CHRIST
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EMOJION
Know your Emotion

by

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Under the guidance of
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A Project report submitted in partial fulfilment of the
requirements of III Semester Master of Science (Data Science)
of CHRIST (Deemed to be University)

November - 2022

CERTIFICATE

This is to certify that the report titled **EMOJION** (know your Emotion) *is a bona fide record of work done by* **Mathukumilli Sumanth (2148016)** *and* **Varun S A (2148059)** *of CHRIST (Deemed to be University), Bengaluru, in partial fulfillment of the requirements of III Semester MSc(Data Science) during the year 2022.*

Head of the Department   **Project Guide**

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ABSTRACT

Psychology and Data Science are closely tied together. Understanding data about human behavior is an important and valuable skill in today's society. Companies, public institutions, and governmental organizations use a continuous stream of big data to describe and predict human behavior. Emotions are mental states which are achieved by neurophysiological changes which are deeply associated with thoughts, feelings, behavioral responses, and a degree of pleasure or displeasure. The idea that emotions directly cause behavior, and that is the proper function of emotion, is well established in psychology. Our project's objective is to create an interactive dashboard and present the user with his/her major emotion. Creating an interactive dashboard helps to visualize one's emotional state throughout that period. It also helps to answer questions like, what caused the emotional shift, when does it happen, and how the change take place. This helps one to analyze which are the factors responsible for one's emotions. We can also analyze at which time frame, under what circumstance, and for how long a particular emotion was experienced.

The application is targeted toward two sets of audiences. The first target audience is the commons. Where the design and application help the common man to access and get the advantage of it. The second specified audience is the psychological clients who reach out to a mental health specialist. This also helps psychologists to study their client's mental health, and emotional well-being and identify potential threat cycles in their lifestyles. This allows psychologists to track the effectiveness of their sessions. Through these dashboards, phycologists can track the progress that their client has made after visiting them. This also reveals the required changes to be made in their following therapy sessions. This helps us to improve the impact that these sessions/therapies have on the client's life.

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1. INTRODUCTION

Psychology is the study of people's behaviour, performance, and mental operations. It also refers to the application of the knowledge, which can be used to understand events, treat mental health issues, and improve education, employment, and relationships. The subject lies at the intersection of applied, educational, and theoretical science. In its primary form, psychology studies people—who and what they are. It looks into why they act and think the way they do and how someone can improve himself or herself. Therefore, everything a person does is connected to the subject. Psychology allows people to understand more about how the body and mind work together. This knowledge can help with decision-making and avoiding stressful situations. It can help with time management, setting and achieving goals, and living effectively.

Science not only allows people to be more successful, but it can also impact their health. It helps many tackle their mental illnesses so that they can continue living their lives. While psychological knowledge is often applied to the assessment and treatment of mental health problems, it is also directed towards understanding and solving problems in several spheres of human activity. By many accounts, psychology ultimately aims to benefit society. Many psychologists are involved in some kind of therapeutic role, practicing psychotherapy in clinical, counselling, or school settings. Other psychologists conduct scientific research on a wide range of topics related to mental processes and behaviour. Typically, the latter group of psychologists work in academic settings (e.g., universities, medical schools, or hospitals). Another group of psychologists is employed in industrial and organizational settings. Psychologists are also hired in IT sectors where the company needs to analyse the employee's mental health in order to achieve optimised results. Yet others are involved in work on human development, aging, sports, health, forensic science, education, and the media. Psychologists are involved in research on perception, cognition, attention, emotion, intelligence, subjective experiences, motivation, brain functioning, and personality. Psychologists' interests extend to interpersonal relationships, psychological resilience, family resilience, and other areas within social psychology.

1.1.   PROJECT DESCRIPTION

Monitoring our emotions is crucial to becoming more self-aware because the Pandemic has had a significant impact on people's mental health. The majority of the time, people don't express their feelings of sadness, anger, and other bad emotions. A significant need for an application that can track emotions in a much easier and simpler method will result from the fact that businesses, in addition to individuals, need to understand the emotional behaviours of their employees to facilitate the smooth operation of their operations. That leads to our motive behind this Emojion

The desire that we now see in the globe is what inspired our idea. the desire for mental well-being, collectivism, and calmness. The world was never the same again after the pandemic. It has a lasting impact on one's mental state. Numerous case studies illustrate how the pandemic has affected people's lives. Millions of individuals are now homeless and suffering because it has a negative impact on children and the younger generation. Globally, this had an impact on businesses of all sizes in the technology sector. My anxiety level has reached previously unheard-of heights.

Now that businesses, psychologists, and several healthcare providers have recognised the importance of mental health, they are putting more emphasis on fostering emotional intelligence in individuals and staff members. The capacity to recognise, control, and comprehend one's emotions is known as emotional intelligence. A high EQ aids in connection development, team stress reduction, conflict resolution, and job satisfaction. In the end, having a high EI means having the capacity to raise team output and employee retention. Because of this, employers prefer to hire and advance people for management positions who have a high "EQ" (emotional quotient), rather than IQ (intelligence quotient)
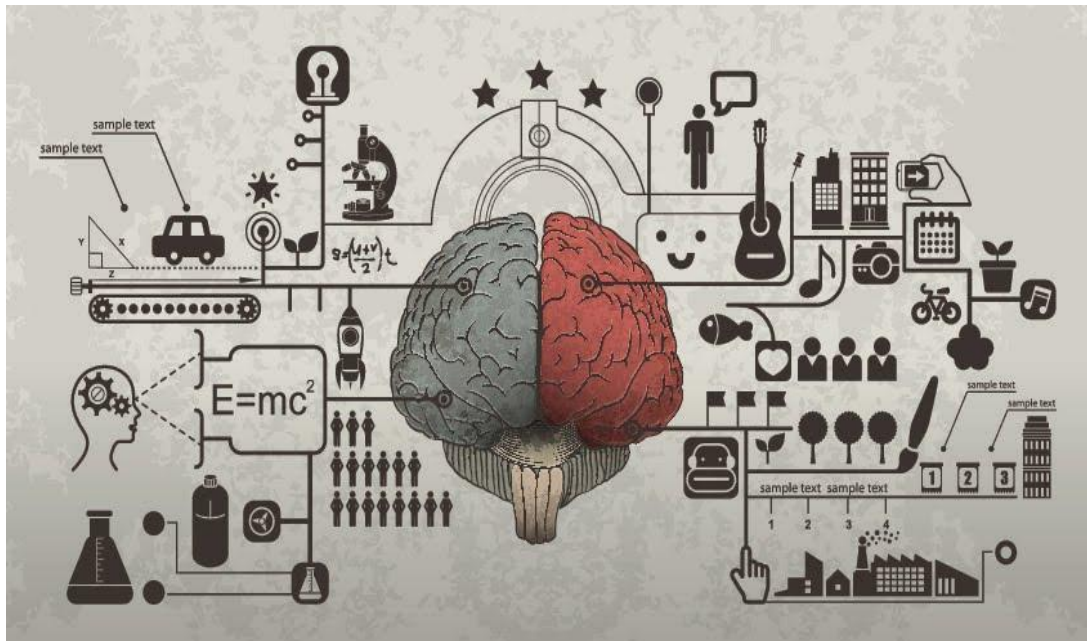
Figure 1.1 - Cognitive Science

EI is important for everyone who wants to be career ready. With high emotional intelligence (EI) we are more likely to get hired, promoted, earn better salaries, and most importantly, lead a happy life

1.2.   OBJECTIVES

Our project's objective is to create an interactive dashboard and present the user with his/her major emotion. Creating an interactive dashboard helps to visualize one's emotional state throughout that period. It also helps to answer questions like, what caused the emotional shift, when does it happen, and how the change take place. This helps one to analyse which are the factors responsible for one's emotions. We can also analyse at which time frame, under what circumstance, and for how long a particular emotion was experienced. This helps us to effectively manage our emotions and to keep track of our mental health. The first step in being mentally healthy is to be aware of our mental state at any given time. This is termed "insight" in Psychology.

1.2.1. Purpose

The purpose of the application is to provide the users with a platform to visualize his/her emotion. As emotions play an integral role in our daily activities, it also affects our moods and motives. The application aims at providing the user an opportunity to facilitate their emotions all through the desired time period. This helps in the overall well-being of a person thereby significantly impacting lives in a positive way.

1.2.2. Scope

- This application helps psychologists to study their client's mental health, and emotional well-being and to identify potential threat cycles in their lifestyle

- Helps the common man to track his/her emotional cycle. Providing a web/app will help people to track their emotional status and help improve their lifestyle.

- This helps psychologists to track the effectiveness of their sessions. Through these dashboards, phycologists can track the progress that their client has made after visiting them

- This reveals and gives the required changes to be made in the client's following therapy sessions.

