Capstone Project Report
On

# SMART STUDENT EMOTION RECOGNITION SYSTEM


## Submitted By

Spandan Dixit 18012011018

Virpalsinh D Jadeja 18012011025

**Bachelor of Technology (Computer Engineering)**
**Semester- V**

## Guided By

**Prof. Hiten Sadani**

## Submitted to

**Department of Computer Engineering/Information Technology**
**U. V. Patel College of Engineering**
**Ganpat University, Ganpat Vidyanagar – 38401**

**U.V. Patel College of Engineering**

**Ganpat University, Mehsana, Gujarat, India - 384 012**


# CERTIFICATE

*This is to certify that the capstone project-II report entitled* ***"Smart Student Emotion Recognition System"*** *is prepared and presented by* ***Mr. Virpalsinh D. Jadeja*** *bearing Enrollment No.:* ***18012011025****,* $6^{th}$ *semester of* ***B. Tech (Computer Engineering)*** *and his work is satisfactory.*

**Guided by: -**

**Prof. Hiten Sadani**

**.....**

**Head of Department: -**

**Dr. Paresh M. Solanki**

**.....**

**Date: __/__/2020**

**U.V. Patel College of Engineering**

**Ganpat University, Mehsana, Gujarat, India - 384 012**


# CERTIFICATE

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**……**

**Date: __/__/2020**

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# ACKNOWLEDGMENT

I wish to express my sincere gratitude to U. V. Patel College of Engineering, Ganpat University, Kherva. By providing a way to innovate our mind in such a way that to help me to build a project by bringing the old technology's inner strength, long lastingness', reliability and new technology's performance, security, speed to gather to make a Smart Student Emotion Recognition System by using the concept of Python, Machine Learning and Data Science modules abilities.

I am sincerely very thankful to Prof. Hiten Sadani, Facultiy at Ganpat University. By providing very valuable time and gives guidance and opportunities to work together as a team, and to do a project in the Data Science Field. By very thankful to him to encourage me to innovate my project to the highest peak.

I am very thankful to all the competitive students who also very helpful to work together not as a competitor but as a family member very joyfully.

Spandan Dixit 18012011018

Virpalsinh Jadeja 18012011025

# ABSTRACT

In the modern 21st century, our world progressed to much in the last 2 decades. But not in all the fields. Is our Education still progressed the same as our modern world did in the last decades? No, but from the last few years, there are so many systems developed and existed that provide facilities especially to the faculties and students to communicate with chats, q/a, and many other ways, that system will decrease the communication barrier between them. This remedy is very good, but it is not possible, especially for a situation where we know that not all students will understand as quickly as other students. Like every student, the mind works differently. So, some students are able to learn very quickly but the same thing that other students need days to get. Also, faculties are not able to give every student good attention so he/she will not able to come to know that the student or attendee is present in the class or not in terms of mentally as well as physically too. So, it is necessary to grab out some more features to this system and detect whether the student is mentally present or not. If yes, so How happy student is with the lecture. So, it is necessary to implement the sentiment system for students, so faculties can change their teaching methods according to students. If this system succeeds it can increase the overall performance of the student. In addition to other systems, the System will give all the information of faculties and students to the institute's HOD, so they can easily identify that how students come to know each topic in their mind that is taught by faculties. And HOD can also get the idea that which faculties are good at communicating skill, taught methods and other factors that affects barrier between both.

# 1. INTRODUCTION

Universities and schools are now having so many facilities which did not available in the last one-two decades. But nowadays Universities and schools are fully digitalized with a security system such as a CCTV camera. But that system is only playing an important role when some abnormal thing is happening. schools and colleges adopted a CCTV facility as a major concern for a security purpose Not even in staff rooms, lobby, and cabins but also in each class. So, why not utilize them to do some more stuff that can even help more not only in abnormal situations but even in normal situations isn't it? So why not to include some more functionalities or modules in the security system like student feedback system so that universities cannot even get the feedback of each student but this system can identify the identity of students as well, they can track records of all the students that which students are doing a study or which student are not present in the class. This system can take attendance automatically so universities and schools do not need to take attendance of all the students. They can track records of all the student's behaviours like happy, sad, angry, Neutral etc. By using this system, we can measure clients' and employees' behaviours also. So, the boss/owner can easily track their client's activities with a statistic. The system will definitely help companies in future to grow fast by promoting those employees who really working hard or who are working very smart. So, it will directly impact company's annual report so it helps companies to not growing linearly but exponentially too. By applying this system at company level, it will improve country economy drastically. But the system is currently focusing on University/School level. So, the main motive of the system is to design such environment for universities/schools for better careers of their students and to trains their students accordingly so that it will easily beat the future. As the system is so small to imagine as it having so small amount of functionality so it will easily ignored by peoples who are heard about this system for a first time but when the system applies in Universities /schools then it will definitely decrease the stress of the students as they now knows each and every topics very basic fundamentally because now the faculties knows how to teach students according to their mind level/brain level so that students can getting every topics very fast and it will help students to increase the interest about subjects. And overall, it will decrease the stress and depression level of the students because students now enjoying the studying. As the depression is a very major concern nowadays specially for countries like India where so many students are committing suicide due to depression/stress/bad result and also just thinking about future results.

## 1.1.PURPOSE

By Using a CCTV Camera system not only as a security purpose we should need to utilize that system for more kinds of stuff like taking attendance, by tracking students' behaviours/Sentiments, by tracking a faculty

teaching method, and many more things. Not limited to students and faculties if we apply this technology/module into office level or business level we can track record of clients, employees' moods. So, the owner/boss can track records of their clients or their staff.

## 1.2.SCOPE

By scope, our project/student Emotion Recognition system is only limited to Schools, colleges/institutes, Universities, and also at the business level.

As far we know that if a country wants to become a superpower or wants innovation to their population thinking or life expectancy of a people, they need to change their population mindset, and to change their mindset education is a major concern to change. If a country succeeds to change the education system so it will definitely be benefited us. So, the scope is very limited but it can change a whole country system.

## 1.3.OVERVIEW

By making this project our main target is to measure the feedback of students. Many Industries which are producing some chemicals, or we can say the products. by manufacturing those products fortunately or unfortunately they are getting an extra thing with those products well known as a side product. In the student feedback system as a side product, we can also track record of faculties as well. How?

By using student feedback systems, we can track students' feedback and by applying machine learning using sentimental analysis, we can track record of faculties as well that which faculties are good at teaching, teaching methods, behaviours, and lots more things. by discussed in purpose owners of the companies can track their client's activities so the owner/boss can get ideas about the productivity of each and every employer, employee. So, they can get clear cut ideas that which employee are good at productivity, out of the box thinking, by selling their products as a sell's person, etc. by that they can get an idea about which person needs to be as a leader, who is good at marketing, advertising, accounting, and many more things. Also, the owner can get an idea about their future decisions at promotions of employees, designating an employee, etc. The system is currently using CNN technology which is Convolutional Neural Network. This technology will help system to increase the reliability of the face detection.

# 2. LITERATURE REVIEW

By Providing a facility of a Student feedback system using sentiment system by implementing machine learning and data mining we can get some sort of advantages. Sentiment system is not a new thing it is used in various fields. Some out of them also researched to implement this system in educational field too.

So here is some sort of topics discussed by reviewing many literatures.

## 2.1. STUDENT FEEDBACK

Implementing the student feedback system to offline as well online classes we can measure the emotions of the students. We can grade the students according to their activeness during class and based on that faculties can grade them by statistics generated by this system. The system is capturing all the student's emotions/ sentiments continuously and by that it will used to improvement of teaching. More often student is always shy to raise his/her hand to give the answer of the questions. [2]

## 2.2.MOBILE PHONES

In Recent Years mobile phones technology changes rapidly. This will one of the major distractions for students. According to some reports 98% students are owning the smart phone.so generally students are using their mobile for entertainment purposes instead of using for their knowledge. So, it will be barrier for such this type of cases where students are using their mobile phones during their classes. It is necessary to include smartphone detection so it will help faculties also to know that how students are actually studying instead of playing some games and sending messages to their friends etc. [2]

## 2.3.NAMED ENTITY EXTRACTION

So, as we know that in school / colleges there are lots of people sitting in the class which is either students, faculties, etc. so it is necessary to detect each and every student noun so that it will help system to take the attendance of the student and also it will detect every student's activity individually which will help system to make a statistic for every student so that faculties can track every student's performance. And based on that system will generate performance analysis report with graphical representation. [8]

## 2.4.EMOTION EVALUATION

System needs to add some method or techniques to evaluate sentiments/emotions. For example, "I Loves iPhone". By this sentence we can evaluate nature/ behaviour of the people like this sentence says particular smartphone devices which is favourite for his/her. So, it is mean by a specific user choice.so from this sentence we express emotions like it just loves iPhone that means it is very happy. From this we can evaluate

different types of emotions by using this technique in our system. So, it will lead to add some of modules to differentiate different emotions like, emotional negative (-2), rational negative (-1) neutral (0), rational positive (1), emotional positive (2).[4]

## 2.5.EDGE DETECTION

Face recognition is used to identify a face from an image and verify that face from database by comparing. By applying this technique, we need to train our machine to identify the sharp edge from faces.so it is important to successfully identify the edge. Edge recognition is generally use three steps for successful detection.

1)Filtering: - As image is now very good at quality but sometimes due to poor quality of the images, it is necessary to figure it out the noisy part from that picture. This method is known as Edge Detection.

2)Enhancement: - After Filtering we need to enhance that images by improving the image quality if image contains some text, by adding sharpness the text will be clearer.

3)Detection.: - after enhancing the image we need to detect the thing in image and compare that things with our database to process it for further use.

As often Edge Detection have a further type like Canny Detection and Sobel Detection.

Canny Edge detection is one of most popular image processing method. While Sobel Detection is also popular by analysing the image by manipulating at pixels.

### 2.5.1.Canny Edge Detection

Canny Edge Detection is very popular Edge Detection algorithm by it is using 5 steps.

1)Smoothing: - It will simply little blur the image so it will remove unwanted noise.

2)Finding gradients: - edge should marked when finding a large magnitude.

3)Non-maximal suppression: - where large magnitude founds it will detect edges.

4)Double Thresholding: - potential edge will detected by double thresholding.

5)Edge tracking: - it will combine all detected edges detected in all the above 4 steps.

### 2.5.2. Sobel Edge Detection

This Detection technique is uses two 3*3 mask one for to count gradients in x direction and another is used to mark gradients in y directions. So, this technique is depending on mathematical calculation of two 3*3 array.

As both the techniques are very good the accuracy of the canny Edge Detection is around 87.5% where Sobel Edge Detection accuracy is around 75%. So, if the image is very noisy it not be filtered very well. Overall, each method is producing good images.[9]

## 2.6. EMOTION DISTRIBUTION

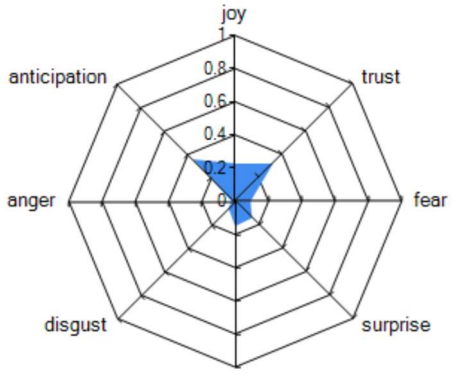


*Figure 1 Emotion Distribution chart [5]*

The chart having 8 independent edges and each of carried out type of emotions like anger, joy, fear, trust, surprise, etc. so for each and every axis we need to calculate the points and based on that we are transferring the points between range 0 to 1. So, suppose joy having point 0.25 and trust having 0.3 marking so we can calculate all the edges and by using this we can draw a graph on it which display the assumption of the face.[5]

## 2.7. METHODOLOGY

Using machine learning we can achieve lots more than we thought but not as usual, requires a planning by which it can help a system to work fantastically well and great. To achieve an efficiency requires a proper planning well known as Methodology. In this system is based on some modules which requires some calculations, database management stuff, analysis stuff, etc. to achieve all this kind of stuffs we need to include the following steps in our system. [7]

### 2.7.1. Corpus Collection

As we know that to include machine learning and deep learning the first basic thing is to collection of a data in a such a way that system can easily identify and process that data. As a great machine learning model wants a great Corpus data.by using corpus collection model uses a trial-and-error method to collect process the data includes three classes. Positive, negative and neutral. The data is

classified in three classes is based on the intensity of expression availed form a different data set. If intensity is too high that we need to assign that data sets to a neutral class. [7]

### 2.7.2. Pre-processing

After collection of a data, we first need to process that data. But stop, data may include unproper collection. So, before the processing of a data we need to process that data and correct data to proper way. This method is well known as pre-processing of a data because we are correcting and processing a data before actual use. But it is advised to already choose a data collection which is already in a correct form that our system wants. [7]

### 2.7.3. Features Extraction

As a good machine learning/deep learning models always contains a good functionality which will differ that model to other available models in a market. So, to choosing a good feature is a very essential for model so it can run very nicely. [7]

### 2.7.4. Sentiment classification Techniques

Now we have to process a data to use a feature like sentiment analysis. there are so many techniques like support vector machines (SVM), Naïve Bayes (NB), Complement Naïve Bayes (CNB), and maximum Entropy (ME) using this type of technique system can achieve performance-oriented models. [7]

### 2.7.5. Polarity Detections

Polarity plays important roles to detect a sentiment classification. polarity provide all avail features currently available in the system. [7]

The below graph all the steps that system must use in their models.

