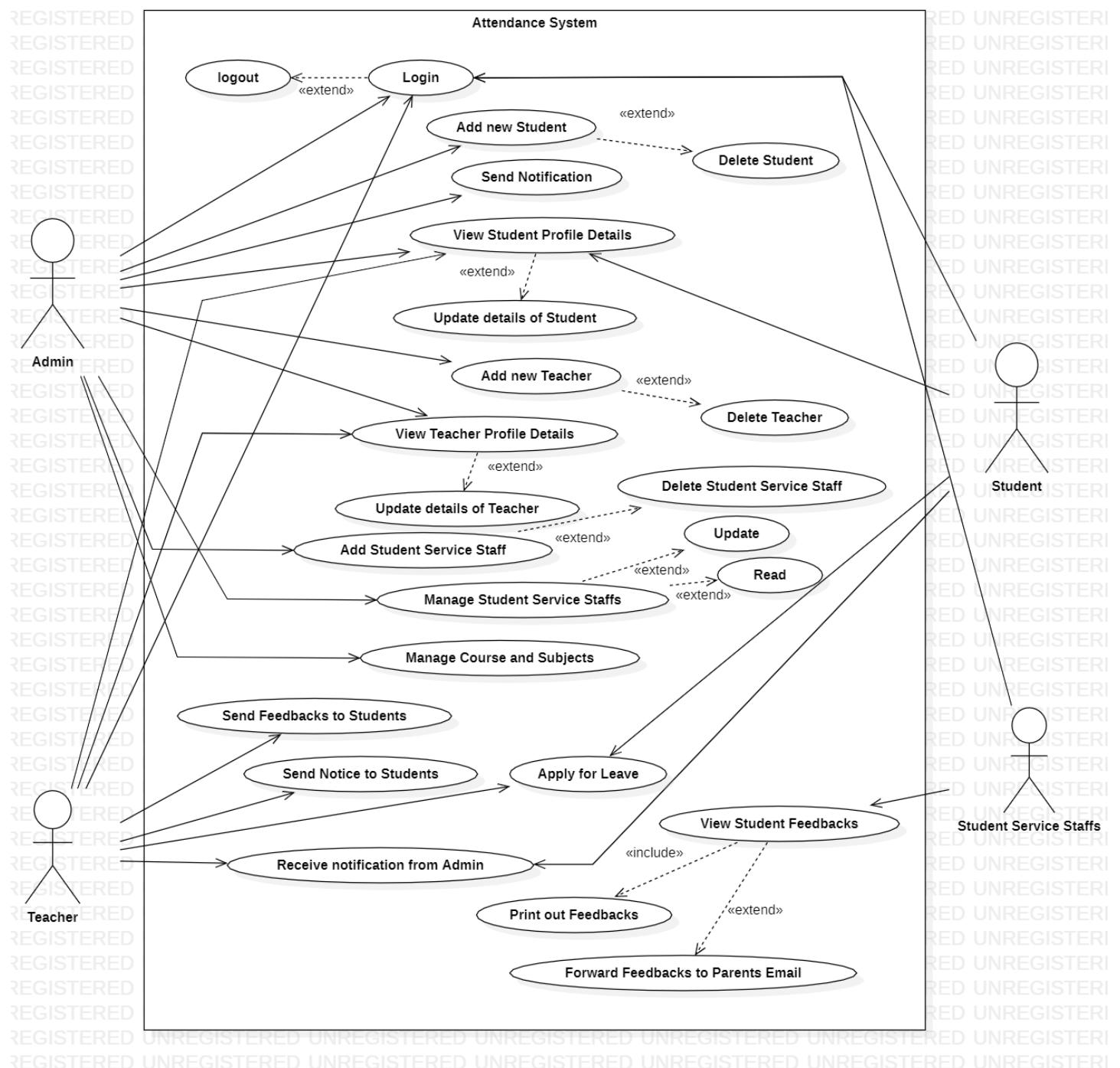


Figure 52: Use case diagram of User Management System (UMS)

III. ER Diagram

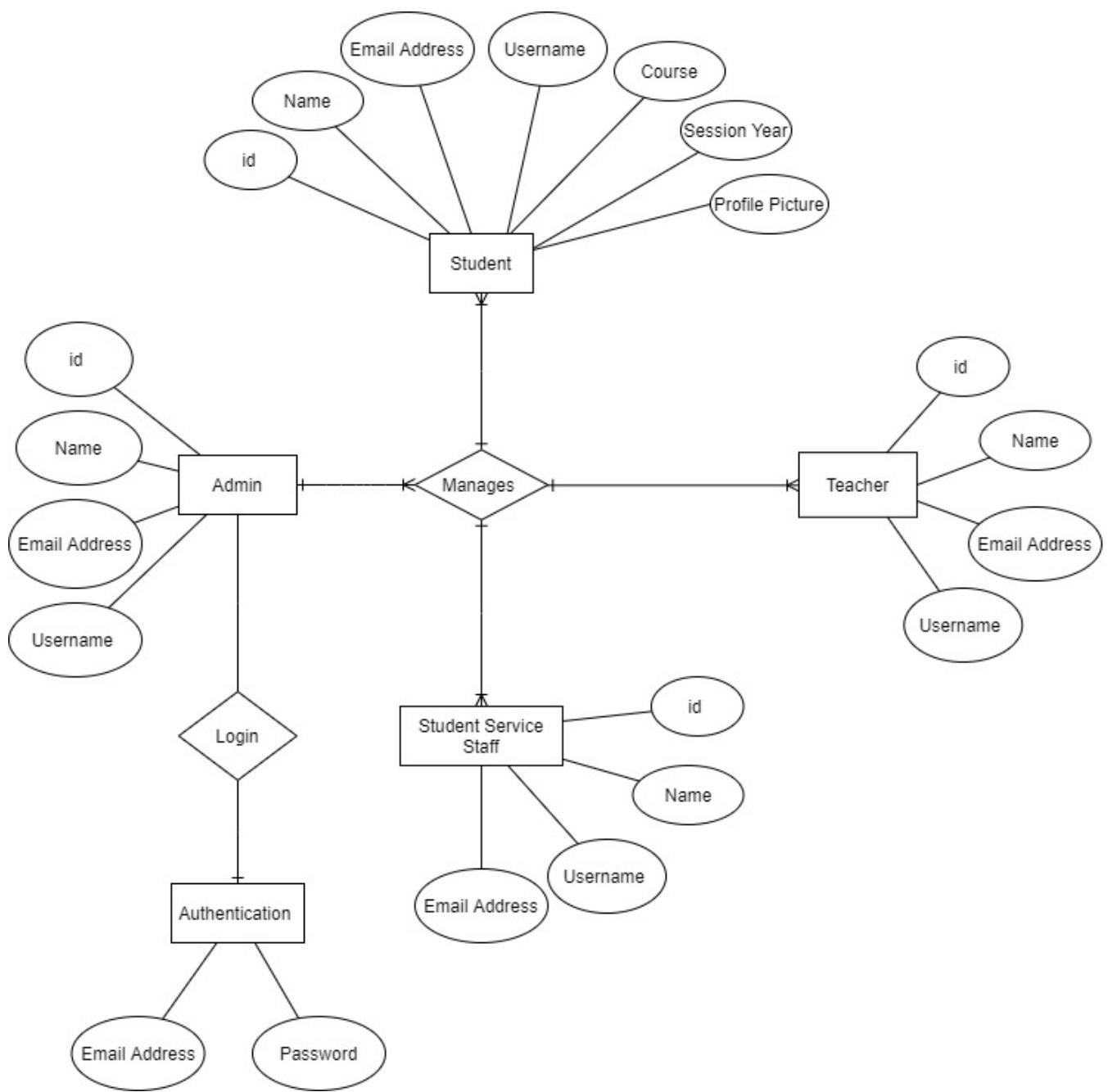


Figure 53: ER Diagram of User Management System

IV. Class Diagram

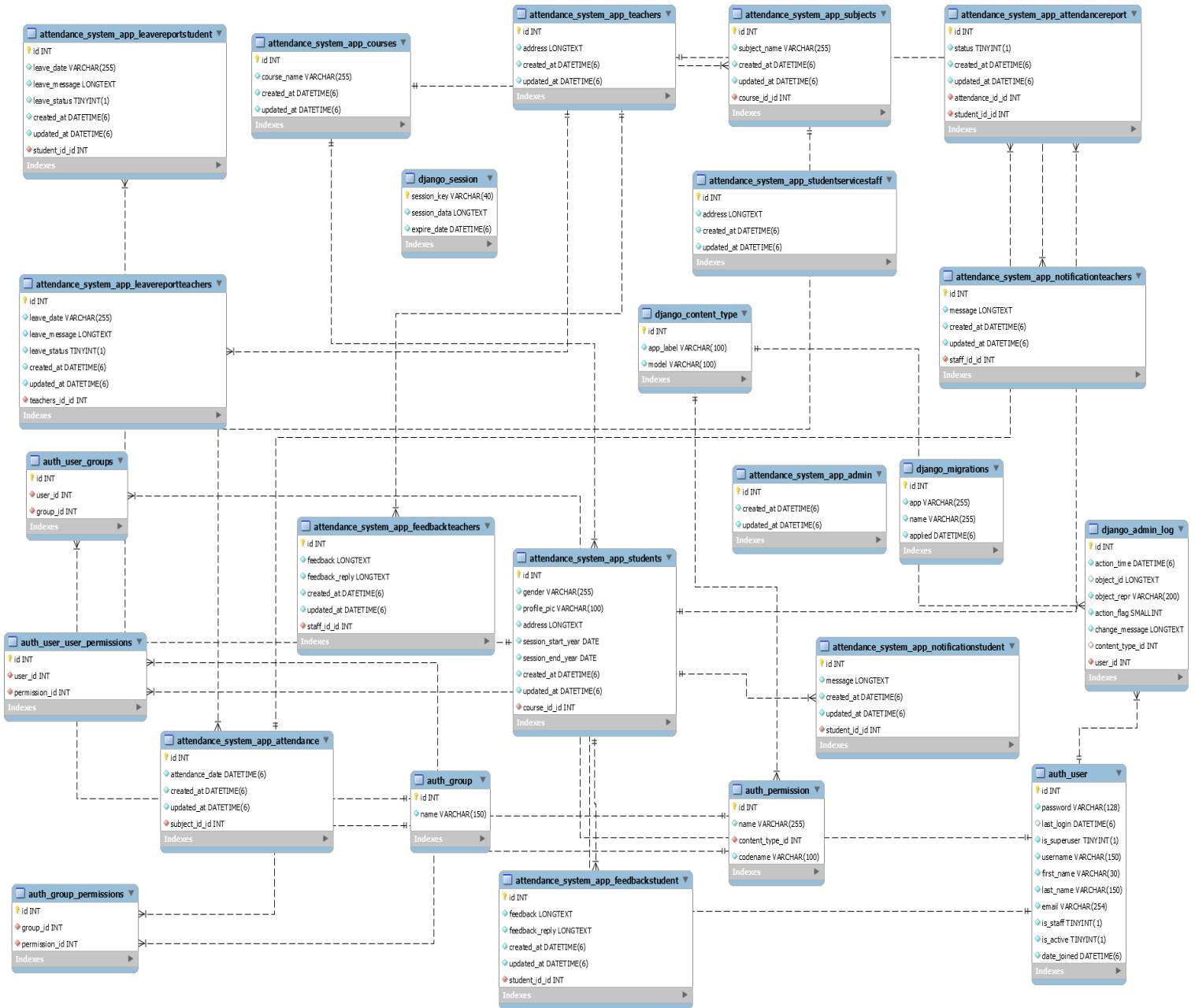


Figure 54: Class diagram of User Management System (UMS) and all subsystems

V. Sequence Diagram

- User login:

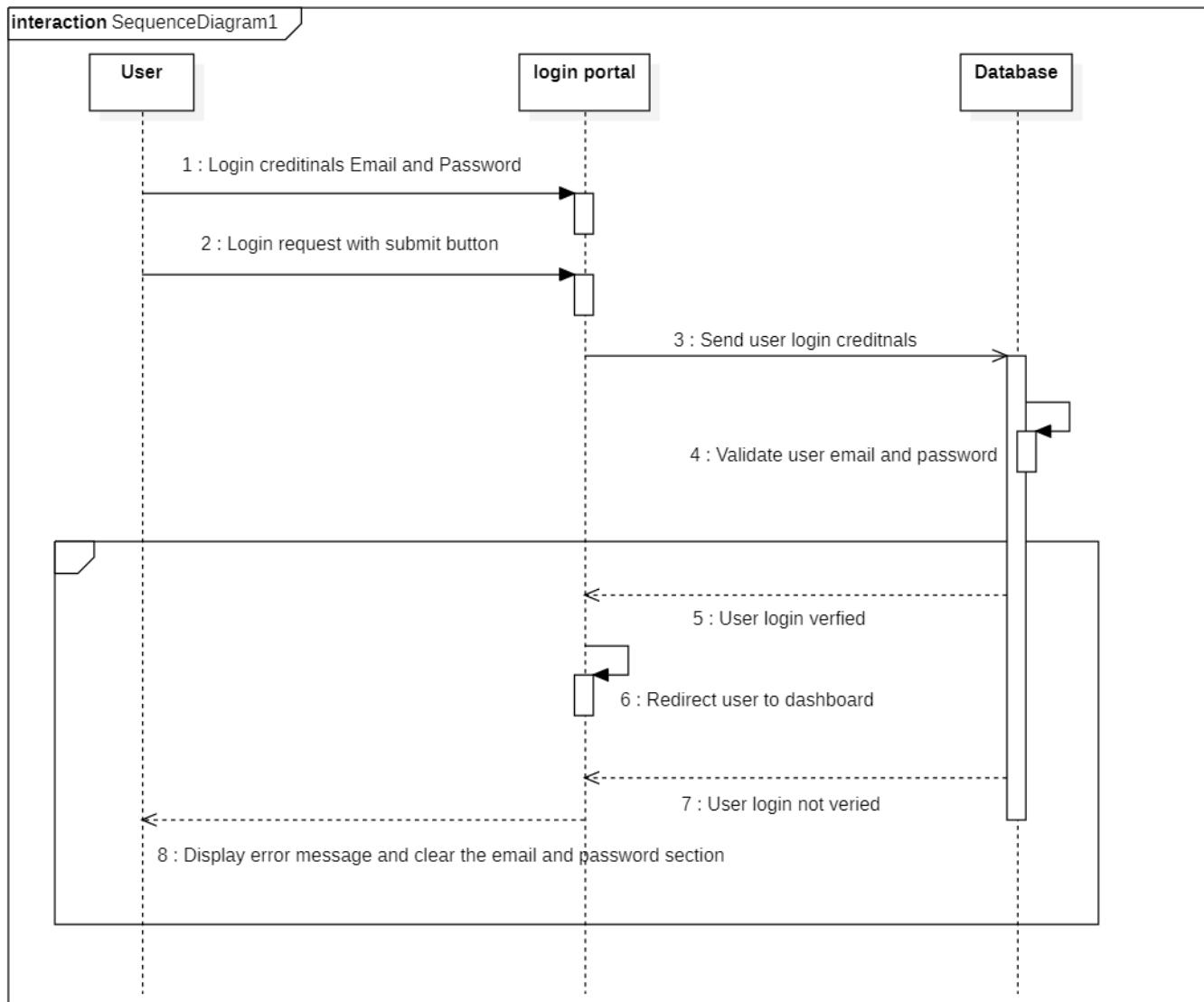


Figure 55: Sequence diagram of user's login

- Manage Students

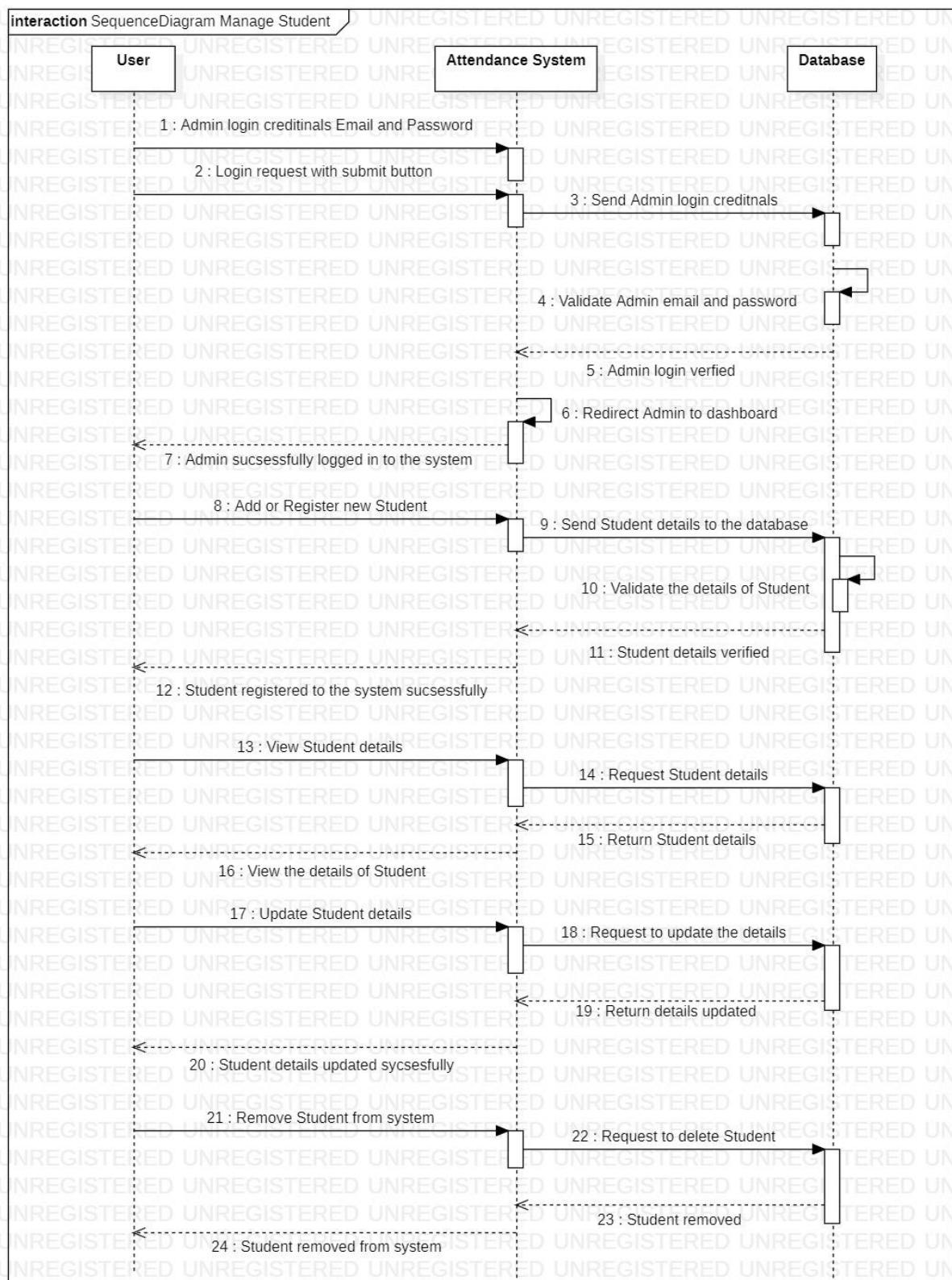


Figure 56: Sequence diagram of mange students

- Manage Teachers

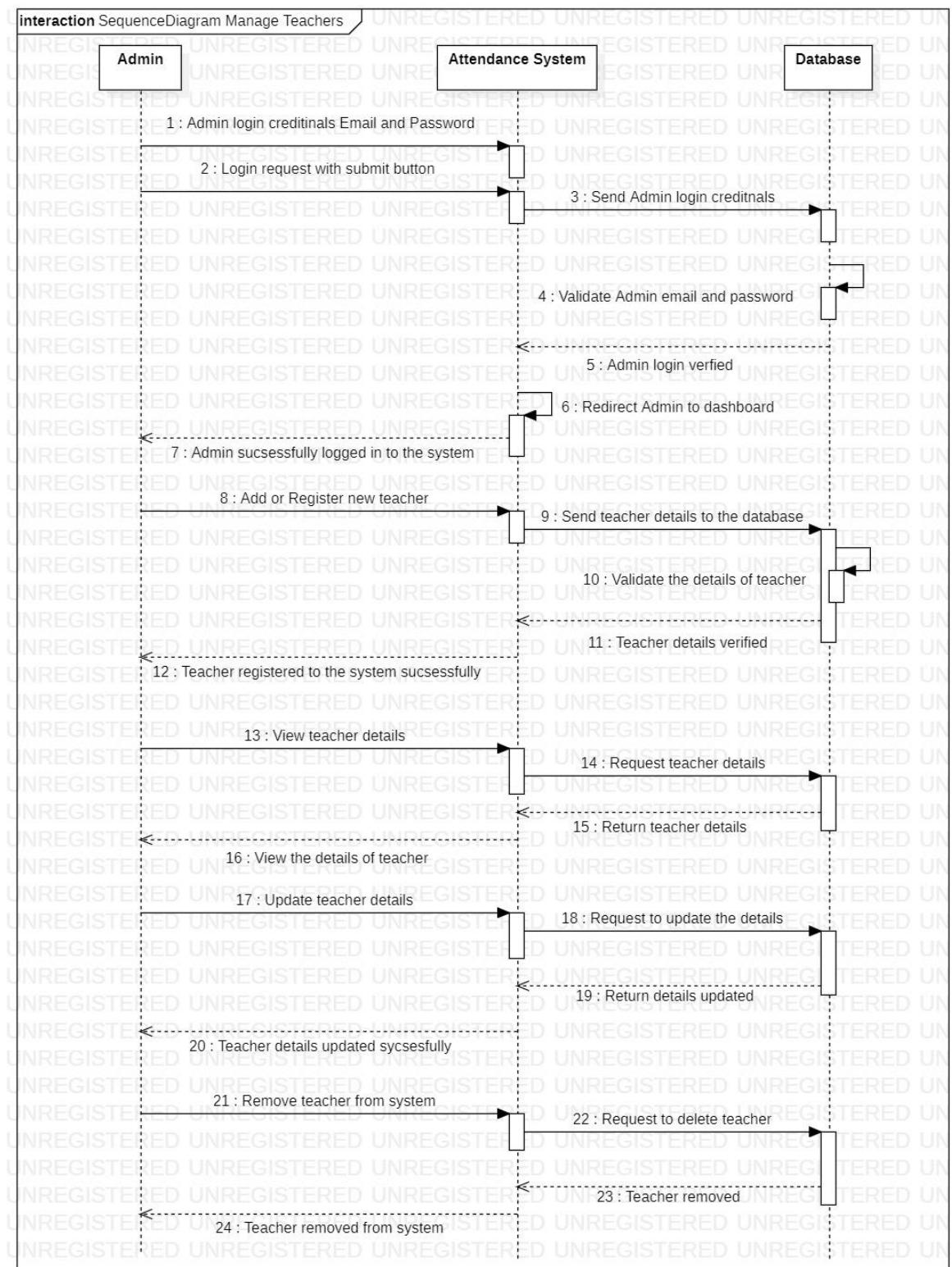


Figure 57: Sequence diagram of manage teachers.