- This helps us to improve the impact that these sessions/therapies have in the client's life.
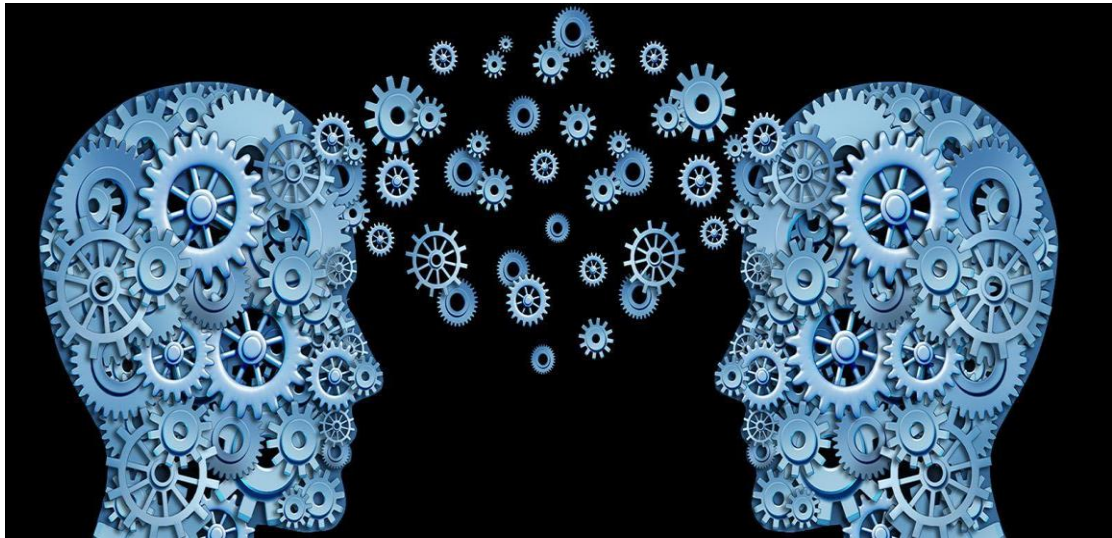
Figure 1.2 -Mechanical Brain

1.3.   OVERVIEW OF THE REPORT

The following report contains the Introduction, System Requirements, System Design, Implementation, and Testing of the Emojion web application. It highlights the basic idea of the project along with the various modules and features incorporated in it. The report explains the various software and hardware requirements of the application. It gives an idea of the implementation and working of the application, and the extent of its working.

2. SYSTEM DESIGN AND REQUIREMENTS

2.1.   PROBLEM DEFINITION

This project proposes an emotion tracking system based on emojis in the form of a web application for visualizing the emotion in various charts as requirements. It aims to give the user a clear visualization of their emotions.

2.2.   REQUIREMENTS SPECIFICATION

2.2.1. Functional Requirements

The functionalities of the web application are as follows:

1. **Login**

- A new user should complete the registration process which entails providing details like Name, Email ID, Address, Phone number, Username, and Password. Verification of the Email ID is done by sending a link to the provided Email ID and by clicking on it, the account will be created. Then the details are entered into a database.

- An existing user can log in by providing the username and password which was given during registration. These details are verified by comparing them with the rows in the database and only if both the username and password are correct, the user can successfully log in.

- If the username is available but the password is incorrect, then the user will be provided with an option to reset their password. Upon clicking this option, they will be directed to a webpage where they should enter the Email ID through which they have registered and a link will be sent through Email by which they can reset their password. Once this process is completed, the new password is replaced with the old password in the database.

- If both the username and password are not matching with the rows in the database then the user will be redirected to the registration page.

2. **Login log**

- Whenever a user logs into the website, the user details such as User ID, Username, and Password Status are collected and stored in a database.

This enables the admin to keep track of the dates, times, and frequencies the user has logged into the website.

3. Select Emotions

- The system should provide various emotions buttons as the Login / Signup such as "Joy", "Sadness", "Fear", "Surprise", "Disgust" and "Angry". After clicking one of these buttons/ images it will automatically redirect to the next page mentioned below.

4. Select Emojis

- The system should provide various emojis related to the previous emotion chosen in a random order.
- The Emojis will be a combination of strong, moderate, and week emotions.
- After choosing the emoji it should redirect to the source page

5. Select the Source of emotion

- This page should consist of 2 buttons with takes the input of the source namely "internal" and "external"

6. Information Storing

- Whenever the user clicks all three buttons ("Emotion", "Emoji" and "Source") the information such as Username, Date, Time, Emotion, Emoji, and Source must be collected and stored in the local database.

7. Visualising the data

- The Stored data must be extracted as visualized in a catchy graphical way and to even forecasted value must be shown using some time series model.

2.2.2. Non-Functions Requirements

- **Usability**: The application must be easy to use. It should let any user, regardless of their familiarity with technology, upload, edit, and submit.

- **Performance**: Response time must be as little as possible. The given input must be quickly predicted and visualize the data

- **Supportability**: The system requires coding knowledge, NLP, and time-series techniques for maintenance.

- **Security:** Only the users registered with the application can gain access to or her Dashboard.

2.3. SYSTEM REQUIREMENTS

2.3.1. User Characteristics

The application will have three types of users/beneficiaries namely individuals, Psychologists, and firms/Corporate. Each user has different functionalities offered within the application.

- **Client (Individual)**: An Individual can use this application to self-evaluate his emotions with respect to time ("Morning", "Afternoon" and "Evening") and sources ("Internal" and "External"). This will help a user to change his lifestyle and have more positive emotions which help in reducing various health issues.

- **Psychologist**: The Emojion system can be used by psychologists to well understand their clients as can give appropriate treatment. It helps them to understand how effective their treatment is working on a client and can help them to change their way of treatment.

- **Firms:** This application will also help the firms to track their employees and understand the stress level in the office and will help to take corrective methods, So the efficiency of work will increase and this leads the company towards a common objective in much optimal way without any Human Resource issues.

2.3.2. Software and Hardware Requirements

Software Requirements

- **Operating System:** Windows 8 or later, macOS Sierra 10.12 or later, 64-bit Ubuntu 14.04+, Debian 8+, openSUSE 13.3+, or Fedora Linux 24+.

  To use the application the user requires a web browser supported through the computer and a stable internet connection.

- **Tools, Libraries, and Packages**: As a developer, we would require Python installed on a computer along with the necessary packages to build and deploy the application on the web. For information storage we use SQLLite3.

Hardware Requirements

- Processor: Intel Pentium 4 and AMD 3000 or later

- Memory: 2 GB minimum, 4 GB recommended

- Screen Resolution: 1280x1024 or larger

- Application window size: 1024x680 or larger

2.3.3. Constraints

The main limitation of this project is that it is a web application that will solely depend on the self-integrity of the individual to evaluate their emotions, So the data might be misleading if the user is not using this application accurately. And Emotion is one element that will be affected by many other factors and it is a sensitive thing so individuals will not share the information as expected.

3.   SYSTEM DESIGN

3.1.   SYSTEM ARCHITECTURE

The system architecture is the representation of the hardware and software architecture of the system. The system architecture for the proposed web application is given below.
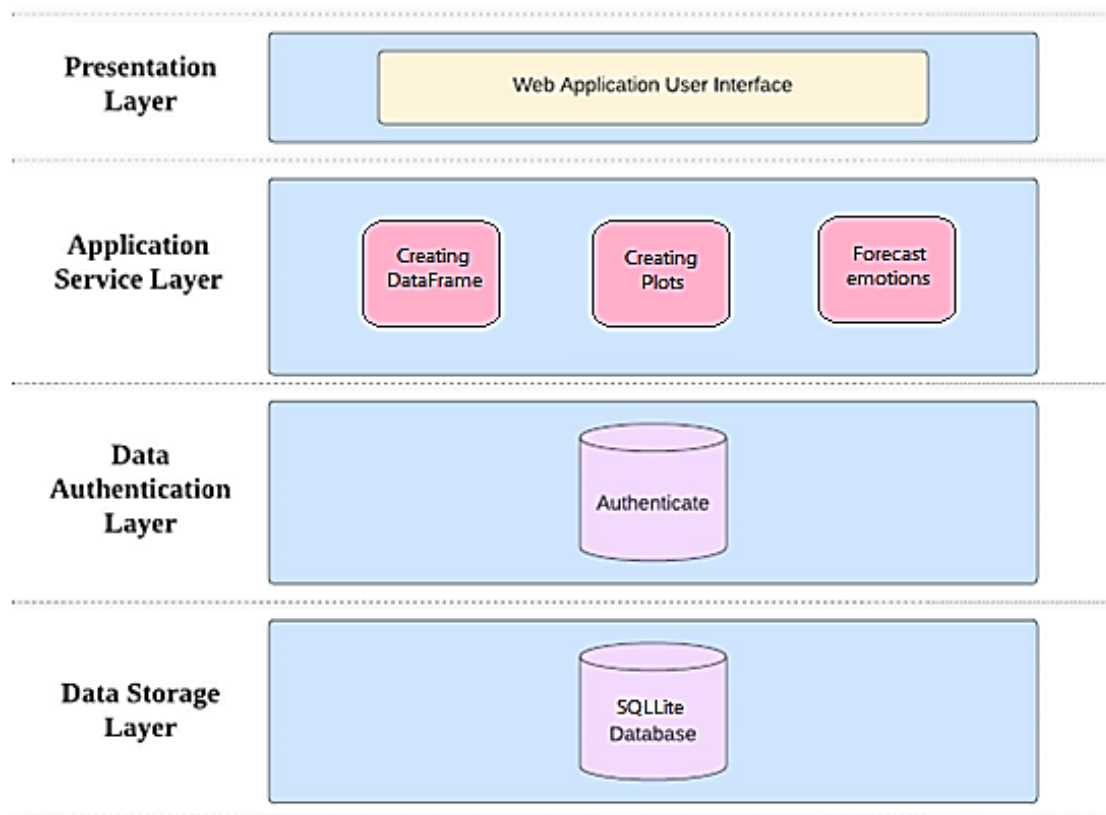

Figure 3.1 - System Architecture

The entire web application can be divided into four distinct layers. Data can flow through layers adjacent to each other.

- **Presentation Layer:** This is the topmost layer that interacts with the user. It comprises the user interface. It is the layer with which the user is in direct contact.

- **Application Service Layer:** This is the next layer which is immediately below the user interface. This layer comprises all the main modules of the application, which can be further divided into sub-modules.