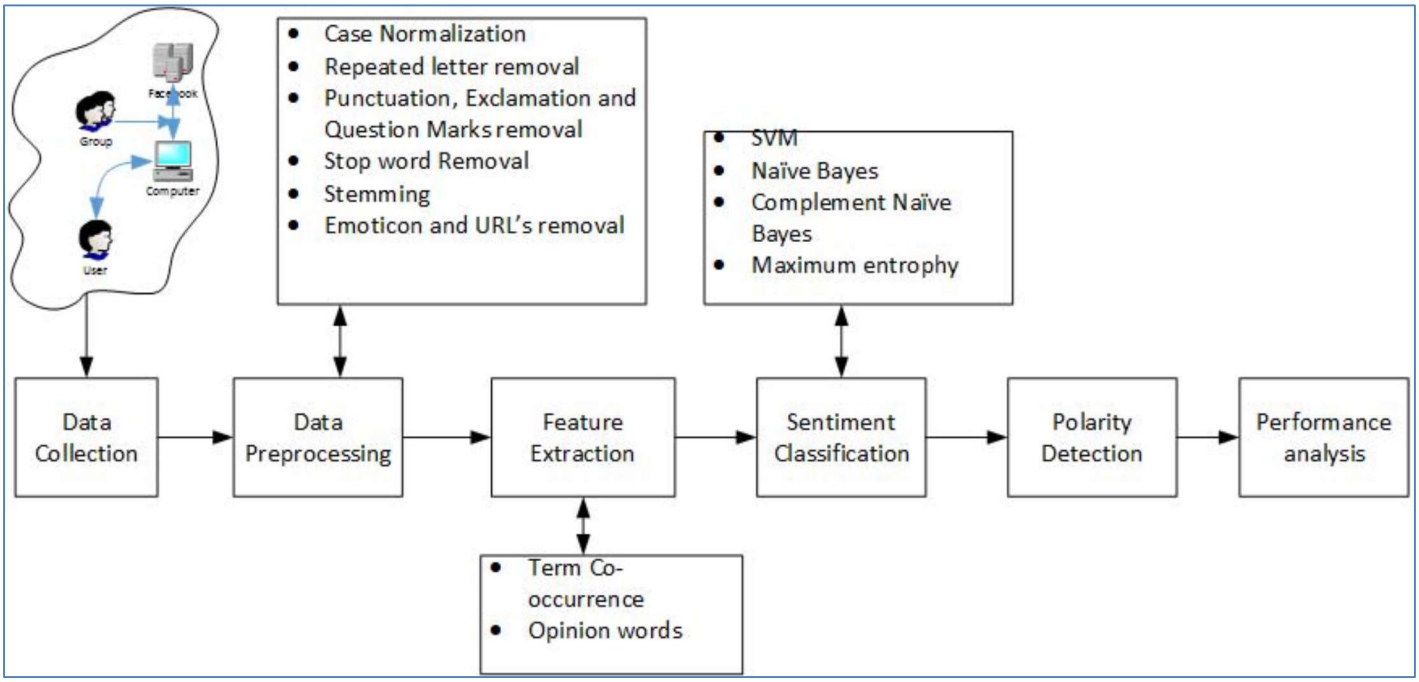


*Figure 2 Methodology Diagram [7]*

### 2.7.6. Performance Analysis

Performance analysis is a mandatory in a field where we are providing a system with a large and sometimes a very large amount of data sets. So, it is necessary that the system must good at a processing speed, features and machine learnings algorithms.[7]

## 2.8. TRADITIONAL SENTIMENT ANALYSIS ARCHITECTURE

As it is always good to look at back and find what is best and carry all that best stuff, and add that stuff to your systems so your system will always in a top compare to your competitive systems. The traditional sentiment model/architecture is providing some basic but important stuffs/modules like feedback data which is avail in data collection, to process a data by using a various technique like pre-processing with lower casing, normalization of a data, removal of irrelevant contents, etc. after that we need to actual process that data to analyse the emotions or sentiment identification by using NRC lexicon, vector creation method. And after we need to compute over that emotions / sentiments to get the facility like data visualization. Some systems not be good about data visualization but to having a good system must having a great data visualization.[6]

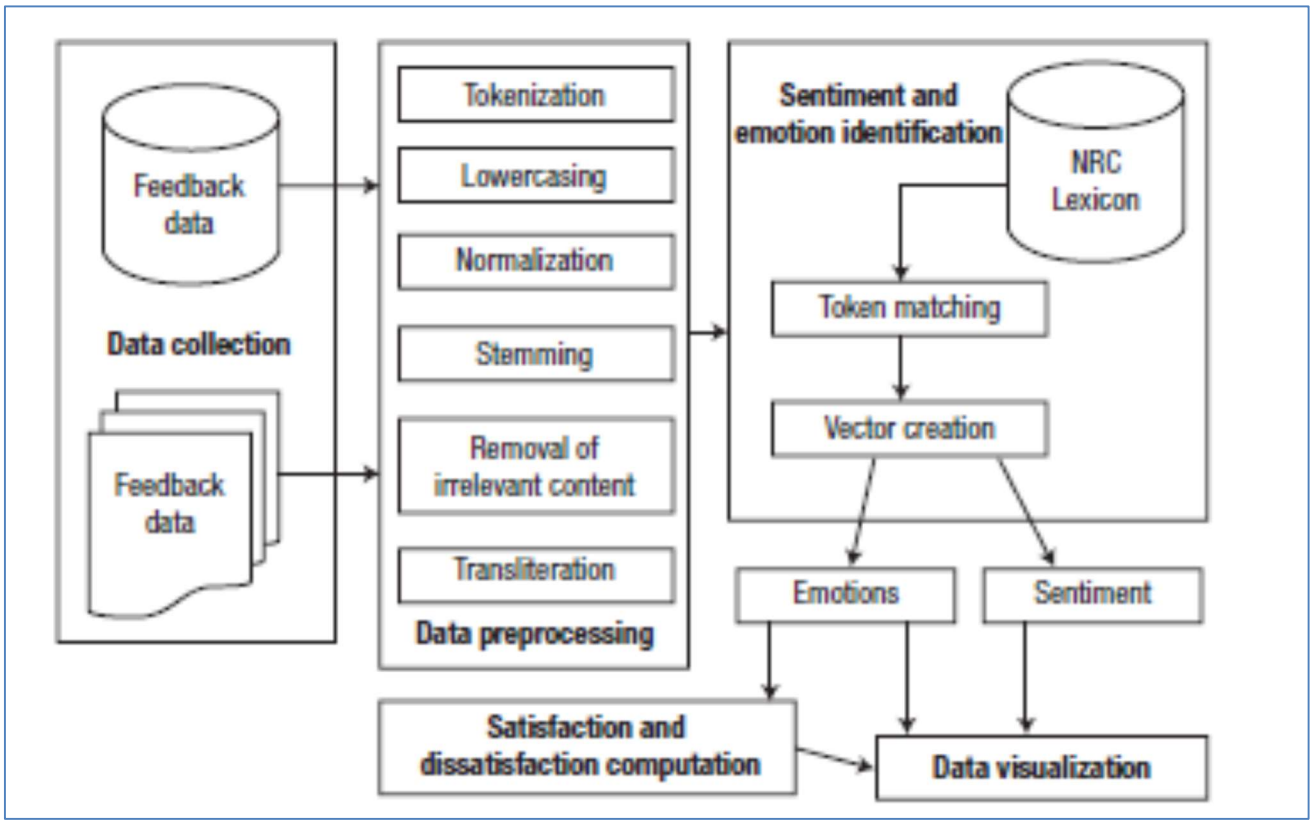


*Figure 3 Traditional sentiment Analysis Architecture [6]*

## 2.9.ASPECT TERM EXTRACTION

Aspect term extraction is a way to extract the student emotion from social media comments and activity of the students in social media. From this type of method, we can extract the emotions of the students by processing a social media comments and by using that comments we can convert the whole lines/ words to the sentiments. This system will work as displayed below.[3]

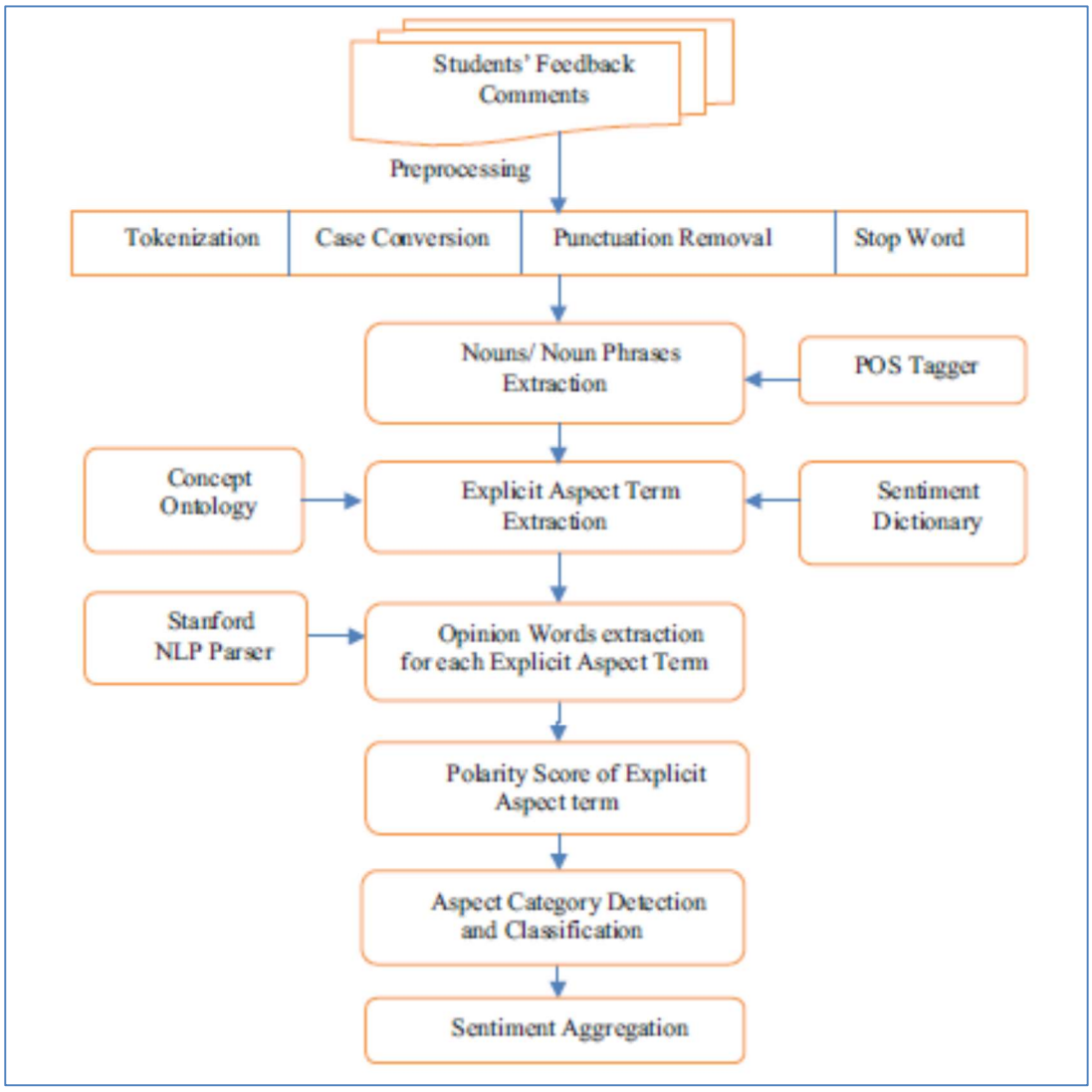


*Figure 4 Flowchart of aspect-based sentiment analysis on student's feedback [3]*

## 2.10. REALTIME SENTIMENTS

Student's feedback can definitely help faculties to build them teaching method in such a way that the students overall face is happy till end of the lecture not only that but also, they are enjoying the lectures. Some universities are taking feedback from the students at the end of the semester / year. That mean if the student is unhappy with that universities that will be known to the universities after the end of the year/semester that will impact students study performance/research-oriented performance. So, if the system is existing which will continuously be analysing the students in such a way that it will give the real time information to the institutes HOD and faculties. If this functionality applies to the Large level that means at country levels so it will definitely increase the student's fundamentals as well.[1]

# 3. SOFTWARE REQUIREMENTS

## 3.1. NON-FUNCTIONAL REQUIREMENTS

### 3.1.1. Usability

- The system is so simple that it is very easy to operate.
- The system having a built-in user manual if require user can easily get the knowledge if it is hard to understand some feature.
- System will generate data automatically with graphical interface so user doesn't need to get stuck at every point.

### 3.1.2. Reliability

- The system should give 99.9% uptime because it runs on University Server.
- If System fails it can be restored by admin within an hour. And it can be backed up.

### 3.1.3. Performance

- The system performance is depending on the server, because the system it works from University Server side. But system will take some times to calculate some statistics if needed as Major part of this system is a processing on a data so it may take some time.

### 3.1.4. Supportability

- The system is by self is made from the new technology as far as it also supports new technology because system is so Reliable.

### 3.1.5. Implementation

- Currently System is made from Python, Flask.
- In future the system can adopt Node.JS because of advantages like I/O processing powers.
- System uses the concept of Machine Learning, Deep Learning etc.

### 3.1.6. Packaging

- As system is available online it can access from every part of the world but limited to the part of that system like students, faculties and HOD/Admin.

#### 3.1.7. Security

- As security is major concern for every-one. It is too secure that the data is available at a server with some encryption.

#### 3.1.8. Scalability

- System is available and thousands of students can access the data at a same time.

#### 3.1.9. Budget

- System is made from no cost as we have available server from University.

## 3.2. FUNCTIONAL REQUIREMENTS

As the system will perform very good at University/School level. The system contains three types of user bases.

#### 3.2.1. HOD/Principal (Work->Administrator)

As an Admin User HOD/Principal having all the functionality provided by the system to the any user.

##### *3.2.1.1. Admin Login/Register*

Admin can easily create the account easily with admin login with no verification. After validation of inputs like phone no. email id, it will add Admin User in to the database. After validation it will redirect to dashboard.

##### *3.2.1.2. Users*

HOD/Principal Can manage all the Users. They can create, Delete, Modify Users details. Also, admin can see the active users in check status section, total active users by class view, subject view, batch view.

##### *3.2.1.3. Settings*

In setting section, admin can change admin account password, Email Id, Phone No.

Also, in setting section they can manage faculty view and student view.

#### *3.2.1.4.Inbox*

In inbox section Hod can easily contact/discuss with faculties and students.

#### *3.2.1.5.Calendar*

In Calendar section HOD can easily manage Events, meetings.

#### *3.2.1.6.Dashboard*

In Dashboard section the HOD can find all the important Fields of students and faculties. In Performance Field as per shown in Figure in Protocol. HOD can able to see Graphical representations of performance with daily, weekly, monthly and semester view, can see average student's analysis report also. HOD can see attendance of students and faculties, leaves of faculties, time log of all subjects, and can send feedback to faculties too. And in addition to this HOD/Principal can able to see all the above stuff in Four different view, Class View, Batch View, Subject View, Faculty view. HOD can generate the report, Sentiment analysis report also. HOD can see total classes, total students, recent classes, top teachers based on teaching methods, teaching performance.

#### *3.2.1.7.Chat Room*

In chat room feature admin-faculty can easily communicate together.