- Manage Student Service Staff

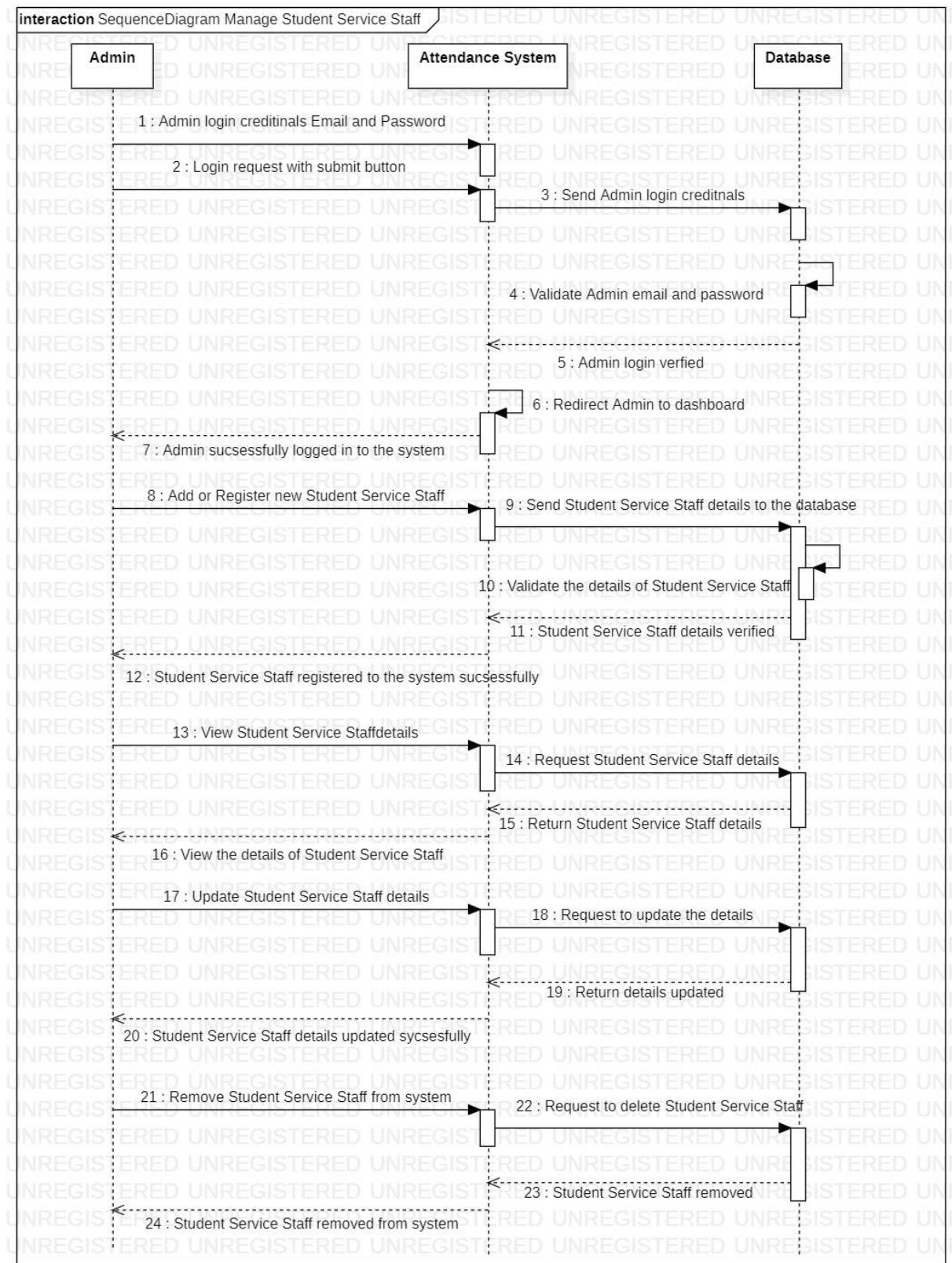


Figure 58: Sequence diagram of student service staffs

VI. Wireframe

- Login

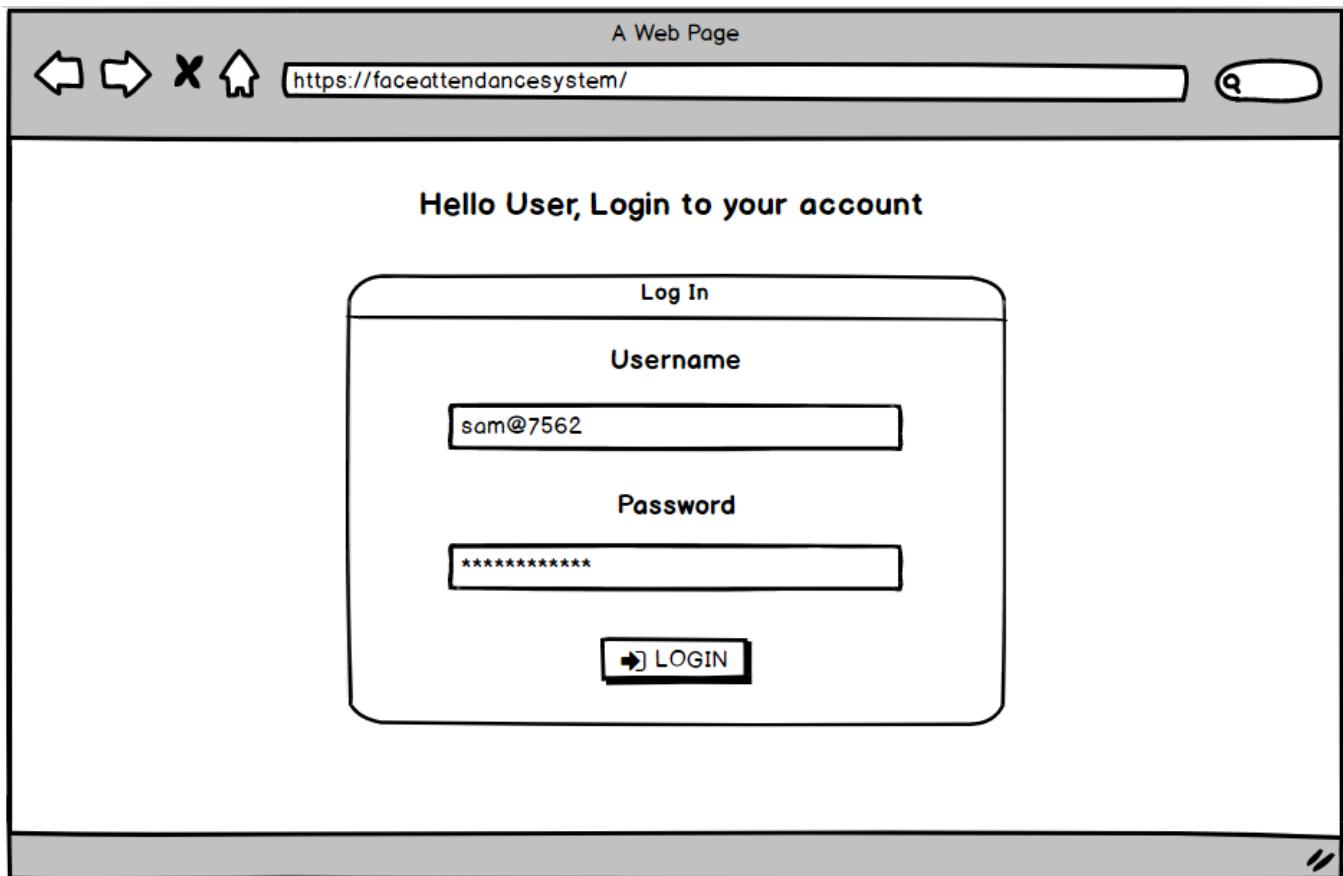


Figure 59: Wireframe of login portal

- Login email and password incorrect

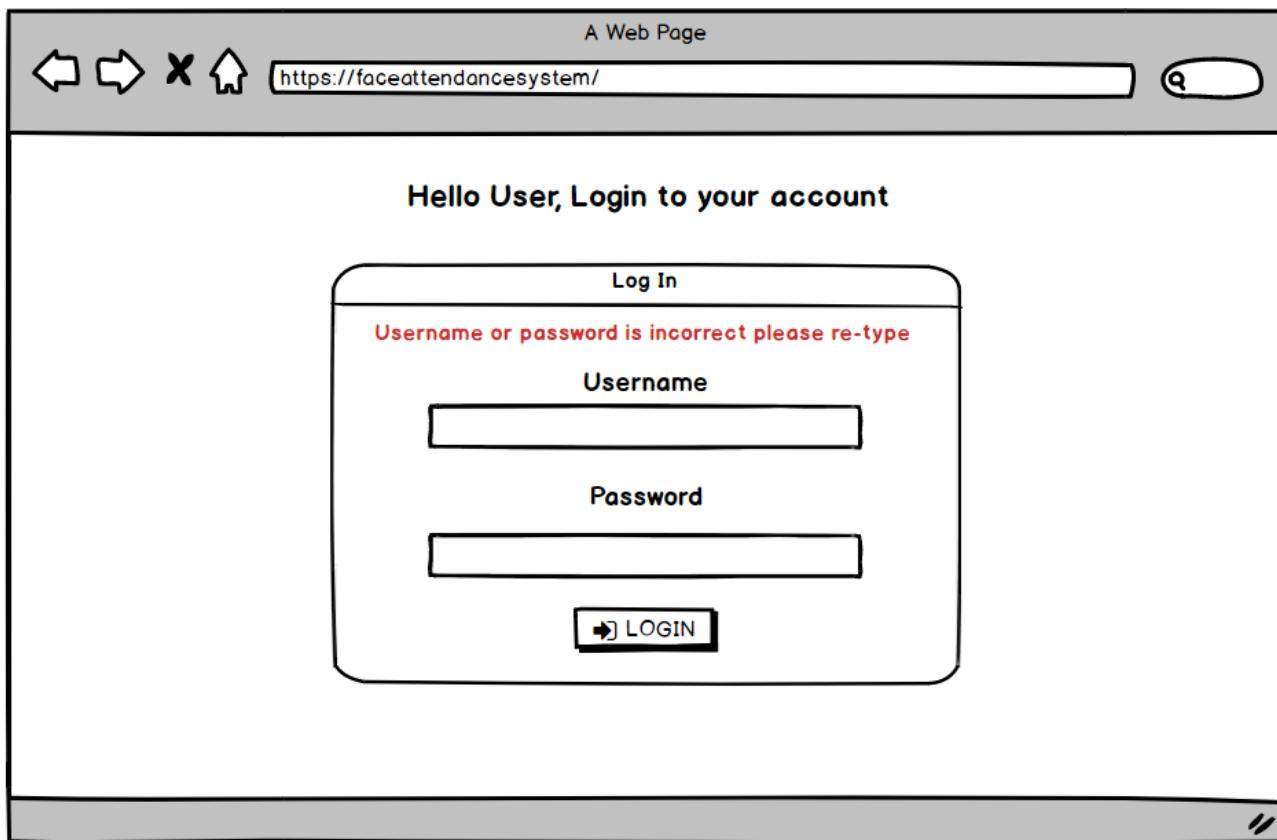


Figure 60: Wireframe of error message while login

- View and update profile details of user

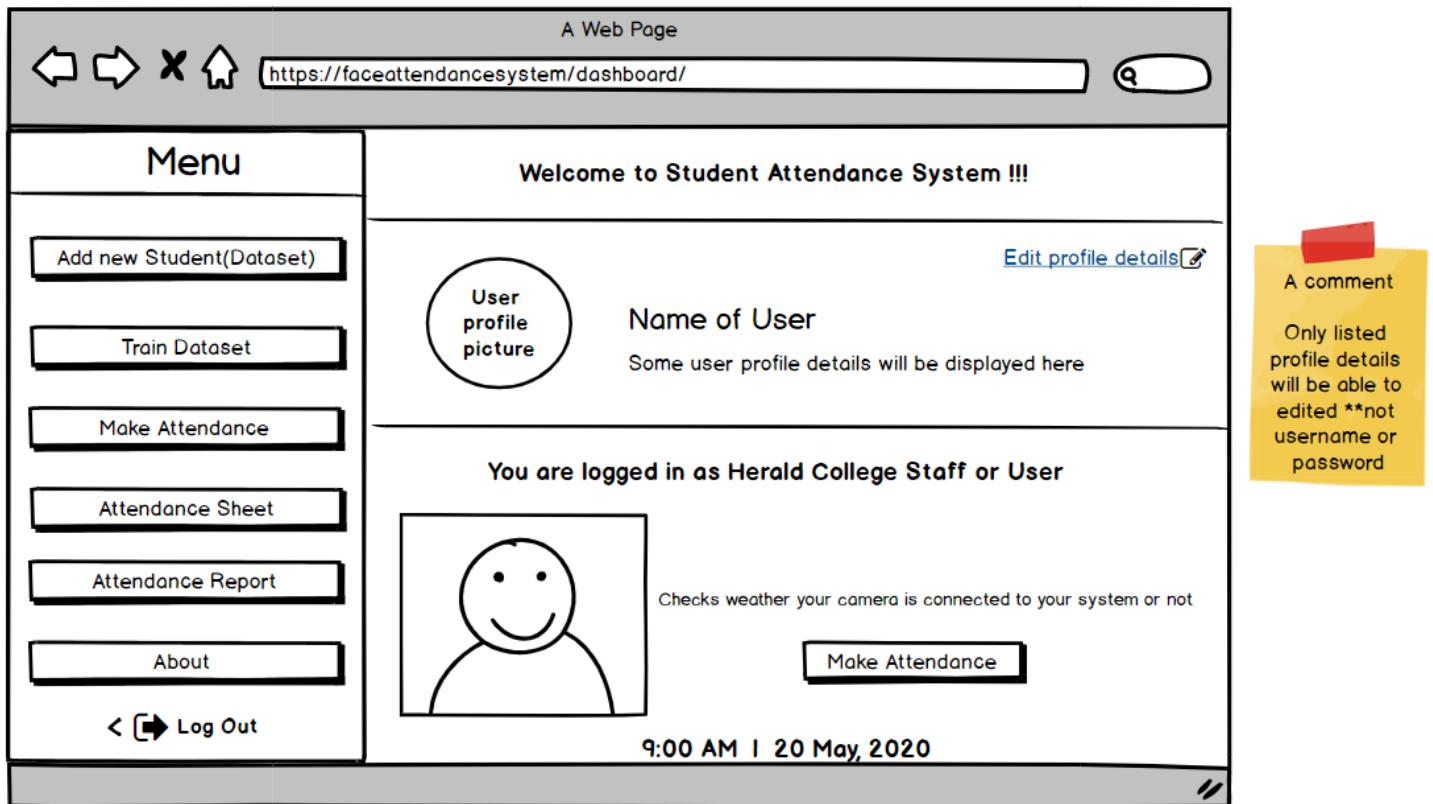


Figure 61: Wireframe of view and update profile details of user

5.4 Face Detection System

5.4.1 SRS

Requirement ID	Requirement Specification	Use Case	Moscow
Admin			
FDS – F – 1	As an admin, I want the system to store image of students faces through upload file function while registering them to the system.	Upload Image	Must have
FDS – F – 2	The captured image of student should be stored in the database or file system.	Store Image File System or Database	Must have
FDS – NF – 2.1	The system should store only the face area of students.		Should have
FDS – UR – 2.1	The image should be stored as a JPEG format file in the database or file system.		Must have
FDS – UR – 2.2	The system should be able to fetch the URL of the image stored inside the file system while displaying the image as profile picture on user profile.		Could have
FDS – UR – 2.3	The system should be able to detect the faces with the accuracy of 80%.		Could have
Teacher			
FDS – F – 3	As a Teacher, I want system to detect student faces through camera while taking their attendance.	Detect faces	Must have

5.4.2 Design/modelling diagrams

I. Activity Diagram

- Upload Image and Store Image File System or Database:

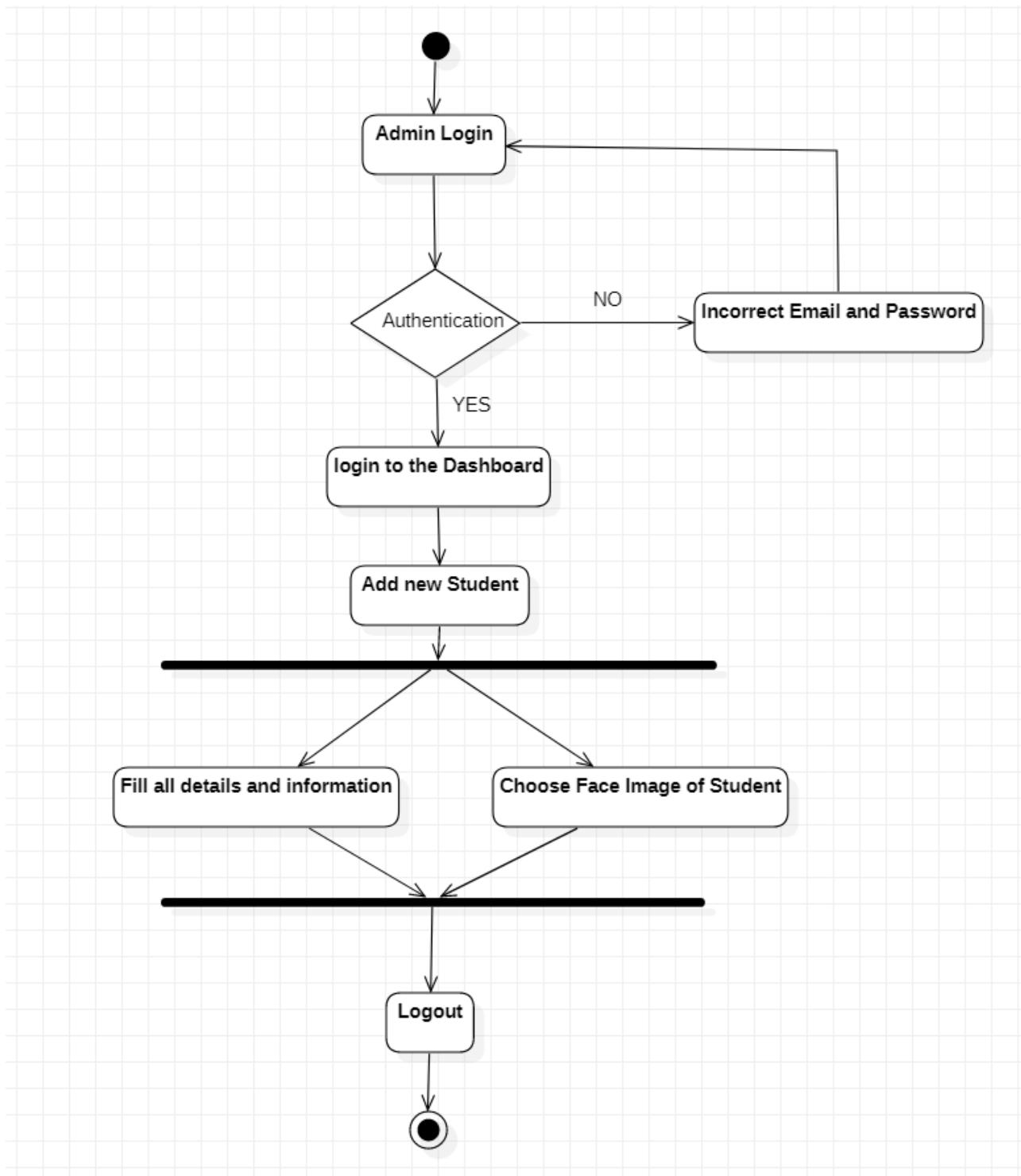


Figure 62: Activity Diagram of Upload Student Image while registering

- Detect faces:

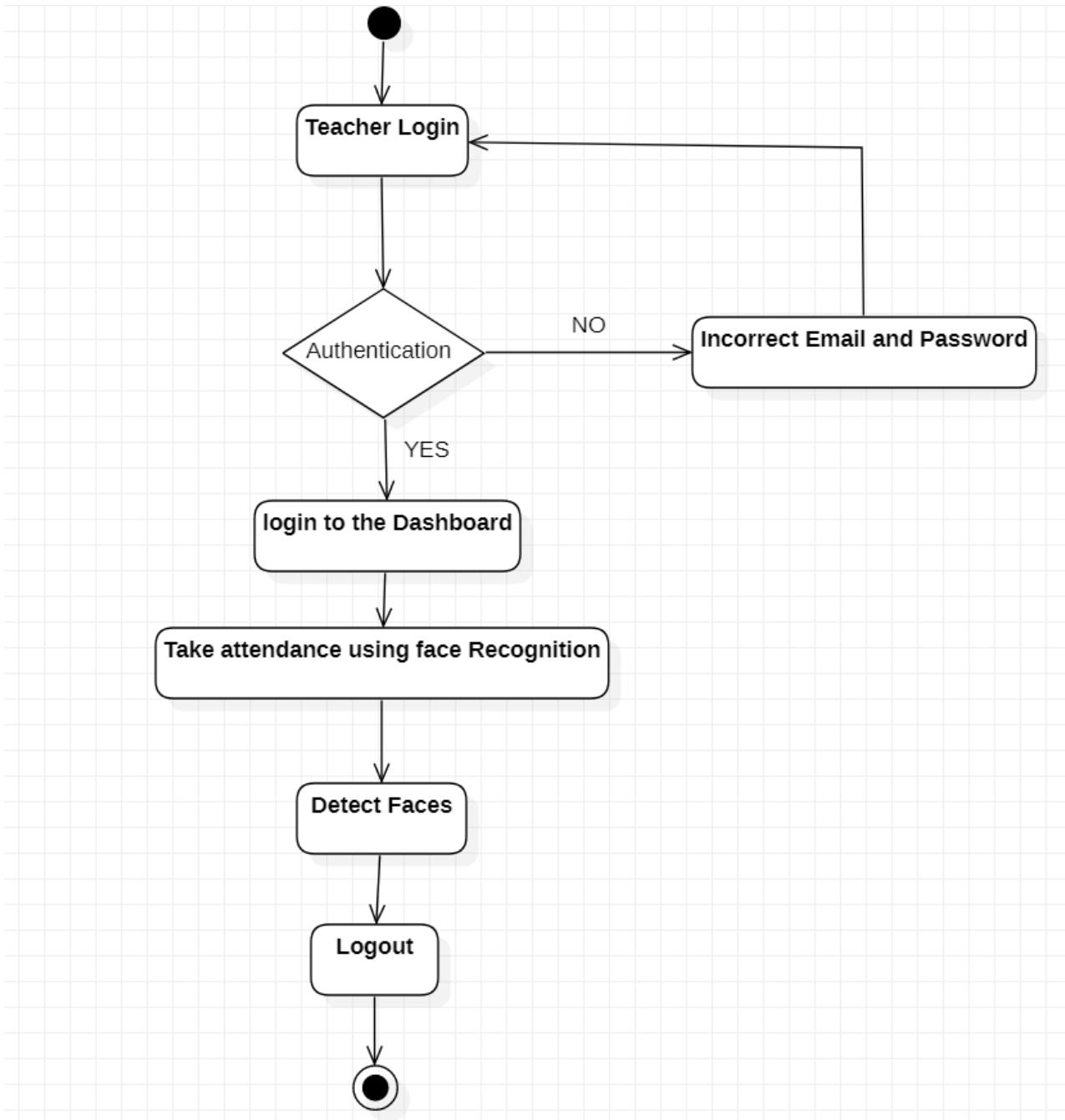


Figure 63: Activity Diagram of Detect student faces

II. Use Case Diagram

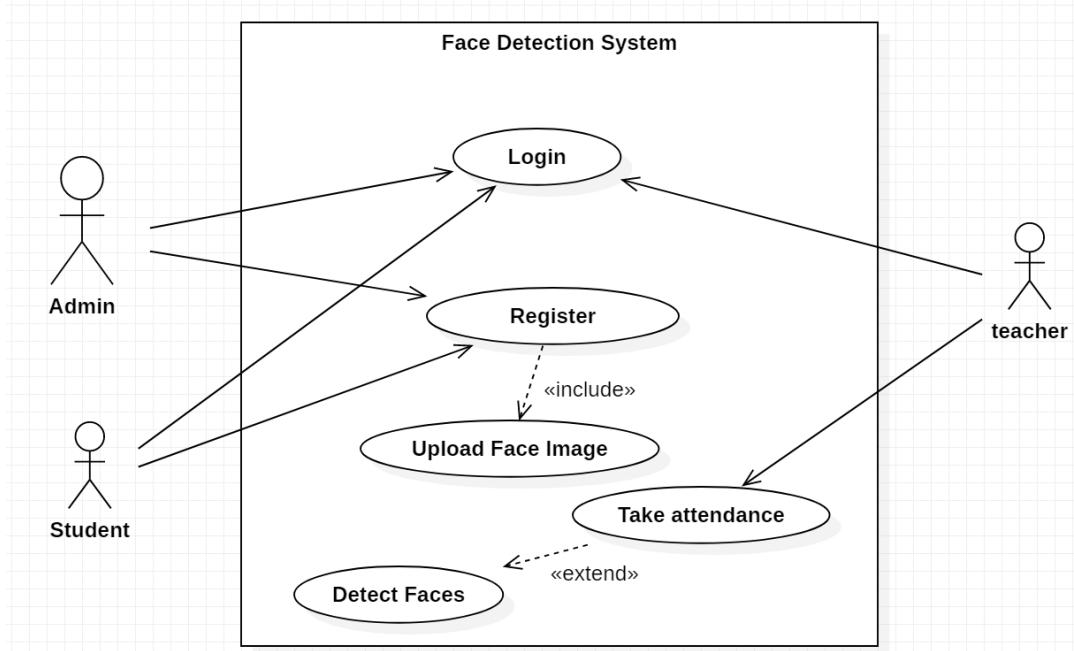


Figure 64: Use Case Diagram of face detection system

III. ER Diagram

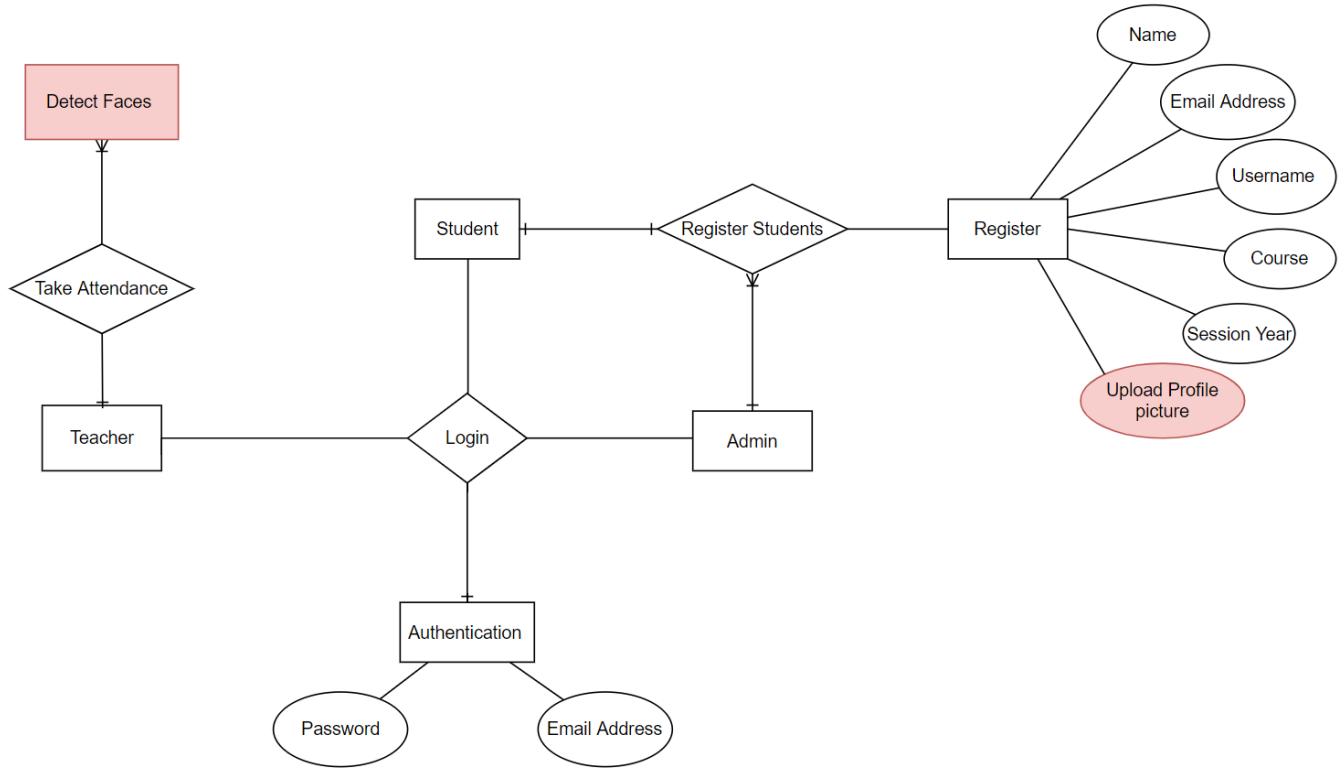


Figure 65: ER Diagram of face detection system

IV. Sequence Diagram

- Upload Image and Store Image File System or Database:

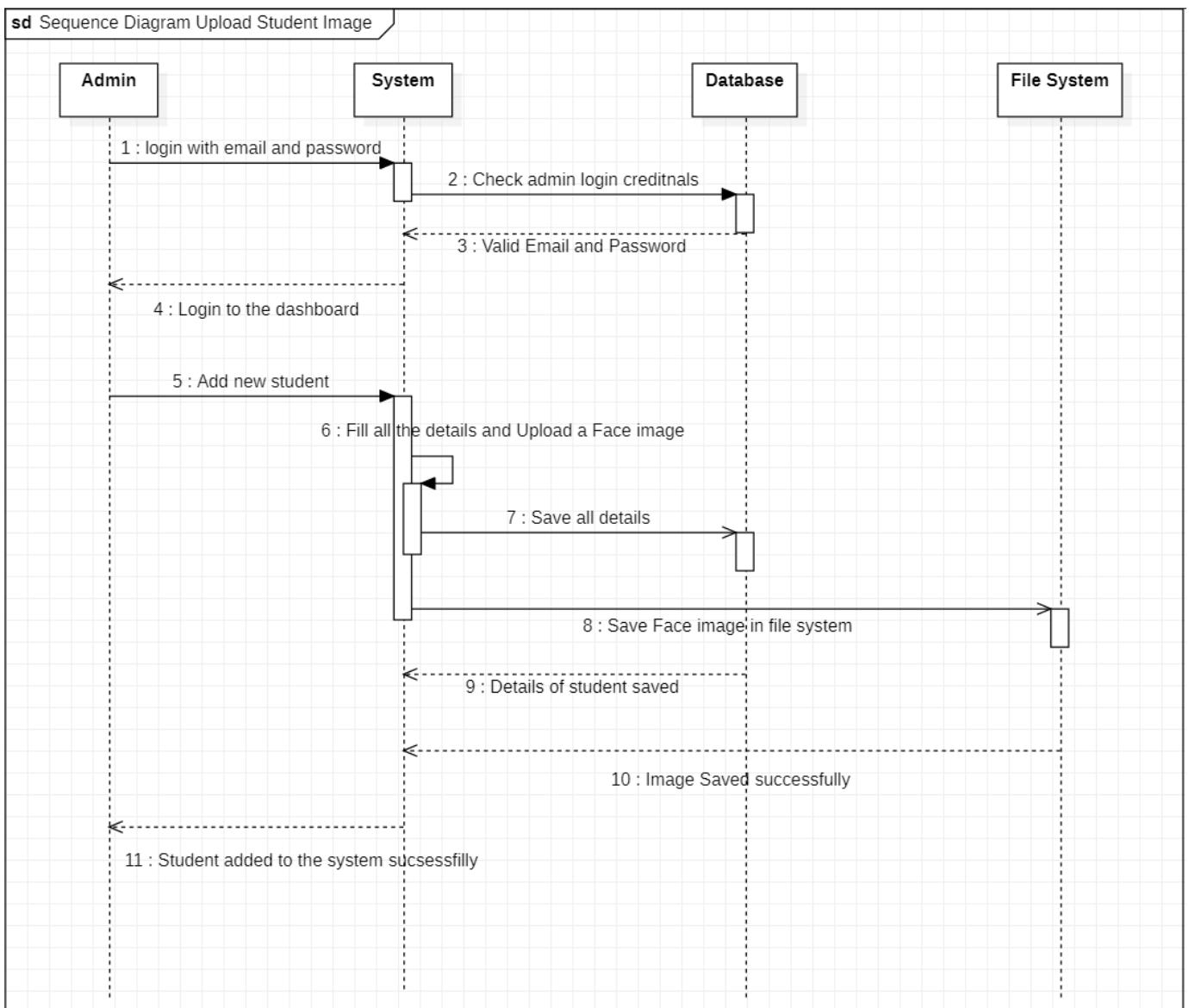


Figure 66: Sequence Diagram of Upload Student Image while registering

V. Wireframe

- Capturing and detecting student face data

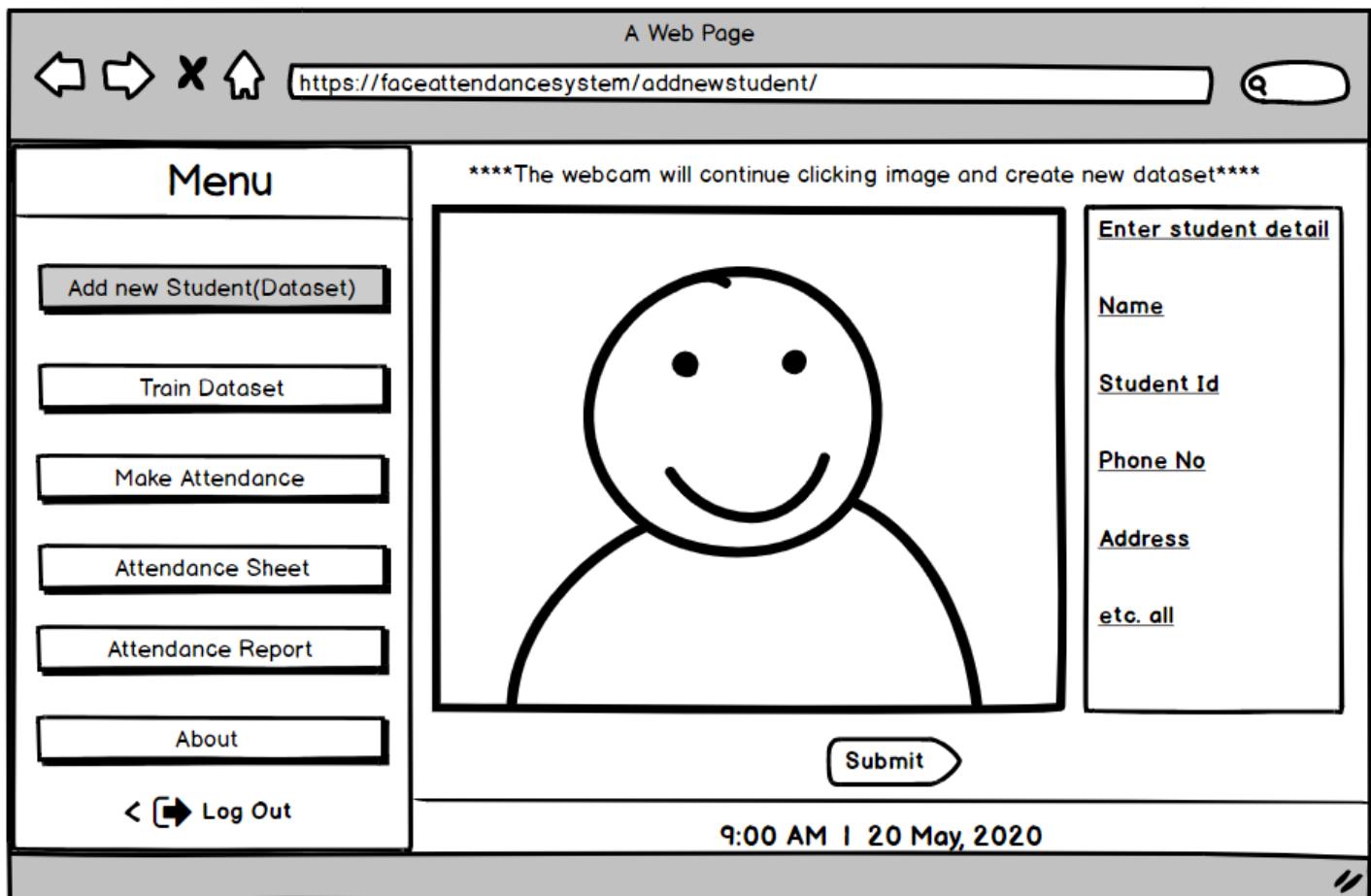


Figure 67: Wireframe of Capturing and detecting student face data

5.5 Face Recognition System

5.5.1 SRS

Requirement ID	Requirement Specification	Use Case	Moscow
Teacher			
FRS – F – 1	As a Teacher, I want the system to recognize student faces during attendance and match them with the previous images stored in database or file system.	Recognize Student	Must have
FRS – UR – 1.1	The system should be able to recognize student faces with the accuracy of 80%.		Could have

5.5.2 Design/modelling diagrams

I. Activity Diagram

- Recognize Student:

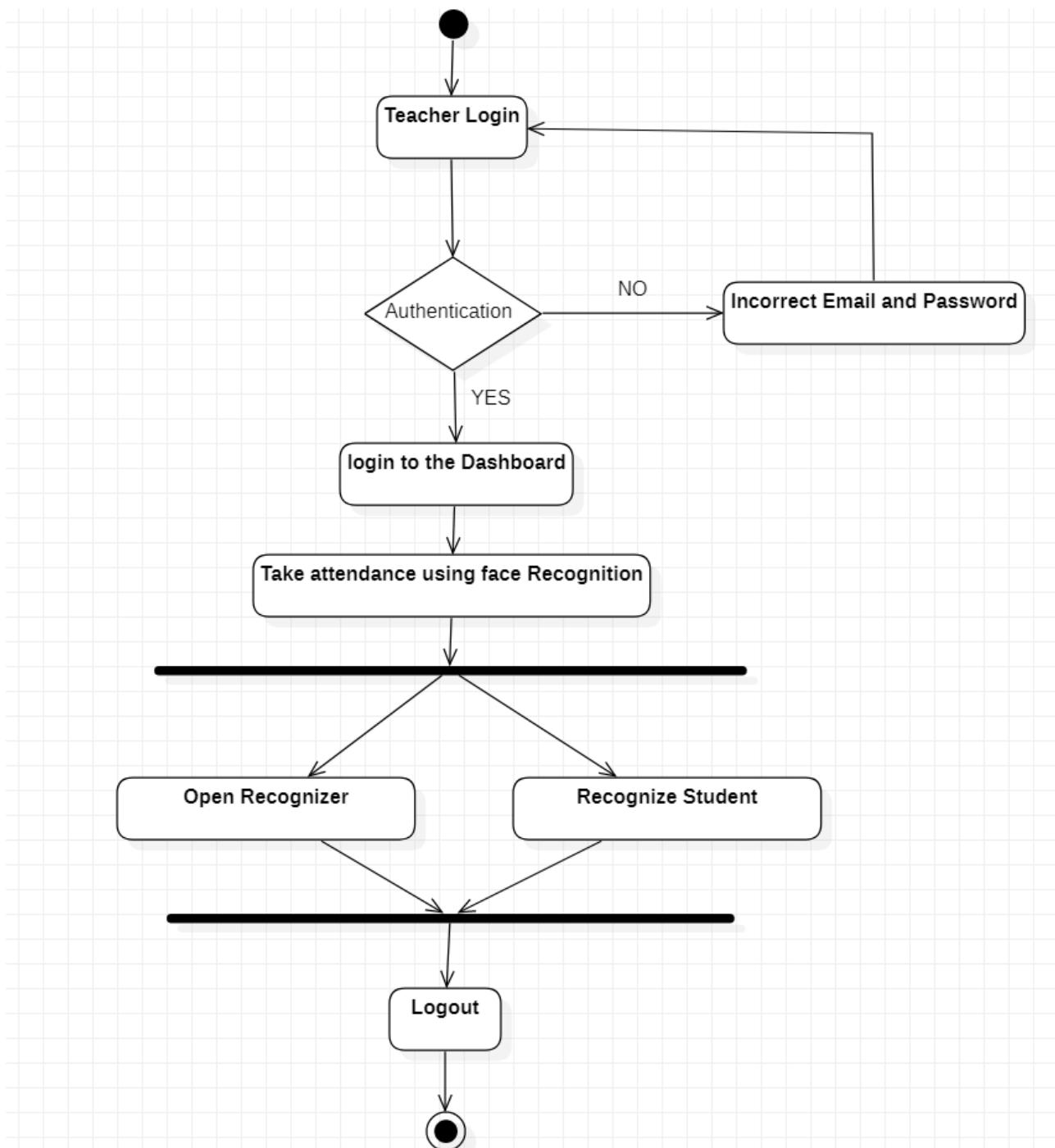


Figure 68: Activity Diagram of Recognizing students

II. Use Case Diagram

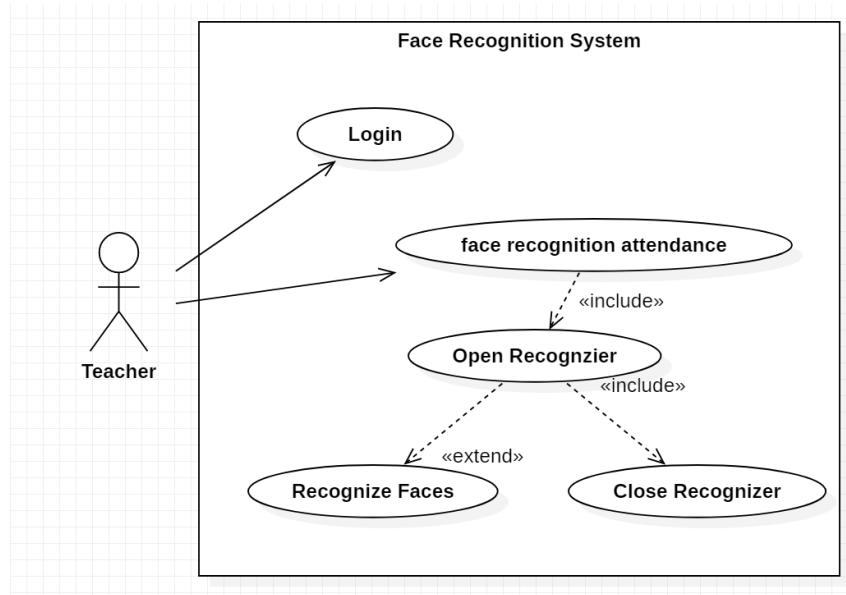


Figure 69: Use case diagram of face recognition system

III. ER Diagram

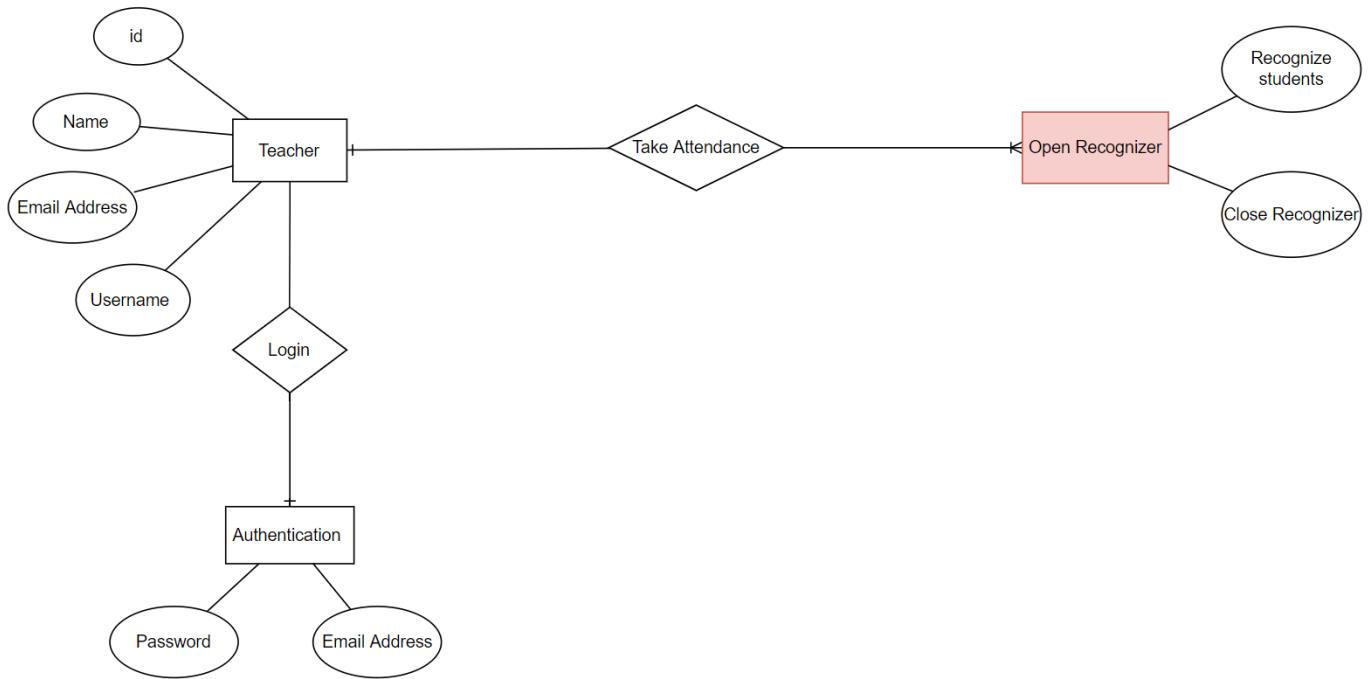


Figure 70: ER Diagram of face recognition system

IV. Sequence Diagram

- Recognize Student:

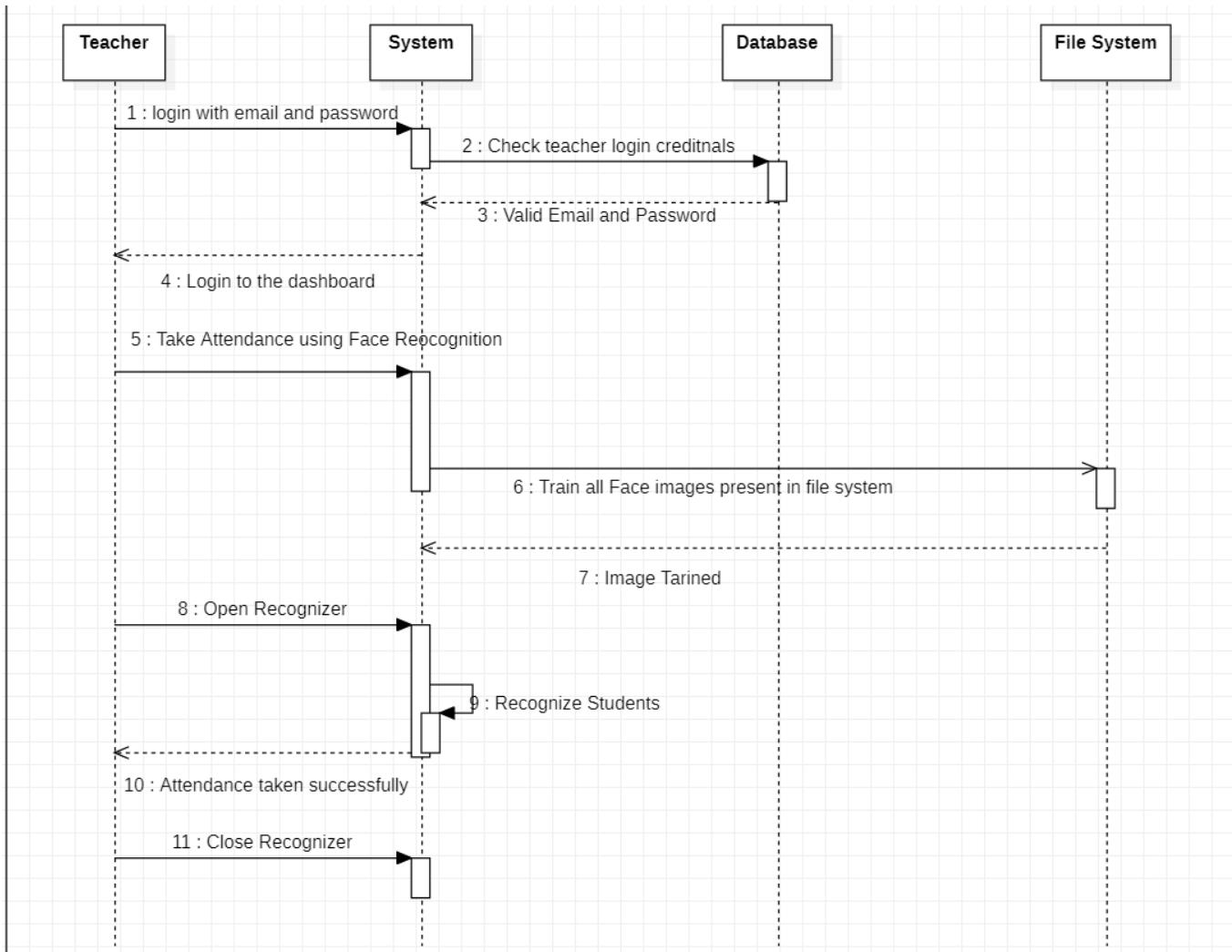


Figure 71: Sequence Diagram of Recognizing students

V. Wireframe

- Automatic attendance with face recognition

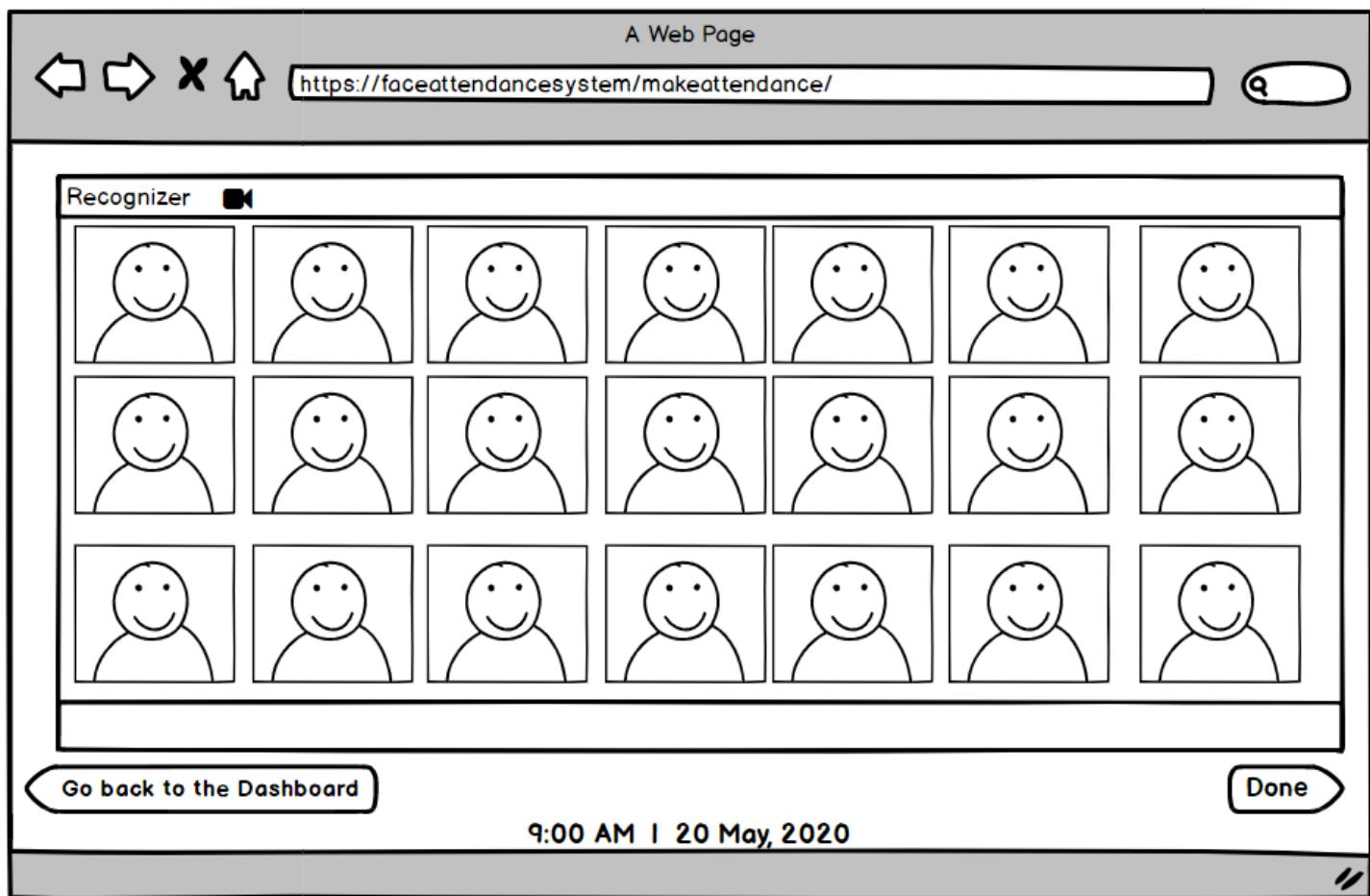


Figure 72: Wireframe of automatic attendance with face recognition

5.6 Attendance Management System

5.6.1 SRS

Requirement ID	Requirement Specification	Use Case	Moscow
Admin			
AMS – F – 1	As an Admin, I want to view attendance report of all students.	View Attendance Report	Must have
Teacher			
AMS – F – 2	As a Teacher, I want to take attendance of students present in my class.	Take Attendance	Must have
AMS – F – 3	As a Teacher, I want to view attendance report of my class.	View Attendance Report	Must have
Student			
AMS – F – 4	As a Student, I want to view my attendance report.	View Attendance Report	Must have
Student Service Staff			
AMS – F – 5	As a Student Service Staff, I want to view the attendance report of a student.	View Attendance Report	Must have
AMS – F – 6	Student Service Staff should be able to download the attendance report of a particular student and forward the (.pdf) report to student parents.	Forward Report	Could have

5.6.2 Design/modelling diagrams

I. Activity Diagram

- View Attendance Report (Admin):

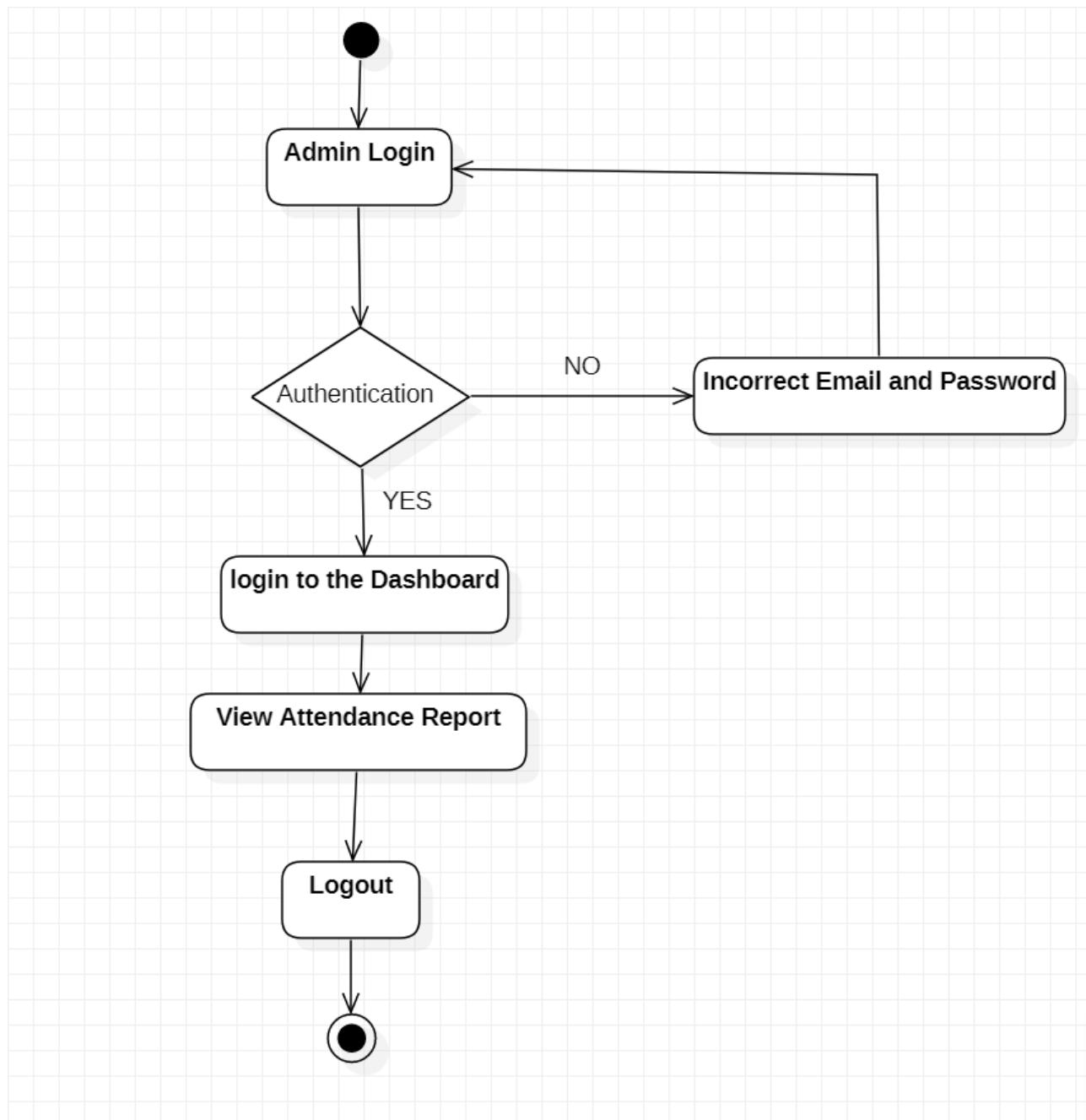


Figure 73: Activity Diagram of View Attendance Report (Admin)

- Take Attendance:

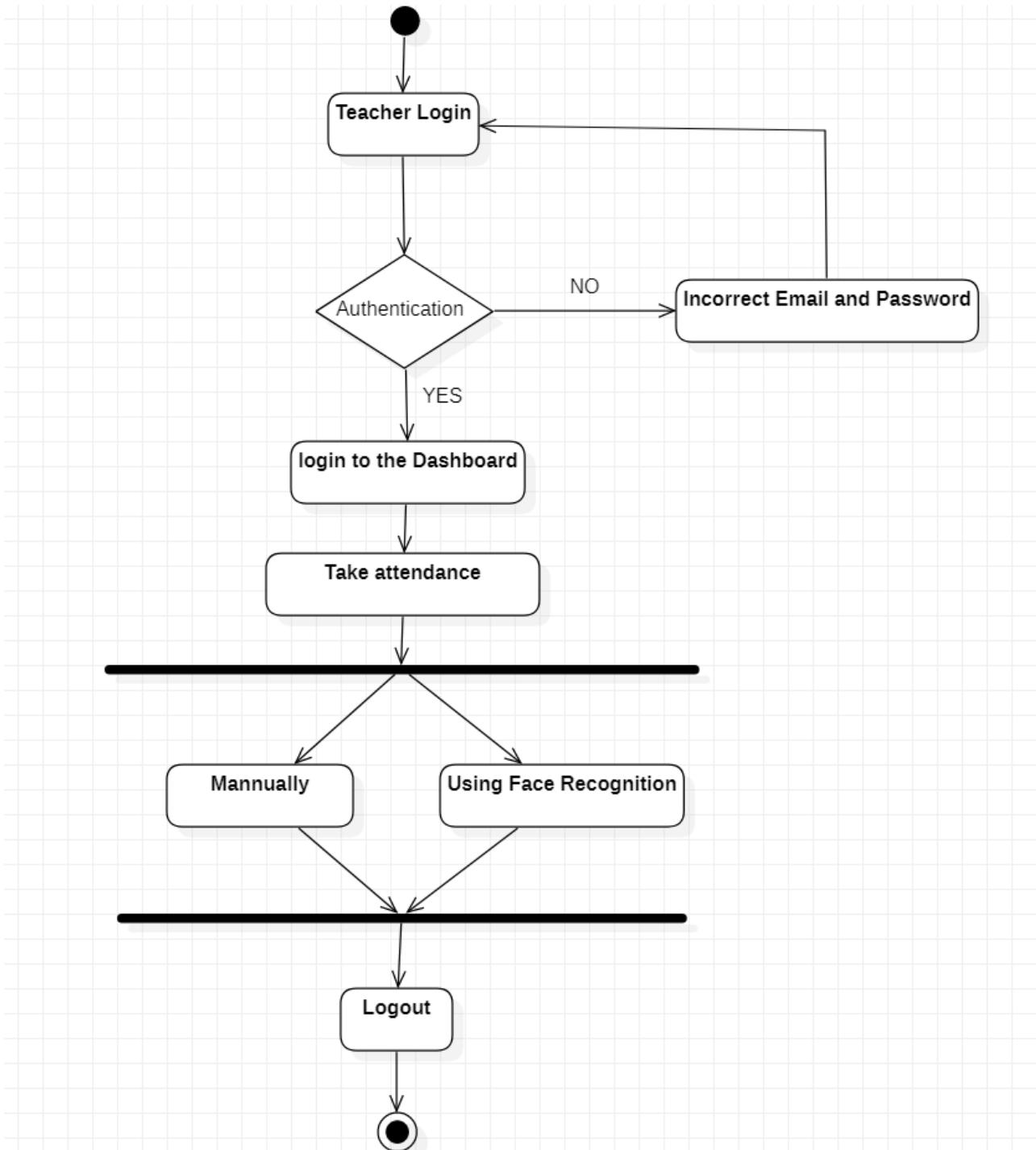


Figure 74: Activity Diagram of taking attendance of Students

- View Attendance Report (Teacher):

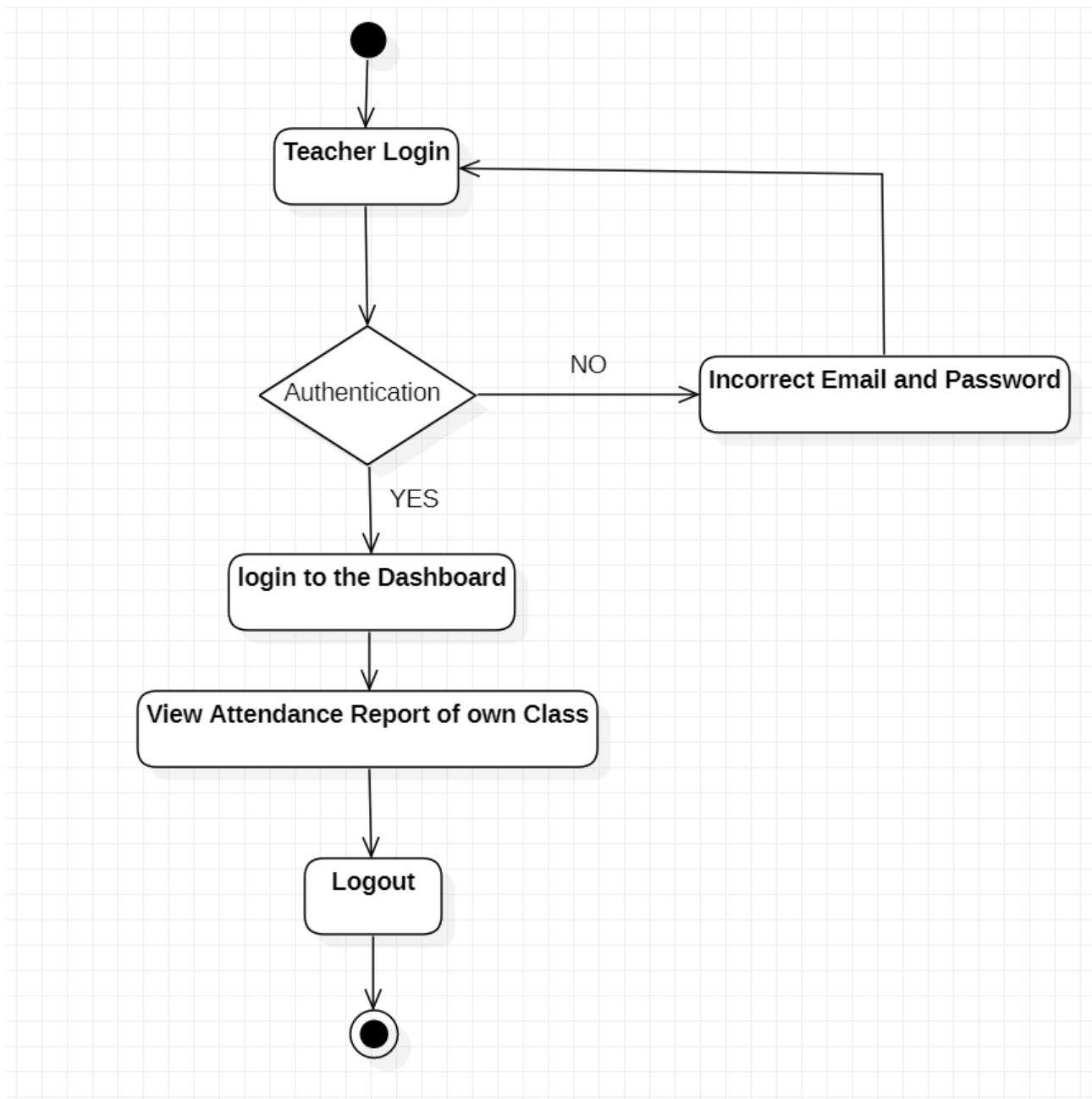


Figure 75: Activity Diagram of View Attendance Report (Teacher)

- View Attendance Report (Student):

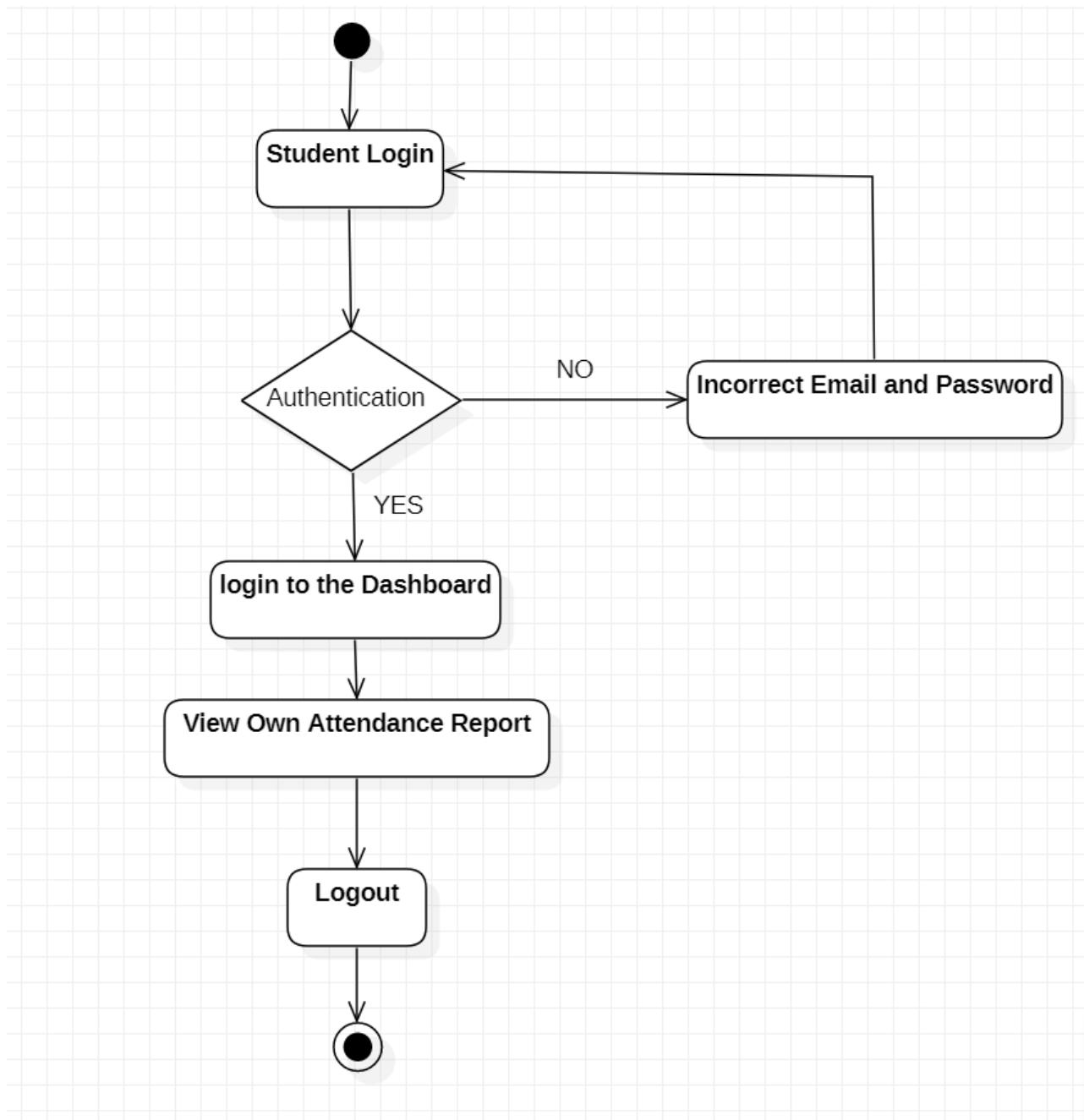


Figure 76: Activity Diagram of View Attendance Report (Student)

- View Attendance Report (Student Service Staff) and Forward Report:

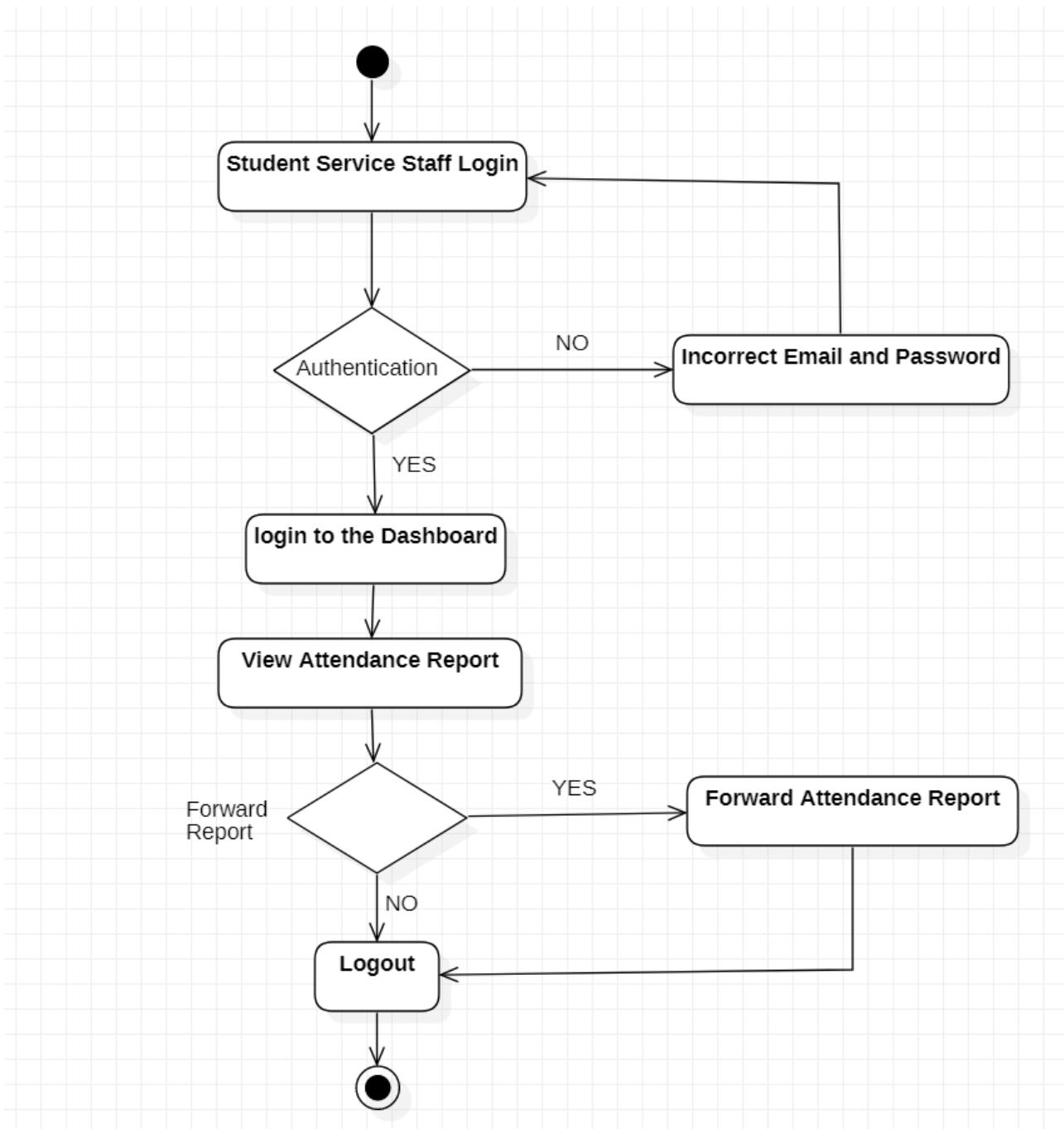


Figure 77: Activity diagram of View Attendance Report (Student Service Staff) &Forward Report

II. Use Case Diagram

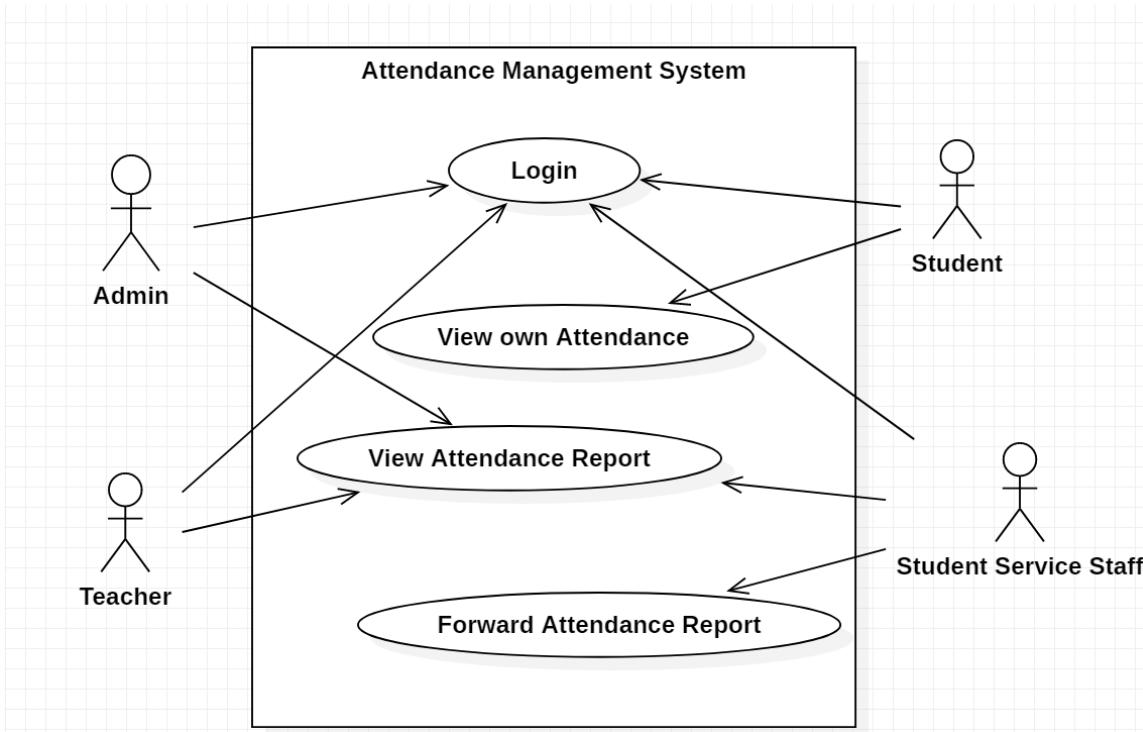


Figure 78: Use Case Diagram of Attendance Management System

III. ER Diagram

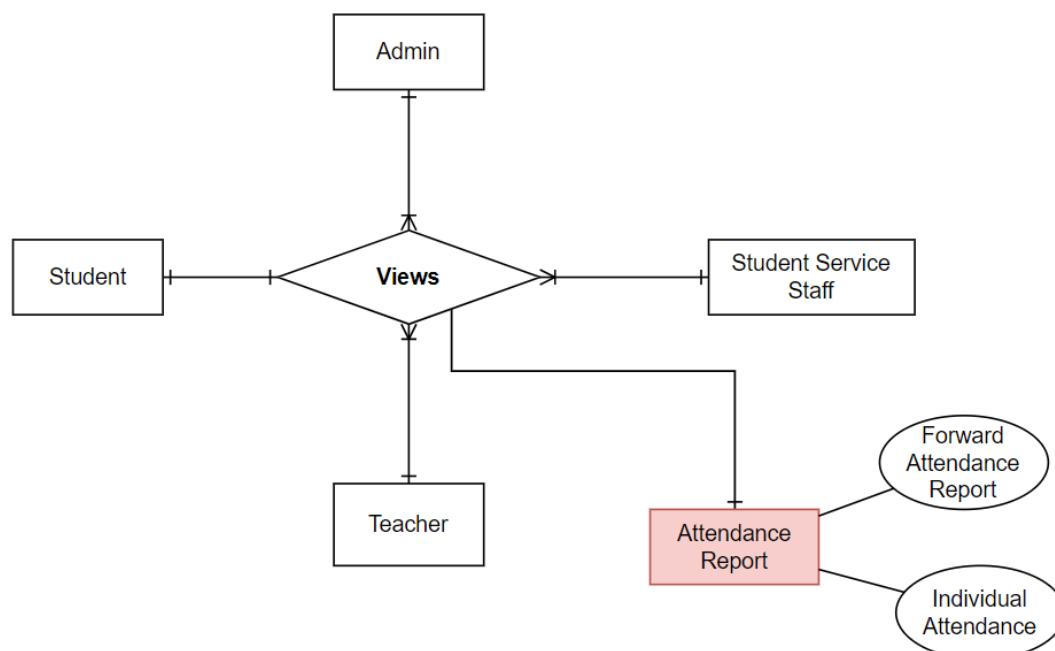


Figure 79: ER Diagram of Attendance Management System

IV. Sequence Diagram

- View Attendance Report (Admin):

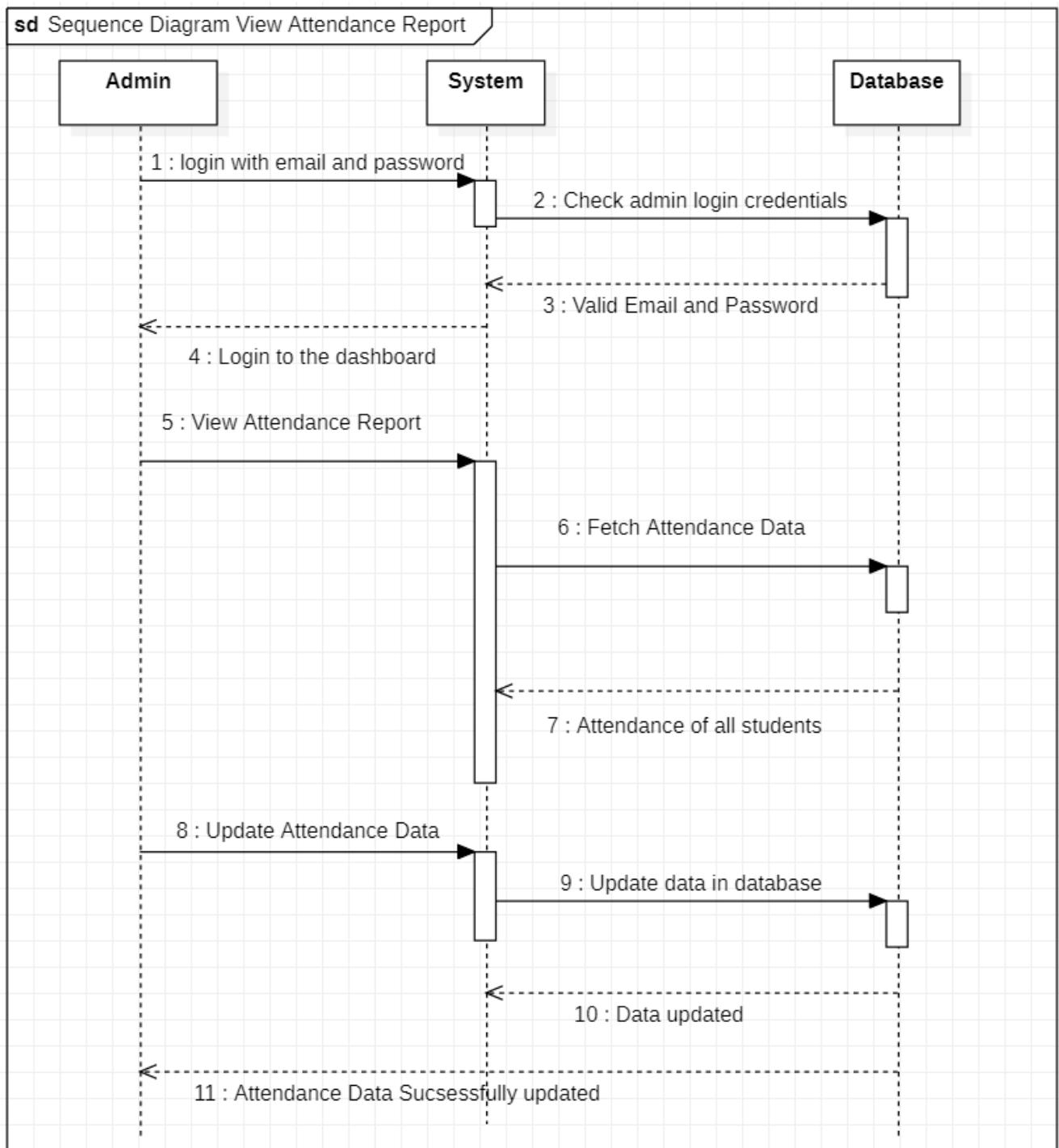


Figure 80: Sequence Diagram of View Attendance Report (Admin)

- View Attendance Report (Teacher):

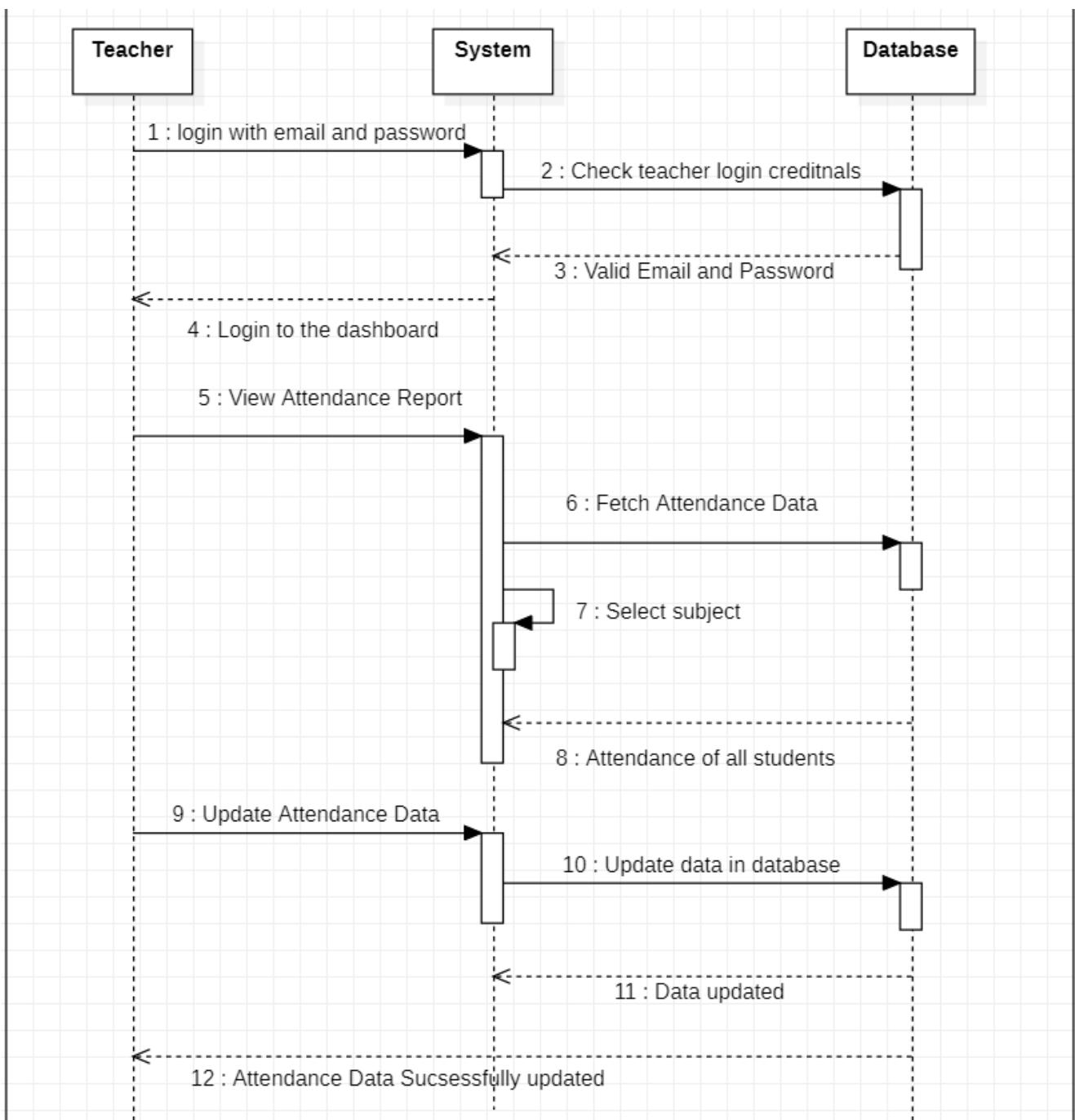


Figure 81: Sequence Diagram of View Attendance Report (Teacher)

- View Attendance Report (Student):

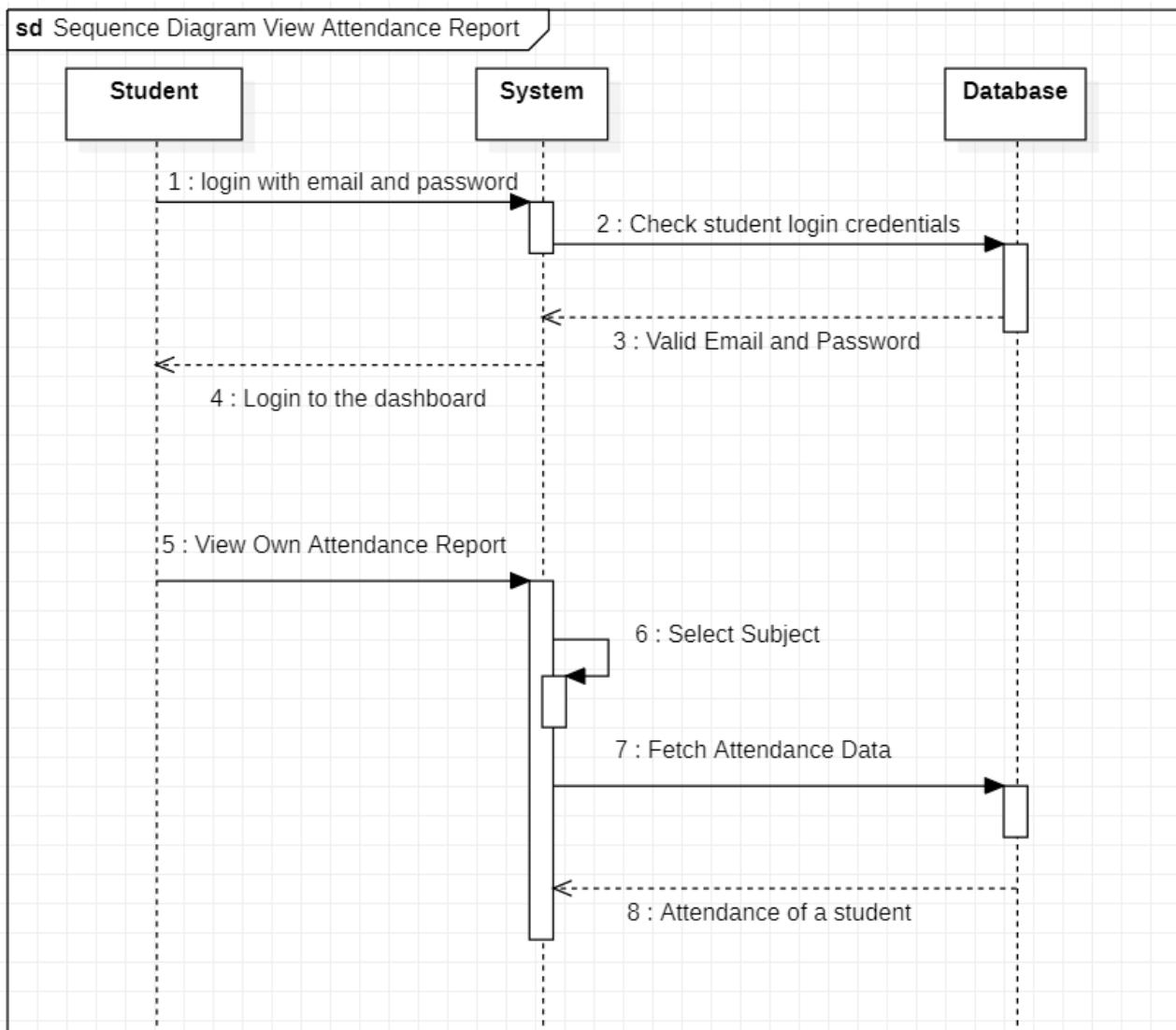


Figure 82: Sequence Diagram of View Attendance Report (Student)

- View Attendance Report (Student Service Staff) and Forward Report:

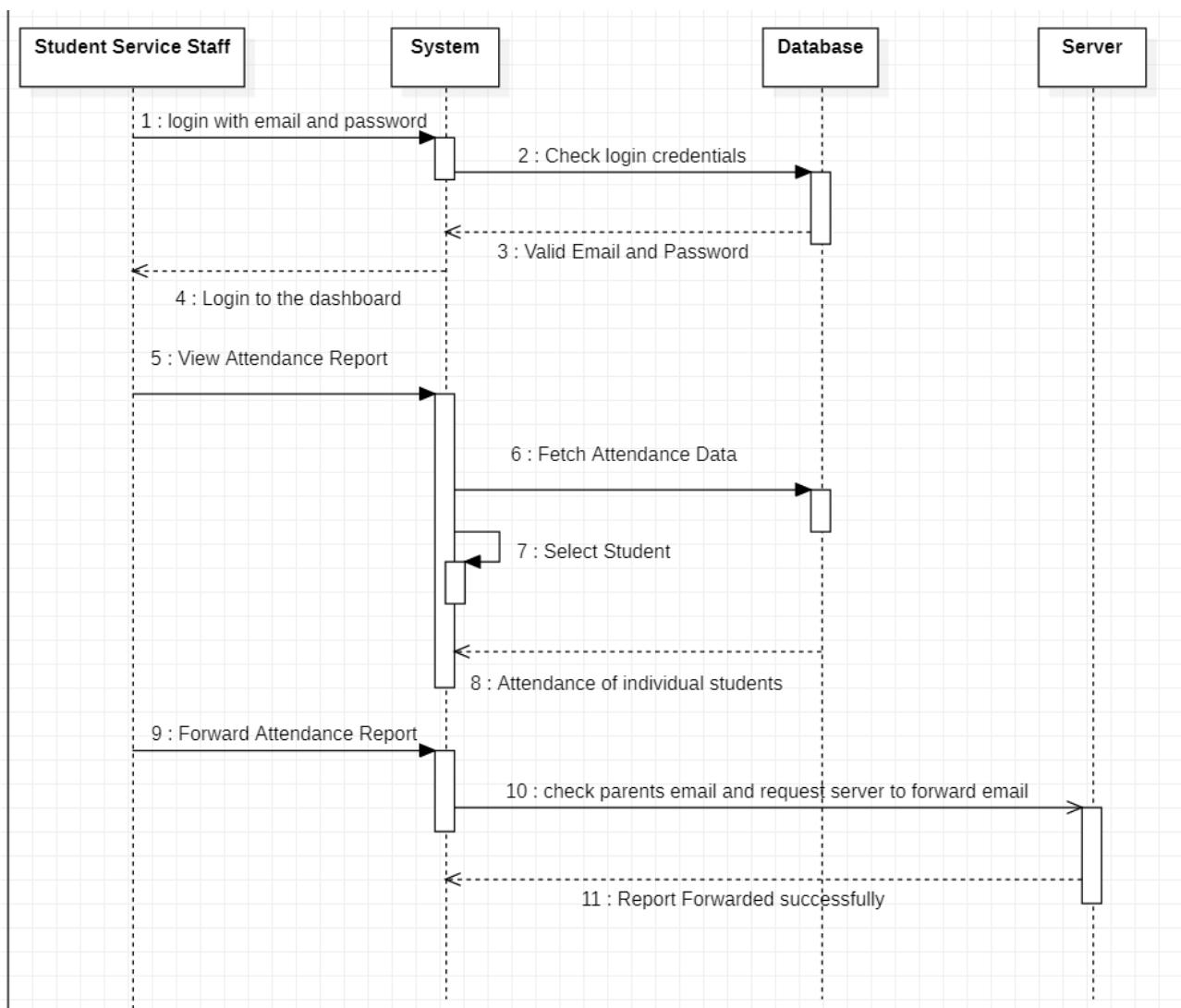


Figure 83: Sequence Diagram of View Attendance Report (Student Service Staff)

V. Wireframe

- Attendance Sheet of a class or section

A Web Page

<https://faceattendancesystem/attendancesheet/>

The Attendance Sheet of your Class

Name	Student Id	Attendance	Phone Number
Samir Husen	NP03A180216	Present	9810344567
Samrat Shrestha	NP03A180276	Absent	9811254552
Tenzin Lama	NP03A1803392	Present	9812225126
Eric Jhosi	NP03A180002	Present	9844456284
Jayant Karmacharya	NP03A180007	Present	9814893317
Suraj Kumal	NP03A180321	Absent	9978522361
Karma Dolma Gurung	NP03A180045	Present	9819656002

[Go back to the Dashboard](#)

9:00 AM | 20 May, 2020

Figure 84: Wireframe of attendance Sheet of a class or section

- Attendance report of class:

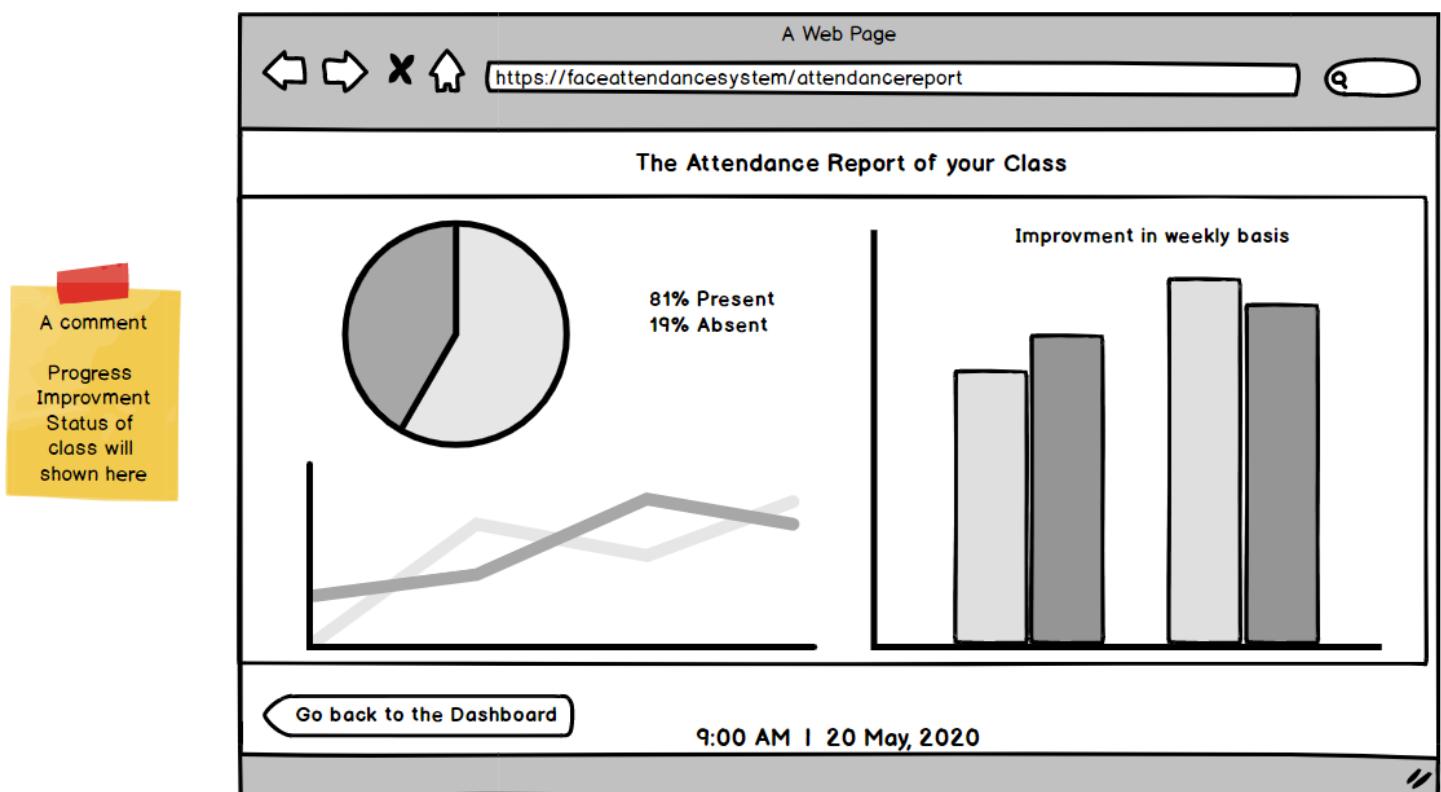


Figure 85: Wireframe of attendance report of a class

5.7 Testing of whole system

UserStoryID	TestCaseID	Title	Description	Test Steps	Test Data	EXPECTED RESULT	POSTCONDITION	ACTUAL RESULT	COMMENTS
Admin									
USA001	TCA001	Login	Testing login for Admin	1. Go to the required URL 2. Provide email 3. Provide password 4. Click on login button 5. Tick the google recpatch	email="" password=""	Error message should be displayed	An error message should be shown	Invalid Login Details	PASS
	TCA002				email="admin@gmail.com" password="admin123"	Success message should be displayed	Successful landing to Dashboard	Login to the Dashboard	PASS
	TCA003				email="admin@gmail.com" password="admin" Without ticking google recpatch	Error message should be displayed(Invalid Captcha Try again)	An error message should be shown	Invalid Captcha Try again	PASS
USA002	TCA004	Reset Password	This page will help admin to reset password	1. Go to the required URL 2. Click on reset password 3. Enter the email 4. Click on submit button	email=""	Error message or waring should be displayed	An error message should be shown	Please fill ot the field it is required	PASS
	TCA005			1. Go to the required URL 2. Click on reset password 3. Enter the email 4. Click on submit button	email="admin@gmail.com"	System should send a reset password link to the email	Option to reset password	Reset passowrd link sent Sucsessfully	PASS
USA003	TCA006	Dashboard	This page will help admin visit dashboard	1. Admin should be logged in 2. Click on dashboard	N/A	List all option in dashboard	Go to the page that the admin navigates to	View Dashboard	PASS
USA004	TCA007	Edit Profile	This page will help admin to edit profile	1. Admin should be logged in 2. Click on edit profile option on the menu 3. Enter required fields 4. Click submit button	username=morty password=pass12345 email=morty@gmail.com firstname=rick lastname=steves address=california	Successful edit of admin	Success message should be displayed	Profile edited successfully	PASS
	TCA008			1. Admin should be logged in 2. Click on edit profile option on the menu 3. Enter required fields 4. Click submit button	username= password= email= firstname= lastname= address=	Unsuccessful edit of admin	Redirect to enter details again	Failed to edit profile	PASS
USA005	TCA007	Add Teacher	This page will help to add new teacher	1. Admin should be logged in 2. Click on create new teacher 3. Enter required fields 4. Click submit button	username=rick password=rick1234 email=rick@gmail.com firstname=rick lastname=steves address=california	Successful creation of teacher	Success message should be displayed	Failed to Add Teacher	PASS
	TCA008			1. Admin should be logged in 2. Click on create new teacher 3. Enter required fields	username= password= email= firstname=rick lastname=steves address=california	Unsuccessful creation of teacher	Error message should be displayed	Teacher Succsesfully added	PASS