- **Data Authentication Layer:** This layer checks for the validity of the source of the data or the destination of the receiver. Only verified and registered users can access the databases that are below this layer. Computers and other sources with admin privileges can also access the layer below.

- **Data Storage Layer:** This layer consists of the databases in which information on the application is stored.

3.2.   MODULE DESIGN

The primary modules of the web application are described as follows:

3.2.1.   File Management

This module consists of user registration and login, and user upload.

An existing user can log in by providing the username and password which was given during registration. These details are verified by comparing them with the rows in the database and only if both the username and password are correct, the user can successfully log in.

A new user must sign up before using the application (i.e., Give input to store and view the dashboard), After registering a unique user name will be created and the data is stored accordingly.

If the username is available but the password is incorrect, then the user will be provided with an option to reset their password. Upon clicking this option, they will be directed to a webpage

where they should enter the Email ID through which they have registered and a link will be sent through email by which they can reset their password. Once this process is completed, the new password is replaced with the old password in the database.

If both the username and password are not matching with the rows in the database then the user will be redirected to the registration page.

Upon logging in, the individual client can start giving inputs such as "emotions, emoji, and source" Or   can "View dashboard."

If it is a firm or Psychologist, they can view the details of all their clients or employees (still under development)

In Dashboard, one can see the daily plot of their emotions, "Emotion vs Source," "Emotion vs Timeslot" and "Pie charts" etc (can be updated in the future)

3.2.2. User Management

This module consists of the administrator roles for the web application. The administrator is responsible for managing the users and the web application. They perform functions like modifying user details and validating user details.

3.2.3. Plotting

In this module we create various plots to provide users with an easy visualization to understand their emotions. Plots were created using the Plotly Package from python, some plots are as follows

- positive emotions chat with respect to time here it shows the line graph of the score of various emotions, similarly we have a plot for negative emotions.
- A pie chat that shows the number of times an emotion
- A block plot of emotions vs time slots such as morning, evening, and night

- A block plot of emotions vs tasks such as before task after a task and during the task (optional)
- A block plot of emotion and sources Etc.

3.2.4. Forecasting

Here we used the Time series model to forecast or predict the future emotions, this will help so self-evaluate the emotions and to find the potential risk of extreme emotions.

3.2.5. Report Generation

This module consists of generating reports for the client, psychologist, and firms in the form of dashboards. The client dashboard displays various graphs that will give a good idea about their emotions. For other dashboard displayed a consolidated of all the clients and employee.

3.3. DATABASE DESIGN

3.3.1. Database Structure

```
{
emos: {
        user_name:{
                        time:
                        date:
                        emotion:
                        emoji:
                        source:
                    }
        }
```

}

3.3.2. Data Flow Diagram

A data flow diagram (DFD) maps the flow of information through a process or system. It also provides information on the input and output of each process or data store. For the proposed web application, the DFD at three levels, 0, and 1 have been formed and are given below.
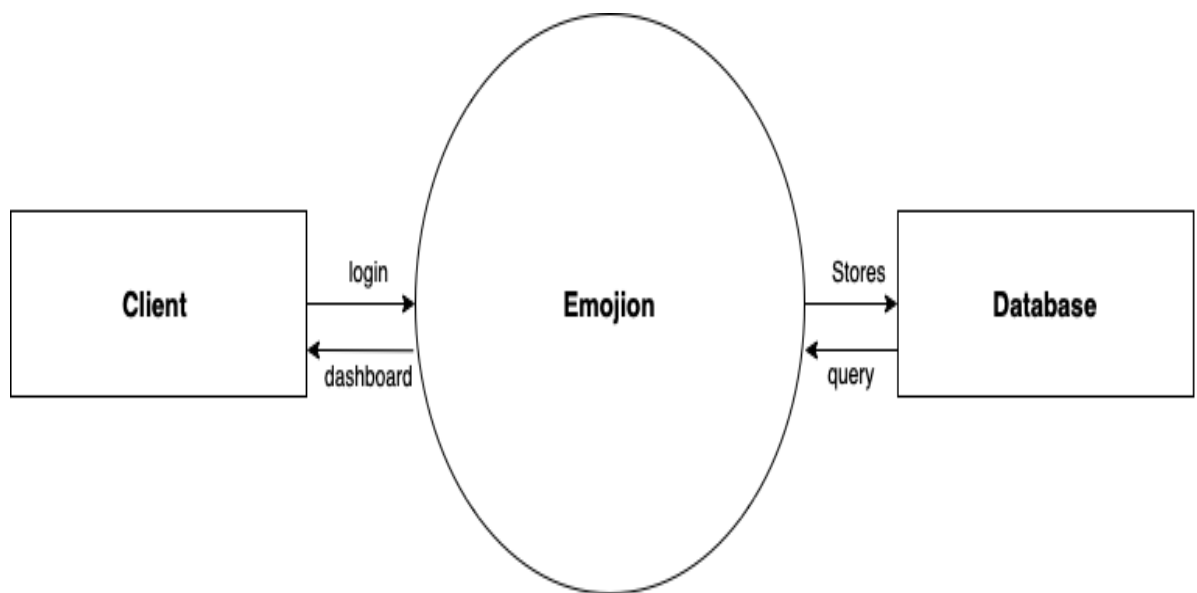
DATA FLOW DIAGRAM LEVEL 0

Figure 3.3.2.1-Data Flow Diagram Level 0

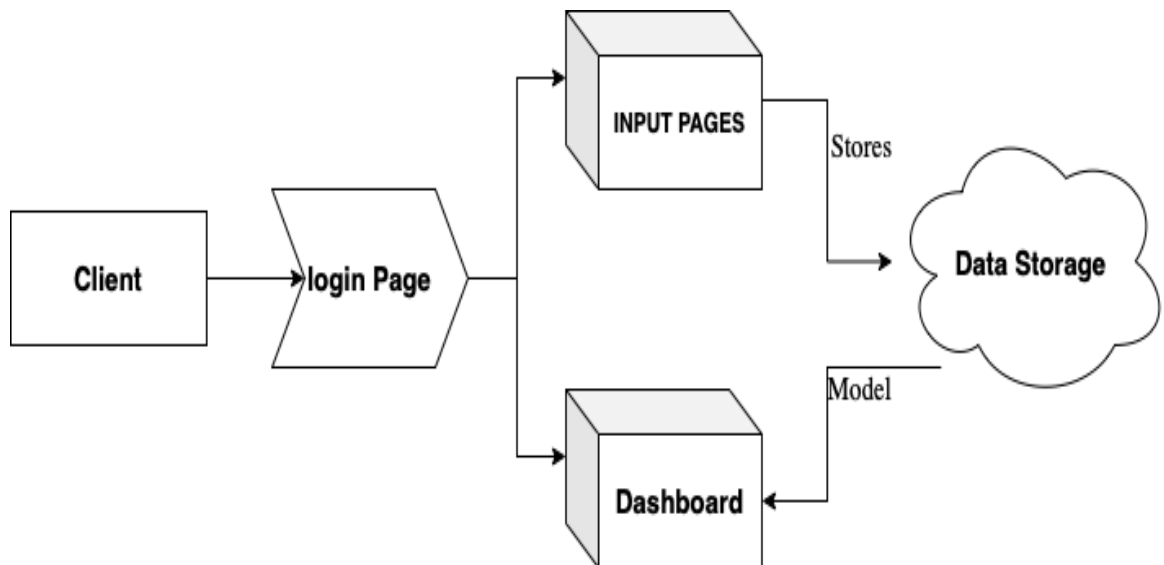The Level 0 DFD shows the flow of data from the users and administrator to and from the web application.

DATA FLOW DIAGRAM LEVEL 1

Figure 3.3.2.2 -Data Flow Diagram Level 1

The Level 1 DFD shows the flow of data among the users, the modules, and the data stores. The data flow begins with the user logging into the web application, and performing their task of resume upload or job description form filling respectively. This data is managed by the administrator. The user input data passes through the extraction module, from which the extracted data passes through the scoring module. The data output from scoring is used in the report generation module and is displayed to the users in the form of dashboards.
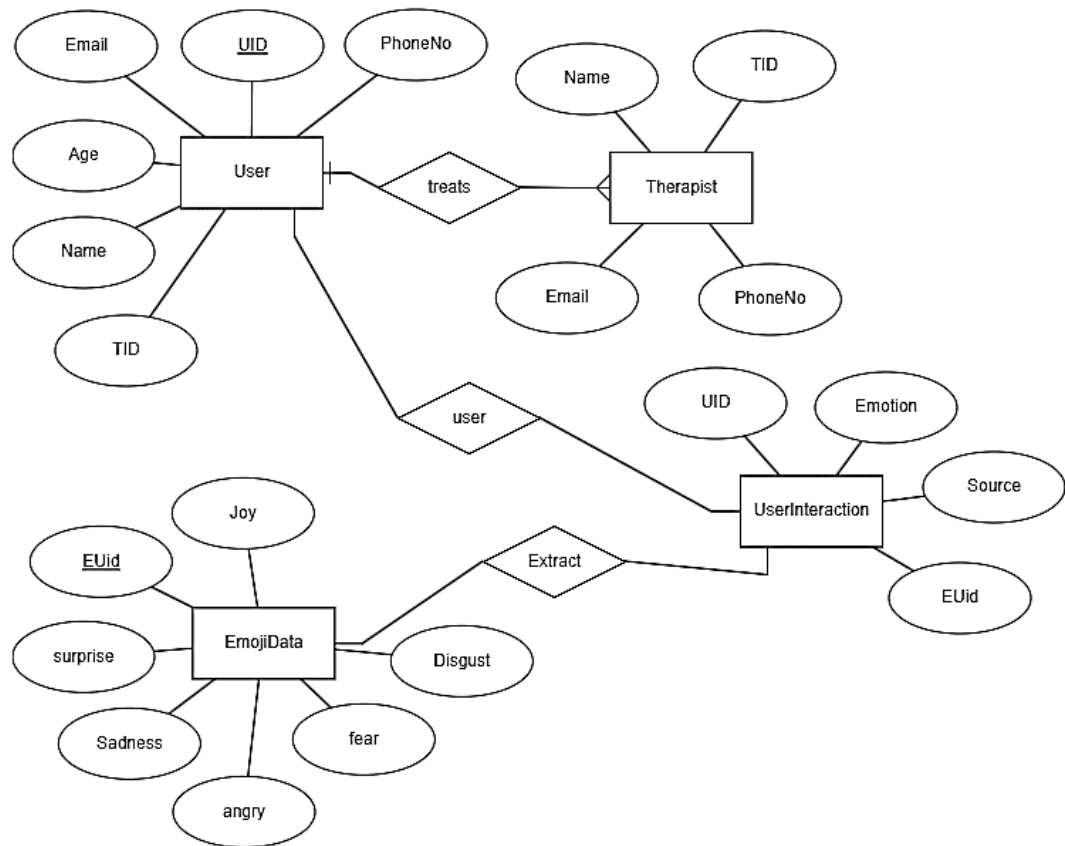
3.3.3. Entity Relationship diagram