### 3.2.2. Faculties/Teachers (Work-Employee)

Faculties having so many features to manage all the students, according to the class, batch and subject views provided to them.

#### *3.2.2.1.Login*

Faculties can easily Login to their system with Ids and Passwords which is provided by HOD/Admin. Requires full name, email id, password, phone no. HOD can easily login because they can manage all the users. After validation of inputs like phone no. email id, it will add Admin User in to the database.

#### *3.2.2.2.Settings*

In setting section, faculties can change their account password, Email Id, Phone No.

#### *3.2.2.3.Inbox*

In inbox section faculties can easily contact/discuss with Admin and students.

#### *3.2.2.4.Calendar*

In Calendar section faculties can easily manage Events, meetings.

#### *3.2.2.5.Dashboard*

In Dashboard section the Faculties can find all the important Fields. In Performance Field as per shown in Figure in Protocol. faculties can able to see Graphical representations of performance with daily, weekly, monthly and semester view, can see average student's analysis report also. faculties can see attendance of students and faculties, leaves of faculties, time log of all subjects, and can send feedback to faculties too. And in addition to this faculties can able to see all the above stuff in Faculty view. Faculties can generate the report, Sentiment analysis report also. Faculties can see total classes, total students, recent classes, teaching performance report.

#### *3.2.2.6.Chat Room*

In chat room feature admin-faculty can easily communicate together.

### 3.2.3.Students (Work-Attendee)

Students can see applicable classes, batches and subjects' views provided to them.

#### *3.2.3.1.Login*

Student can easily login to their system by given credentials.

#### *3.2.3.2.Settings*

In setting section, students can change their account password, Email Id, Phone No.

#### *3.2.3.3.Inbox*

In inbox section students can easily contact/discuss with Admin and students.

#### *3.2.3.4.Calendar*

In Calendar section students can get messages of Events, meetings created by faculties/ HOD.

#### *3.2.3.5.Dashboard*

In Dashboard section student can only check their attendance, student sentiment analysis report. They can provide additional feedback to faculties and HOD.

# 4. HARDWARE & SOFTWARE REQUIREMENTS

## 4.1.HARDWARE REQUIREMENTS

### 4.1.1.Servers

Server is one of the most essential part of the system. Hence System is totally depending on it. The system is available at a University Servers so it is totally secure with firewalls and other security features which is available at University Side. If University having a multiple server so it can be used as a backup so it can be restored if required.

#### 4.1.2. CCTVs

As our System is analyse the face of the students it is essential to have camera on every class. So then and then system is able to generate the data and examine the sentiments of the students and Faculties.

#### 4.1.3. High GPU Processing Power

The system must require a high processing power to process their data to the server. Because the system uses machine learning, deep learning to process user data.

## 4.2. SOFTWARE REQUIREMENTS

As system are made by using Python language, we need to use additional modules to increase the efficiency of the system. Hence some of the modules are so popular that it will come built in in python or some are less popular compare to that built in modules so that we need to additionally add that modules by using pip install module name.

#### 4.2.1. OpenCV

OpenCV is used to get the input as a photo by using camera modules. OpenCV and NumPy is used to detect an object which will help machine learning module for further computations.

#### 4.2.2. Pandas

Pandas is used to do data manipulation by using NumPy library. Pandas is made by using NumPy library which will give advantages such as speed, efficiency, effectiveness, easiness etc.

#### 4.2.3. Sklearn

Sklearn is very popular library which is very popular to programmers who are currently learning or working with a machine learning/deep learning model. Sklearn library is used to predict data from available datasets.

#### 4.2.4. Skimage

As Sklearn is very useful tools whenever we need to predict and process a data which is available in text but what if we need to process an image so that time Skimage module is very useful hence it is useful to predict an object from available images provided by system or datasets.

#### 4.2.5. PIL

Whenever we need to add some image in data sets at that time PIL well known as pillow is very useful library. PIL is stand for python imaging library.

#### 4.2.6. OS

As our system uses some insert delete operations like generating a report, extracting data, including some data at that time we need to interact with operating system to create, insert, append, modify content of a file. So, OS module is very helpful at that time as it is very simple to use and it will provide very large no of functions to interact with operating system.

#### 4.2.7. NumPy

One of the very popular libraries available in python which will provide some functionalities like creation and processing of arrays, working with mathematical functions like linear algebra and many more.it is very popular library.

#### 4.2.8. Pytesseract

Some time it requires to detect text from images at that time we need to use this library which will help system to identify text from images as it is working with PIL module which is discussed above. (Pytesseract not directly used in this project but it is used by PIL module internally).

#### 4.2.9. TensorFlow

TensorFlow is very much important to run various algorithms that helps to detect edges from a video file/image file and then by processing them it gives the output in terms of String that whether person is happy or sad, etc. It is very much useful to process machine learning algorithms by using deep neural network.

#### 4.2.10. Tensorflow.keras

TensorFlow is one of the most useful modules among all the modules in which it is useful to implement an Artificial Neural Network in an App so that it can process and predict various classes we applied on a model.

#### 4.2.11. Glob

Glob module is useful to get the present working directory path and we can change the path using available various methods. It generally uses the standard Unix path extensions to work with different Operating systems.

#### 4.2.12. Flask

Flask module is a micro web framework used to build a web app written in python. As it is almost light weight and faster than other libraries, and not uses any other resources and libraries it is called a micro web framework. It is very much easy to use and not dependent to any other library, so that with flask module we can even use other tools/libraries with flask. That means Flask is very much compatible to other tools/libraries.

#### 4.2.13. Pyrebase

Pyrebase is one of the most famous libraries useful for database read and write. When we need to work with google firebase.to authenticate different type of users upon their roles and responsibilities, Pyrebase helps to authenticate faster. Pyrebase provides different methods like. auth () for authentication, database () for connect to database, etc.

# 5. WORK DISTRIBUTION

Work distribution help us to know that how people managed to divide their work in a specific time with the help of timeline chart.

As below mentioned thing is almost equally devided to two part in which in first phase research work, system model and web app is managed by one person and Documentation, SRS report and some other conecpts of ml algorithms is managed by other person.

In second phase a lengthy task like Flask Web app with basic structure like login,signup,etc., firebase integration, and assigning user roles is managed by a one person and other likely small but difficult task like training a model, emotion classifier using .csv, .json from video file, and documentation is managed by other person.

## 5.1.PHASE – I

| Virpalsinh Jadeja | Spandan Dixit |
|---|---|
| 1). Design of Flask Web App.<br>2). Some Research Part.<br>3). Grab some basic concepts of ml.<br>4). To decide System Model. | 1). Document Preparation<br>2). Some Research Part<br>3). learning of new concepts that system requires. |

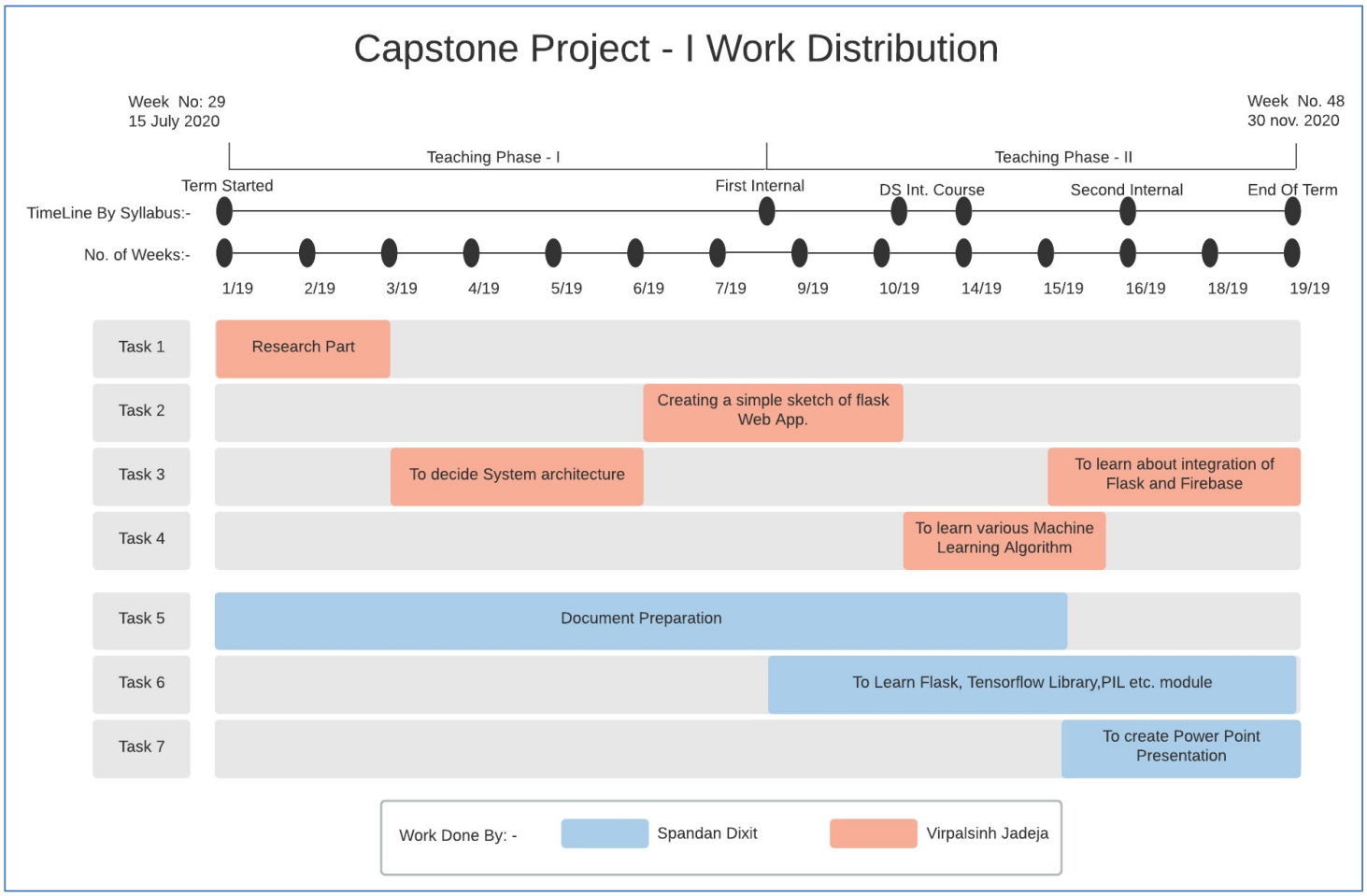


*Figure 5 Work Distribution for Capstone Project - I*

## 5.2.PHASE – II

| Virpalsinh Jadeja | Spandan Dixit |
|---|---|
| 1. Creating Login/signup page | 1. Creating wireframe/mock-up/prototype |

| | |
|---|---|
| 2. Fetching different templates for flask web app<br>3. Getting started with firebase<br>4. Creating three types of users and allocating roles.<br>5. Fetching user info and authenticating using firebase<br>6. Adding chat room feature for future release | 2. Setting up emotion recognition<br>3. Training model<br>4. Conversion of Video to image/.csv/. json<br>5. Collecting meaningful data<br>6. Plotting data to dashboard |

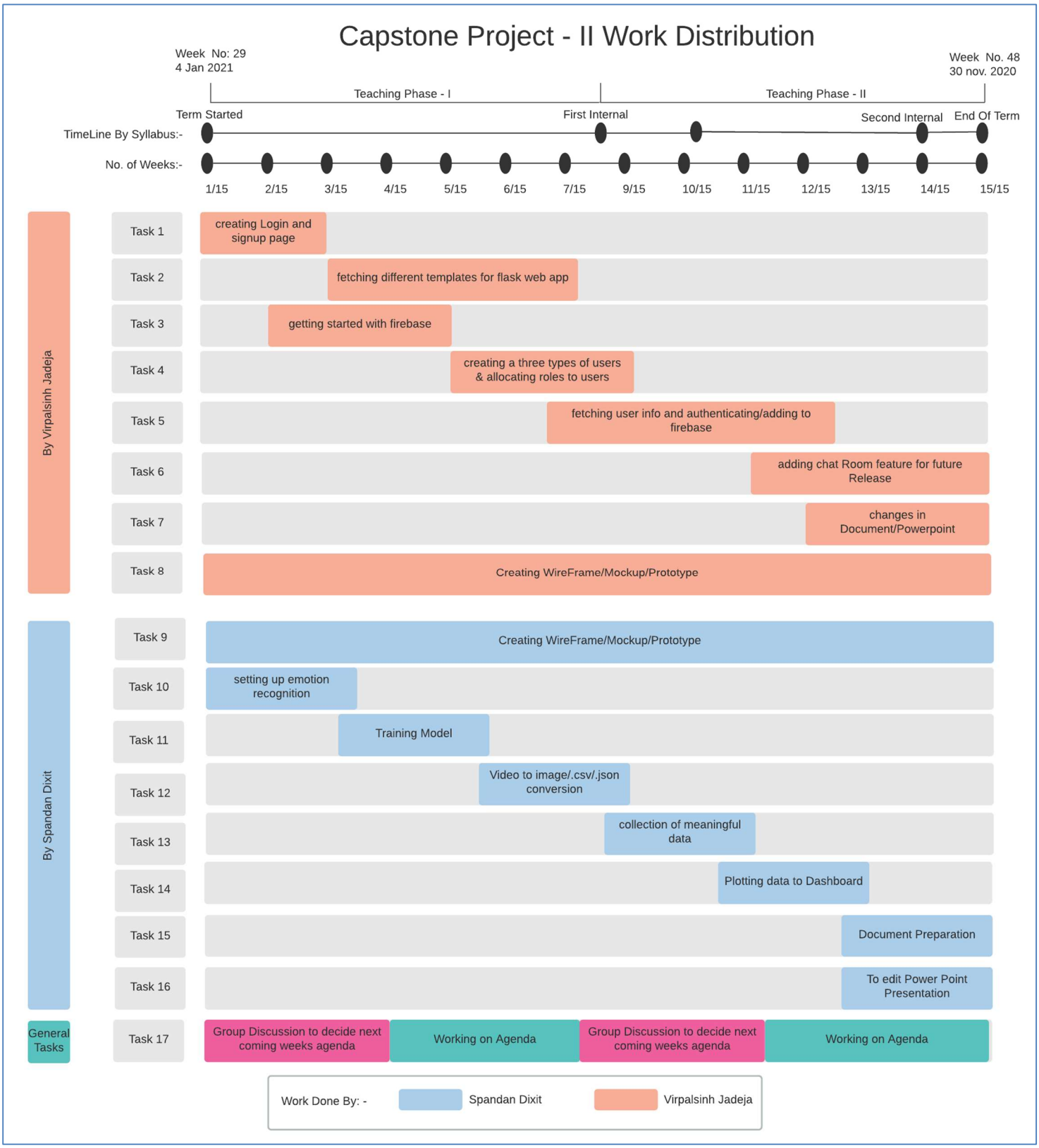


*Figure 6 Work Distribution for Capstone Project - II*

# 6. DIAGRAMS

For any type of project whether it is a School level, college level or Business level software Diagrams is a heart of that project to know other about that basic structure. Below diagrams contains very basic structure of this project as well as some of the things that diagrams contains can be added in a future work.