				3. Enter required fields 4. Click submit button	address=california country=US				
USA006	TCA009	Add Student Service Staff	This page will help to add new Student Service Staff	1. Admin should be logged in 2. Click on create new Student Service Staff 3. Enter required fields 4. Click submit button	username=rick password=rick1234 email=rick@gmail.com firstname=rick lastname=steves address=california	Successful creation of Student Service Staff	Success message should be displayed	Failed to Add Student Service Staff	PASS
	TCA010			1. Admin should be logged in 2. Click on create new Student Service Staff 3. Enter required fields 4. Click submit button	username=rick password=rick1234 email=rick@gmail.com firstname=rick lastname=steves address=california country=US	Unsuccessful creation of Student Service Staff	Error message should be displayed	Student Service Staff Succesfully added	PASS
USA007	TCA011	Add Student	This page will help to add new Student	1. Admin should be logged in 2. Click on create new Student 3. Enter required fields 4. Click submit button	username=rick password=rick1234 email=rick@gmail.com firstname=rick lastname=steves address=california sex="male" course="BIT" session_year="2020-12-12" profile_pic="JPEG File"	Successful creation of student	Success message should be displayed	Failed to Add Student	PASS
	TCA012			1. Admin should be logged in 2. Click on create new Student 3. Enter required fields 4. Click submit button	username=rick password=rick1234 email=rick@gmail.com firstname=rick lastname=steves address=california sex="male" course="BIT" session_year="2020-12-12" profile_pic="JPEG File"	Unsuccessful creation of Student	Error message should be displayed	Student Succsesfully added	PASS
USA008	TCA013	View Teachers	This page will list all the tecahers	1. Admin should be logged in 2. Click on manage teacher menu	N/A	List of all the teacher	List page should be shown	Teacher list with all details is diplayed	PASS
USA009	TCA014	View Student Service Staff	This page will list all the student service staffs	1. Admin should be logged in 2. Click on manage student service staff menu	N/A	List of all the student service staff	List page should be shown	Student service staff list with all details is diplayed	PASS
USA010	TCA015	View Student	This page will list all the students	1. Admin should be logged in 2. Click on manage student menu	N/A	List of all the student	List page should be shown	Student list with all details is diplayed	PASS
USA011	TCA016	Edit Teacher	This page will help to edit teacher details	1. Admin should be logged in 2. Click on edit option 3. Enter required fields 4. Click submit button	username=rick password=rick1234 email=rick@gmail.com firstname=rick lastname=steves address=california	Successful edit of user	Success message should be displayed	Teacher edit sucssesfully	PASS
	TCA017			1. Admin should be logged in 2. Click on edit option 3. Enter required fields 4. Click submit button	username=rick password=rick1234 email=rick@gmail.com firstname=rick lastname=steves address=california country=US username=rick	Unsuccessful edit of user	Redirect to enter details again	Failed to edit teacher	PASS

USA012	TCA018	Edit Student Service Staff	This page will help to edit student service staff details	1. Admin should be logged in 2. Click on edit option 3. Enter required fields 4. Click submit button	username=rick password=rick1234 email=rick@gmail.com firstname=rick lastname=steves address=california	Successful edit of user	Success message should be displayed	Student service staff edit successfully	PASS
	TCA019			1. Admin should be logged in 2. Click on edit option 3. Enter required fields 4. Click submit button	username=rick password=rick1234 email=rick@gmail.com firstname=rick lastname=steves address=california country=US	Unsuccessful edit of user	Redirect to enter details again	Failed to edit student service staff	PASS
USA013	TCA020	Edit Student	This page will help to edit student details	1. Admin should be logged in 2. Click on edit option 3. Enter required fields 4. Click submit button	username=rick password=rick1234 email=rick@gmail.com firstname=rick lastname=steves address=california sex="male" course="BIT" session_year="2020-12-12" profile_pic="JPEG File"	Successful edit of user	Success message should be displayed	Student edit successfully	PASS
	TCA021			1. Admin should be logged in 2. Click on edit option 3. Enter required fields 4. Click submit button	username=rick password=rick1234 email=rick@gmail.com firstname=rick lastname=steves address=california sex="male" course="BIT" session_year="2020-12-12" profile_pic="JPEG File"	Unsuccessful edit of user	Redirect to enter details again	Failed to edit student service staff	PASS
Teacher									
USA014	TCA022	Login	Testing login for teacher	1. Go to the required URL 2. Provide email 3. Provide password 4. Click on login button 5. Tick the google recpatch	email="" password=""	Error message should be dispalyed	An error message should be shown	Invalid Login Details	PASS
	TCA023				email="teacher@gmail.com" password="teacher"	Success message should be dispalyed	Successful landing to Dashboard	Login to the Dashboard	PASS
	TCA024				email="teacher@gmail.com" password="teacher" Without ticking google recpatch	Error message should be dispalyed(Invalid Captcha Try again)	An error message should be shown	Invalid Captcha Try again	PASS
USA015	TCA025	Reset Password	This page will help teacher to reset password	1. Go to the required URL 2. Click on reset password 3. Enter the email 4. Click on submit button	email=""	Error message or waring should be dispalyed	An error message should be shown	Please fill ot the field it is required	PASS
	TCA026			1. Go to the required URL 2. Click on reset password 3. Enter the username 4. Click on submit button	email="teacher@gmail.com"	System should send a reset password link to the email	Option to reset password	Reset passowrd link sent Sucsessfully	PASS

USA016	TCA027	Dashboard	This page will help teacher visit dashboard	1. Teacher should be logged in 2. Click on dashboard	N/A	List all option in dashboard	Go to the page that the admin navigates to	View Dashboard	PASS
USA017	TCA028	Edit Profile	This page will help teacher to edit profile	1. Teacher should be logged in 2. Click on edit profile option on the menu 3. Enter required fields 4. Click submit button	username=morty password=pass12345 email=morty@gmail.com firstname=rick lastname=steves address=california	Successful edit of teacher	Success message should be displayed	Profile edited successfully	PASS
	TCA029			1. Teacher should be logged in 2. Click on edit profile option on the menu 3. Enter required fields 4. Click submit button	username= password= email= firstname= lastname= address=	Unsuccessful edit of teacher	Redirect to enter details again	Failed to edit profile	PASS
Student Service Staff									
USA018	TCA030	Login	Testing login for Student Service Staff	1. Go to the required URL 2. Provide email 3. Provide password 4. Click on login button 5. Tick the google recpatch	email="" password=""	Error message should be dispalyed	An error message should be shown	Invalid Login Details	PASS
	TCA031				email="staff@gmail.com" password="staff123"	Success message should be dispalyed	Successful landing to Dashboard	Login to the Dashboard	PASS
	TCA032				email="staff@gmail.com" password="staff" Without ticking google recpatch	Error message should be dispalyed(Invalid Captcha Try again)	An error message should be shown	Invalid Captcha Try again	PASS
USA019	TCA033	Reset Password	This page will help admin to reset password	1. Go to the required URL 2. Click on reset password 3. Enter the email 4. Click on submit button	email=""	Error message or waring should be dispalyed	An error message should be shown	Please fill ot the field it is required	PASS
	TCA034			1. Go to the required URL 2. Click on reset password 3. Enter the email 4. Click on submit button	email="staff@gmail.com"	System should send a reset password link to the email	Option to reset password	Reset passowrd link sent Sucsessfully	PASS
USA020	TCA035	Dashboard	This page will help Student Service Staff visit dashboard	1. Staff should be logged in 2. Click on dashboard	N/A	List all option in dashboard	Go to the page that the admin navigates to	View Dashboard	PASS
USA021	TCA036	Edit Profile	This page will help Student Service Staff to edit profile	1. Student service staff should be logged in 2. Click on edit profile option on the menu 3. Enter required fields 4. Click submit button	username=morty password=pass12345 email=morty@gmail.com firstname=rick lastname=steves address=california	Successful edit of admin	Success message should be displayed	Profile edited successfully	PASS
	TCA037			1. Student service staff should be logged in 2. Click on edit profile option on the menu 3. Enter required fields 4. Click submit button	username= password= email= firstname= lastname= address=	Unsuccessful edit of admin	Redirect to enter details again	Failed to edit profile	PASS

Student									
USA022	TCA038	Login	Testing login for Student	1. Go to the required URL 2. Provide email 3. Provide password 4. Click on login button 5. Tick the google recpatch	email="" password=""	Error message should be displayed	An error message should be shown	Invalid Login Details	PASS
	TCA039				email="admin@gmail.com" password="admin123"	Success message should be displayed	Successful landing to Dashboard	Login to the Dashboard	PASS
	TCA040				email="admin@gmail.com" password="admin" Without ticking google recpatch	Error message should be displayed(Invalid Captcha Try again)	An error message should be shown	Invalid Captcha Try again	PASS
USA023	TCA041	Reset Password	This page will help student to reset password	1. Go to the required URL 2. Click on reset password 3. Enter the email 4. Click on submit button	email=""	Error message or waring should be displayed	An error message should be shown	Pleae fill ot the field it is required	PASS
	TCA042			1. Go to the required URL 2. Click on reset password 3. Enter the username 4. Click on submit button	email="admin@gmail.com"	System should send a reset password link to the email	Option to reset password	Reset passowrd link sent Sucsessfully	PASS
USA024	TCA043	Dashboard	This page will help student visit dashboard	1. Student should be logged in 2. Click on dashboard	N/A	List all option in dashboard	Go to the page that the admin navigates to	View Dashboard	PASS
USA025	TCA044	Edit Profile	This page will help student to edit profile	1. Student should be logged in 2. Click on edit profile option on the menu 3. Enter required fields 4. Click submit button	username=rick password=rick1234 email=rick@gmail.com firstname=rick lastname=steves address=california sex="male" course="BIT" session_year="2020-12-12" profile_pic="JPEG File"	Successful edit of admin	Succcess message should be displayed	Profile edited successfully	PASS
	TCA045			1. Student should be logged in 2. Click on edit profile option on the menu 3. Enter required fields 4. Click submit button	username= password= email= firstname= lastname= address= sex="male" course="BIT" session_year="2020-12-12" profile_pic="JPEG File"	Unsuccessful edit of admin	Redirect to enter details again	Failed to edit profile	PASS

5.8 Artificial Intelligence Components

5.8.1 Data Collection

The data inside the attendance system are the set of multiple images. Those images are the facial records of the students which are collected and stored inside the file system while registering them to the attendance system. All the images are in the format of JPEG. The data or images stays inside the folder named media instead of residing inside the database. The images are in RGB format and there is only one training image for each student.

5.8.2 Model Development

The model was developed based on different libraries and algorithm. the two algorithms used inside the system are histograms of oriented gradients (HOG) and Support vectors machine (SVM). OpenCV, face_recognition and NumPy libraries were during the development. At first the model collects the training data (images) from the file system, and it finds the encoding of the training dataset. Then a function is used to open a csv file present inside the system alongside the web camera is opened and the detection and recognition are performed. After, the recognition the name, time are recorded in csv file using a function and the escape button is responsible for closing the web camera.

5.8.3 Optimization Evaluation

The model can recognize the faces only with the help of one training data (image) which proves the accuracy rate is good until now. If the dataset size will increase, then the optimization can be performed but for now the accuracy rate is good.

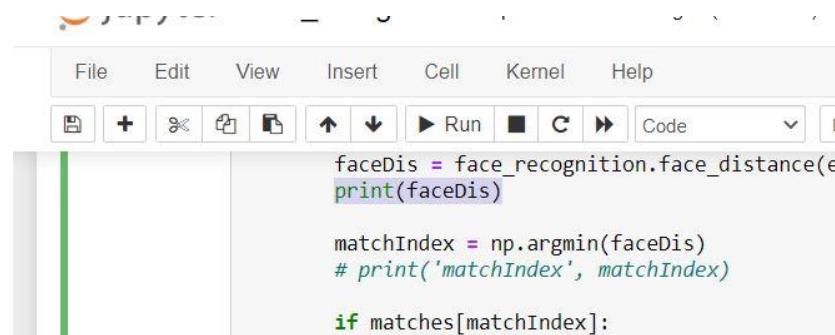
5.8.4 AI Integration inside the system

Firstly, the script was created which contains the model that is to be used inside the system. Then the function was created inside the views file which was able to run that script by accessing the file location. Finally, inside the HTML file a button was created which was able to run that function. There was no use of API during the integration of the model. Simply a creation of button that was able to run the script.

5.8.5 Testing accuracy of the system

Running the script in Jupyter notebook for testing the accuracy. There is a function inside a model called (faceDis) which can calculate the distance of image and compute the image into one dimensional array.

- Function(faceDis)



```

File Edit View Insert Cell Kernel Help
File + X Run C Code
faceDis = face_recognition.face_distance(e)
print(faceDis)

matchIndex = np.argmin(faceDis)
# print('matchIndex', matchIndex)

if matches[matchIndex]:

```

Figure 86: Array printing function of model

- Now suing the Elon Musk face image after running this script to the web camera as we can see the image is being recognized within the rectangular box and name below it.
- Also, the (faceDis) function is printing the array of every image present in dataset.

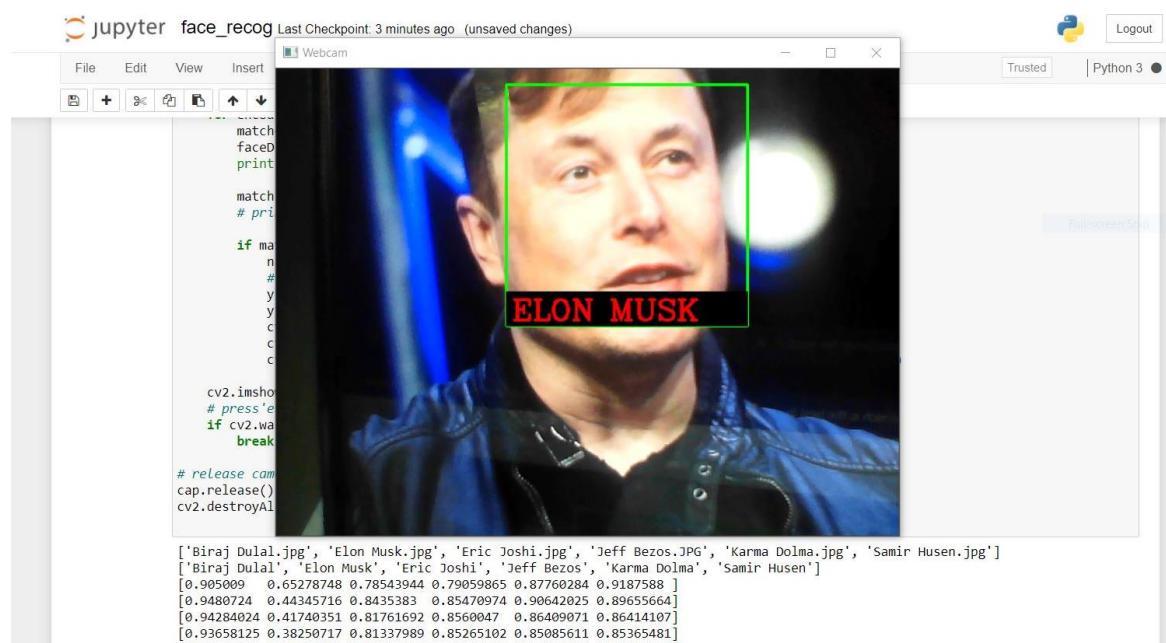
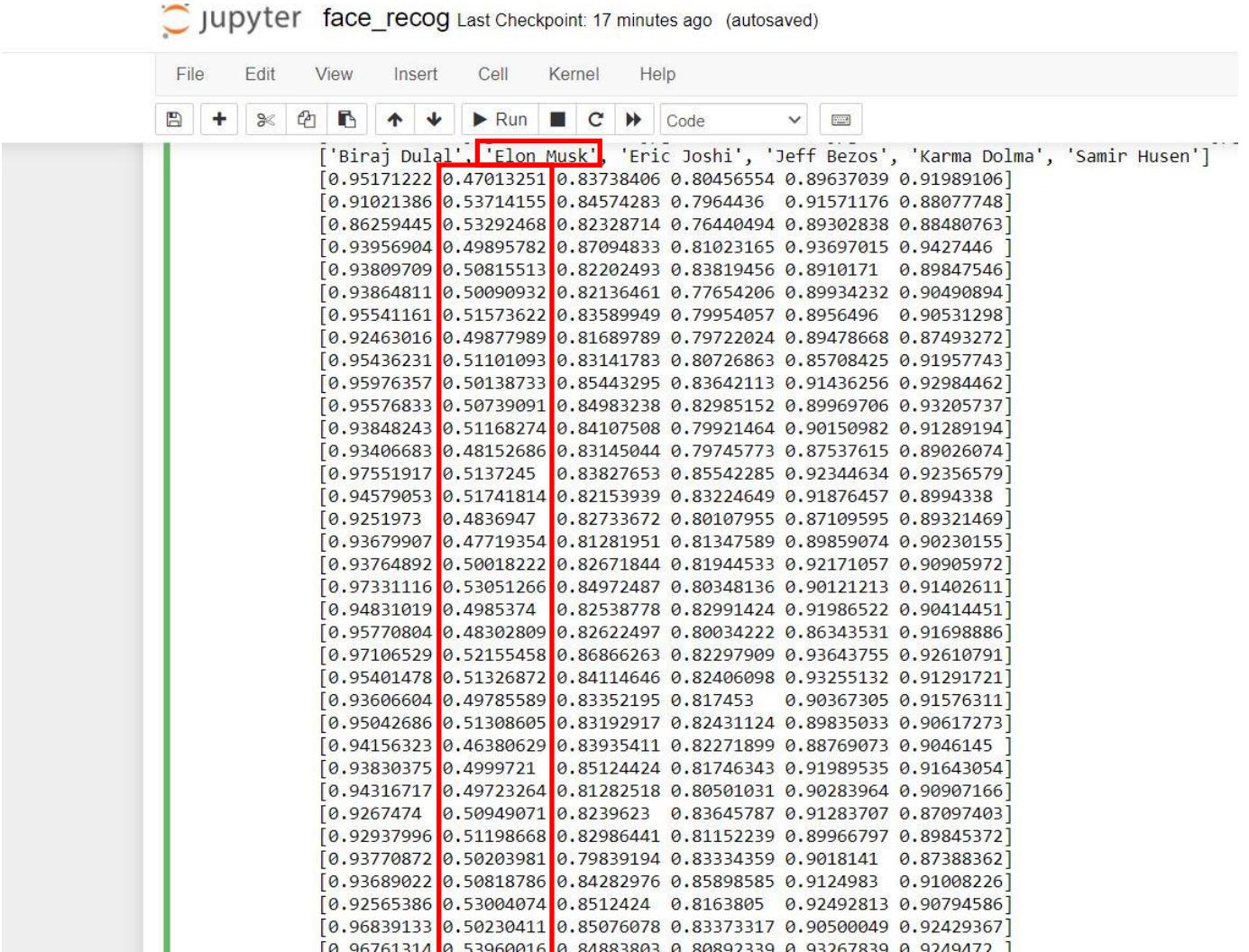


Figure 87: Face recognition of Elon Musk

- Comparison of output result

As we can see there are multiple arrays printed in the output. The outputs are the array of each images present inside the dataset. Now in the output we can clearly see that the array gained from Elon Musk image and the array from other training images is different. Because the Elon Musk image was shown for the recognition to the system. The red rectangular box contains the array of Elon Musk. The accuracy is good until now.



```
jupyter face_recog Last Checkpoint: 17 minutes ago (autosaved)

File Edit View Insert Cell Kernel Help
File + % Run Cell Code

['Biraj Dular', 'Elon Musk', 'Eric Joshi', 'Jeff Bezos', 'Karma Dolma', 'Samir Husen']
[0.95171222 0.47013251 0.83738406 0.80456554 0.89637039 0.91989106]
[0.91021386 0.53714155 0.84574283 0.7964436 0.91571176 0.88077748]
[0.86259445 0.53292468 0.82328714 0.76440494 0.89302838 0.88480763]
[0.93956904 0.49895782 0.87094833 0.81023165 0.93697015 0.9427446 ]
[0.93809709 0.50815513 0.82202493 0.83819456 0.8910171 0.89847546]
[0.93864811 0.50090932 0.82136461 0.77654206 0.89934232 0.90490894]
[0.95541161 0.51573622 0.83589949 0.79954057 0.8956496 0.90531298]
[0.92463016 0.49877989 0.81689789 0.79722024 0.89478668 0.87493272]
[0.95436231 0.51101093 0.83141783 0.80726863 0.85708425 0.91957743]
[0.95976357 0.50138733 0.85443295 0.83642113 0.91436256 0.92984462]
[0.95576833 0.50739091 0.84983238 0.82985152 0.89969706 0.93205737]
[0.93848243 0.51168274 0.84107508 0.79921464 0.90150982 0.91289194]
[0.93406683 0.48152686 0.83145044 0.79745773 0.87537615 0.89026074]
[0.97551917 0.5137245 0.83827653 0.85542285 0.92344634 0.92356579]
[0.94579053 0.51741814 0.82153939 0.83224649 0.91876457 0.8994338 ]
[0.9251973 0.4836947 0.82733672 0.80107955 0.87109595 0.89321469]
[0.93679907 0.47719354 0.81281951 0.81347589 0.89859074 0.90230155]
[0.93764892 0.50018222 0.82671844 0.81944533 0.92171057 0.90905972]
[0.97331116 0.53051266 0.84972487 0.80348136 0.90121213 0.91402611]
[0.94831019 0.4985374 0.82538778 0.82991424 0.91986522 0.90414451]
[0.95770804 0.48302809 0.82622497 0.80034222 0.86343531 0.91698886]
[0.97106529 0.52155458 0.86866263 0.82297909 0.93643755 0.92610791]
[0.95401478 0.51326872 0.84114646 0.82406098 0.93255132 0.91291721]
[0.93606604 0.49785589 0.83352195 0.817453 0.90367305 0.91576311]
[0.95042686 0.51308605 0.83192917 0.82431124 0.89835033 0.90617273]
[0.94156323 0.46380629 0.83935411 0.82271899 0.88769073 0.9046145 ]
[0.93830375 0.4999721 0.85124424 0.81746343 0.91989535 0.91643054]
[0.94316717 0.49723264 0.81282518 0.80501031 0.90283964 0.90907166]
[0.9267474 0.50949071 0.8239623 0.83645787 0.91283707 0.87097403]
[0.92937996 0.51198668 0.82986441 0.81152239 0.89966797 0.89845372]
[0.93770872 0.50203981 0.79839194 0.83334359 0.9018141 0.87388362]
[0.93689022 0.50818786 0.84282976 0.85898585 0.9124983 0.91008226]
[0.92565386 0.53004074 0.8512424 0.8163805 0.92492813 0.90794586]
[0.96839133 0.50230411 0.85076078 0.83373317 0.90500049 0.92429367]
[0.96761211 0.53960016 0.81888802 0.80899222 0.92267822 0.9219177 1]
```

Figure 88: Output of the model in form of 1-Dimesnional array

Now let us see how the model will behave when we let the model to recognize multiple and unknown images.

- There are two people in the image where one is unknown, and another Jeff Bezos and the system also recognize it with the help of training image.

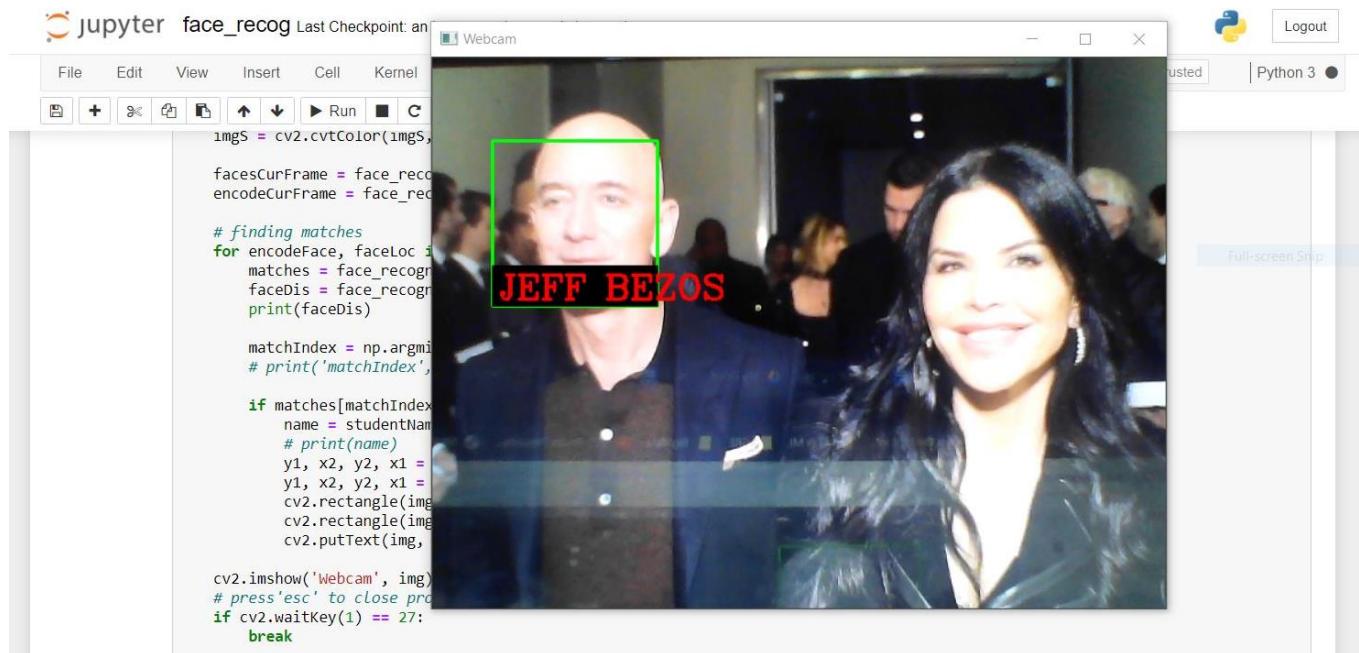


Figure 89: Face recognition of Jeff Bezos

- Complicated image can be also recognized (Jeff Bezos wearing glasses)

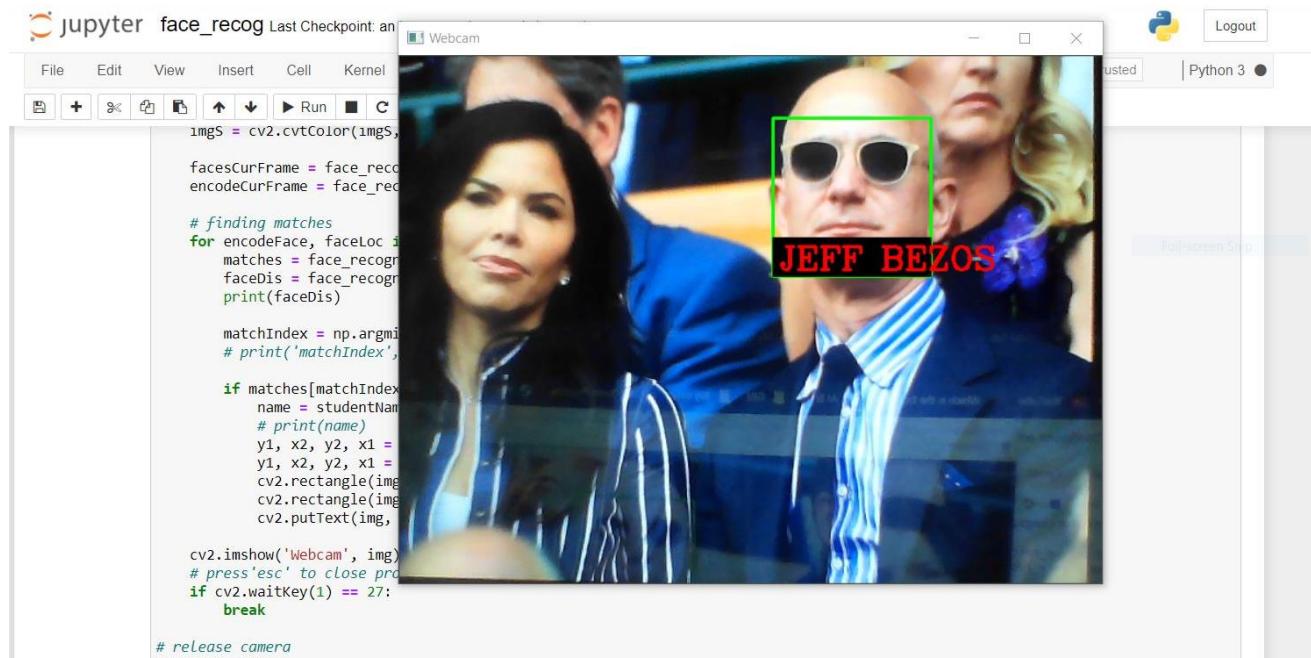


Figure 90: Face Recognition of Jeff Bezos with complications

- Face recognition of two person at the same time

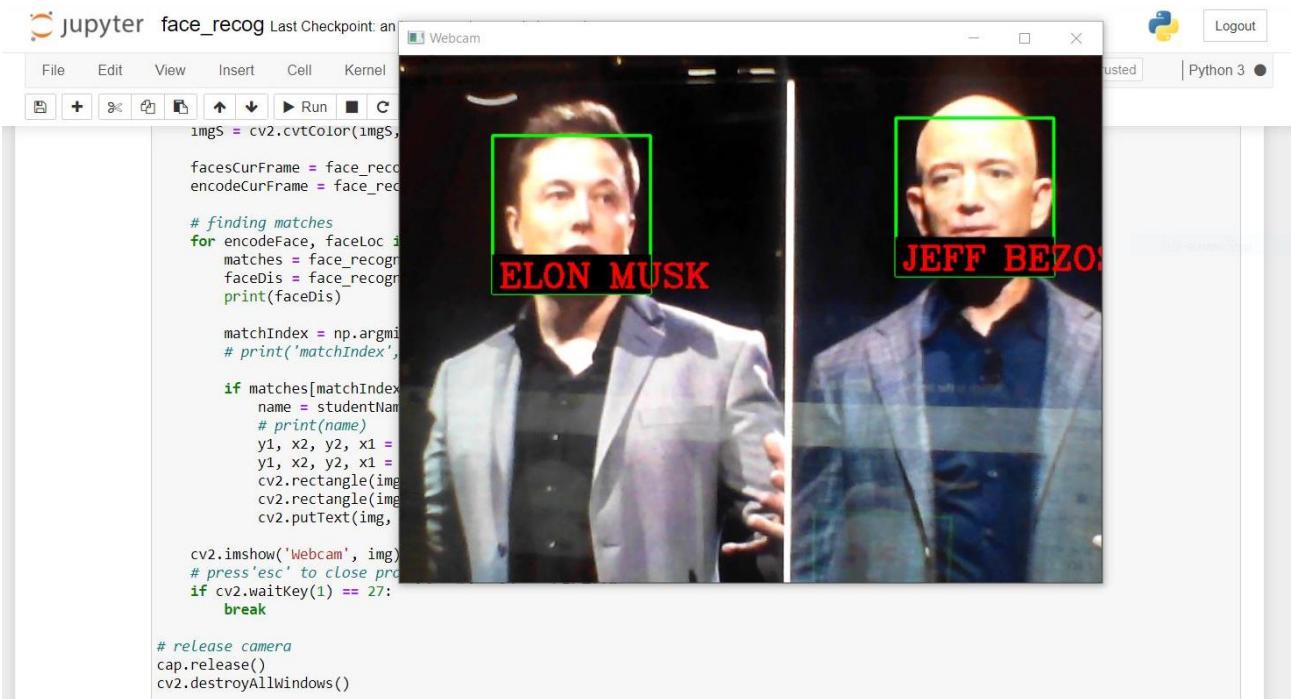


Figure 91: Face Recognition of multiple faces

- Here, in the image below Mark is not recognized because the image of Mark is not trained so, it is left unknown.