Figure 3.3.3.1 – Entity Relationship Diagram

3.4.   INTERFACE DESIGN AND PROCEDURAL DESIGN
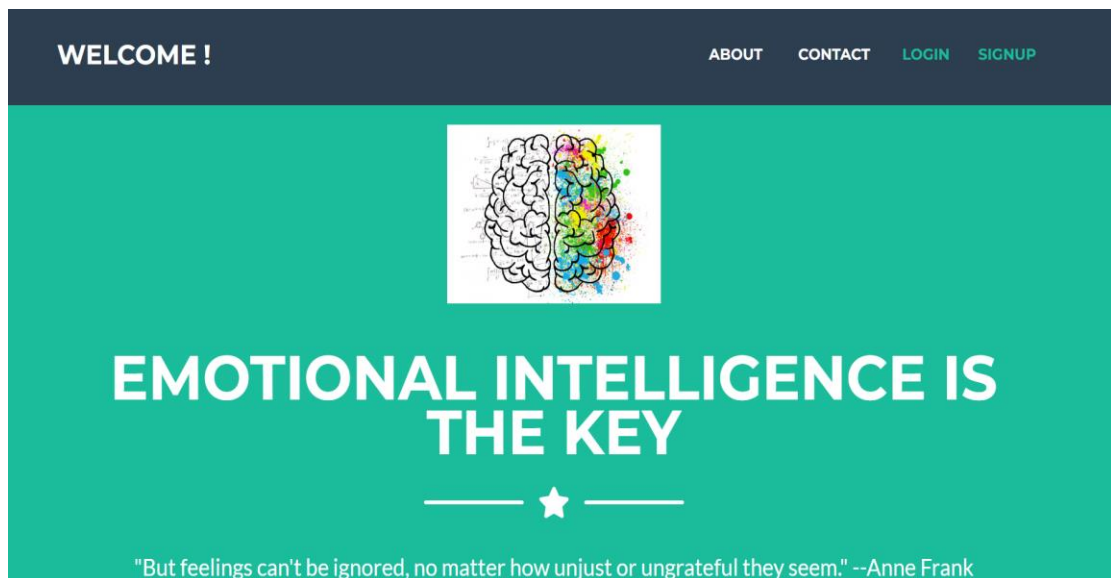
3.4.1.   User Interface Design

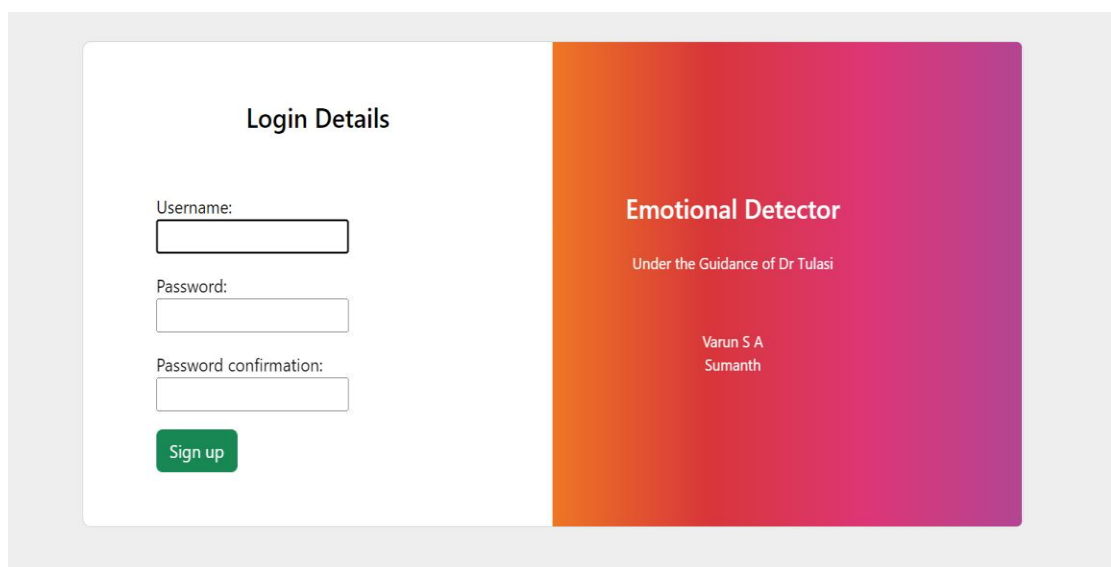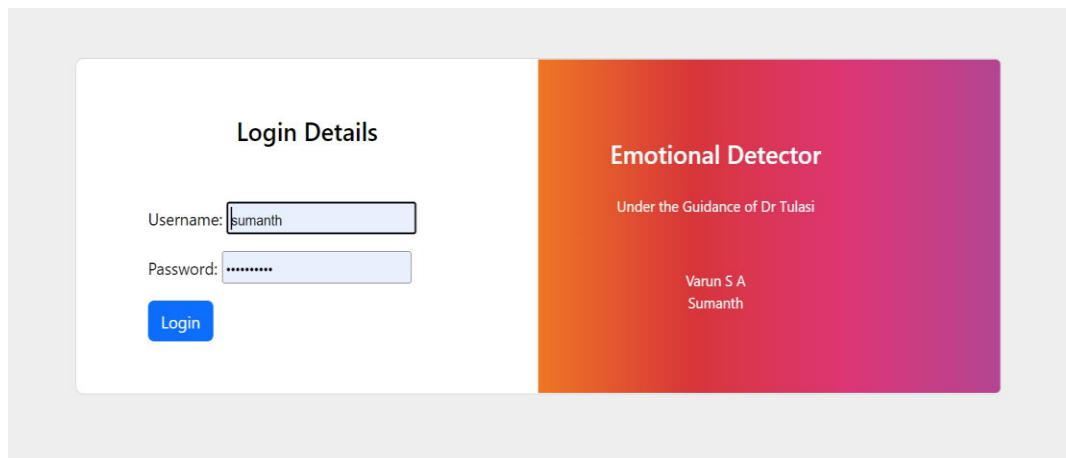Figure 3.4.1.1-Application: Home Page before Log-in