## 6.1.FLOWCHART

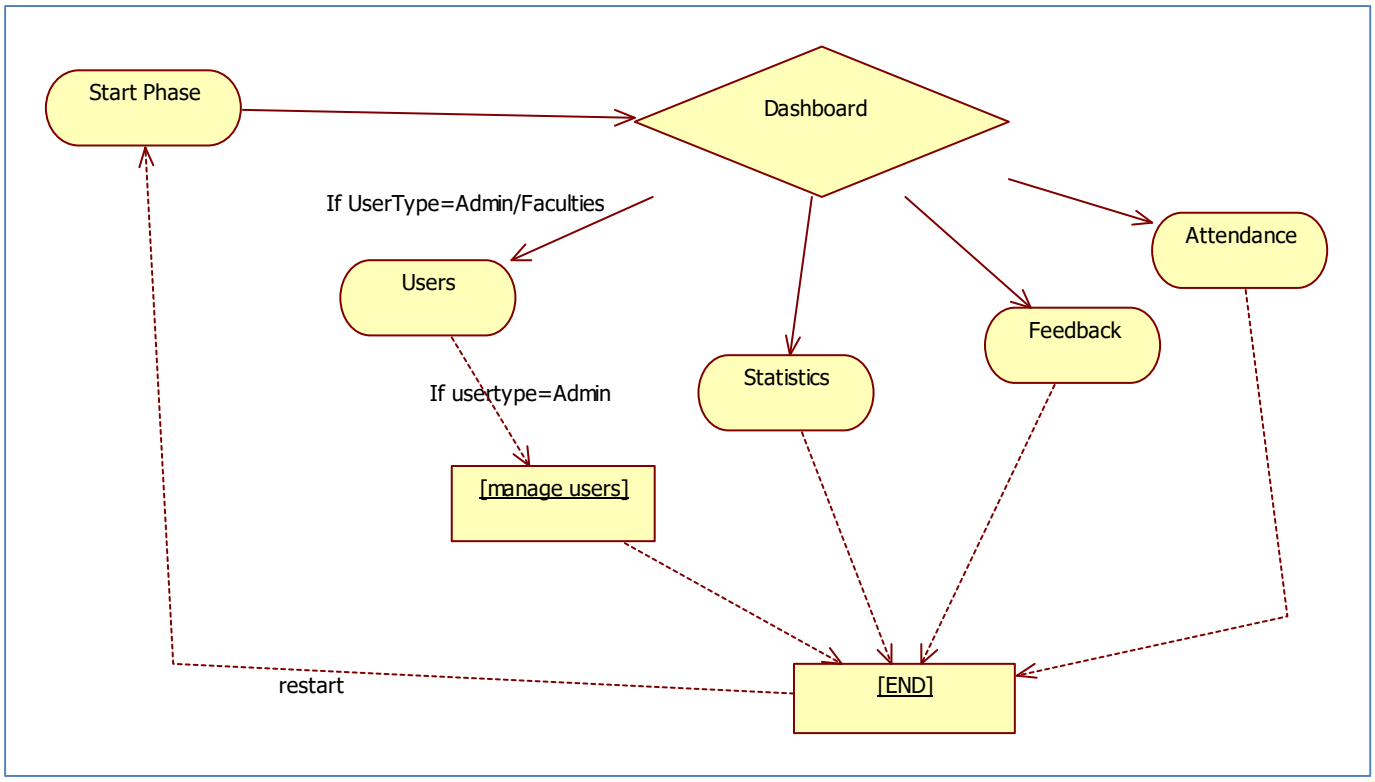


*Diagram 1 Flow Chart Diagram*

Flowchart is a very popular type of diagram which describes your project all modules overall work in a simplest form. Because the flow chart is the simplest type of diagram, there is a total two types of modules are available the system, which contains dashboard section and user section. In dashboard section the users having functionalities like attendance, feedback, statistics and user's module is available to the limited users to manage the complete flow of system.

## 6.2. USE CASE DIAGRAM

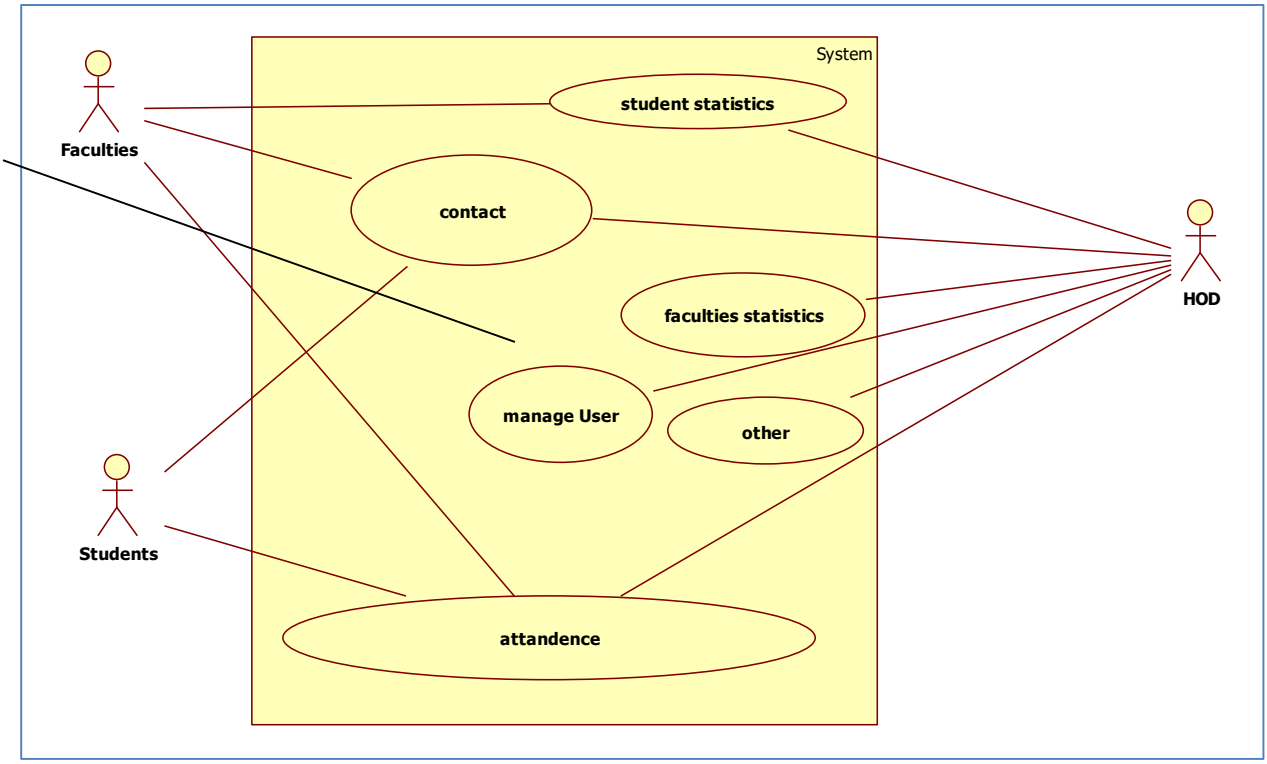


*Diagram 2 Use Case Diagram Users*

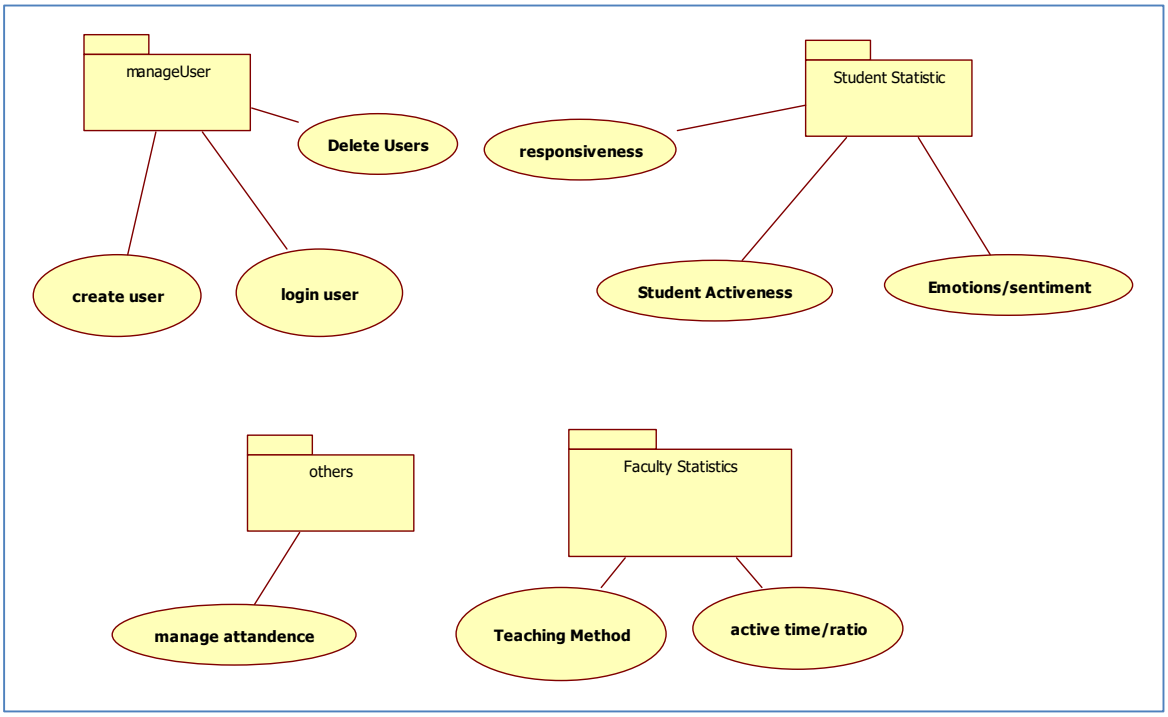


*Diagram 3 Use Case Diagram Modules*

Use case diagrams always be a good diagram types to show a modules accessibility from users' perspective. As the Diagram is the best way to tell the all the system without speaking a single word, as our system is divided to three different user interfaces. The only Use case diagram is a perfect way to understand all the user access.so here is the user accessible modules described below,

Admin/HOD: -

As the system will only be maintained by the HOD as an Administrative. All the modules must be access by the systems. All the modules like student statistics, faculty statistics, manage users and attendance system contact details. Admin can create users, add users to the group by categorize to different classes, batches, departments and institutes. The main benefit of the system to the faculty statistics modules is to check faculties activity, contact to the specific user.

Employee /Faculty: -

As the system more widely used by faculties, they must need all the modules to work with system. Faculties can easily student statistics, contact, attendance system.as faculties need all the modules together to manage all their stuffs like to check student statistics, manage students with their queries.

Attendee /Student: -

As the more often the big user base, they require to check their attendance again and again, and if require then they can contact to faculties to reverify their attendance if there is an any mistake happen by system. As the system is still not perfect as the human being there may be any mistake happen to not attend specific student that already present in the class.

As mentioned above in the diagrams we have a part of modules where we described and sub divided our modules to the submodules more often as the feature of the system. The system having some important modules like manage users' student/faculties statistics, others. Manage user modules contains create user, login user, delete user. The student statistic module contains the all the information as well as the recent and past activity of the students also all the detected emotions/sentiments of students by system.

## 6.3.DATA FLOW DIAGRAM

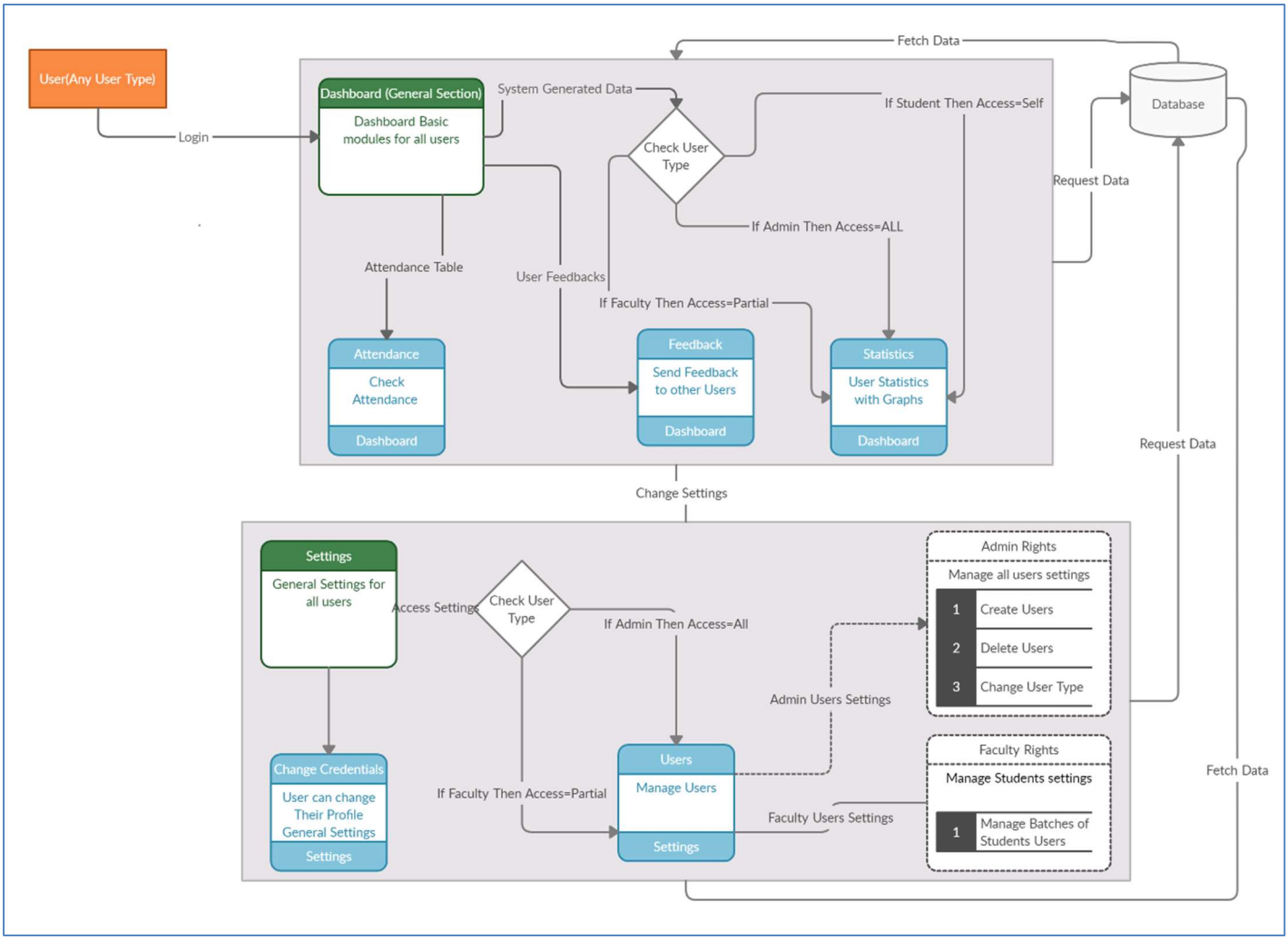


*Diagram 4 Dataflow Diagram*

Dataflow diagram is very useful to know the complete flow of a data in a system. After successfully login in the system user can easily interact with the interface with varieties of modules like dashboard, settings.in a dashboard section user can interact with all the features like statistics, attendance, feedbacks. In settings modules user can change credentials, manage users.