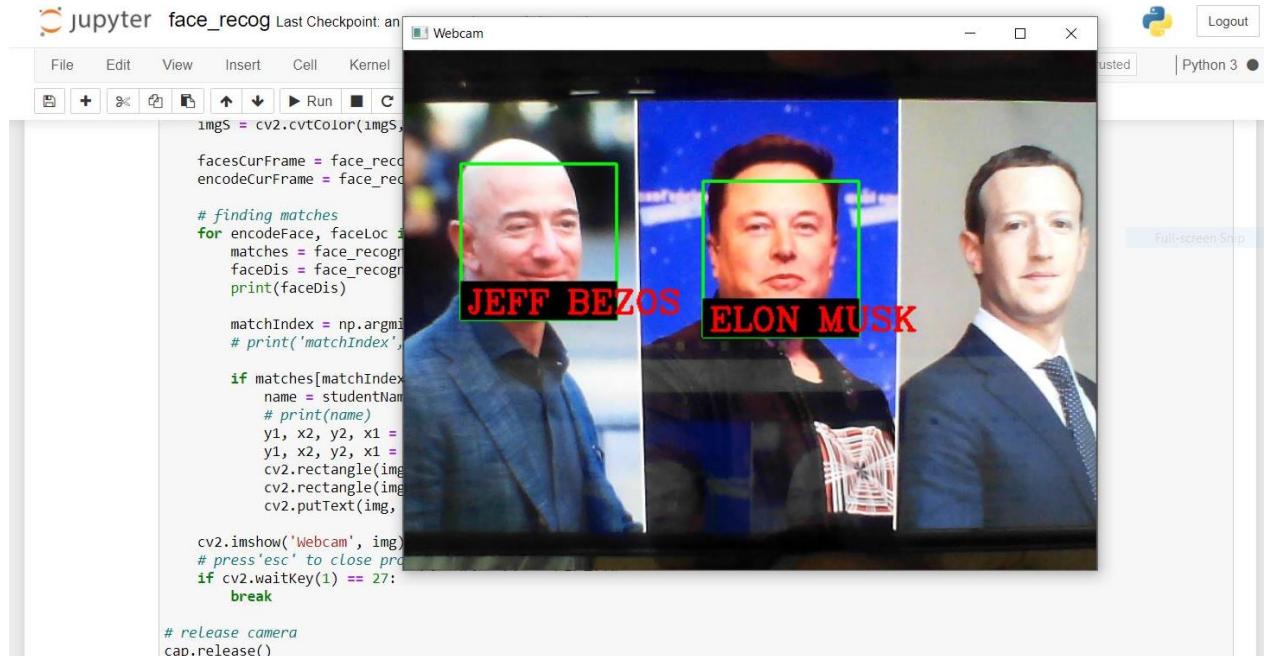


Figure 92: Face Recognition of multiple persons with one unknown face

CHAPTER SIX: CONCLUSION

The “Attendance System” will use face recognition and detection system for marking present and absent to the student by detecting their frontal face in the classroom. There are lot of system, which uses face recognition as their basic tool for classifying image such as Law enforcement and Facebook. There is different algorithm used in face detection and recognition HOG (Histogram of Oriented Gradients) and SVM (Support Vector Machine) are two of them. Agile Scrum methodology is one of the most popular and well-organized software development methodology. The main aim of this project was to develop an attendance system which will be able to recognize student faces and mark them present in the attendance sheet. The user interface of this application is user-friendly. The system uses Django default authentication system for protecting and authenticating the users present inside the system.

Different users have different levels of permission and function in this system. From the above study and research, it is stated that different algorithms have different capabilities only the thing that differentiate them from each other are the techniques and accuracy result rate. Multiple researches are ongoing in this field of machine learning. Python programming language which uses MVT (Model, View, and Template Pattern) provides an easy and well-developed environment for web development. Libraries such as OpenCV, face recognition and Dlib perform a high level of face recognition with the implementation of different algorithms. There are different tools such as MySQL, GitHub, and Anaconda which helped during the system development. The system can detect and recognize faces of students with more than 85% of accuracy rate. Overall, this was the conclusion drawn on the topic of the final year project.

CHAPTER SEVEN: CRITICAL EVALUATION OF THE PROJECT

Going through numbers of research papers and studies the project was developed successfully. There were few changes according to the planning which was done during the start of the project. The main system was divided into five subsystems but later two subsystems were merged. Like this there are few changes during the development period. The system was developed and planned according to agile scrum methodology. JIRA an agile methodology tool which was planned to be used during development phase was failure because JIRA is a tool that is used by whole team therefore, it was difficult to use it alone. When the planning was going the attendance, system was aimed to be developed which will use only the face recognition system for attendance but when the real development started the system is developed with the functions which can take attendance manually as well as with face recognition approach. The system development time and period were also bit misplaced in the Gantt chart. The research and study took a bit more time than assumed during planning. Studying different algorithms understanding them was a quiet time taking process. The supervised learning approaches of machine learning algorithm learns from there experience.

Eigenfaces algorithm was planned to be used for implementing the face recognition system but instead of eigenfaces the support vector machine classifier algorithm was used because it works better and provide more accuracy. The study and research also help to find the perfect algorithm for the system. The aims and objectives are achieved accordingly. Literature review section was huge and consisting lots of research which helped to explore the findings. In the field of machine learning, there are multiple researches performed the research paper that were studied in above section were written by well knowledgeable peoples. Talking about the system, system was stored in Cloud or in simple word the backup was done on the daily basis using GitHub tool which helped to minimize the risk that occurred during the development phase. The machine where the development was going suddenly crashed and everything was removed and deleted from it. However, GitHub saved the whole project. Few functions which were not planned at first were added such as loading data from csv, result functions for students, profile picture for student etc. After few changes and add up functions the system development phase came to an end, and the system can recognize faces of students with great accuracy.

7.1 Self-reflection

The project related study and research helped me to learn different machine learning algorithms, techniques, approaches, and concepts. It was a deep dive into the aspects of artificial intelligence, machine learning and deep learning. I have now much better experience with python programming language and how it can be implemented in machine learning which will help me further. There were also few new terms that I studied such Ajax, jQuery, and few more. I learned methods to use and handle different tools used while developing any application. The well manner, planning, procedure, and processes of building a real-world application. I get to know how the algorithms are integrated inside the system and how different type of libraries are implemented. The major thing in programming is the problem solving all that matters is how we solve the problem that is stated. The knowledge and experience I gained form this project has increase my level which will help me further with my career.

CHAPTER EIGHT: EVIDENCE OF PROJECT MANAGEMENT

8.1 Log Sheets

PROJECT MANAGEMENT LOG	
First Name: SAMIR	Surname: HUSEN
Student Number: 2039211	Supervisor: MR. BIRAJ DULAL
Project Title: Attendance System using Face Recognition and Detection	Date: 10-Sep-2020
What have you done since the last meeting	
<ul style="list-style-type: none"> First Meeting 	
What do you aim to complete before the next meeting	
<ul style="list-style-type: none"> Create a sample document describing the functionalities and requirements of my system Design use case diagram 	
Supervisor comments	
<ul style="list-style-type: none"> In your system teachers should be able to give feedback to each students Add one more actor (Students) in your system Students should be able to view and calculate their total attendance percentage Do more research on Algorithms you are planning to use in your system 	

We confirm that the information given in this form is true, complete and accurate.

Student Signature: 

Date: 10/09/2020

Supervisor Signature: 

Date: 10/09/2020

Figure 93: Meeting - 1st

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PROJECT MANAGEMENT LOG	
First Name: SAMIR	Surname: HUSEN
Student Number: 2039211	Supervisor: MR. BIRAJ DULAL
Project Title: Attendance System using Face Recognition and Detection	Date: 13-Sep-2020
What have you done since the last meeting	
<ul style="list-style-type: none"> • Further research on topic and Algorithms • Created a sample document describing the functionalities and requirements of my system • Added a new actor in my system (Students) as supervisor requested • Designed use case diagram 	
What do you aim to complete before the next meeting	
<ul style="list-style-type: none"> • Complete first Milestone (Proposal) 	
Supervisor comments	
<ul style="list-style-type: none"> • Add one more actor (Student services) in your system • The student service should be able to download the feedback report of each student given by teachers. • Topic is approved now you shall continue proposal writing 	

We confirm that the information given in this form is true, complete and accurate.

Student Signature:

Date: 13/09/2020

Supervisor Signature:

Date: 13/09/2020

Figure 94: Meeting - 2nd

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PROJECT MANAGEMENT LOG	
First Name: SAMIR	Surname: HUSEN
Student Number: 2039211	Supervisor: MR. BIRAJ DULAL
Project Title: Attendance System using Face Recognition and Detection	Date: 20-Sep-2020
What have you done since the last meeting	
<ul style="list-style-type: none"> Completed first milestone (Proposal Draft 1) 	
What do you aim to complete before the next meeting	
<ul style="list-style-type: none"> Work according to feedback and submit Proposal Draft 2 	
Supervisor comments	
<ul style="list-style-type: none"> Proposal draft 1 not passed. Do not use tabular format for Aim and objectives simply list them. In the artefacts proposed, write the frame, libraries, or algorithms required to develop a particular artefact. Before showing the sprints in the Gantt chart, you should divide works into various sprints (its good if you do that in the WBS). Have a conclusion. 	

We confirm that the information given in this form is true, complete and accurate.

Student Signature:

Date: 20/09/2020

Supervisor Signature:

Date: 20/09/2020

Figure 95: Meeting - 3rd

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PROJECT MANAGEMENT LOG	
First Name: SAMIR	Surname: HUSEN
Student Number: 2039211	Supervisor: MR. BIRAJ DULAL
Project Title: Attendance System using Face Recognition and Detection	Date: 22-Sep-2020
What have you done since the last meeting	
<ul style="list-style-type: none"> Worked according to previous feedback and submitted proposal draft 2. 	
What do you aim to complete before the next meeting	
<ul style="list-style-type: none"> Work on next milestone literature review 	
Supervisor comments	
<ul style="list-style-type: none"> Proposal draft 2 Passed. 	

We confirm that the information given in this form is true, complete and accurate.

Student Signature:

Date: 22/9/2020

Supervisor Signature:

Date: 22/9/2020

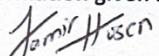
Figure 96: Meeting - 4th

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PROJECT MANAGEMENT LOG	
First Name: SAMIR	Surname: HUSEN
Student Number: 2039211	Supervisor: MR. BIRAJ DULAL
Project Title: Attendance System using Face Recognition and Detection	Date: 08-Oct-2020
What have you done since the last meeting	
<ul style="list-style-type: none"> Worked on literature review and submitted literature review draft 1. 	
What do you aim to complete before the next meeting	
<ul style="list-style-type: none"> Research on more different algorithm, techniques, and similar systems for literature review part. Work according to feedback and submit final draft of literature review. 	
Supervisor comments	
<ul style="list-style-type: none"> The literature review seems good. Please review preferred framework as well. 	

We confirm that the information given in this form is true, complete and accurate.

Student Signature: 

Date: 08/10/2020

Supervisor Signature: 

Date: 08/10/2020

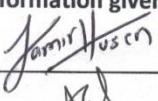
Figure 97: Meeting - 5th

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PROJECT MANAGEMENT LOG	
First Name: SAMIR	Surname: HUSEN
Student Number: 2039211	Supervisor: MR. BIRAJ DULAL
Project Title: Attendance System using Face Recognition and Detection	Date: 15-Oct-2020
What have you done since the last meeting	
<ul style="list-style-type: none"> Worked on literature review. Researched on different framework suitable for the project. 	
What do you aim to complete before the next meeting	
<ul style="list-style-type: none"> Begin with next milestone artefact design. Start first sprint user management system. 	
Supervisor comments	
<ul style="list-style-type: none"> The literature review seems well detailed and looks good for submission. 	

We confirm that the information given in this form is true, complete and accurate.

Student Signature: 

Date: 15/10/2020

Supervisor Signature: 

Date: 15/10/2020

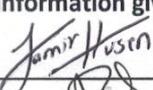
Figure 98: Meeting - 6th

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PROJECT MANAGEMENT LOG	
First Name: SAMIR	Surname: HUSEN
Student Number: 2039211	Supervisor: MR. BIRAJ DULAL
Project Title: Attendance System using Face Recognition and Detection	Date: 24-Nov-2020
What have you done since the last meeting	
<ul style="list-style-type: none"> Completed SRS (System Requirements Specification) document Use case diagram for user management system. Sprint 1 user management system started. 	
What do you aim to complete before the next meeting	
<ul style="list-style-type: none"> Continue working on system. Work on artefact design according to feedback and submit final draft. 	
Supervisor comments	
<ul style="list-style-type: none"> NF 2.1 and 2.2 seems like Functional requirement. Most of your NF are Functional. Please study more about that. Use case and wireframes seems good. Work on system (Demo feedback) 	

We confirm that the information given in this form is true, complete and accurate.

Student Signature: 

Date: 24/11/2020

Supervisor Signature: 

Date: 24/11/2020

Figure 99: Meeting - 7th

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PROJECT MANAGEMENT LOG	
First Name: SAMIR	Surname: HUSEN
Student Number: 2039211	Supervisor: MR. BIRAJ DULAL
Project Title: Attendance System using Face Recognition and Detection	Date: 07-Dec-2020
What have you done since the last meeting	
<ul style="list-style-type: none"> Completed artefact design Worked on sprint 1 user management system started. 	
What do you aim to complete before the next meeting	
<ul style="list-style-type: none"> Continue working on system. 	
Supervisor comments	
<ul style="list-style-type: none"> The SRS and Use case seems good and well detailed. Carry on with your project further 	

We confirm that the information given in this form is true, complete and accurate.

Student Signature: Jamir Husen

Date: 07/12/2020

Supervisor Signature: [Signature]

Date: 07/12/2020

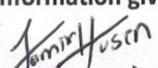
Figure 100: Meeting - 8th

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PROJECT MANAGEMENT LOG	
First Name: SAMIR	Surname: HUSEN
Student Number: 2039211	Supervisor: MR. BIRAJ DULAL
Project Title: Attendance System using Face Recognition and Detection	Date: 17-Jan-2021
What have you done since the last meeting	
<ul style="list-style-type: none"> Admin functions almost completed. 	
What do you aim to complete before the next meeting	
<ul style="list-style-type: none"> Continue working on system. Work on professionalism report. Complete dashboard for all actors. 	
Supervisor comments	
<ul style="list-style-type: none"> Add block and unblock functionality for all actor's teacher, students, and student service staff. Add function which redirects user to update password section when user logs in for first time in system. 	

We confirm that the information given in this form is true, complete and accurate.

Student Signature: 

Date: 17/01/2021

Supervisor Signature: 

Date: 17/01/2021

Figure 101: Meeting - 9th

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PROJECT MANAGEMENT LOG

First Name: SAMIR

Surname: HUSEN

Student Number: 2039211

Supervisor: MR. BIRAJ DULAL

Project Title: Attendance System using Face
Recognition and Detection

Date: 15-Feb-2021

What have you done since the last meeting

- Admin task almost completed.
- Created login system and dashboard for all actors.

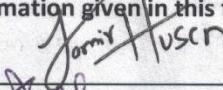
What do you aim to complete before the next meeting

- Start next artefact (face detection and recognition system)

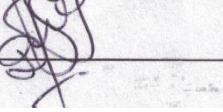
Supervisor comments

- Student service staffs should be able to view the attendance report of each student present on system.
- Work on next artefact (face detection and recognition system).

We confirm that the information given in this form is true, complete and accurate.

Student Signature: 

Date: 15/02/2021

Supervisor Signature: 

Date: 15/02/2021

Figure 102: Meeting - 10th

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PROJECT MANAGEMENT LOG	
First Name: SAMIR	Surname: HUSEN
Student Number: 2039211	Supervisor: MR. BIRAJ DULAL
Project Title: Attendance System using Face Recognition and Detection	Date: 08-Mar-2021
What have you done since the last meeting	
<ul style="list-style-type: none"> Session year added for students. Teacher functionally – Take attendance, Update and View attendance, Feedback and reply feedback message, Apply for leave. 	
What do you aim to complete before the next meeting	
<ul style="list-style-type: none"> Student able to view their own attendance. Reset password functionality. Student dashboard. 	
Supervisor comments	
Report (Professional Report – 25%) <ul style="list-style-type: none"> Social issue looks good no change needed. In Ethical issues, make points more relatable to system (Personal Privacy and Equality act) also remove hacking point because it is not relatable to system. Legal issues also relate to system. Security looks goods no change needed. 	
System: <ul style="list-style-type: none"> Import student's attendance according to course (BIT and BBA) Forget / Reset password option for all users. Redirect user to the reset password panel when logins for first time. Delete and block function for all users. 	

We confirm that the information given in this form is true, complete and accurate.

Student Signature:

Date: 08/03/2021

Supervisor Signature:

Date: 08/03/2021

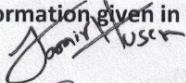
Figure 103: Meeting - 11th

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PROJECT MANAGEMENT LOG	
First Name: SAMIR	Surname: HUSEN
Student Number: 2039211	Supervisor: MR. BIRAJ DULAL
Project Title: Attendance System using Face Recognition and Detection	Date: 15-Mar-2021
What have you done since the last meeting <ul style="list-style-type: none"> • Password Reset option for all users. • Fetch students with the subjects and session year. 	
What do you aim to complete before the next meeting <ul style="list-style-type: none"> • Students view their own attendance. • Some basic template changes. • Student leave apply and feedback. • Admin check email availability for users during adding students. • Admin view attendance, Approve and disapprove leave permission and Reply feedbacks. 	
Supervisor comments <ul style="list-style-type: none"> • Work on system which will be able take attendance of student. • Recognizer able to mark student present. • Result in (csv) format. • Teachers approve (Student Leave). 	

We confirm that the information given in this form is true, complete and accurate.

Student Signature: 

Date: 15/03/2021

Supervisor Signature: 

Date: 15/03/2021

Figure 104: Meeting - 12th

- Online Meetings:

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PROJECT MANAGEMENT LOG	
First Name: SAMIR	Surname: HUSEN
Student Number: 2039211	Supervisor: MR. BIRAJ DULAL
Project Title: Attendance System using Face Recognition and Detection	Date: 04-Apr-2021
What have you done since the last meeting	
<ul style="list-style-type: none"> Students view their own attendance. Some basic template changes. Student leave apply and feedback. Admin check email availability for users during adding students. Admin view attendance, Approve and disapprove leave permission and Reply feedbacks (for both teachers and students) Edit profile option for all users. Dashboard for students and teachers. 	
What do you aim to complete before the next meeting	
<ul style="list-style-type: none"> Work further on system. Complete FYP draft report. 	
Supervisor comments	
System: <ul style="list-style-type: none"> Work on recognition part. Result in csv format. 	
Report: <ul style="list-style-type: none"> Explain why the methodology is used and relate it to system development process. In AI part of report confusion matrix, ROC curve and model evaluation should be done. Testing should be separated for each artefact and use the testing approach chosen. 	

We confirm that the information given in this form is true, complete and accurate.

Student Signature: Samir Husen

Date: 4th Apr 2021

Supervisor Signature: Biraj Dulal

Date 4th Apr 2021

Figure 105: Meeting - 13th

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PROJECT MANAGEMENT LOG	
First Name: SAMIR	Surname: HUSEN
Student Number: 2039211	Supervisor: MR. BIRAJ DULAL
Project Title: Attendance System using Face Recognition and Detection	Date: 21-Apr-2021
<p>What have you done since the last meeting</p> <ul style="list-style-type: none"> • Home page for admin • Add and edit result in system for teachers. • Student View Result in their dashboard 	
<p>What do you aim to complete before the next meeting</p> <ul style="list-style-type: none"> • Complete whole system. • Complete Main Report and Professionalism Report. 	
<p>Supervisor comments</p> <ul style="list-style-type: none"> • Grading system in result function. • Add the missing aspects in report. • Work further on system. 	

We confirm that the information given in this form is true, complete, and accurate.

Student Signature: Samir Husen

Date: 21st Apr 2021

Supervisor Signature: Biraj Dulal

Date: 21st Apr 2021

Figure 106: Meeting - 14th

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School of Mathematics and Computer Science



PROJECT MANAGEMENT LOG	
First Name: SAMIR	Surname: HUSEN
Student Number: 2039211	Supervisor: MR. BIRAJ DULAL
Project Title: Attendance System using Face Recognition and Detection	Date: 03-May-2021
What have you done since the last meeting	
<ul style="list-style-type: none"> • Register function for all actors (Teacher, Student and Student Service Staff) • Student View Result • Face Recognition System for attendance completed. • Student Service Staff Dashboard, View feedback of students and Attendance Report 	
What do you aim to complete before the next meeting	
<ul style="list-style-type: none"> • Complete whole system. • Complete Main Report and Professionalism Report. 	
Supervisor comments	
<ul style="list-style-type: none"> • System is almost completed. • Add (csv) load option in the face recognition system. • Add Testing and screen shot below of the system. • Complete report. 	

We confirm that the information given in this form is true, complete, and accurate.

Student Signature: Samir Husen

Date: 3rd May 2021

Supervisor Signature: Biraj Dulal

Date: 3rd May 2021

Figure 107: Meeting - 15th

8.2 Gantt Chart

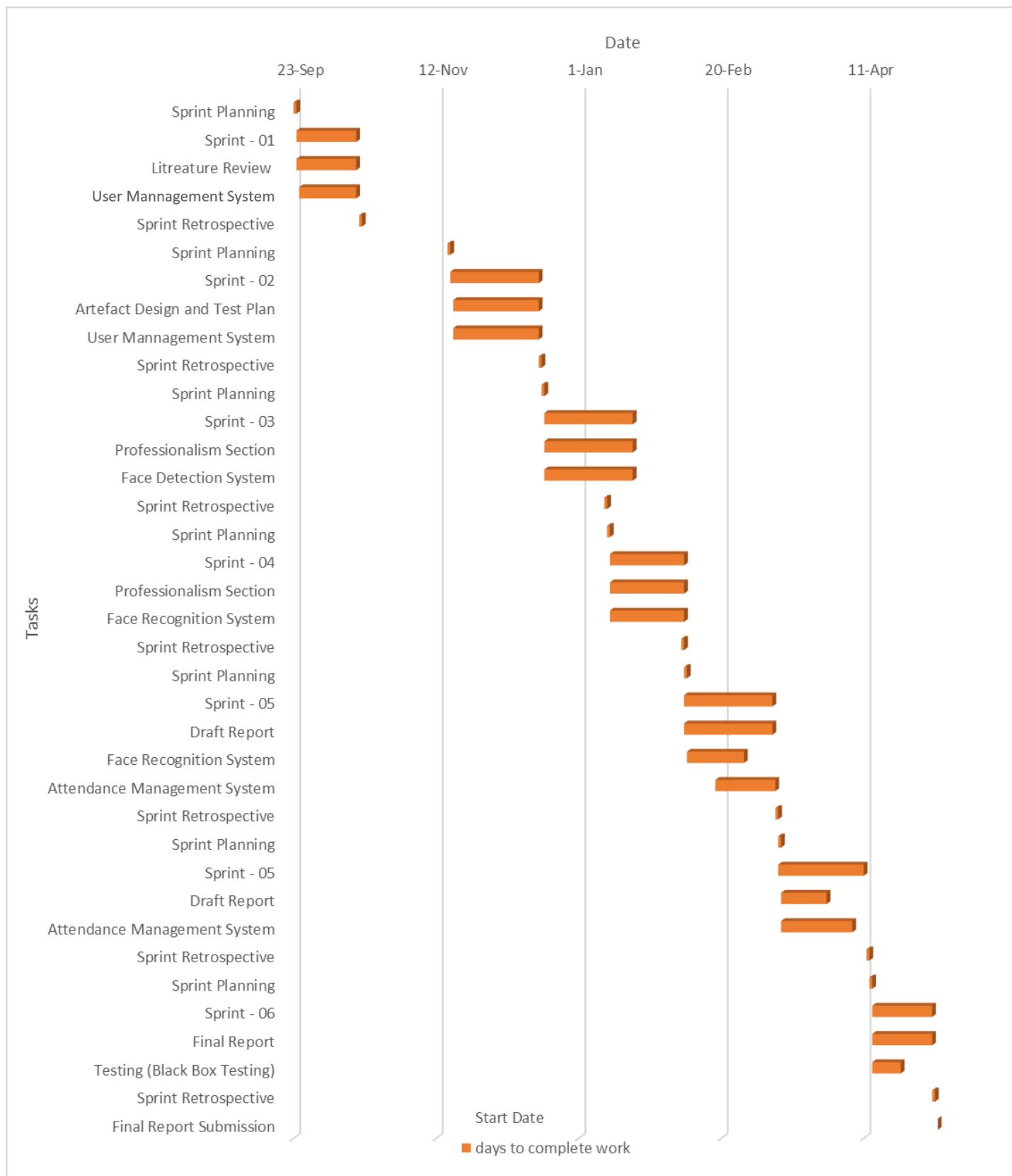


Figure 108: Gantt Chart

CHAPTER NINE: REFERENCES AND BIBLIOGRAPHY

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CHAPTER TEN: APPENDICES

10.1 Client or potential end users

The Attendance System is being developed for tracking attendance record of students. The main purpose of this system is to take attendance and it is only possible where there are large number of students. Therefore, Colleges and Schools are supposed to be my client. This system will only benefit them. They can also use it for staff attendance at the same time while the student attendance has been taken. After the deployment, the clone of system will be divided into all the classrooms.

10.2 Cost estimation document

The table below will finalize the cost of final product in the context of Nepal:

SN	Job / Tool	Duration	Quantity	Cost in (NRs.)
1.	Developer <ul style="list-style-type: none"> - Machine learning Engineer - Python Developer - Front End Developer - Project Manager 	3 months	Four	180,000 180,000 105,000 150,000
2.	Laptop – High End Specification	n/a	Four	500,000
3.	Server	1 year (Compulsory)	One	2000
4.	Jira Project Management tool subscription	4 months	n/a	\$35 Per Month 16556.40
5.	Office or Setup rent	4 months	One	100,000
Total Estimated Cost				Rs.12,33,556

10.3 System configuration

Below are some packages which should be installed:

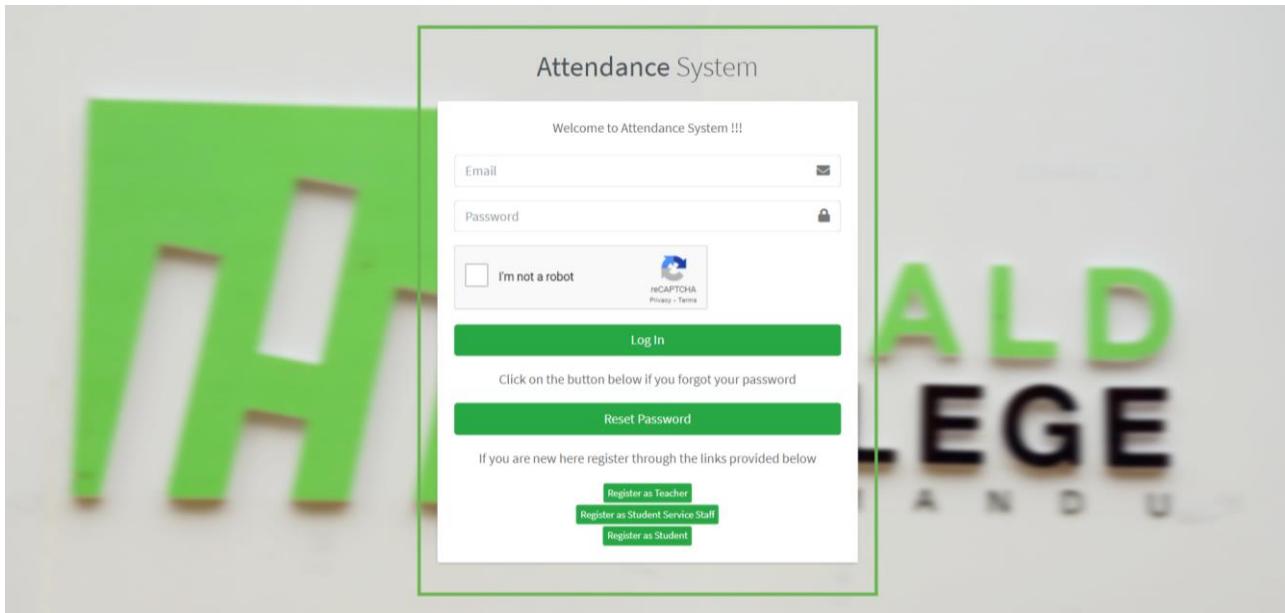
SN	Package	Version
1.	Python	3.9.2
2.	OpenCV	4.5.1
3.	OpenCV-python	4.5.1.48
4.	NumPy	1.20.1
5.	Django	3.1.7
6.	Dlib	19.21.1
7.	face_recognition	1.3.0
8.	Mysql-client	0.0.1
9.	mysqlclient	2.0.3
10.	pandas	1.2.4
11.	pillow	8.1.1

IDE – PyCharm Community Edition 2020.3.3

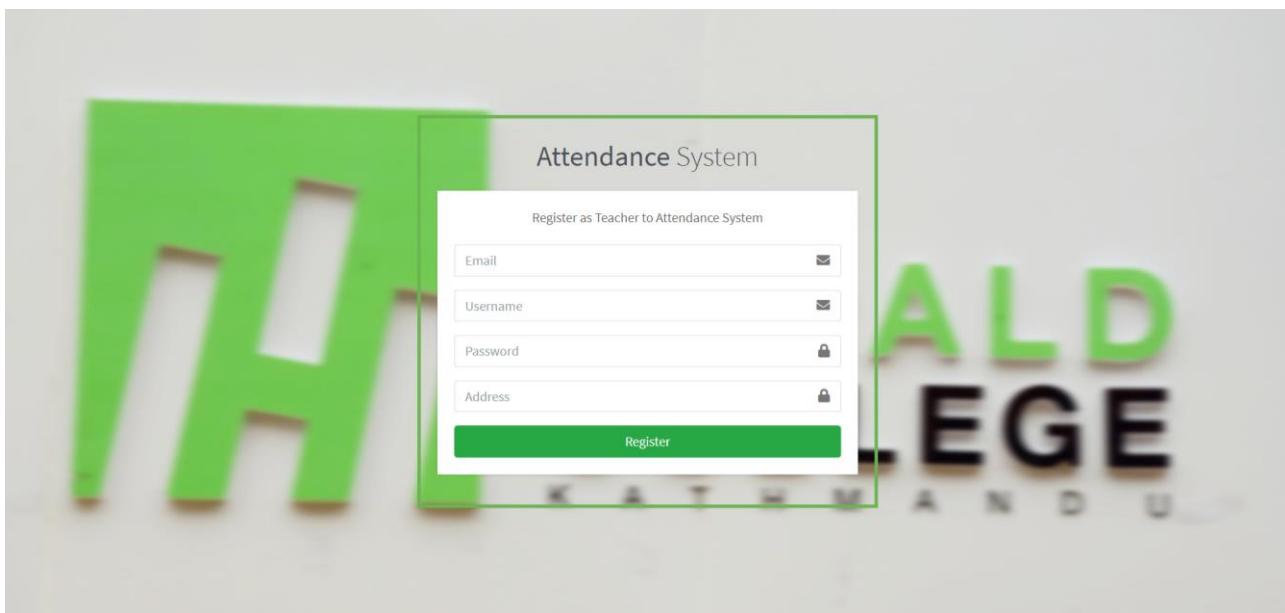
Database – MySQL 8.0

10.4 User manual of system

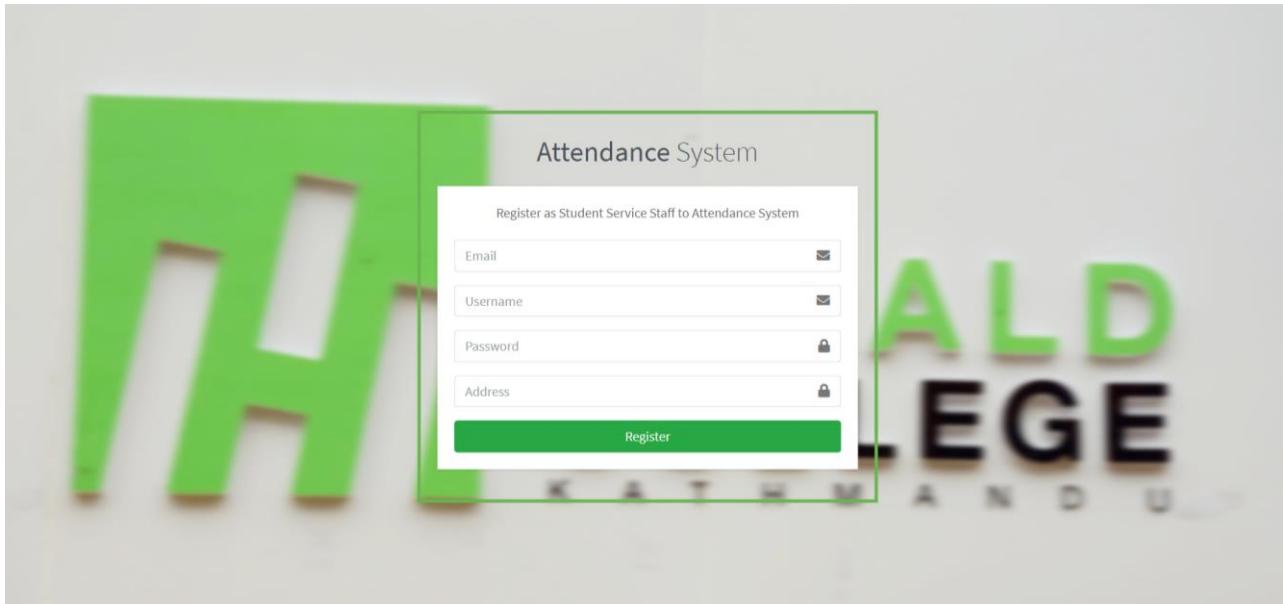
- Login page for all users:



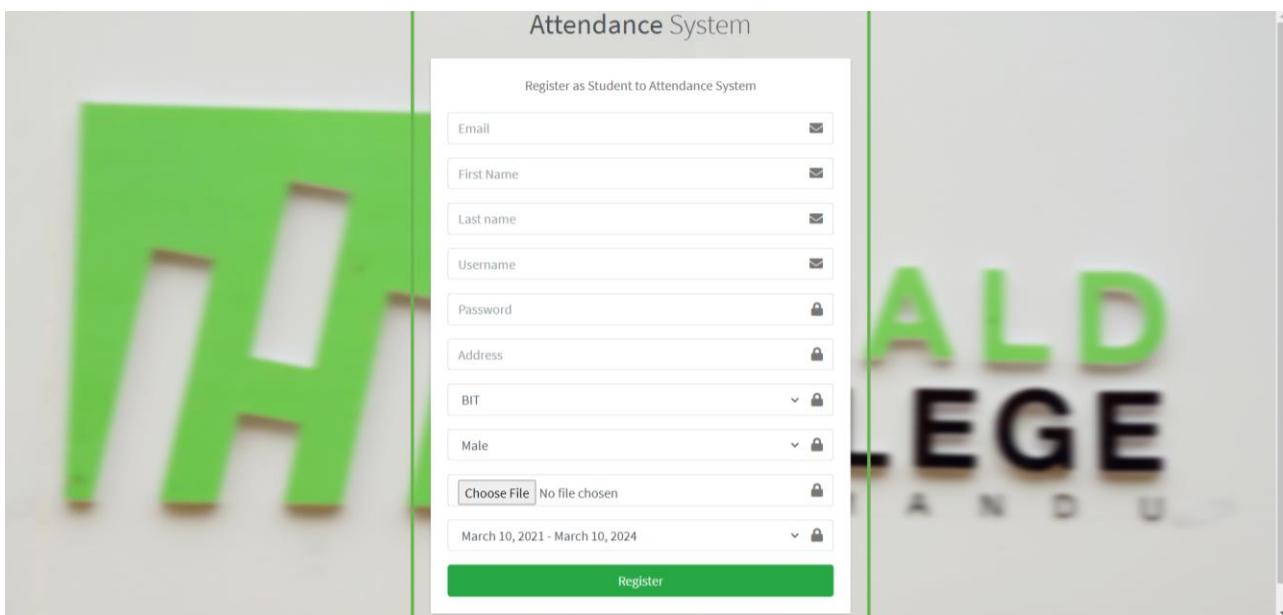
- Register as teacher:



- Register as Student Service Staff:



- Register as Student:



- Reset Password for all users:

Attendance System

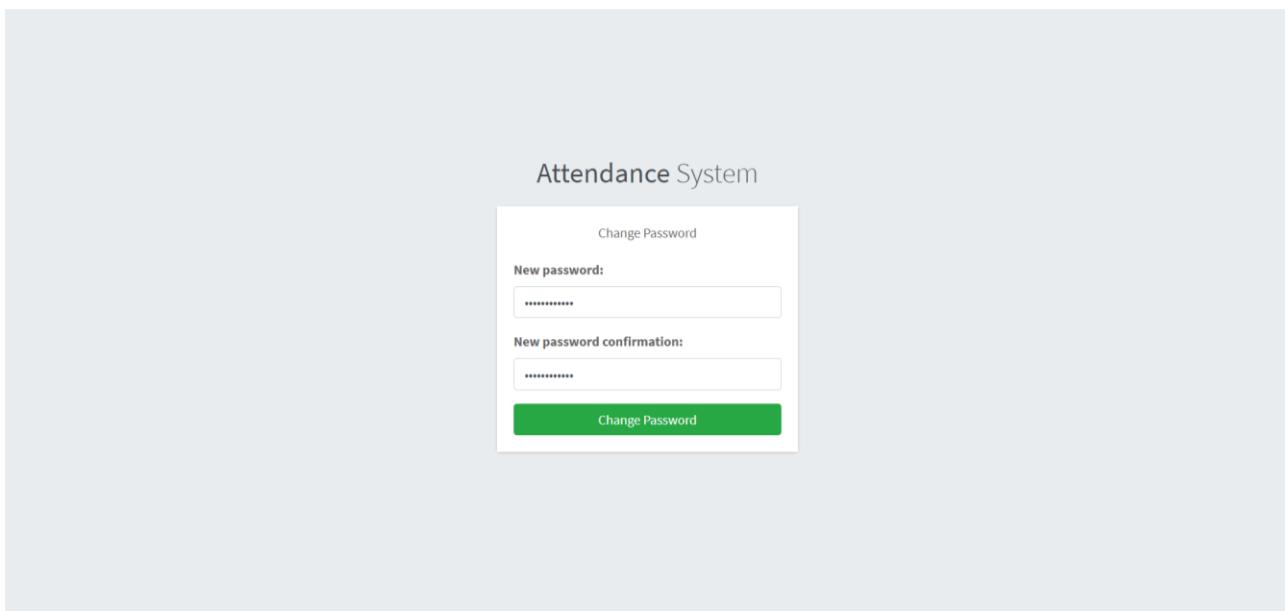
Forgot Password

Email:

Submit

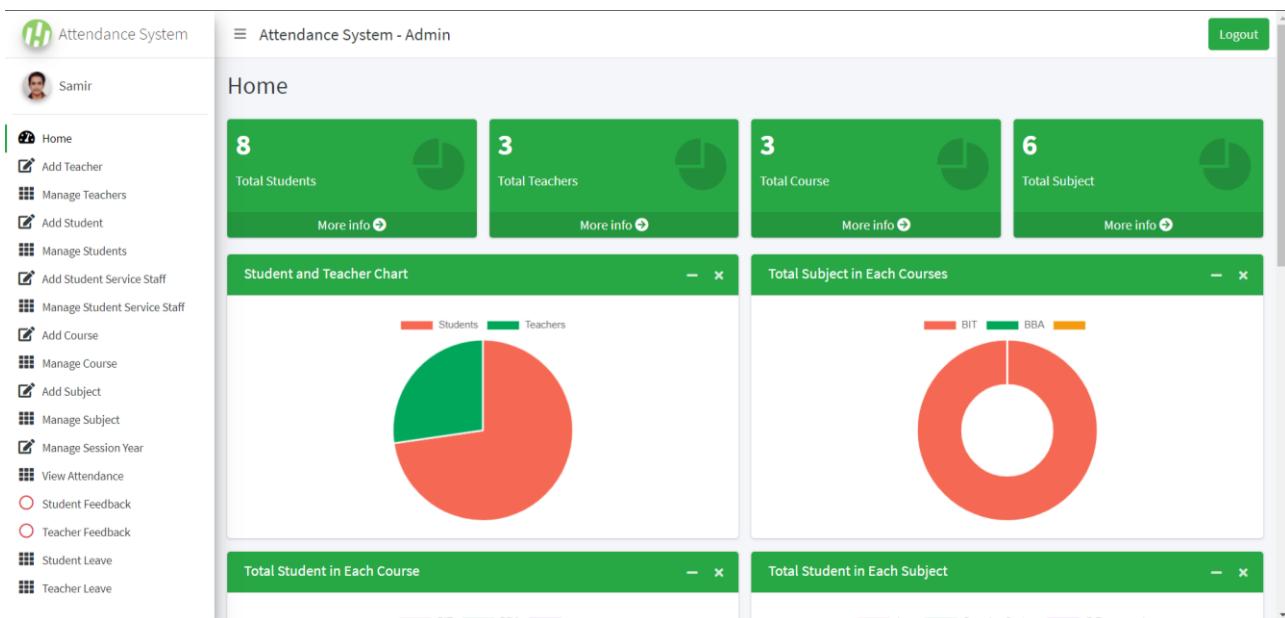
Attendance System

We've Emailed you Instruction to Reset Password if Account Exists with Email You Will Received Password Reset Instruction on Your Email



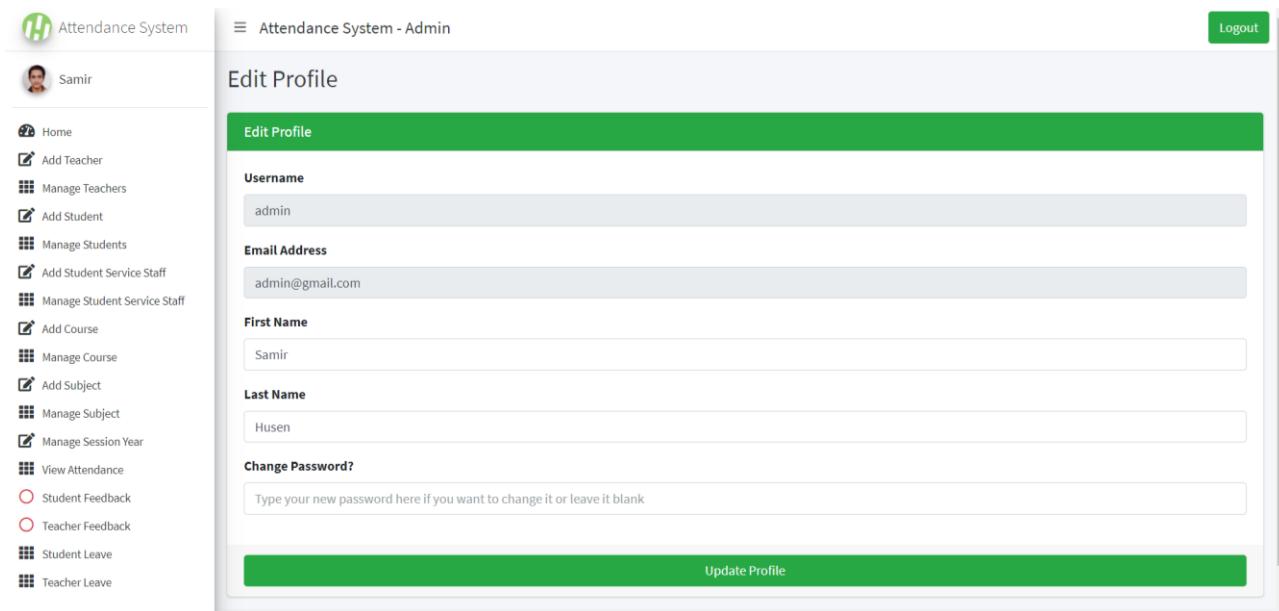
10.4.1 Admin Manual

- Dashboard:



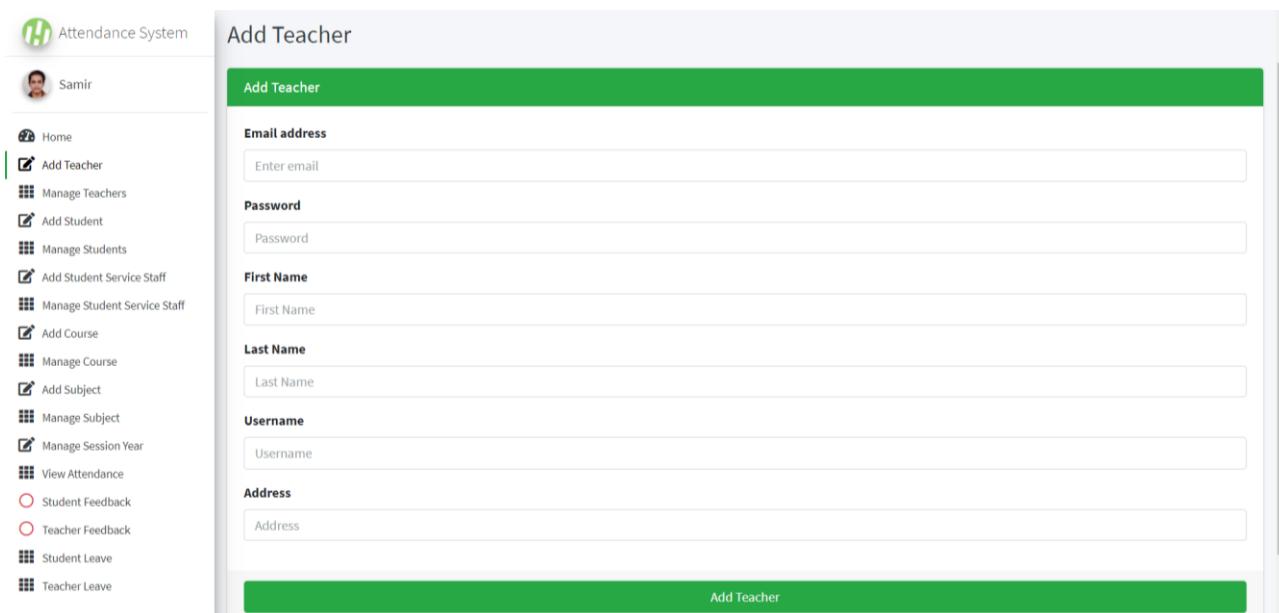
The dashboard features a sidebar with user info ('Samir') and a list of management functions. The main area displays four cards: 'Total Students' (8), 'Total Teachers' (3), 'Total Course' (3), and 'Total Subject' (6). Below these are two donut charts: 'Student and Teacher Chart' (Students: red, Teachers: green) and 'Total Subject in Each Courses' (BIT: red, BBA: green, others: orange). At the bottom are two more charts: 'Total Student in Each Course' (DIT: red, DDA: green, others: purple) and 'Total Student in Each Subject' (IT: red, Computer Science: green, others: orange).

- Edit Profile details:



The screenshot shows the 'Edit Profile' page of the Attendance System. The left sidebar shows a navigation menu with options like Home, Add Teacher, Manage Teachers, etc. The main area has a green header 'Edit Profile'. It contains fields for Username (admin), Email Address (admin@gmail.com), First Name (Samir), Last Name (Husen), and a Change Password? field with placeholder text 'Type your new password here if you want to change it or leave it blank'. A green 'Update Profile' button is at the bottom.

- Add teacher:



The screenshot shows the 'Add Teacher' page of the Attendance System. The left sidebar shows a navigation menu with options like Home, Add Teacher, Manage Teachers, etc. The main area has a green header 'Add Teacher'. It contains fields for Email address (Enter email), Password (Password), First Name (First Name), Last Name (Last Name), Username (Username), and Address (Address). A green 'Add Teacher' button is at the bottom.

- Manage Teacher:

ID	First Name	Last Name	User Name	Email	Address	Last Login	Date Joined	Action
2	Sachin	Kafle	teacher1	teacher@gmail.com	Baneshwor	May 5, 2021, 6:41 a.m.	March 10, 2021, 5:24 p.m.	<button>Edit</button>
13	Rupak	Koirala	teacher2	teacher1@gmail.com	Thamel	April 1, 2021, 12:03 p.m.	March 29, 2021, 8:52 p.m.	<button>Edit</button>
19	Biraj	Dulal	teacher5	teacher5@gmail.com	Bagbazar	None	April 27, 2021, 11:05 a.m.	<button>Edit</button>

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- Edit Teacher:

- Add Student:

Attendance System - Admin

Add Student

Email:

Password:

First Name:

Last Name:

Username:

Address:

Course:

Logout

Attendance System

Username:

Address:

Course:

Sex:

Session Year:

Frontal Face Image of Student: No file chosen

Add Student

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Version 1.0.1

- Manage Student:

Attendance System - Admin

Logout

Manage Student

Student Details									Search	Course
ID	First Name	Last Name	User Name	Email	Address	Gender	Student Face Image	Session Year		
5	Samir	Husen	Samir Husen	saw.mendes.meer@gmail.com	Balaju	Male		March 10, 2021 To March 10, 2024	BIT	
6	Elon	Musk	Elon Musk	student1@gmail.com	Lalitpur	Male		March 10, 2021 To March 10, 2024	BIT	
7	Eric	Joshi	student2	student2@gmail.com	Gwarko	Male		March 10, 2021 To March 10, 2024	BIT	
8	Karma	Dolma	student3	student3@gmail.com	Kalanki	Female		March 10, 2021 To March 10, 2024	BIT	

Attendance System - Admin

Logout

Manage Student

Student Details									Search	Action
	Address	Gender	Student Face Image	Session Year	Course	Last Login	Date Joined			
5	saw.mendes.meer@gmail.com	Balaju		March 10, 2021 To March 10, 2024	BIT	May 5, 2021, 6:46 a.m.	March 10, 2021, 6:11 p.m.	<button>Edit</button>		
6	student1@gmail.com	Lalitpur		March 10, 2021 To March 10, 2024	BIT	March 23, 2021, 12:38 p.m.	March 18, 2021, 3:25 p.m.	<button>Edit</button>		
7	student2@gmail.com	Gwarko		March 10, 2021 To March 10, 2024	BIT	April 1, 2021, 11:58 a.m.	March 18, 2021, 3:40 p.m.	<button>Edit</button>		
8	student3@gmail.com	Kalanki		March 10, 2021 To March 10, 2024	BIT	April 1, 2021, 11:59 a.m.	March 18, 2021, 3:41 p.m.	<button>Edit</button>		

- Edit Student:

The screenshot shows the 'Edit Student' page of the Attendance System. At the top, it displays 'Edit Student | Username : Samir Husen | ID : 5'. The left sidebar shows a navigation menu with options like Home, Add Teacher, Manage Teachers, Add Student, Manage Students, Add Student Service Staff, Manage Student Service Staff, Add Course, Manage Course, Add Subject, Manage Subject, Manage Session Year, View Attendance, Student Feedback, Teacher Feedback, Student Leave, and Teacher Leave. The 'Add Student' option is highlighted with a green vertical bar. The main form contains fields for Email (saw.mendes.meer@gmail.com), First Name (Samir), Last Name (Husen), Username (Samir Husen), Address (Balaju), Course (BIT), and Sex (Male). A 'Logout' button is located at the top right.

This screenshot shows the same 'Edit Student' page as above, but with more fields filled in. The 'Username' field now contains 'Husen'. The 'Session Year' dropdown is set to '2021-03-10 TO 2024-03-10'. A new section labeled 'Frontal Face Image of Student:' includes a 'Choose File' button and a placeholder 'No file chosen'. The 'Edit Student' button is visible at the bottom of the form. The left sidebar and overall layout are identical to the first screenshot.

- Add Student Service Staff:

Attendance System - Admin

Add Student Service Staff

Email address
Enter email

Password
Password

First Name
First Name

Last Name
Last Name

Username
Username

Address
Address

Logout

- Manage Student Service Staff:

Attendance System - Admin

Manage Student Service Staff

ID	First Name	Last Name	User Name	Email	Address	Last Login	Date Joined	Action
10	Staff	Staff	staff0	staff@gmail.com	Koteshwor	April 11, 2021, 4:14 a.m.	March 23, 2021, 5:48 a.m.	<button>Edit</button>
11	Staff	One	staff1	staff1@gmail.com	Bhaktapur	March 30, 2021, 2 p.m.	March 29, 2021, 5:02 a.m.	<button>Edit</button>
20	Staff	Three	staff6	staff6@gmail.com	Lalitpur	May 5, 2021, 6:48 a.m.	April 27, 2021, 2:41 p.m.	<button>Edit</button>
22	Staff	Seven	staff7	staff7@gmail.com	Kalimati	None	April 28, 2021, 1:59 p.m.	<button>Edit</button>
23	Staff	Eight	staff8	staff8@gmail.com	Bagbazar	None	April 28, 2021, 2:03 p.m.	<button>Edit</button>

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Version 1.0.1

- Edit Student Service Staff:

Attendance System - Admin

Edit Student Service Staff | Username : staff0 | ID : 10

Edit Student Service Staff

Email address
staff@gmail.com

First Name
Staff

Last Name
Staff

Username
staff0

Address
Koteshwor

Save Student Service Staff

- Add Course:

Attendance System - Admin

Add Course

Add Course

Course Name
Enter Course

Add Course

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Version 1.0.1

- Manage Course:

The screenshot shows the 'Manage Course' section of the Attendance System. On the left, a sidebar menu lists various administrative functions. The 'Manage Course' option is highlighted with a green vertical bar. The main content area displays a table titled 'Course Details' with three rows of course information. Each row includes an 'Edit' button.

ID	Course Name	Action
1	BIT	Edit
2	BBA	Edit
3	BSc	Edit

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- Edit Course:

The screenshot shows the 'Edit Course' page. The sidebar menu on the left is identical to the previous screenshot. The main content area has a green header bar with the title 'Edit Course | Course ID : 1'. Below this, there is a form field labeled 'Course Name' containing 'BIT'. At the bottom right of the form is a green button labeled 'Save Course'.

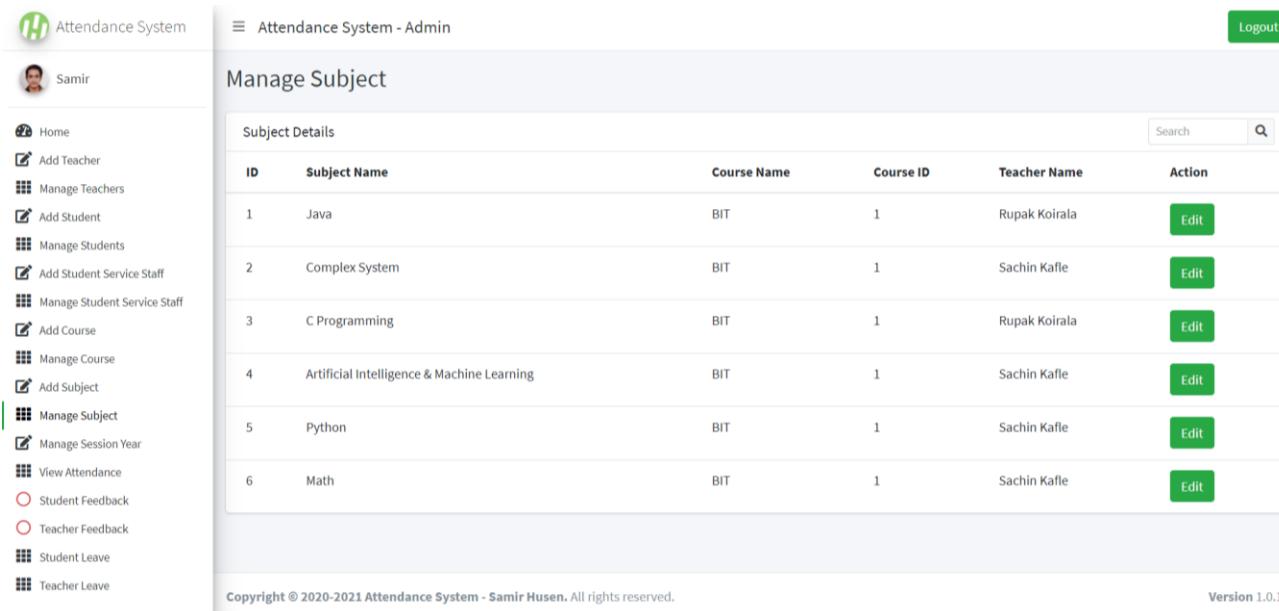
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- Add Subject:



The screenshot shows the 'Add Subject' page of the Attendance System. On the left, there is a sidebar with a user profile for 'Samir' and a list of administrative functions: Home, Add Teacher, Manage Teachers, Add Student, Manage Students, Add Student Service Staff, Manage Student Service Staff, Add Course, Manage Course, Add Subject, Manage Subject, Manage Session Year, View Attendance, Student Feedback, Teacher Feedback, Student Leave, and Teacher Leave. The main area has a green header bar with the title 'Add Subject'. Below it, there are three input fields: 'Subject Name' (placeholder 'Enter Subject'), 'Course' (dropdown menu showing 'BIT'), and 'Teacher' (dropdown menu showing 'Sachin Kafle'). At the bottom right of the form is a green button labeled 'Add Subject'.

- Manage Subject:

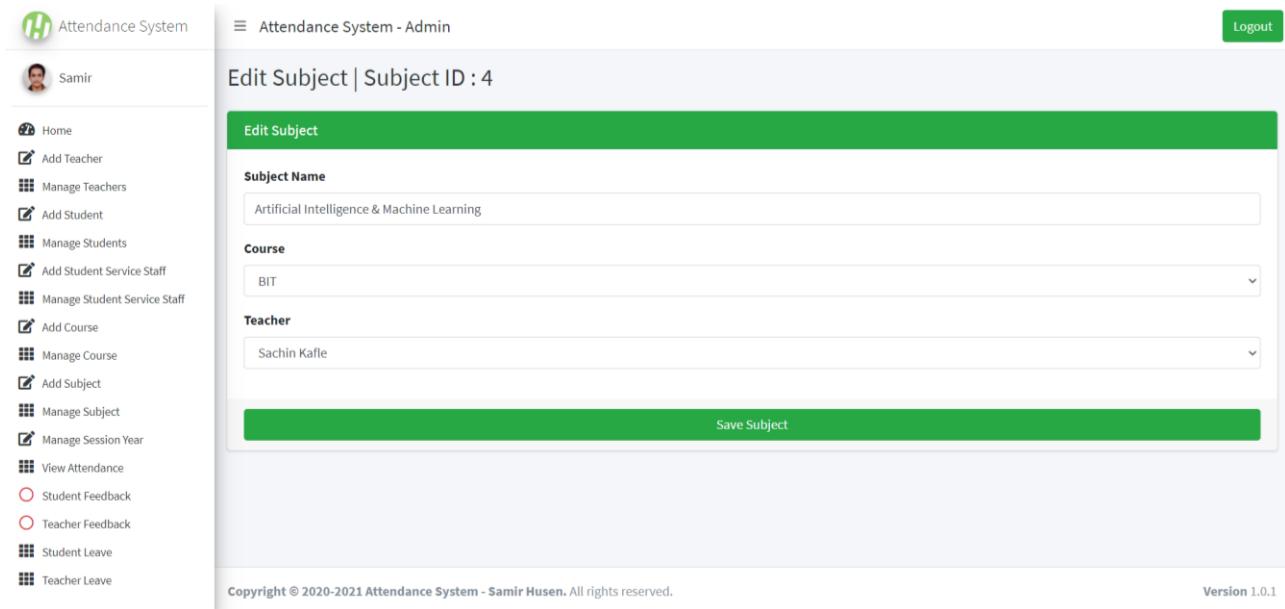


The screenshot shows the 'Manage Subject' page of the Attendance System. The sidebar is identical to the previous screenshot. The main area has a green header bar with the title 'Manage Subject'. Below it is a table titled 'Subject Details' with the following data:

ID	Subject Name	Course Name	Course ID	Teacher Name	Action
1	Java	BIT	1	Rupak Koirala	<button>Edit</button>
2	Complex System	BIT	1	Sachin Kafle	<button>Edit</button>
3	C Programming	BIT	1	Rupak Koirala	<button>Edit</button>
4	Artificial Intelligence & Machine Learning	BIT	1	Sachin Kafle	<button>Edit</button>
5	Python	BIT	1	Sachin Kafle	<button>Edit</button>
6	Math	BIT	1	Sachin Kafle	<button>Edit</button>

At the bottom of the page, there is a copyright notice 'Copyright © 2020-2021 Attendance System - Samir Husen. All rights reserved.' and a version number 'Version 1.0.1'.