Figure 3.4.1.2 - Sign-Up

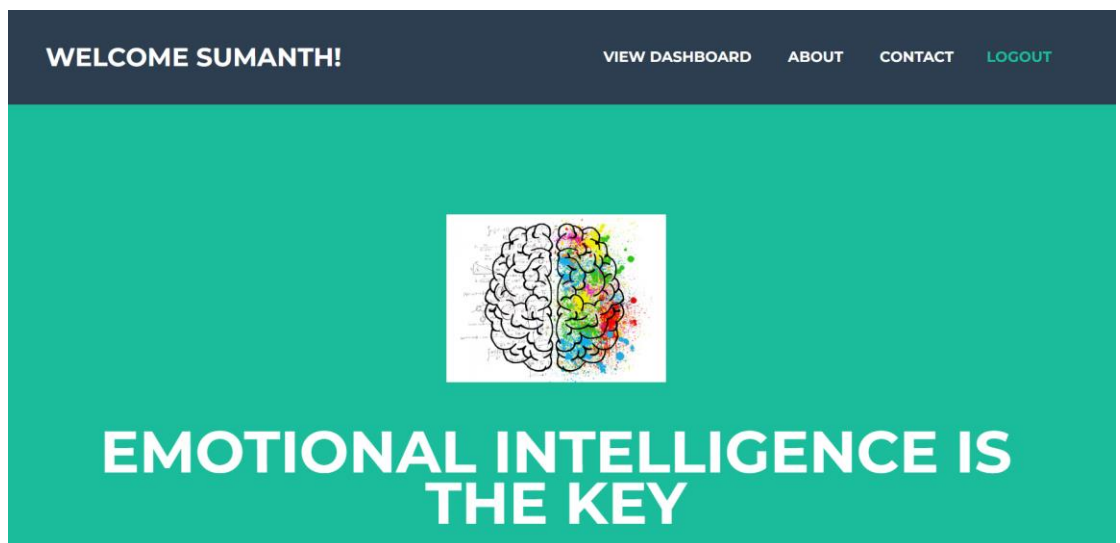Figure 3.4.1.3 - Log-in Page

Figure 3.4.1.4 - Application: Home Page after Log-in

Figure 3.4.1.5 - Emotions Page

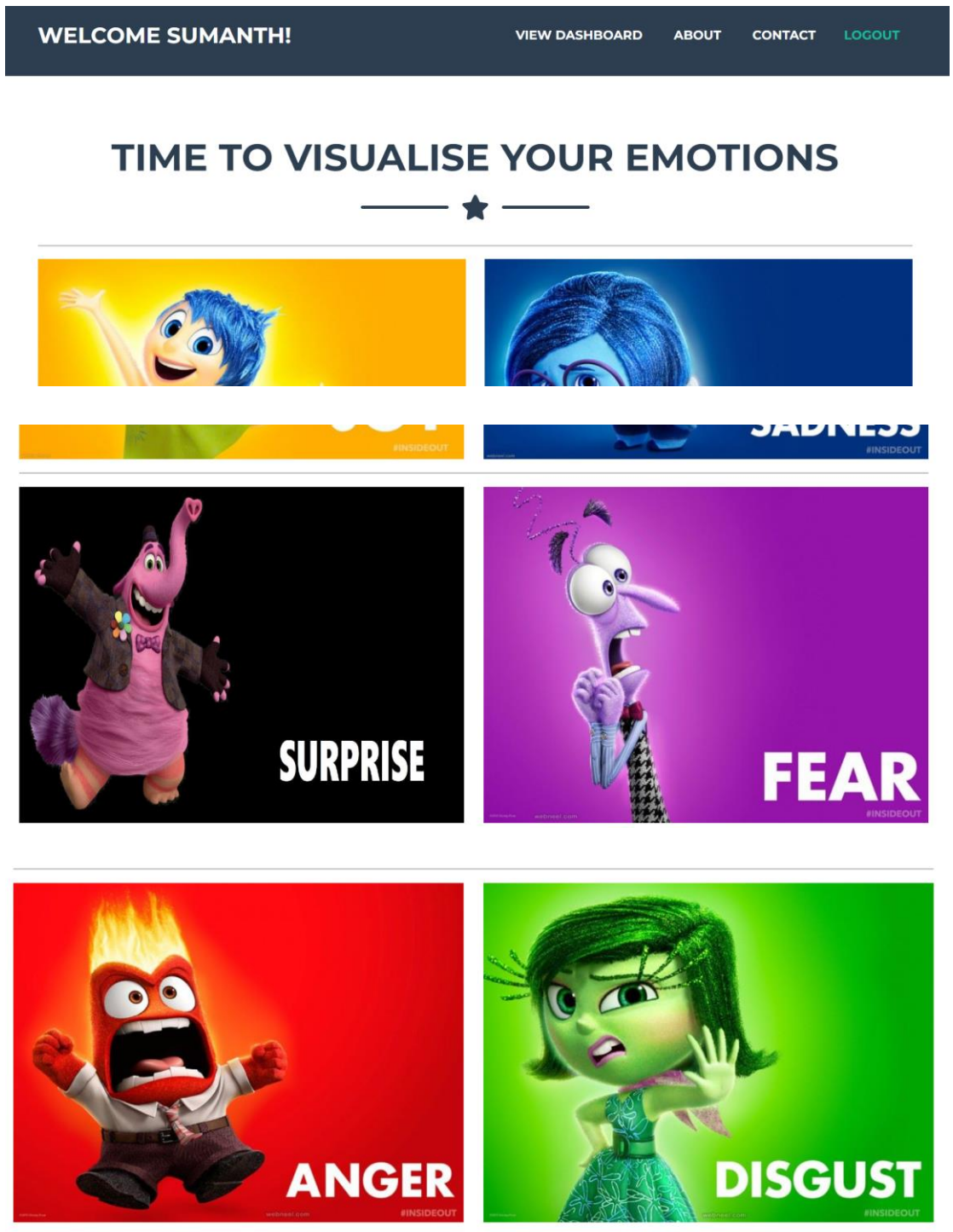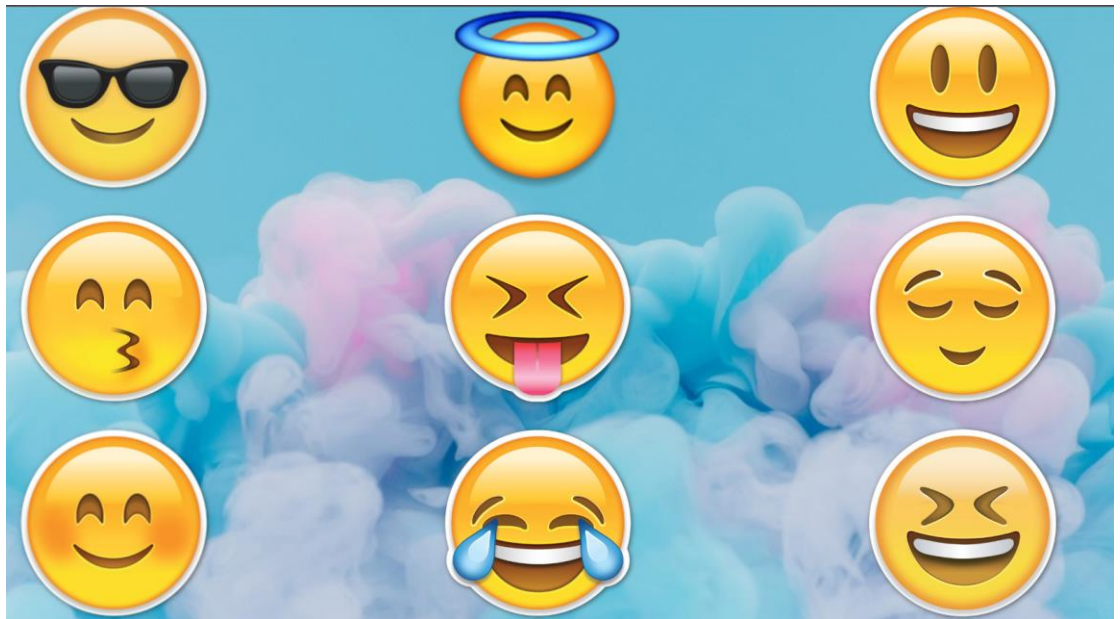Figure 3.4.1.6 - Happy emojis
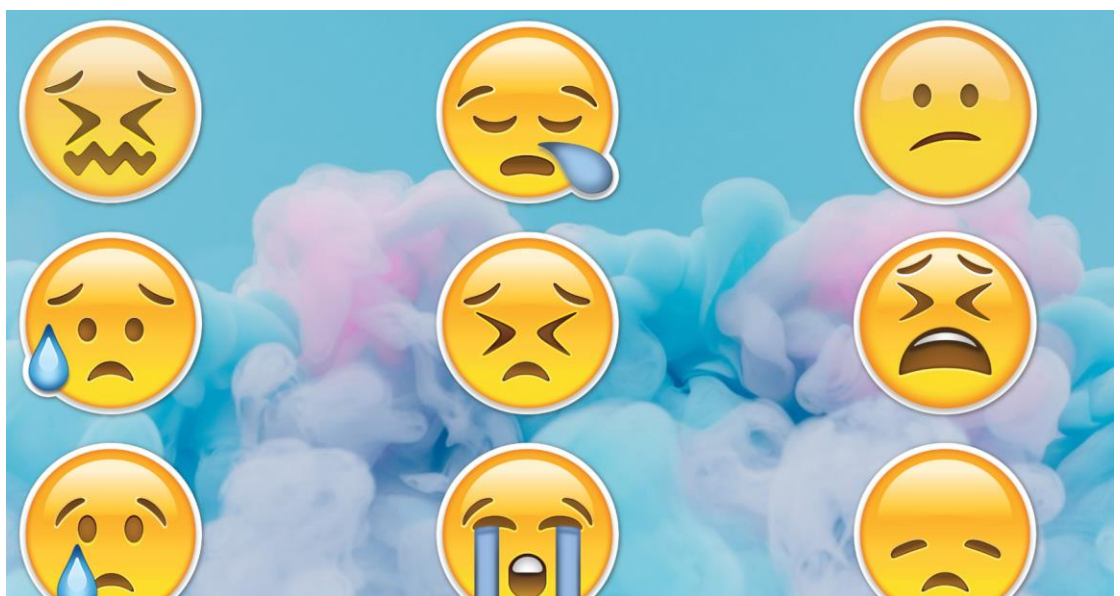
Figure 3.4.1.7 - Sadness emojis