## 6.4.ACTIVITY DIAGRAM

From all the diagram discussed in this project the best diagram to know the complete workflow of the system is the activity diagram. As activity diagram describes the all the activity to the stating and the finishing state so that

the person who are looking and trying to understanding the system is easier to his/her. As the system is divided to the three different user bases that it is necessary not to combine all the user's activity diagrams together but to divide them to the three different parts for Admin users, Employee and the attendee. It is the best way to describe the complete flow of the system divided to the subcategories from users' perspectives. As the main user of the system is the administrator in this system the HOD/Principal they having the ability to interact with each and every module available in this system.

### 6.4.1. Activity Diagram for Admin

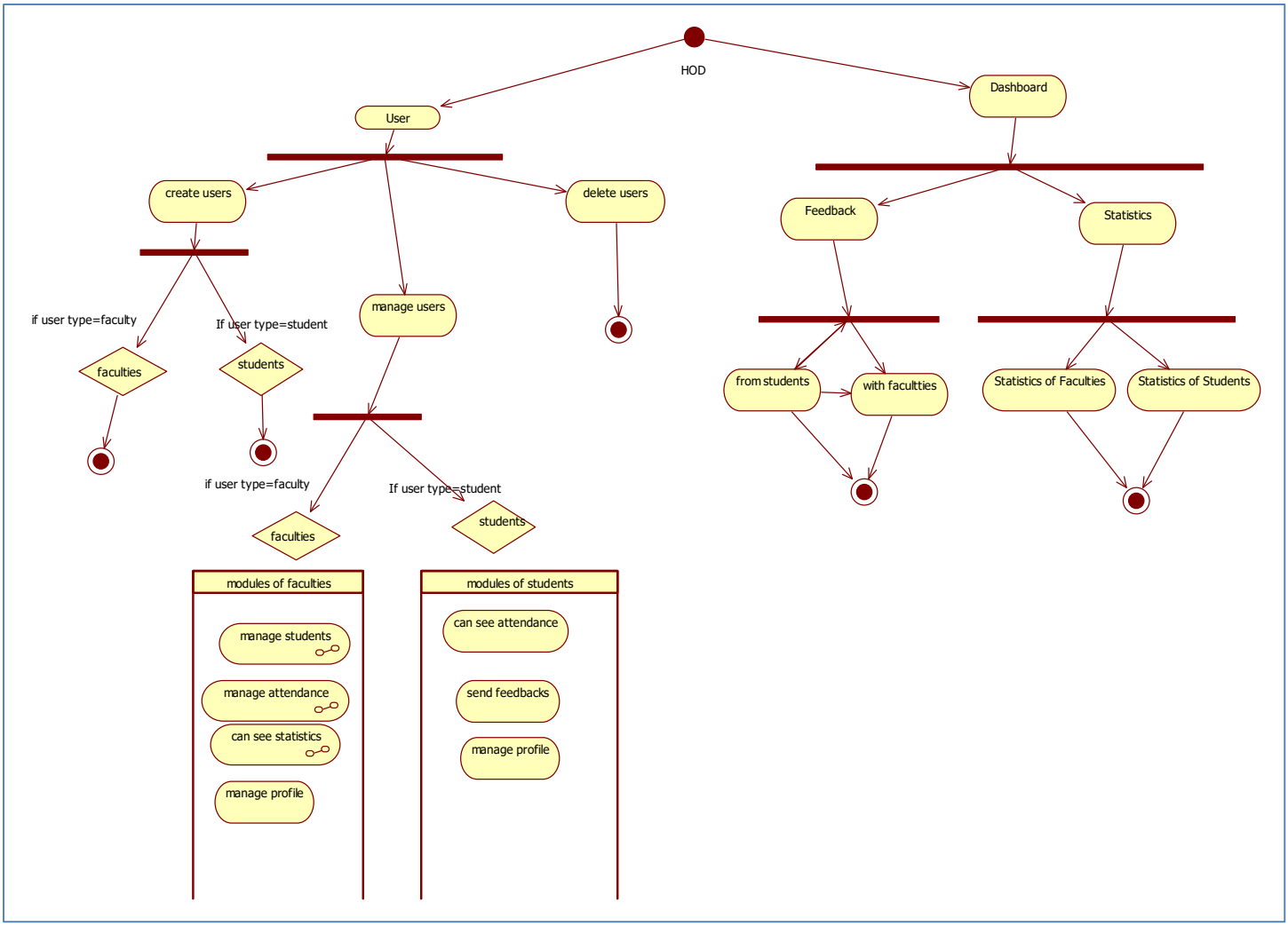


*Diagram 5 Activity Diagram Admin User*

For the admin they having the one-way login functionality which is very easy as the name suggest the admin having all the rights, they no need to having any verifications, that they can easily avoid all the login/signup procedures and they can simply manage users and to access the dashboard section. In manage user section there is three functions

create users, manage users and delete users' sections. After selecting delete user it will ask for confirmation and then it will not be retrieved back. By using the create user functionality they having the option to choose which type of user admin wants to add. If admin choose to create a student, they can create student user, or if admin selects the Faculty user, then faculties users having all the functionality that is allocated to the all the faculties available in the system. After creating user, if the admin goes to the finish state that means to end of all the functionalities available in tis modules. In the manage users' modules the admin can easily reaches all the faculties and students' modules and manage their accessibility and manage that modules according to the department's needs. As for examples the faculties having the options like to manage students, manage attendances, manage profiles options and etc. where the students having very limited functionalities like to check attendance, contact to faculties and manage their profiles.

In other sides in dashboard sections will be accessible by all types of the users like feedback modules, statistic module. In feedback modules all the users can give feedbacks to each other and the admin can easily check and manage all that stuff easily. In fact, admin can also send the feedbacks to the faculties and to the students too. And by using the statistics modules they can see all the report and analysis in a graphical way so admin can easily get that ideas.

### 6.4.2. Activity Diagram for Faculties

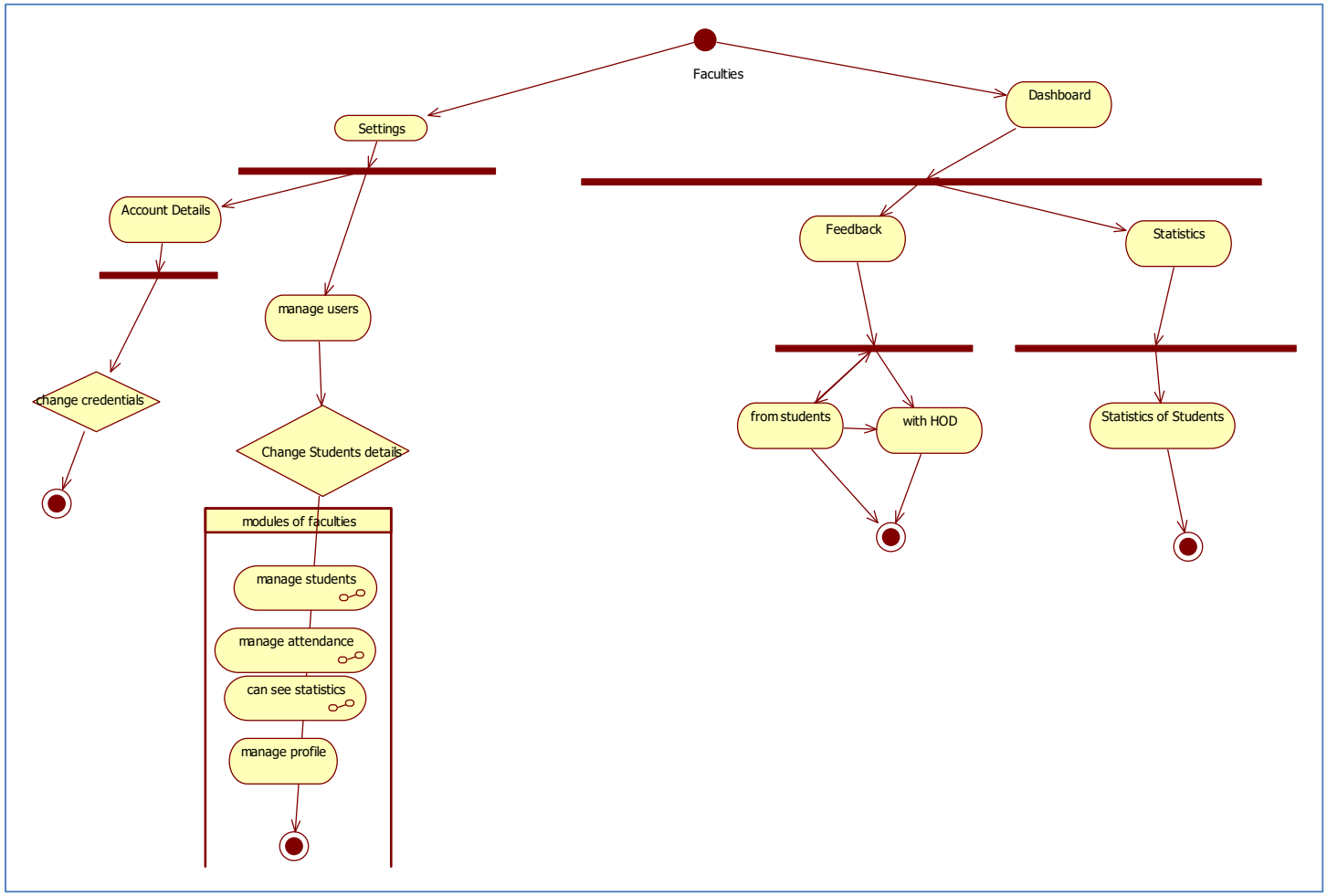


*Diagram 6 Activity Diagram Faculties*

Faculties are the second most powerful user in this system as they need to manage all the user base. And that's why they are having more features than Admin users. They having two modules' settings and dashboard. In setting section faculties can easily manage their account details and change their credentials details according to their requirement. In setting there is an option to manage user where faculties can easily change students' details, manage attendance, and manage all the statistics of the Students. In Dashboard Section faculties are having an option to send the feedback to the HOD, students and to get some feedback to the HOD, students. In statistics section faculties can check their analysis and teaching report and then they can print that report and share that report to pdf files.

### 6.4.3. Activity Diagram for Students

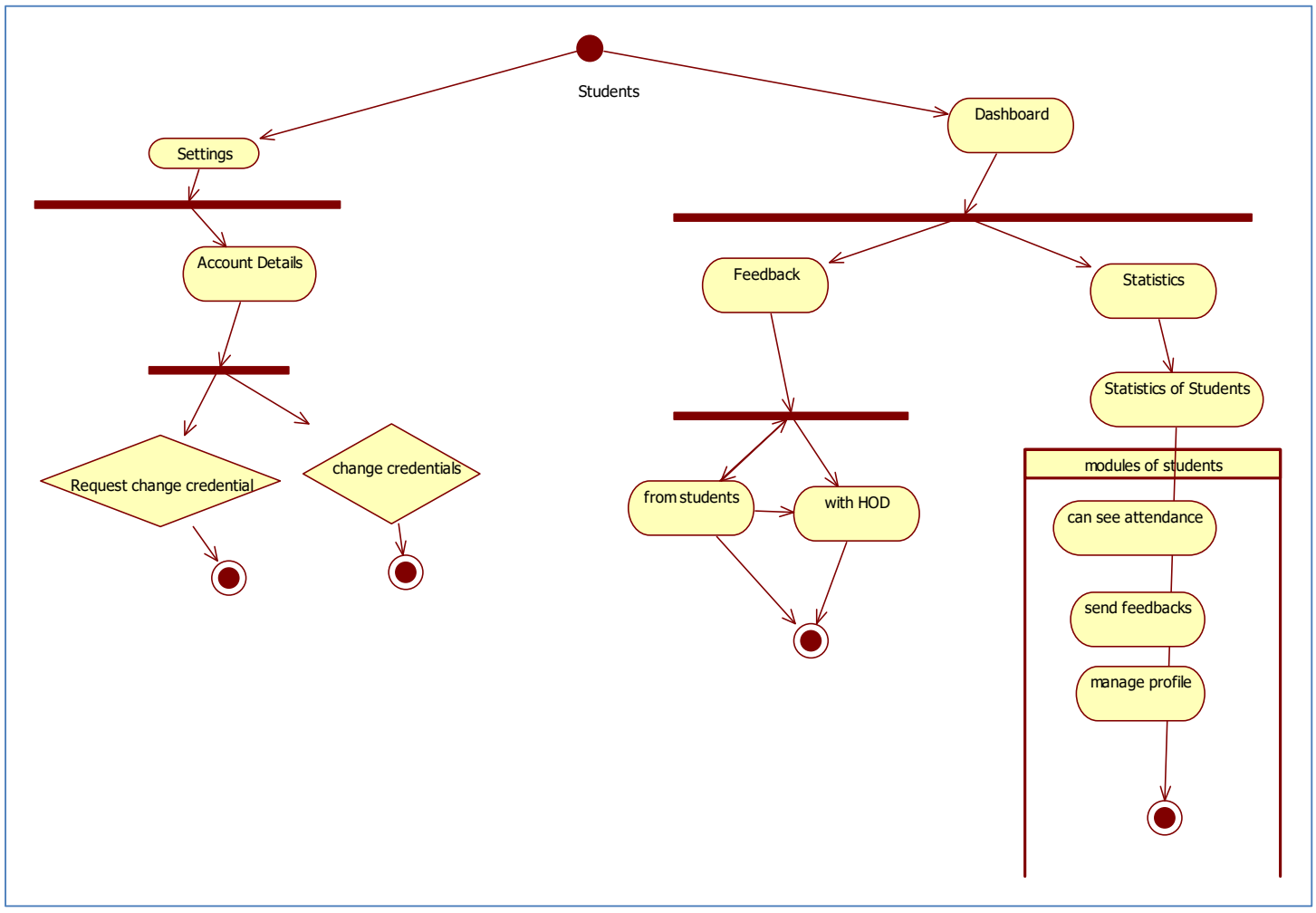


*Diagram 7Activity Diagram Students*

Students are the leanest users according to the available functionalities but still the most powerful users because of the population advantage. Students having two modules' settings and dashboard section. In a settings section student can change theirs accounts details, by managing their credentials. If some account details are essential than they can request to change credentials to the faculty's members. In a Dashboard section they can give feedback to the faculties and HOD. vice versa, HOD and Faculties can also send feedback to each other to decrease the barrier in between. In a dashboard section student can request to change attendance taken by system automatically if the mistake happens to the system in case. They can see all the past attendance and see the all the statistics recognized by the system.