- Edit Subject:



Attendance System - Admin

Edit Subject | Subject ID : 4

Edit Subject

Subject Name
Artificial Intelligence & Machine Learning

Course
BIT

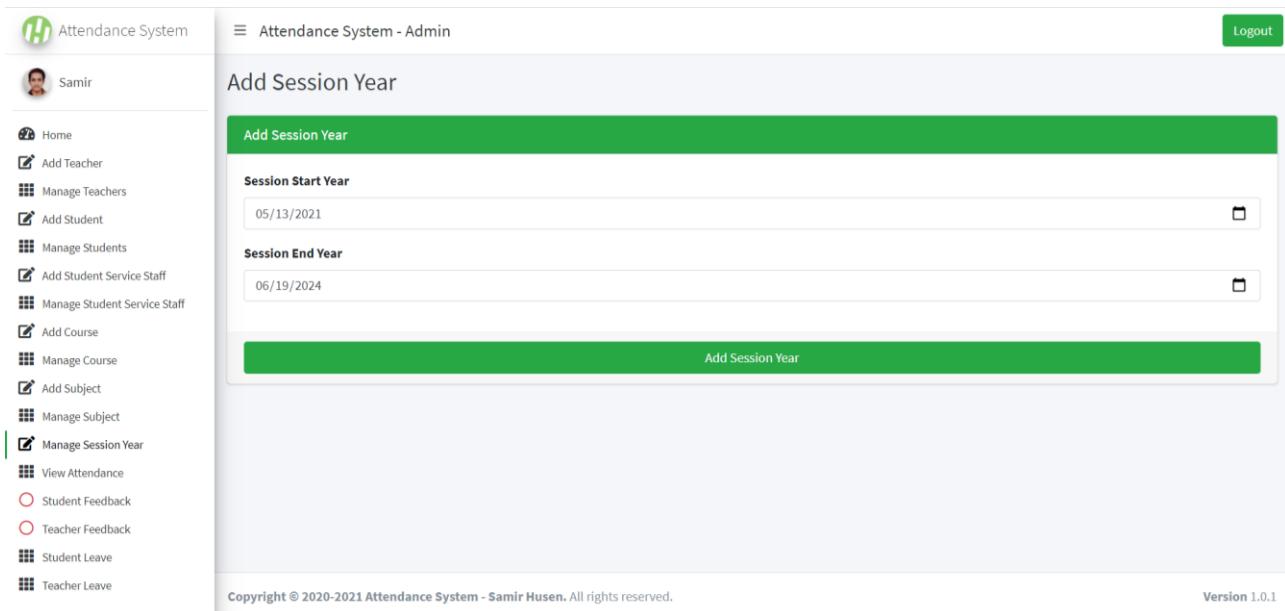
Teacher
Sachin Kafle

Save Subject

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Version 1.0.1

- Manage Session Year:



Attendance System - Admin

Add Session Year

Add Session Year

Session Start Year
05/13/2021

Session End Year
06/19/2024

Add Session Year

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Version 1.0.1

- View Attendance:

The screenshot shows the 'Attendance System - Admin' interface. On the left is a sidebar with a user profile for 'Samir' and a list of administrative functions: Home, Add Teacher, Manage Teachers, Add Student, Manage Students, Add Student Service Staff, Manage Student Service Staff, Add Course, Manage Course, Add Subject, Manage Subject, Manage Session Year, View Attendance (which is selected and highlighted in green), Student Feedback, Teacher Feedback, Student Leave, and Teacher Leave. The main content area is titled 'View Attendance' and contains fields for 'Subject' (set to 'Java') and 'Session Year' (set to 'March 10, 2021 TO March 10, 2024'). A large green button labeled 'Fetch Attendance Date' is centered below these fields. At the bottom of the page, there is a copyright notice 'Copyright © 2020-2021 Attendance System - Samir Husen. All rights reserved.' and a 'Version 1.0.1' link.

This screenshot shows the same 'View Attendance' page as above, but it includes student attendance data. Below the 'Fetch Attendance Date' button, there is a section titled 'Attendance Date' with a dropdown menu set to '2021-04-01'. Below this is another green button labeled 'Fetch Student Data'. The main content area now displays a table titled 'Student Attendance :'. It lists five students with their attendance status: Samir Husen [Absent], Elon Musk [Present], Eric Joshi [Present], Biraj Dulal [Present], Shiwani Jha [Present], Pankaj Shah [Present], and Karma Dolma [Present]. The bottom of the page includes the same copyright and version information as the first screenshot.

- Student Feedback:

The screenshot shows the 'Attendance System - Admin' interface. On the left is a sidebar with a user profile for 'Samir' and a list of administrative functions. The main area is titled 'Student Feedback' and displays a table of messages. The table has columns for ID, Student ID, Student Name, Student Session, Message, Sented On, and Reply. The first message is from 'Samir Husen' with the message 'I have good grades.' and a reply button. The second message is from 'Samir Husen' with the message 'Hello' and a reply button. The third message is from 'Samir Husen' with the message 'March 10, 2021 - March 10, 2024' and a reply button.

ID	Student ID	Student Name	Student Session	Message	Sended On	Reply
1	5	Samir Husen	March 10, 2021 - March 10, 2024	I have good grades.	March 29, 2021, 5:38 p.m.	<button>Reply</button>
2	5	Samir Husen	March 10, 2021 - March 10, 2024	Hello	March 29, 2021, 9:40 p.m.	<button>Reply</button>
3	5	Samir Husen	March 10, 2021 - March 10, 2024		May 5, 2021, 6:48 a.m.	<button>Reply</button>

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This screenshot shows the same interface as above, but with a modal window open over the 'Student Feedback' table. The modal is titled 'Reply' and has a sub-header 'Reply To : Samir Husen'. It contains a large text input field and a blue 'Reply' button at the bottom right. The background table remains visible, showing the three messages listed earlier.

- Teacher Feedback:

The screenshot shows the 'Teacher Feedback' section of the Attendance System. On the left is a sidebar with navigation links. The main area displays a table of messages from a teacher named Sachin Kafle.

ID	Teacher ID	Teacher Name	Message	Sended On	Reply
1	2	Sachin Kafle	Hey	March 11, 2021, 1:08 p.m.	Okay
2	2	Sachin Kafle	Your attendance is very low.	March 11, 2021, 1:11 p.m.	<button>Reply</button>
4	2	Sachin Kafle	Provide me feedback	April 28, 2021, 1:54 p.m.	<button>Reply</button>
5	2	Sachin Kafle		May 5, 2021, 6:45 a.m.	<button>Reply</button>

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A modal window titled 'Reply' is open, showing a message field and a 'Reply' button. The message field contains 'Reply To : Sachin Kafle'. The background shows the same 'Teacher Feedback' table as the previous screenshot.

- Student Leave:

The screenshot shows the 'Attendance System - Admin' interface. On the left, there's a sidebar with a user profile for 'Samir' and a list of administrative functions: Home, Add Teacher, Manage Teachers, Add Student, Manage Students, Add Student Service Staff, Manage Student Service Staff, Add Course, Manage Course, Add Subject, Manage Subject, Manage Session Year, View Attendance, Student Feedback, Teacher Feedback, Student Leave, and Teacher Leave. The 'Student Leave' option is highlighted with a green border.

The main content area is titled 'Student Apply for Leave'. It displays a table of leave applications:

ID	Student ID	Student Name	Leave Date	Leave Message	Apply On	Action
1	5	Samir Husen	2021-03-02	I am sick.	March 29, 2021, 5:36 p.m.	Approved
2	5	Samir Husen	2021-03-04	I am having corona syptoms.	March 29, 2021, 5:38 p.m.	Approved
3	5	Samir Husen	2021-03-30	I am sick.	March 29, 2021, 8:50 p.m.	Approved
4	8	Karma Dolma	2021-03-19	I am having corona symptoms.	March 29, 2021, 8:50 p.m.	Disapproved
5	5	Samir Husen	2021-03-13	I am unable to attend class today.	March 29, 2021, 9:22 p.m.	Approve Disapprove
6	5	Samir Husen	2021-03-15	I am feeling sick.	May 5, 2021, 6:47 a.m.	Approve Disapprove

At the bottom of the page, there's a copyright notice: 'Copyright © 2020-2021 Attendance System - Samir Husen. All rights reserved.' and a version number: 'Version 1.0.1'.

- Teacher Leave:

The screenshot shows the 'Attendance System - Admin' interface. The sidebar and layout are identical to the previous 'Student Leave' screenshot, with the 'Teacher Leave' option highlighted in the sidebar.

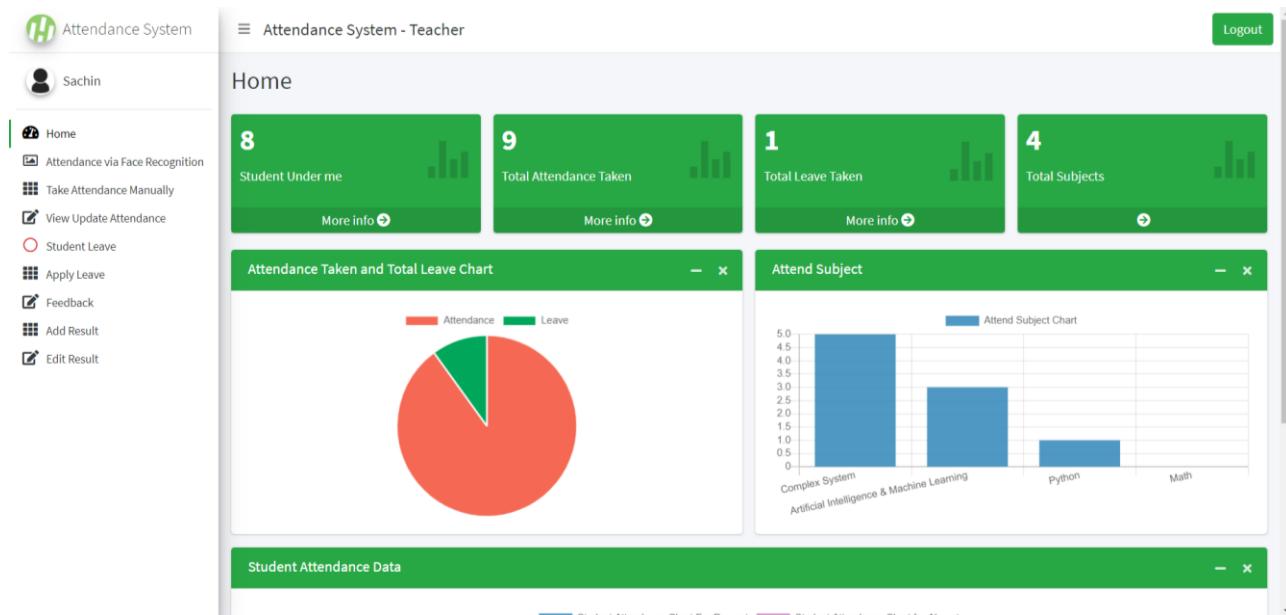
The main content area is titled 'Teacher Apply for Leave'. It displays a table of leave applications:

ID	Teacher ID	Teacher Name	Leave Date	Leave Message	Apply On	Action
1	2	Sachin Kafle	2021-03-13	I am sick.	March 11, 2021, 1:03 p.m.	Approved
2	2	Sachin Kafle	2021-03-14	I am unable to visit college today.	March 11, 2021, 1:11 p.m.	Disapproved
3	2	Sachin Kafle	2021-03-18	I am unable to attend class today.	March 29, 2021, 8:51 p.m.	Disapproved
4	13	Rupak Koirala	2021-03-19	I am sick.	March 29, 2021, 8:52 p.m.	Approved
5	2	Sachin Kafle	2021-04-01	I am unable to attend lecture today.	May 5, 2021, 6:44 a.m.	Approve Disapprove

At the bottom of the page, there's a copyright notice: 'Copyright © 2020-2021 Attendance System - Samir Husen. All rights reserved.' and a version number: 'Version 1.0.1'.

10.4.2 Teacher Manual

- Dashboard:



The dashboard displays the following information:

- Student Under me:** 8
- Total Attendance Taken:** 9
- Total Leave Taken:** 1
- Total Subjects:** 4

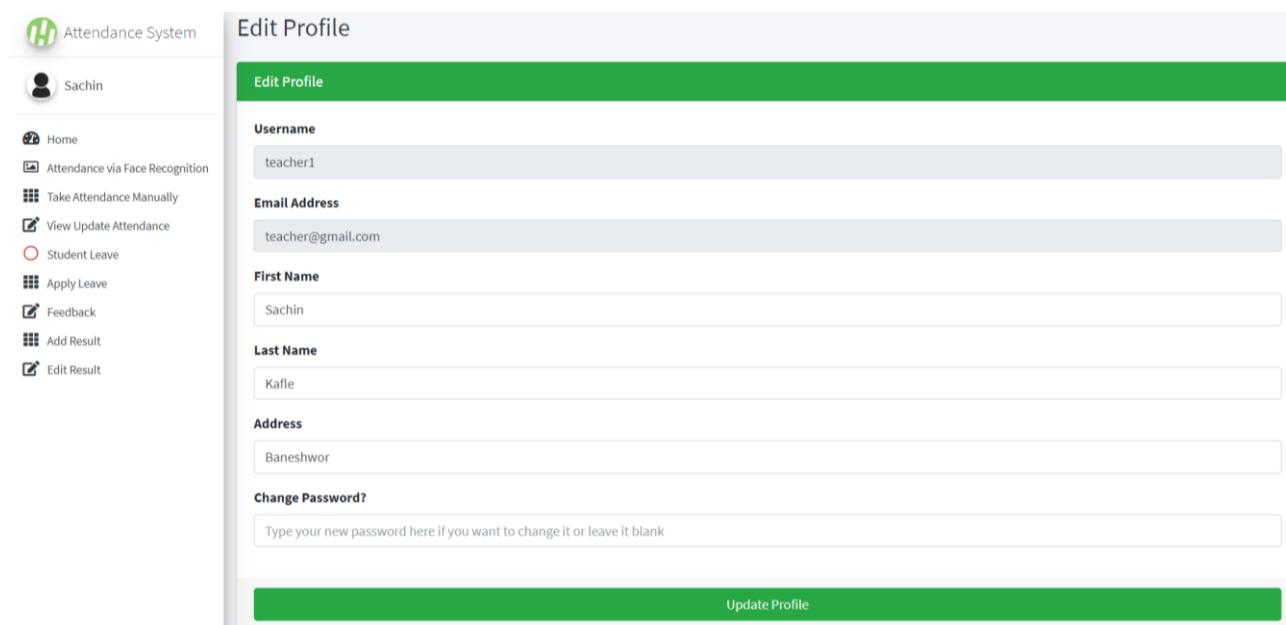
Attendance Taken and Total Leave Chart:

Category	Value
Attendance	8
Leave	1

Attend Subject:

Subject	Attendance
Complex System	5.0
Artificial Intelligence & Machine Learning	3.0
Python	0.5
Math	0.0

- Edit Profile:

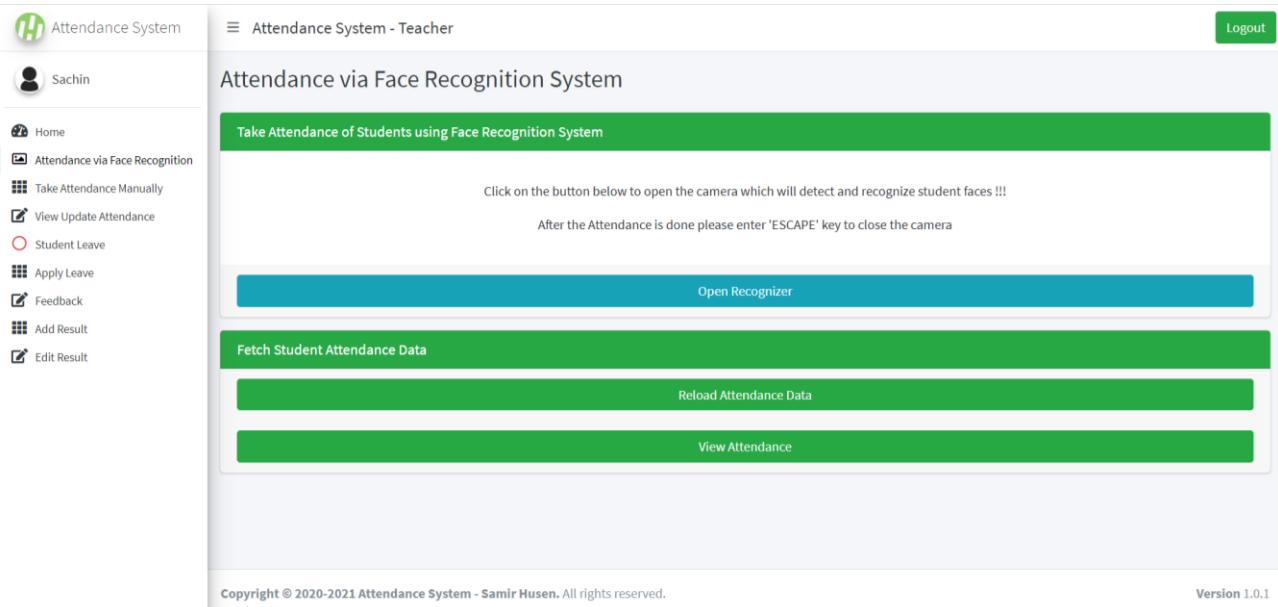


The profile edit page shows the following fields:

- Username:** teacher1
- Email Address:** teacher@gmail.com
- First Name:** Sachin
- Last Name:** Kafle
- Address:** Baneshwor
- Change Password?** Type your new password here if you want to change it or leave it blank

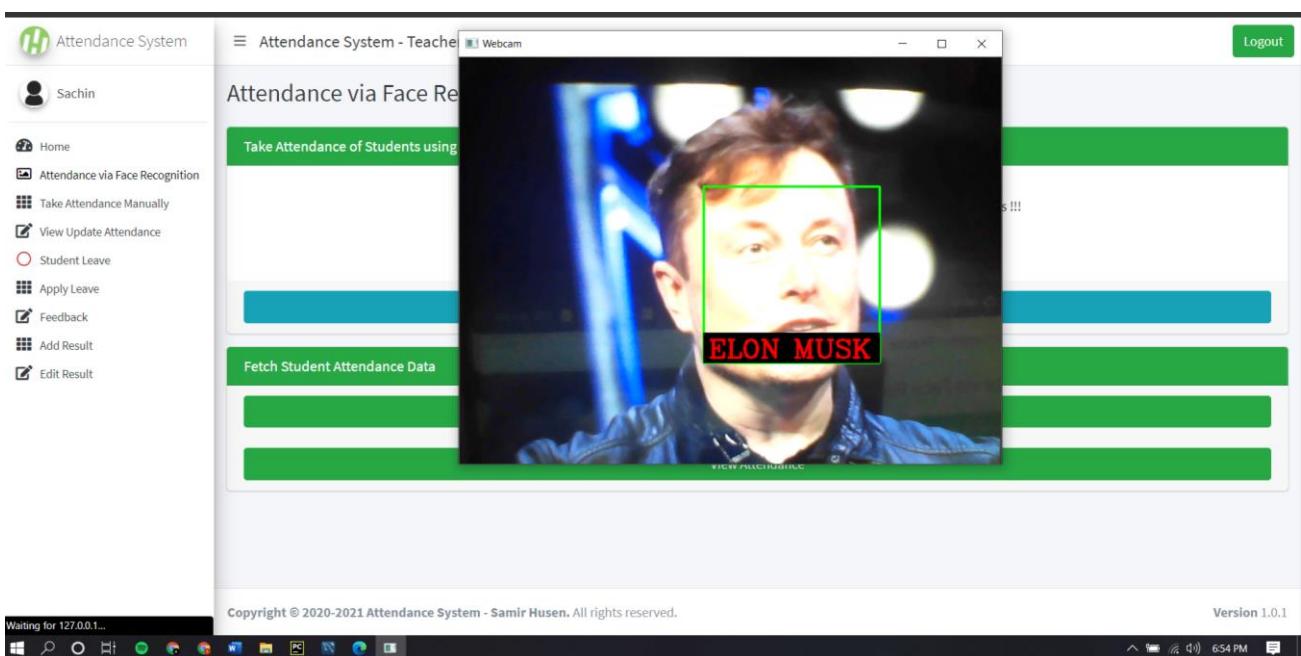
Update Profile button at the bottom.

- Attendance via Face Recognition:



The screenshot shows the 'Attendance via Face Recognition System' page. On the left, a sidebar menu includes options like Home, Attendance via Face Recognition, Take Attendance Manually, View Update Attendance, Student Leave, Apply Leave, Feedback, Add Result, and Edit Result. The main content area has a green header 'Take Attendance of Students using Face Recognition System'. Below it, instructions say 'Click on the button below to open the camera which will detect and recognize student faces !!!' and 'After the Attendance is done please enter 'ESCAPE' key to close the camera'. A large blue button labeled 'Open Recognizer' is centered. At the bottom, there are two green buttons: 'Reload Attendance Data' and 'View Attendance'.

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The screenshot shows the same 'Attendance via Face Recognition System' page. The main difference is that a video feed from a webcam is displayed in a window, showing a person's face with a green bounding box around it. The name 'ELON MUSK' is overlaid in red text at the bottom of the frame. The rest of the interface, including the sidebar and buttons, remains the same.

Waiting for 127.0.0.1... Copyright © 2020-2021 Attendance System - Samir Husen. All rights reserved. Version 1.0.1

- Take Attendance Manually:

Attendance System - Teacher

Manually Attendance

Take Attendance of Students Manually

Subject: Complex System

Session Year: March 10, 2021 TO March 10, 2024

Fetch Students

Attendance Date : 05/05/2021

Samir Husen Elon Musk Eric Joshi Karma Dolma Biraj Dulal Shiwani Jha
 Pankaj Shah Jeff Bezos

Save Attendance Data

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Version 1.0.1

- View Update Attendance:

Attendance System - Teacher

View Update Attendance

View Update Attendance

Subject: Complex System

Session Year: March 10, 2021 TO March 10, 2024

Get Attendance Data

Attendance Date : 2021-04-01

Fetch Student Data

Student Attendance :

<input checked="" type="checkbox"/> Samir Husen [Present]	<input checked="" type="checkbox"/> Elon Musk [Present]	<input checked="" type="checkbox"/> Eric Joshi [Present]	<input checked="" type="checkbox"/> Karma Dolma [Present]
<input checked="" type="checkbox"/> Biraj Dulal [Present]	<input checked="" type="checkbox"/> Shiwani Jha [Present]	<input checked="" type="checkbox"/> Pankaj Shah [Present]	

Save Attendance Data

- Student leave:

The screenshot shows the 'Attendance System - Teacher' interface. On the left is a sidebar with a user profile for 'Sachin' and links for Home, Attendance via Face Recognition, Take Attendance Manually, View Update Attendance, Student Leave (which is selected and highlighted in green), Apply Leave, Feedback, Add Result, and Edit Result. The main content area is titled 'Student Apply for Leave' and contains a table of student leave applications. The table has columns: ID, Student ID, Student Name, Leave Date, Leave Message, Apply On, and Action. The data is as follows:

ID	Student ID	Student Name	Leave Date	Leave Message	Apply On	Action
1	5	Samir Husen	2021-03-02	I am sick.	March 29, 2021, 5:36 p.m.	Approved
2	5	Samir Husen	2021-03-04	I am having corona syptoms.	March 29, 2021, 5:38 p.m.	Approved
3	5	Samir Husen	2021-03-30	I am sick.	March 29, 2021, 8:50 p.m.	Approved
4	8	Karma Dolma	2021-03-19	I am having corona symptoms.	March 29, 2021, 8:50 p.m.	Disapproved
5	5	Samir Husen	2021-03-13	I am unable to attend class today.	March 29, 2021, 9:22 p.m.	Approve Disapprove
6	5	Samir Husen	2021-03-15	I am feeling sick.	May 5, 2021, 6:47 a.m.	Approve Disapprove

At the bottom of the page, there is a copyright notice: 'Copyright © 2020-2021 Attendance System - Samir Husen. All rights reserved.' and a version number: 'Version 1.0.1'.

- Apply leave:

The screenshot shows the 'Attendance System - Teacher' interface. The sidebar is identical to the previous screenshot, with 'Student Leave' selected. The main content area is titled 'Leave Report and Apply for Leave' and contains two sections: 'Apply for Leave' and 'Leave Apply History'. The 'Apply for Leave' section includes fields for 'Leave Date' (a date input field) and 'Leave Reason' (a text area). Below these is a large green button labeled 'Apply for Leave'. The 'Leave Apply History' section contains a table of past leave applications. The table has columns: ID, Leave Date, Leave Message, and Leave Status. The data is as follows:

ID	Leave Date	Leave Message	Leave Status
1	2021-03-13	I am sick.	Approved

Attendance System

Sachin

- Home
- Attendance via Face Recognition
- Take Attendance Manually
- View Update Attendance
- Student Leave
- Apply Leave
- Feedback
- Add Result
- Edit Result

Leave Reason

Apply for Leave

Leave Apply History

ID	Leave Date	Leave Message	Leave Status
1	2021-03-13	I am sick.	Approved
2	2021-03-14	I am unable to visit college today.	Rejected
3	2021-03-18	I am unable to attend class today.	Rejected
5	2021-04-01	I am unable to attend lecture today.	Pending

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- Feedback:

Attendance System

Sachin

- Home
- Attendance via Face Recognition
- Take Attendance Manually
- View Update Attendance
- Student Leave
- Apply Leave
- Feedback
- Add Result
- Edit Result

Attendance System - Teacher

Logout

Feedback Message

Leave a Feedback Message

Feedback History

ID	Feedback Message	Feedback Reply
1	Hey	Okay
2	Your attendance is very low.	
4	Provide me feedback	

- Add Result:

The screenshot shows the 'Attendance System - Teacher' interface. On the left, a sidebar menu includes options like Home, Attendance via Face Recognition, Take Attendance Manually, View Update Attendance, Student Leave, Apply Leave, Feedback, Add Result (which is selected), and Edit Result. The main content area has a green header 'Add Results'. It contains fields for 'Subject' (Complex System) and 'Session Year' (March 10, 2021 TO March 10, 2024). A green button labeled 'Fetch Student' is present. Below this is a 'Student List' section with a dropdown showing 'ID : 5 : Samir Husen'. There are two input fields: 'Assignment Marks:' and 'Exam Marks:', both currently empty. A green 'Save Result' button is at the bottom.

- Edit Result:

The screenshot shows the 'Attendance System - Teacher' interface. The sidebar menu is identical to the previous screenshot. The main content area has a green header 'Edit Results'. It contains fields for 'Subject' (Complex System) and 'Session Year' (2021-03-10 TO 2024-03-10). A 'Student' dropdown is shown. Below these are sections for 'Assignment Marks:' and 'Exam Marks:', each with an empty input field. A green 'Update Result' button is at the bottom. At the bottom of the page, there is a copyright notice: 'Copyright © 2020-2021 Attendance System - Samir Husen. All rights reserved.' and a version number 'Version 1.0.1'.

10.4.3 Student Manual

- Dashboard:

The screenshot shows the 'Attendance System - Student' dashboard. On the left, a sidebar menu includes: Home, View Attendance, Apply for Leave, Feedback Message, and View Result. The main area displays four green summary cards: 'Total Attendance' (13), 'Absent' (2), 'Present' (11), and 'Total Subjects' (6). Below these are two charts: 'Attendance Chart' (a pie chart showing 13 total, 2 absent, and 11 present) and 'Attendance Statistics' (a bar chart comparing 'Present in Class' and 'Absent in Class' for Java, Complex System, C Programming, Artificial Intelligence & Machine Learning, Python, and Math). The bottom of the screen shows copyright information and a version number.

Attendance System - Student

Samir

Home View Attendance Apply for Leave Feedback Message View Result

Dashboard

13 Total Attendance More info ↗ 2 Absent More info ↗ 11 Present More info ↗ 6 Total Subjects

Attendance Chart

Attendance Statistics

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- Edit Profile:

The screenshot shows the 'Edit Profile' page. The sidebar menu is identical to the dashboard. The main form contains fields for Username (Samir Husen), Email Address (saw.mendes.meer@gmail.com), First Name (Samir), Last Name (Husen), and Address (Balaju). A 'Change Password?' section includes a placeholder 'Type your new password here if you want to change it or leave it blank'. At the bottom is a green 'Update Profile' button.

Attendance System

Samir

Home View Attendance Apply for Leave Feedback Message View Result

Edit Profile

Edit Profile

Username

Samir Husen

Email Address

saw.mendes.meer@gmail.com

First Name

Samir

Last Name

Husen

Address

Balaju

Change Password?

Type your new password here if you want to change it or leave it blank

Update Profile

- View Attendance:

Attendance System

Samir

- Home
- View Attendance
- Apply for Leave
- Feedback Message
- View Result

Attendance System - Student

View Attendance Data

View Attendance

Subject: Java

Start Date: 05/05/2021

End Date: 05/19/2021

View Attendance

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Attendance System

Samir

- Home
- View Attendance
- Apply for Leave
- Feedback Message
- View Result

Attendance System - Student

Attendance Data

View Attendance

Date : March 16, 2021
[Status : Present]

Date : April 1, 2021
[Status : Absent]

Date : March 28, 2021
[Status : Present]

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- Apply for Leave:

ID	Leave Date	Leave Message	Leave Status
1	2021-03-02	I am sick.	Approved
2	2021-03-04	I am having corona syptoms.	Approved

- Feedback Message:

ID	Feedback Message	Feedback Reply
1	I have good grades.	No you dont have
2	Hello	
3		

- View Result:

Attendance System - Student

Result

ID	Subject	Assignment Marks	Exam Marks	Status
3	Complex System	60.0	60.0	PASS

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Version 1.0.1

10.4.4 Student Service Staff Manual

- Dashboard:

Attendance System - Student Service Staff

Home

- 8** Total Students
- 3** Total Teachers
- 3** Total Course
- 6** Total Subject

Student and Teacher Chart

Total Student in Each Course

Total Student in Each Subject

- Edit Profile:



Attendance System

- [!\[\]\(df15d142f573f7c6deef79a8fb75e749_img.jpg\) Staff](#)
- [!\[\]\(d4feff987d48e65b0cfdd0871241b244_img.jpg\) Home](#)
- [!\[\]\(6901ab08ff959c21547fb3d00f16f2cc_img.jpg\) Student Feedback](#)
- [!\[\]\(bd24140ec5e575cd03ae6cbe945f4ee8_img.jpg\) View Attendance](#)

Edit Profile

Edit Profile	
Username	<input type="text" value="staff6"/>
Email Address	<input type="text" value="staff6@gmail.com"/>
First Name	<input type="text" value="Staff"/>
Last Name	<input type="text" value="Three"/>
Address	<input type="text" value="Lalitpur"/>
Change Password?	
<input type="text" value="Type your new password here if you want to change it or leave it blank"/>	
Update Profile	

- Student Feedback:



Attendance System

- [!\[\]\(cf0f62e0d9732cfd7def281b89ed5acc_img.jpg\) Staff](#)
- [!\[\]\(256d9d029d110ed4b2f1d80d3891c60f_img.jpg\) Home](#)
- [!\[\]\(19bf7d7ab72e47cfb32d25f493a70817_img.jpg\) Student Feedback](#)
- [!\[\]\(88650af34e99a9c879131c6944dd7a45_img.jpg\) View Attendance](#)

Logout

Attendance System - Student Service Staff

Student Feedback

Student Feedback					
ID	Student ID	Student Name	Student Session	Message	Sended On
1	5	Samir Husen	March 10, 2021 - March 10, 2024	I have good grades.	March 29, 2021, 5:38 p.m.
2	5	Samir Husen	March 10, 2021 - March 10, 2024	Hello	March 29, 2021, 9:40 p.m.
3	5	Samir Husen	March 10, 2021 - March 10, 2024		May 5, 2021, 6:48 a.m.

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Version 1.0.1

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- View Attendance:

The screenshot shows the 'View Attendance' page of the Attendance System. The top navigation bar includes the logo 'Attendance System', the title 'Attendance System - Student Service Staff', and a 'Logout' button. On the left, a sidebar menu lists 'Staff', 'Home', 'Student Feedback', and 'View Attendance'. The main content area has a green header 'View Attendance'. It contains two dropdown menus: 'Subject' (set to 'Java') and 'Session Year' (set to 'March 10, 2021 TO March 10, 2024'). Below these is a green button labeled 'Fetch Attendance Date'. At the bottom, a copyright notice reads 'Copyright © 2020-2021 Attendance System - Samir Husen. All rights reserved.' and a version number 'Version 1.0.1'.

This screenshot shows the 'View Attendance' page after the 'Fetch Attendance Date' button was clicked. The 'Attendance Date' dropdown now shows '2021-03-16'. Below it is another green button labeled 'Fetch Student Data'. The main content area displays a section titled 'Student Attendance :'. It lists four students with their attendance status: 'Samir Husen [Present]', 'Elon Musk [Present]', 'Eric Joshi [Present]', and 'Karma Dolma [Present]'. At the bottom, a copyright notice reads 'Copyright © 2020-2021 Attendance System - Samir Husen. All rights reserved.' and a version number 'Version 1.0.1'.