Figure 3.4.1.8 - Fear emojis
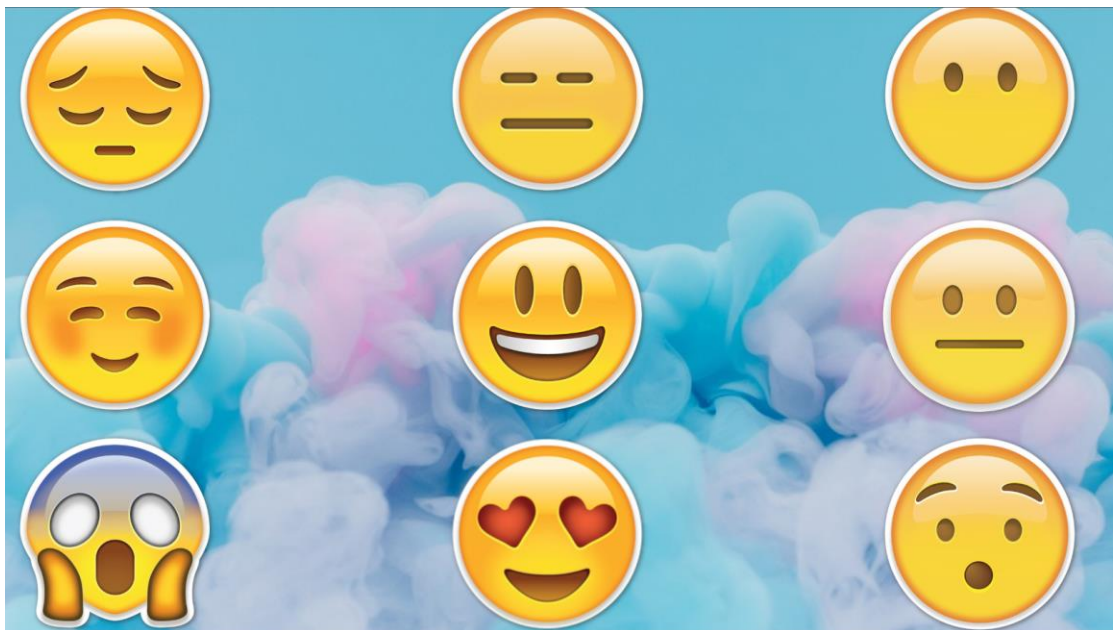
Figure 3.4.1.9 – Surprise emojis
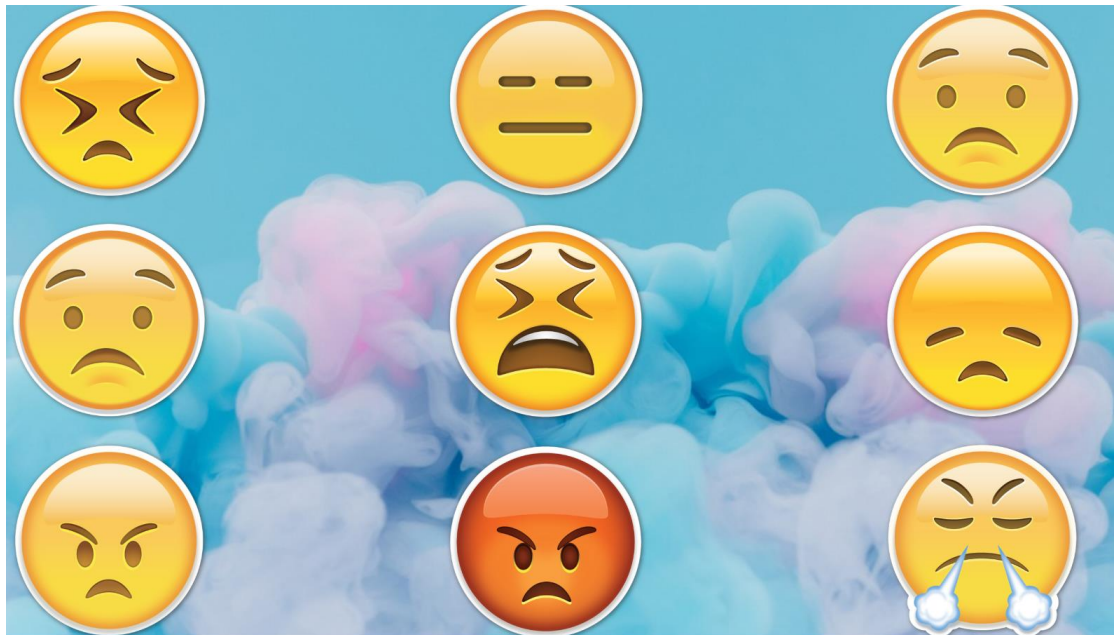
Figure 3.4.1.10 - Angry emojis
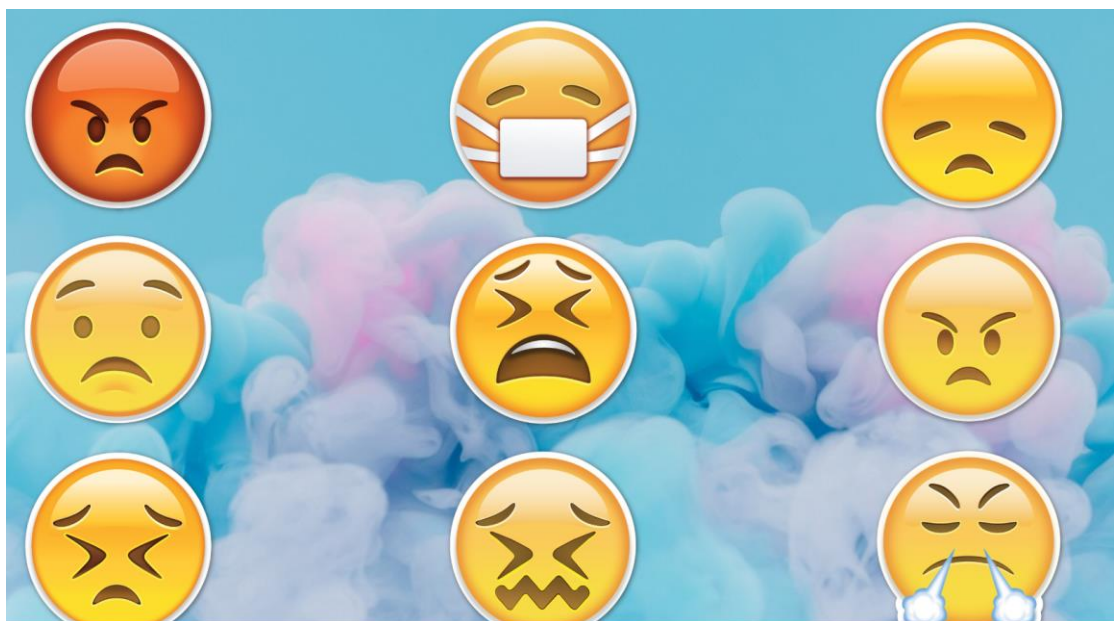
Figure 3.4.1.11 - Disgust emojis

3.4.2. Reports Design
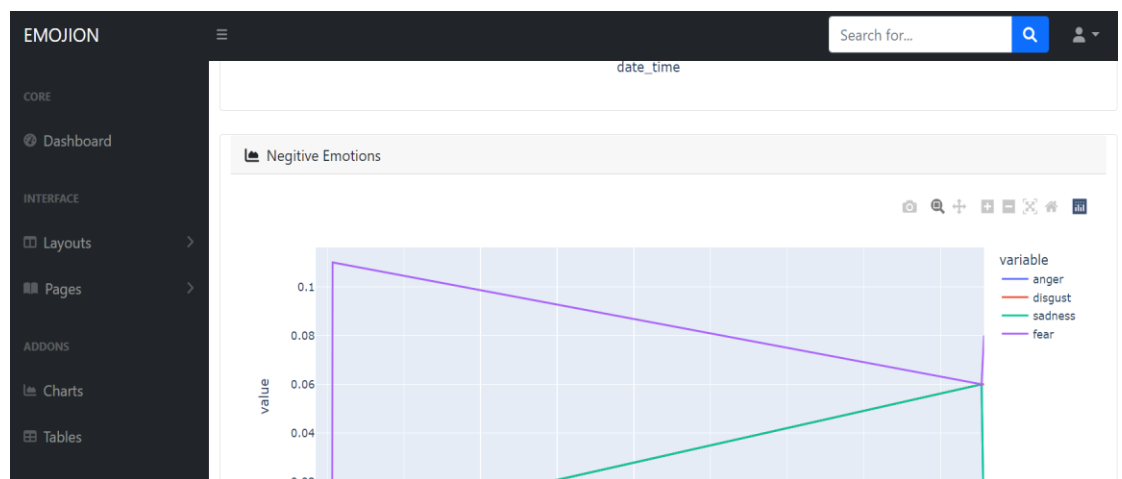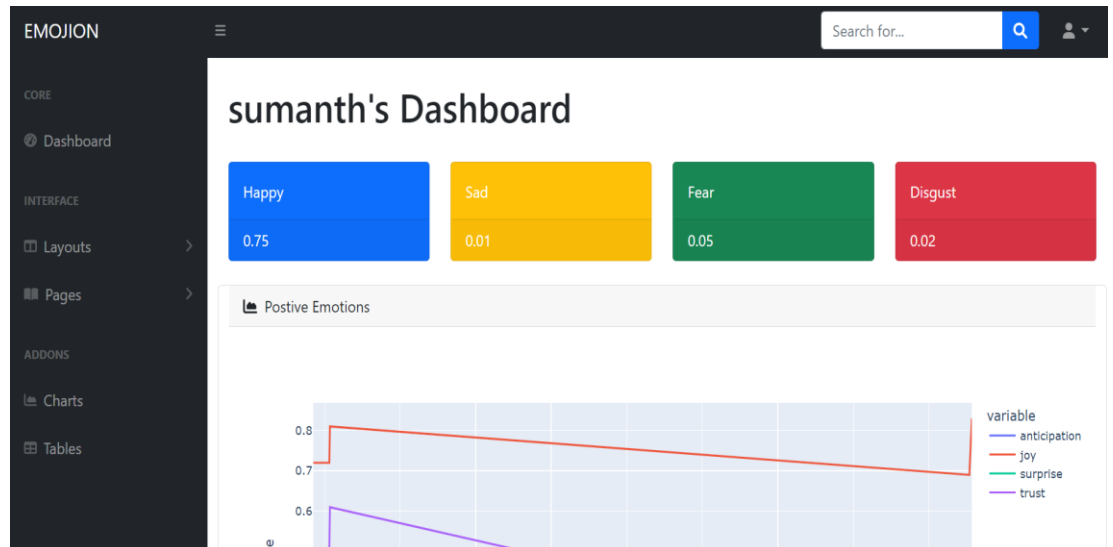
Figure 3.4.2.1 Dashboard