## 6.5.SEQUENCE DIAGRAM

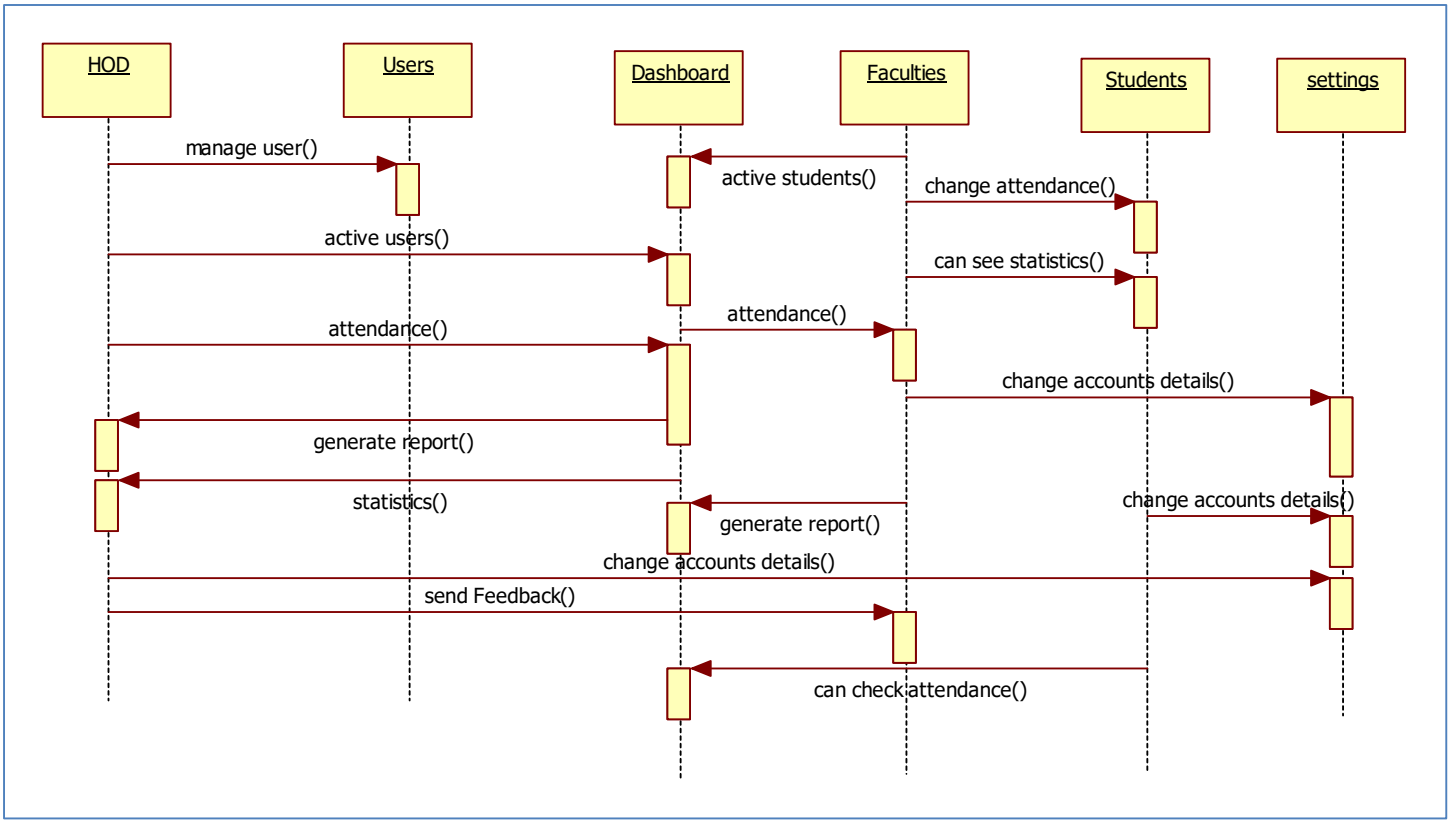


*Diagram 8 Sequence Diagram*

Sequence diagram is very helpful to know the sequence of each and every steps. This is very helpful to know each very step required to do after completion of the recent completed steps. In above sequence diagram it is very clear that to know the overall sequence which is must follow by the system to complete each and every tasks. First it is necessary to create a user and by the manage user section, admin can easily identify active users, HOD can check all the student's attendance, they can create the analysis report, statistics report in a dashboard as well. Faculties can change attendance, check statistics, change details of accounts, change or modify attendance of the students. Students can easily change account details and check their attendance and if require than they can request change in attendance.

## 6.6.PLANNED DATA DICTIONARY

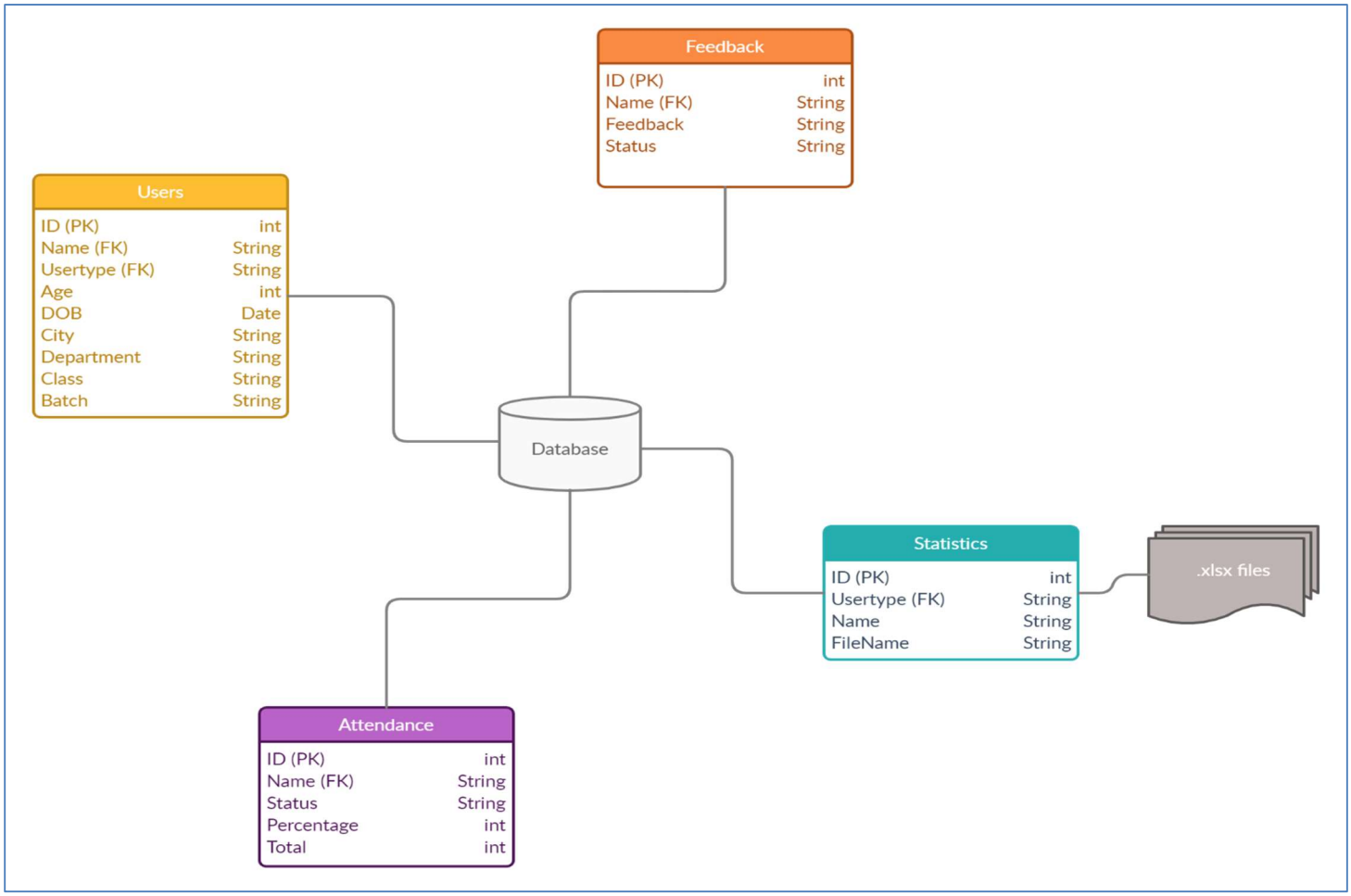


*Diagram 9 Planned Data Dictionary Diagram*

By Data dictionary diagram we can easily find that how backend of the software works. It is the best diagram to look at the dependencies of the tables with the help of Primary Key, Foreign Key, and other dependencies. DD Diagrams tells us that how that software interacts and process the part of the data from design view to the server side. Mainly this system is having 4 types of tables users, attendance, feedback, statistics. All the above modules dependencies can change according to requirements when creating of the webapp. User modules are having all the details of the all the types of the users whether they are a faculties or students. They having a column like id, name, user type, age, dob, city etc.

This type of modules can be accessible by admin users only and faculties members can also manage so small amount of part when required to change the credentials of the student user.in a statistics table that having all the essential

graphical representations like name, user type, date and values graph, activity and based on this data this system will generate the report. In an attendance table it will having all the information to store all the status of the students and the faculties as well. Having all the details like name, status (present/absent/late), percentage, total present in a past. In a feedback system which having the facility to store all the chats/question and answers/feedback from users to users. Having the data like id, feedback, status, name.

## 6.7.CLASS DIAGRAM

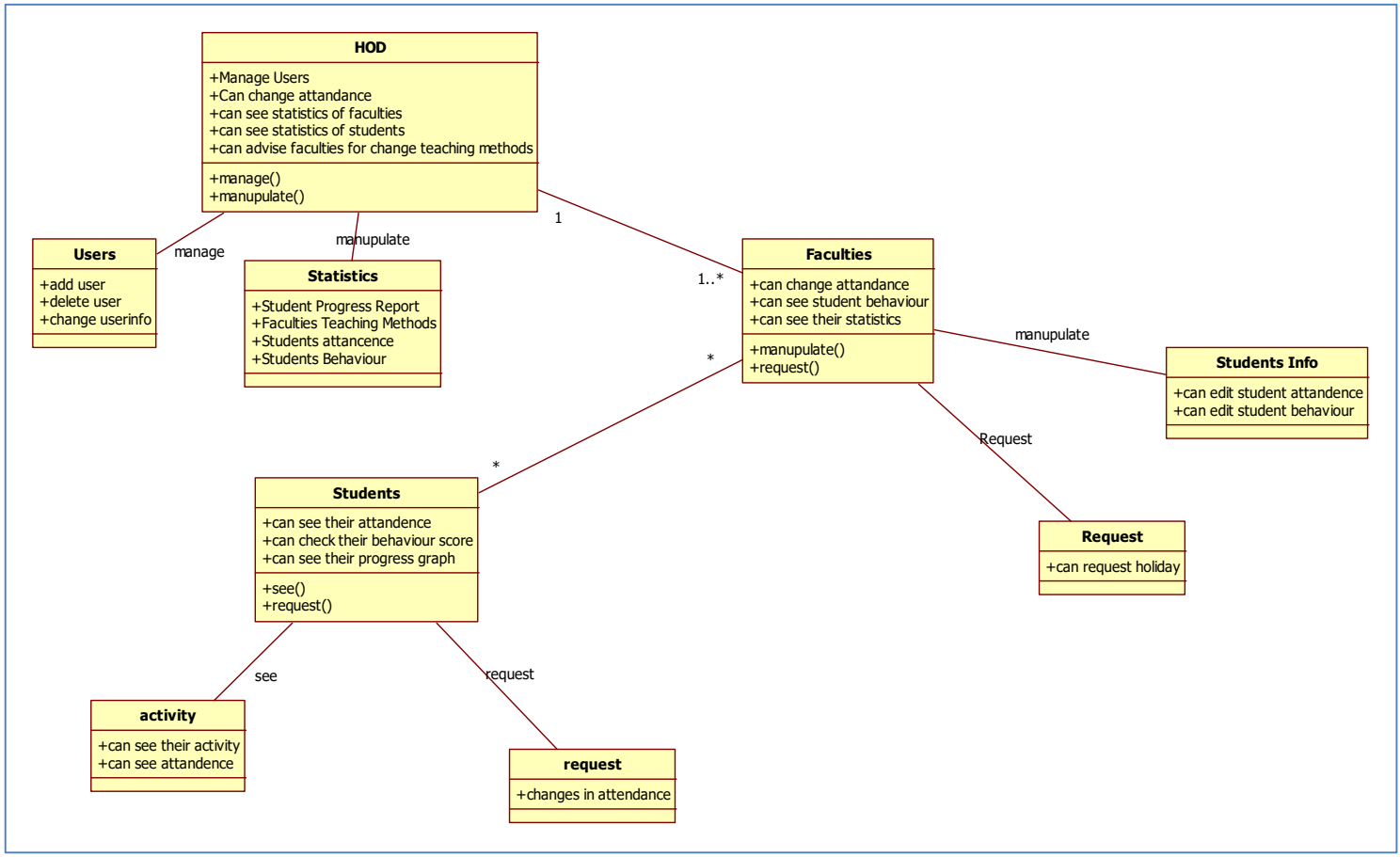


*Diagram 10 Class Diagram*

Class diagram is very useful diagram to check all the modules and the functionality in a single inspection of any inspector. As well as class diagrams are also helpful to know the dependencies of modules in between. From class diagrams It is very clear to check all the accessible modules to the users and also the dependencies to the each other, we can also know 1 to 1, 1 to many, many to 1 and many to many dependencies.

# 7. PROTOTYPE

## 7.1.SIGN UP / REGISTER

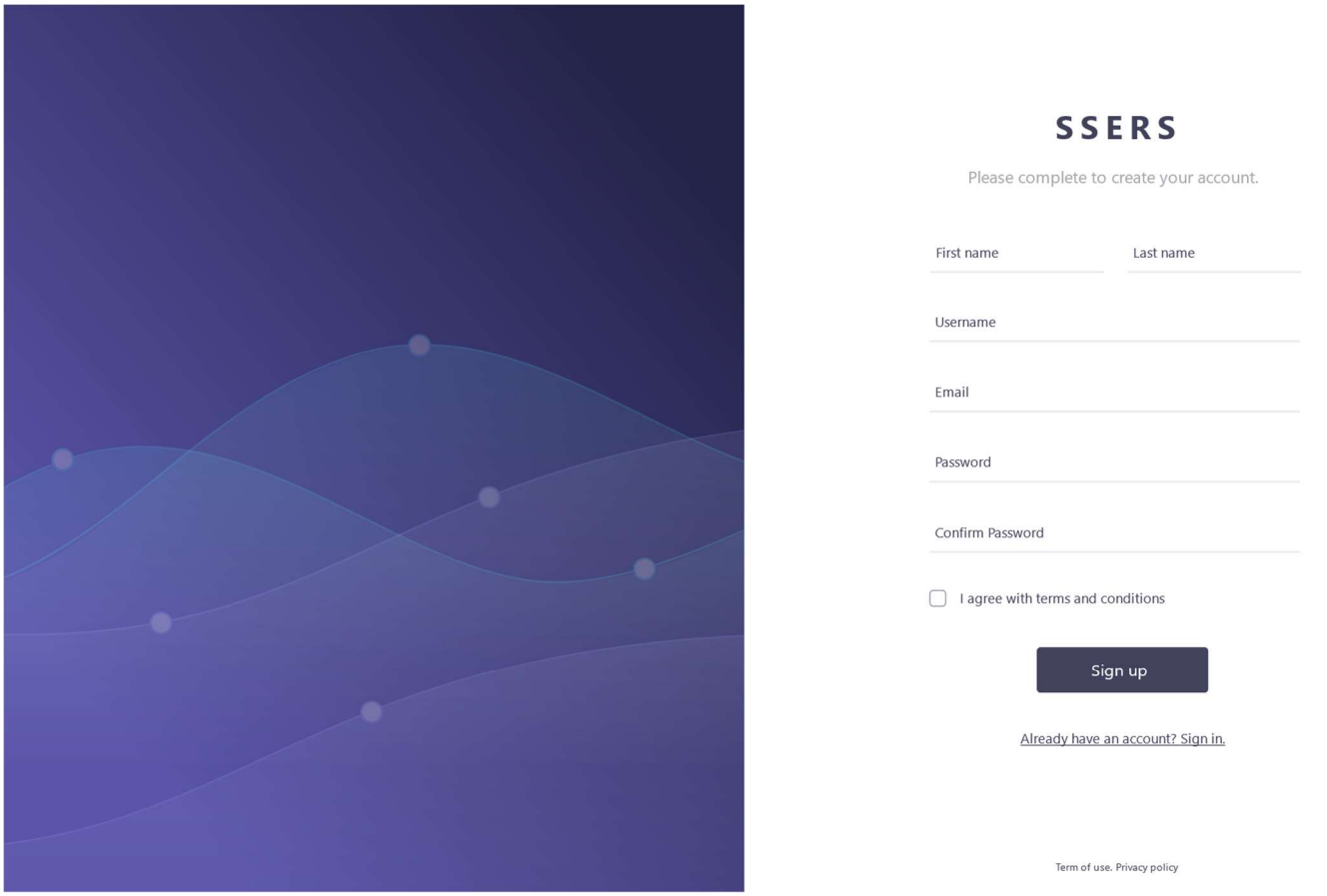


*Figure 7 Register User*

HOD / Admin can easily create, manage, delete Users. The above module is only visible to Admin User Only. So, no other persons outside of universities can register/sign in to this site.

## 7.2. LOG IN / SIGN IN

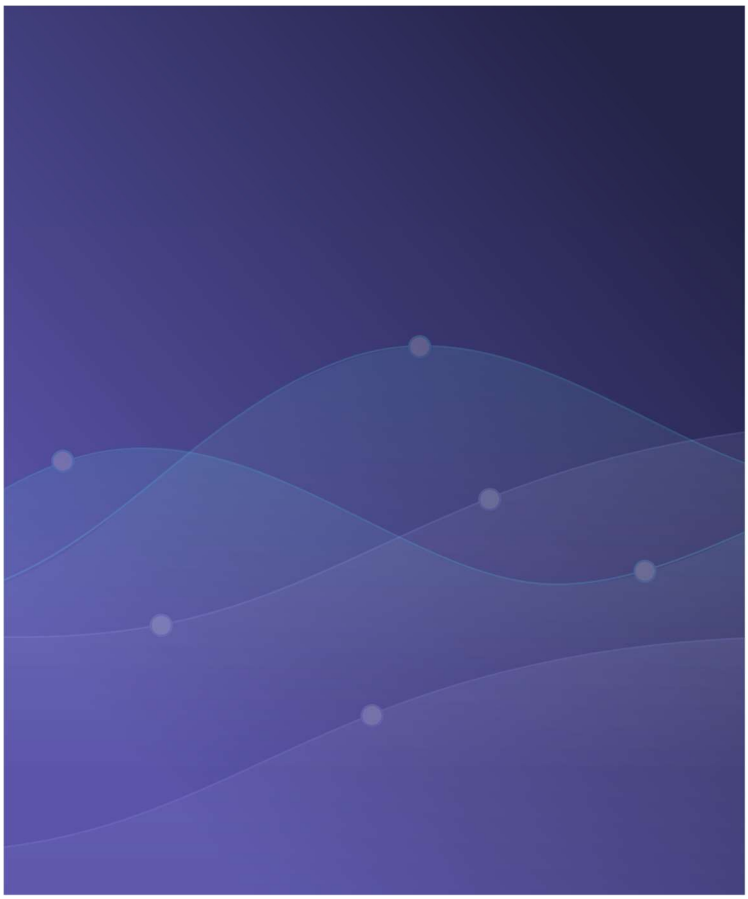


*Figure 8 Sign in*

User can Login by using their credentials so that they can use the various functionality available according to their user role.

## 7.3.FORGOT YOUR PASSWORD

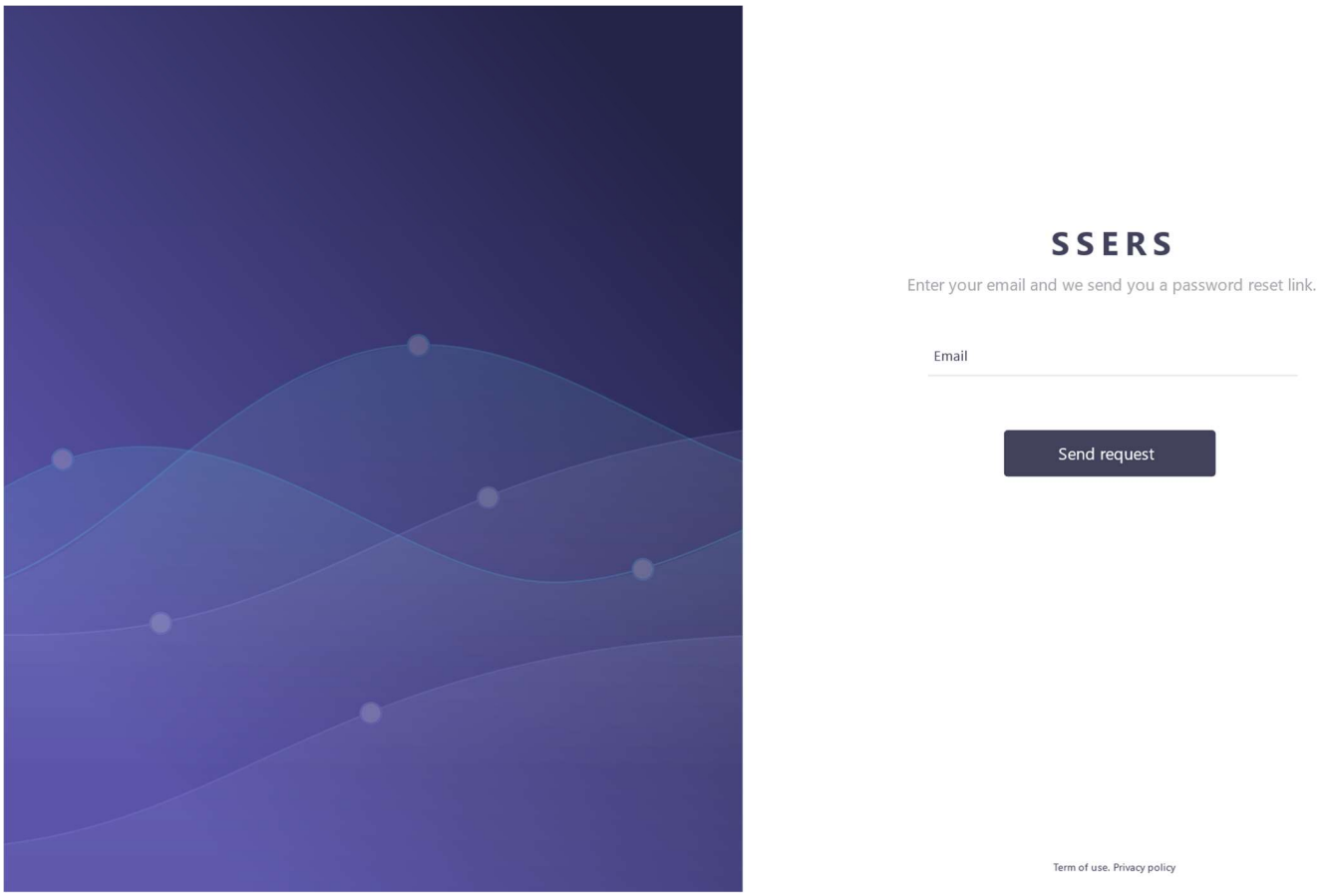


*Figure 9 Forgot Password*

If some how user forgot their password then user just need to write a email and send a request than user will get a email with their password.

## 7.4.DASHBOARD

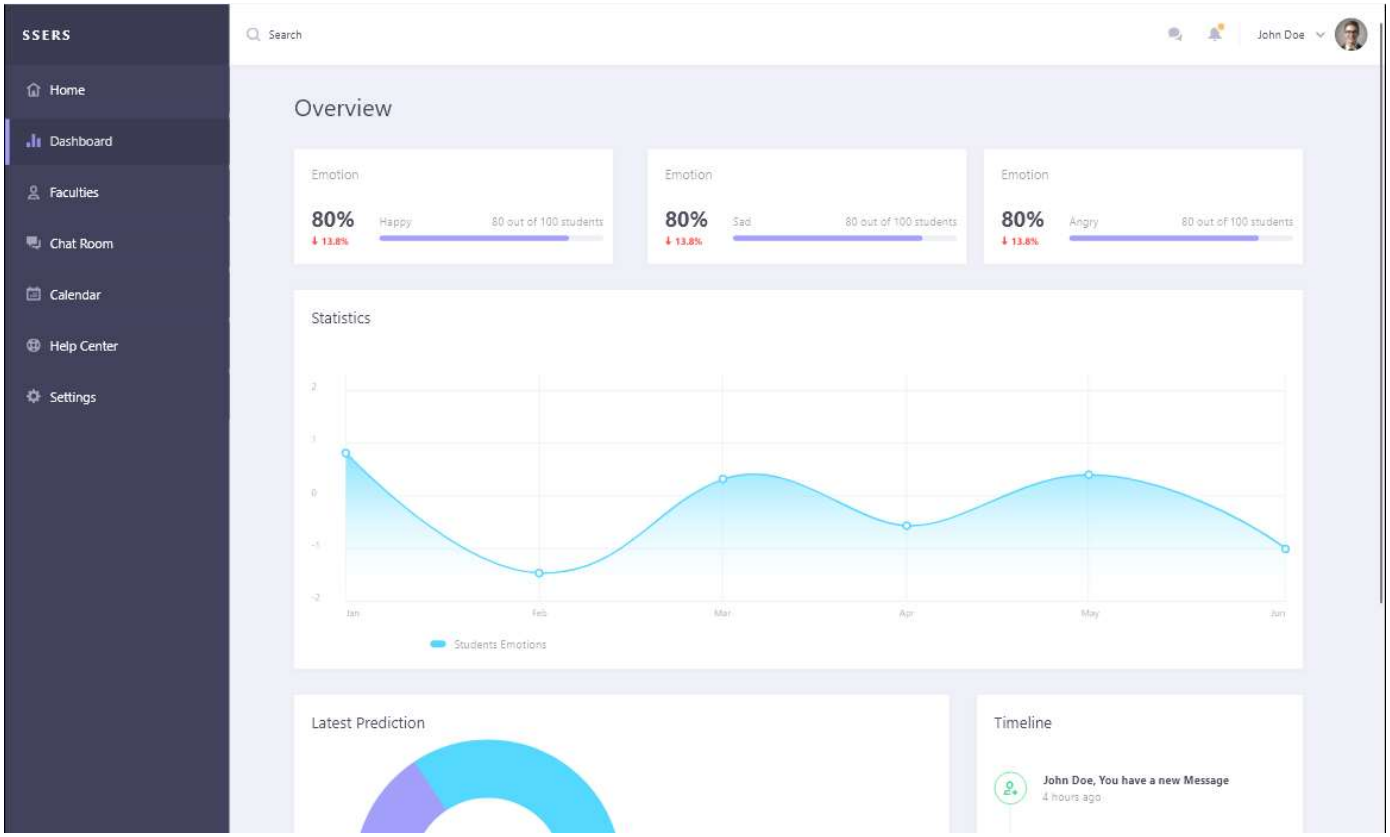


*Figure 10 Dashboard*

HOD can easily see all the report created by system include class attendance, student analysis, working hours. also they can see all the analytics report in graphical representation with monthly,weekly,daily filters.the faculties and HOD can also communicate using feedback part and they can see timelog of perticular classes.