3.4.3. Admin Page
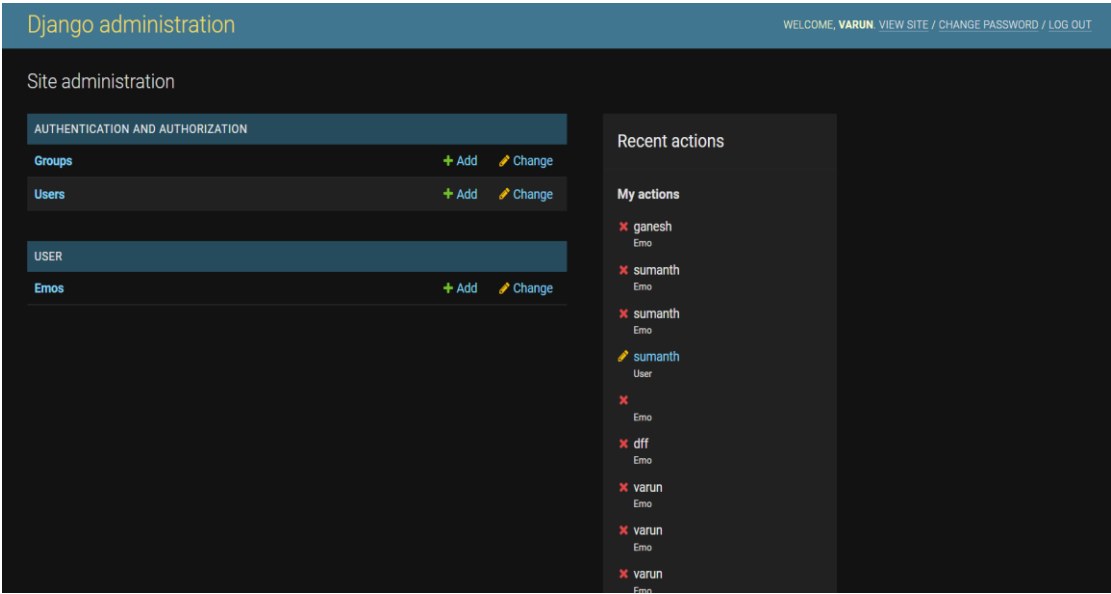
Figure 3.4.3.1 – Admin Home Page

Figure 3.4.3.2 – Data Page (all users)
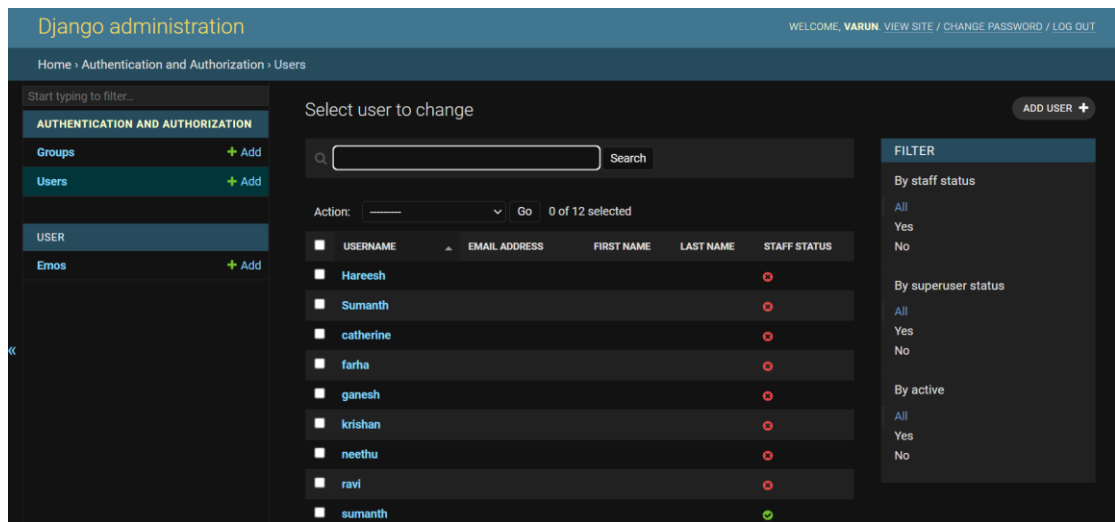
Figure 3.4.3.3 – Admin Users Details page

4. IMPLEMENTATION

4.1. IMPLEMENTATION APPROACHES
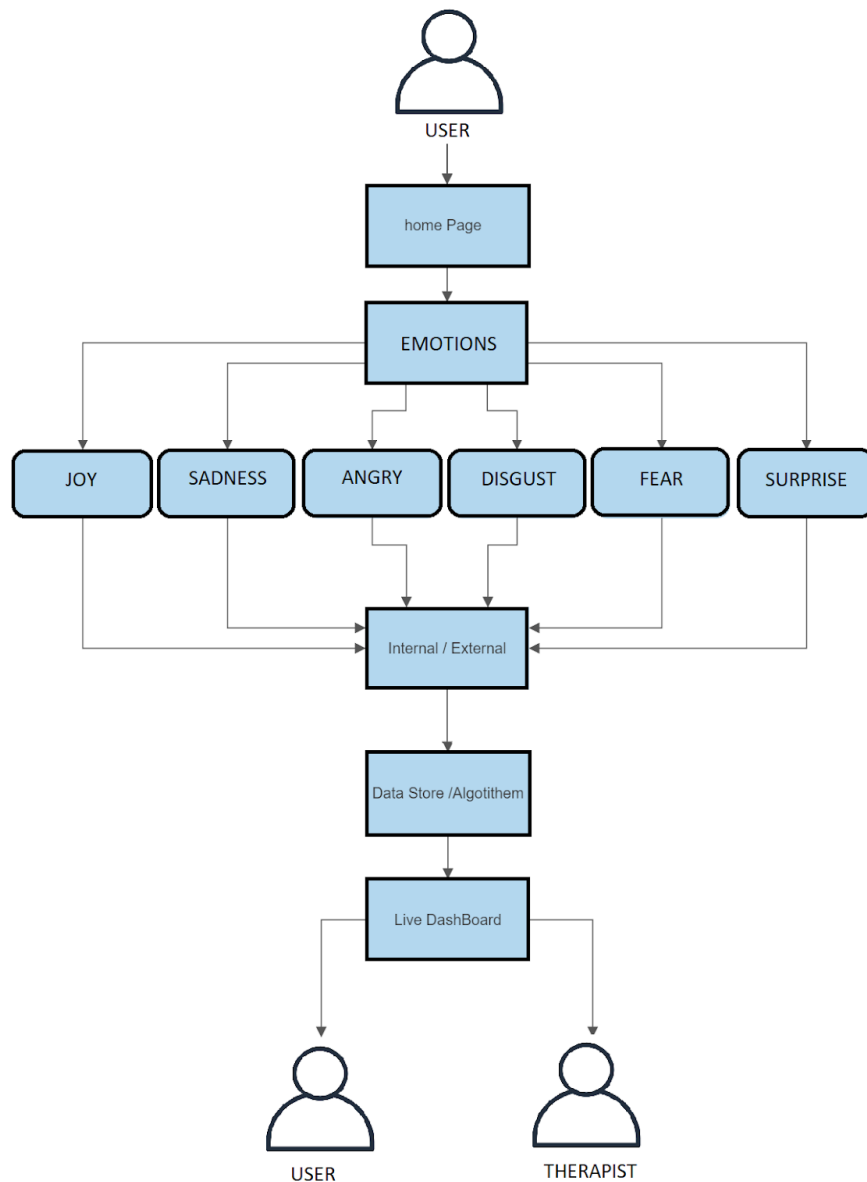
Figure 4.1.1: Sitemap Plan for Web Application

4.2.   CODING STANDARD

The different modules specified in the design document are coded in the coding phase. It is important to maintain a well-defined and standard style of coding to give a uniform appearance to the codes, improve readability, and reduce complexity. It also helps in code reuse and helps to detect errors easily. The coding standards followed are as below:
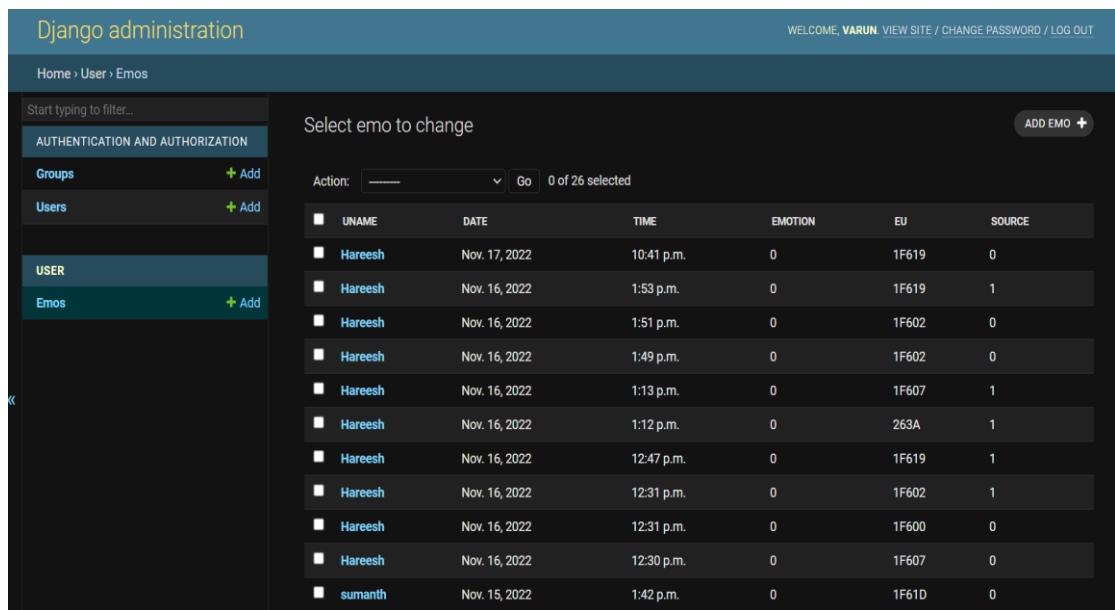
- Naming conventions have been followed. Function name begins with lower case, and in case of more than one word, is appended using underscore. All the HTML files as well as the variables used in this project were given meaningful names so that it might be easier for whoever might read the code.