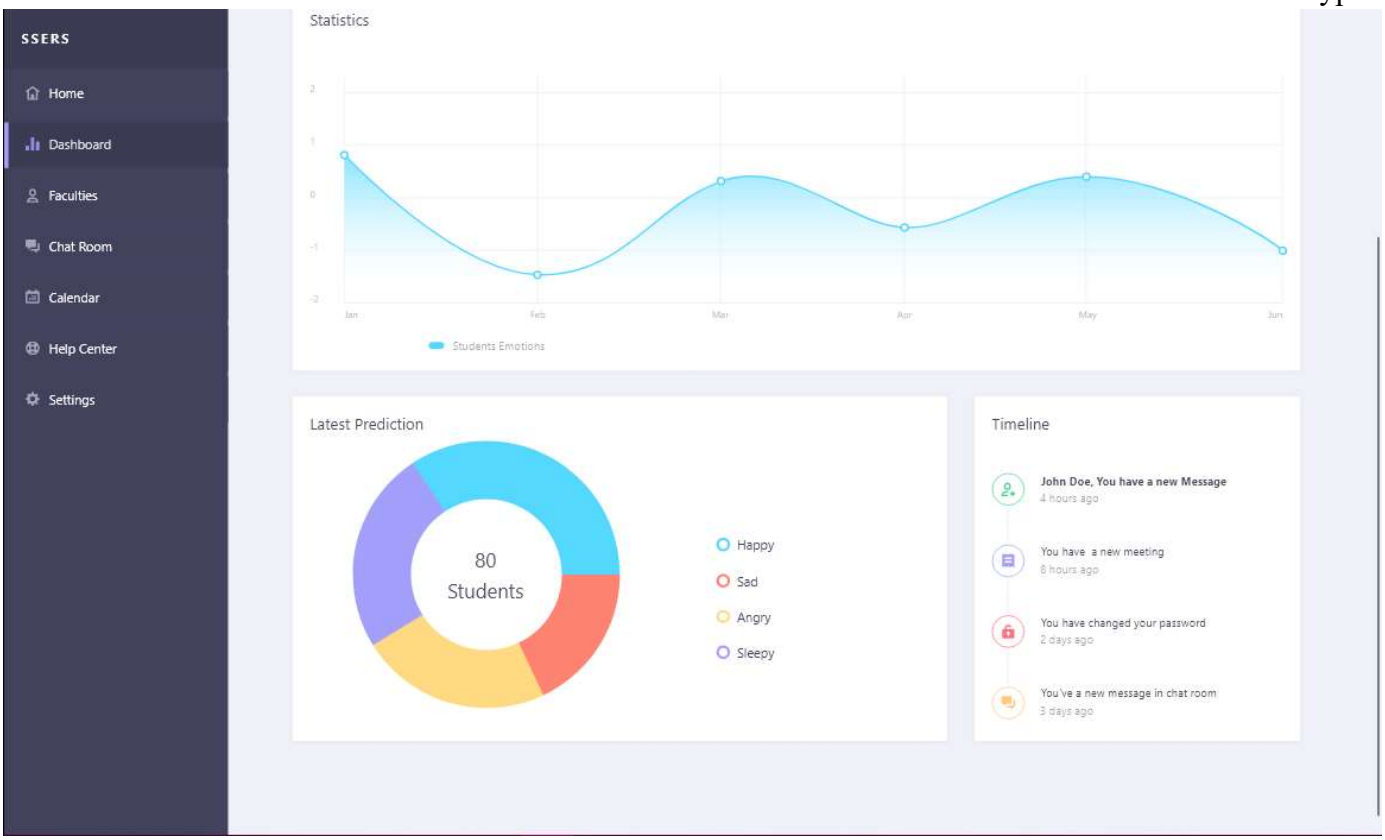


*Figure 11 Dashboard Statistics*

HOD/Admin can easily get informations like Sentiment system analysis report, total class, total students, teachers performance reports, reaching methods, top teachers by teaching methods, recent classes, active classes. although they can change view by All, Class View, Subject View, Teacher View that will be available in future. Admin can also show timeline, latest predictions,etc.

## 7.5.CHAT ROOM

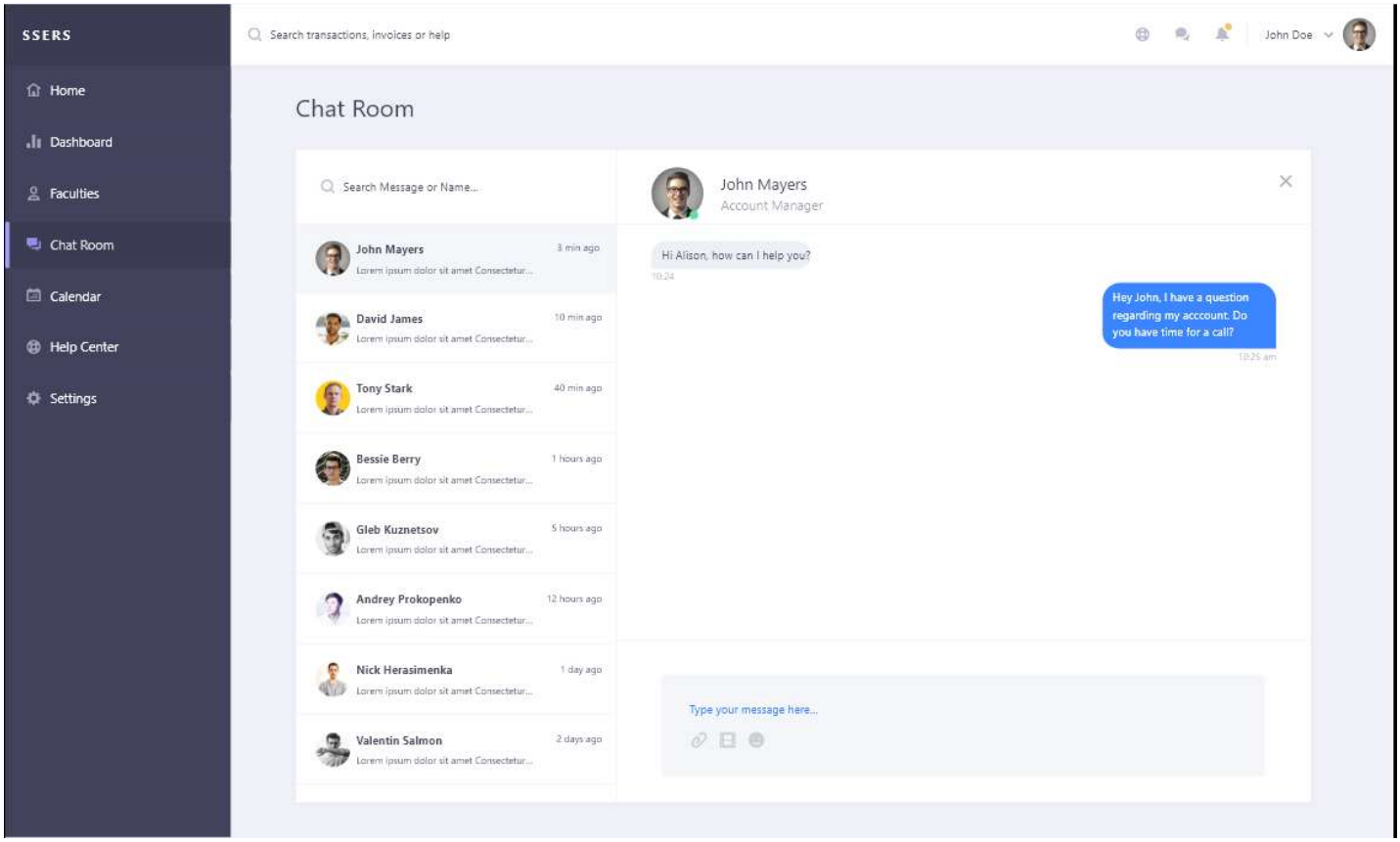


*Figure 12 Chat Room*

This is the Faculty view where it can get some fields like dashboard, reports, analytics, inbox, calendar events, users, other settings.

## 7.6.FACULTIES

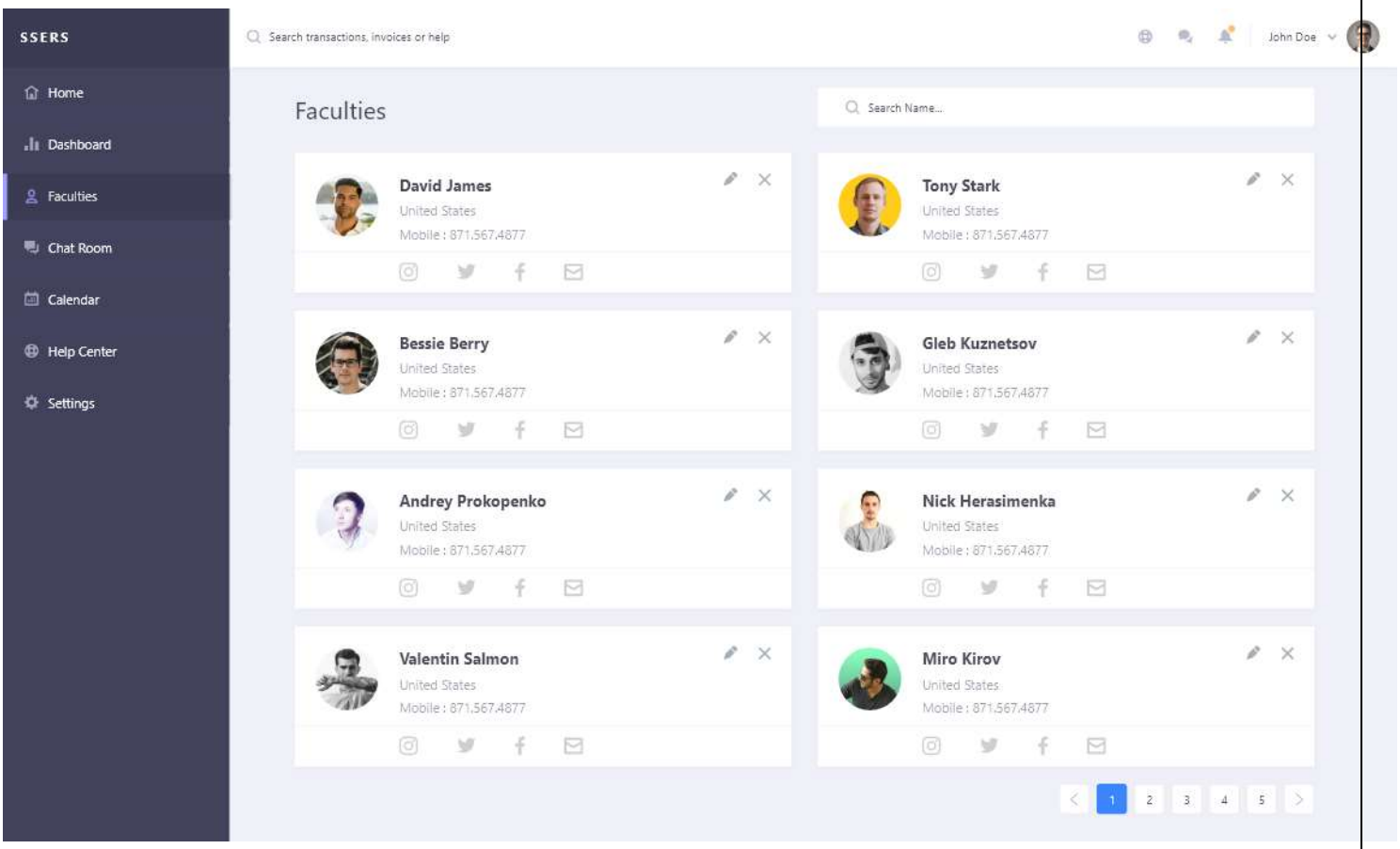


*Figure 13 Faculties*

Admin can easily manage all the faculties by simply going to the faculties tab. Admin can create, rename, delete faculties according to their requirements.

# 8. FUTURE WORK

Right now most of the features of this system are under implementation phase so here is the list of features that are available in a future!

Home section currently missing, that means admin can not check attendance and all that stuff.

In Dashboard section there is a lot of features are missing currently, like Timeline, Search Option, manage user using Profile Icon.

Calendar Feature is missing. That means Admin,faculties and student can't manage their event using calendar feature.

Chat Room Feature are currently under development and will be available very shortly.

Other than this, Setting option, Help center will not available and will be available in near future.

Currently, the Smart Student Emotion Recognition System is limited to the field of education but it also has the opportunity to work on other important factors like professional level, industrial level, agricultural level, and medical level. Once a good effect is achieved, this system increases the chance to benefits other sectors on a large scale on a commercial basis. Implementing this system on a professional level will help companies to treat their employees well so that they can give good respect to every employee they want according to their work. We will be able to easily implement this system at a better industrial level to achieve good and high-level production. It is very difficult to implement in agriculture, but it can be helpful for various agricultural factors like plant disease, food and plant qualities, and soil fertility. For humans to detect the disease before any serious problem occurs, the implementation of this in the medical field is very beneficial for humans.

# 9. CONCLUSION

The Smart Student Emotion Recognition System is a great idea to bridge the gap between literacy rates and start-ups. The system is providing very good solutions, especially for students to grasp all the basic concepts faster that they can change their mind for innovation instead of spending their time to study the same things over and over again. We know that strong communication will provide students with a better ability to catch up quickly. Such well-educated people will help the country to develop rapidly from all directions. To be a developed and successful country, education must be a pillar for the formation of their government, and it is not only a pillar but also a very strong pillar that always helps to protect the country against harmful substances. We cannot imagine a country without this pillar. Implementing this system in our education system will bring immense benefits to the country in the long run. It is great for a country like India to achieve a good position globally with high GDP (PPP) and Great Ecosystem. If we say it happens, we have really created a better world to have a better lifestyle.

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