- Only one statement per line was used in this project wherever possible.

- Proper indentation has been followed. All nested blocks were properly indented and spaced. Proper Indentations were given at the beginning and at the end of each block in the program.

- Each variable has to be given a descriptive and meaningful name indicating the reason behind using it. This is not possible if an identifier is used for multiple purposes and thus it can lead to confusion to the reader. Therefore, all the identifiers in the project were used for a single purpose.

- Lengthy functions are very difficult to understand. Smaller functions were used to carry out small work and lengthy functions were broken into small ones for completing small tasks.

- Exception handling has been performed to deal with every situation where exceptions may occur.

- Regular and updated comments have been used to improve readability of the code.

4.2.1.   Coding Details

4.2.1.1.   Data Set

The Data Set consist of the details of all the score related to an emoji.

Table 4.2.1.1.1 – Emojis Data

Unicode	anger	anticipation	disgust	fear	joy	sadness	surprise	trust
1F308	0	0.28	0	0	0.69	0.06	0.22	0.33
1F319	0	0.31	0	0	0.25	0	0.06	0.25
1F31A	0.06	0.08	0.17	0.06	0.42	0.19	0.06	0.11
1F31E	0	0.22	0	0	0.78	0	0.11	0.22
1F31F	0	0.28	0	0	0.53	0	0.25	0.31
1F338	0	0.22	0	0	0.56	0	0.14	0.25
1F339	0	0.36	0	0	0.56	0	0.11	0.72
1F33A	0	0.11	0	0	0.39	0	0.06	0.19
1F340	0	0.39	0	0	0.47	0	0.22	0.44
1F343	0	0.31	0	0	0.11	0.17	0.03	0.06
1F355	0.06	0.39	0.06	0.06	0.47	0.06	0.17	0.17

The data is extracted through Sentiment analysis done on a

•   Collected ~20M tweets over a period of 1 year

•   100 tweets per day for each of 620 most frequently used emoji

•   Every single tweet contains at least one emoji

•   No more than 5 tweets from an individual user

Used NRC EmoLex is used to capture sentiment words for the above data

Find top K words (based on EmoTag Similarity Scores) for a given emoji

•   Aggregated similarity scores (K=3) are the final sentiment score for that emoji

Finally the data set was evaluated \ Novak et al.

4.2.1.2.   Plots and Table

To create a Dashboard, we used the Plotly library from Python, Plotly provides online graphing, analytics, and statistics tools for individuals and collaboration, as well as scientific graphing libraries for Python, R, MATLAB, Perl, Julia, Arduino, and REST.

Code:

1. Packages imported

```python
from django.shortcuts import render
import pandas as pd
import json
import plotly.express as px
from plotly.offline import plot
from user.models import emo
import user
import datetime
```

2. Function to get average and convert extract week name

```python
def ave(l1):
    sum =0
    for x in l1:
        sum = sum + x
    if Len(l1)>0:
        return round(sum/Len(l1),2)
    else:
        return 0
```

```python
def weekname(x):
    return x.weekday()
```

3. Function to extract the data from database

```python
def data_extraction():
    qs = emo.objects.all()
    data1 = [
        {
            "uname" : x.uname,
            "date": x.date,
            "time":x.time,
            "emotion":x.emotion,
            "EU":x.EU,
            "source":x.source
        } for x in qs
    ]

    return pd.DataFrame(data1)
```

As the data is stored in Dictionary from, we used the above function to create data frame.

4. Forecast model

```python
def forecast1(x):
    time = timelist(x.size)
    x1 = pd.DataFrame({"score":x,"time":time})
    x1['time']=pd.to_datetime(x1['time'])
    x1 = x1.set_index('time')
    model = ARIMA(x1,order=(2,1,2))
    model_fit = model.fit()
    forecast = model_fit.forecast()[0]
    return round(float(forecast),2)
```

Here we use a ARIMA model of order (2,1,2) to predict the future value, But the order is fixed based on various sample analysis of ACF and PACF plots.

5. Data Cleaning

```python
df2 = df1
df2['date_time'] = df2['date'] + " " + df2['time']
df2['date_time'] = pd.to_datetime(df2['date_time'], format="%Y-%m-%d %H:%M:%S")
df3 =pd.merge(df2,emoji_df,how='inner', left_on = 'EU' , right_on='unicode')
df3 = df3.sort_values(by=['date_time'])
df4 = df3[df3['uname']==str(request.user.username)]
```

```
weekDays = {0:"Monday",1:"Tuesday",2:"Wednesday",3:"Thursday",4:"Friday",5:"Saturday",6:"Sunday"}

df4['WeekDay']=df4['WeekDay'].replace(weekDays)
df4['emotion'] = df4['emotion'].replace({0:'Joy',2:'Sadness',3:'Suprise',1:'Fear',5:'Angry',4:'Disgust'}
df4['source']=df4['source'].replace({0:'Internal',1:'External'})
```

Here we create the data based on their user's name, and did basic data cleaning such as labelling the categorical variables.

6. Plotting line

```
df_pos = df_user[["date_time","anticipation","joy","surprise","trust"]]
fig_postive = plot(px.line(df_pos, x ="date_time", y=df_pos.columns,markers=Tru

#negitive
df_neg = df_user[['date_time','anger','disgust', 'sadness','fear']]
fig_neg = plot(px.line(df_neg, x ="date_time", y=df_neg.columns,markers=True,li
```

Here we plot line graph for various positive emotions ("anticipation", "joy", "surprise" and "trust") and Negative emotions ('anger', 'disgust', 'sadness' and 'fear').

7. Pie chat and heat plot

```
#pie_emotions
pie_emo= plot(px.pie(df_user, names = 'emotion',hole=.3),output_type="div")
pie_so = plot(px.pie(df_user, names = 'source',hole=.3),output_type="div")

#heat Map
df = pd.crosstab(df4['emotion'], df4['WeekDay'])
dff = pd.crosstab(df4['emotion'], df4['source'])
heatplot1 = plot(px.imshow(df,text_auto=True,color_continuous_scale='greens')
heatplot2 = plot(px.imshow(dff,text_auto=True,color_continuous_scale='blues')
```

Here we created a pic chat and heat plot using plotly, pd.crosstab is to create a data for heat Plot.

8. Forecast and Average

```
if df_user.shape[0] >15:
    joy = df_user['joy']
    sad = df_user['sadness']
    fear = df_user['fear']
    angry = df_user['anger']
```

```
ave_joy = forecast1(joy)
ave_sad = forecast1(sad)
ave_fear = forecast1(fear)
ave_ang = forecast1(angry)

else:
    ave_joy = ave(df_user['joy'])
    ave_sad = ave(df_user['sadness'])
    ave_fear = ave(df_user['fear'])
    ave_ang = ave(df_user['anger'])
```

We will only forecast after 15 data points (demo purpose), which will become 30 data points. So, if the points a less than the average value is displayed

4.2.2. Screen Shots
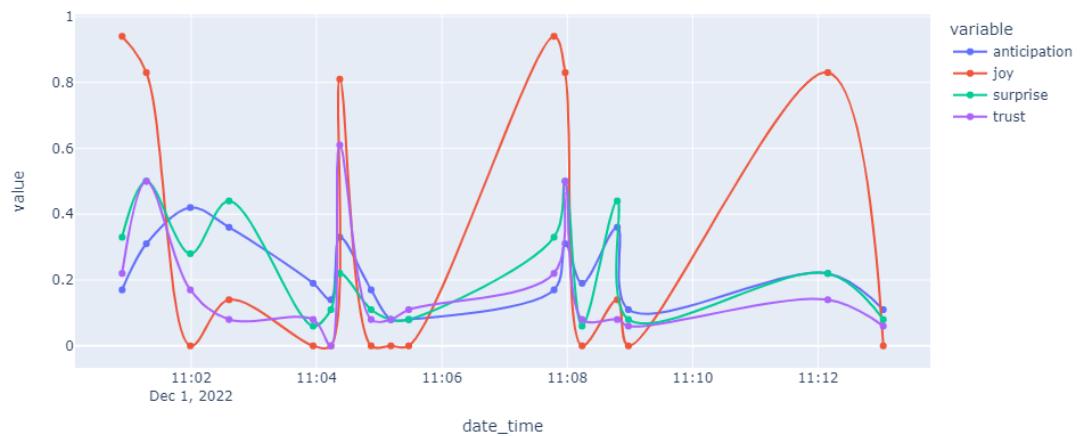
Graph outputs

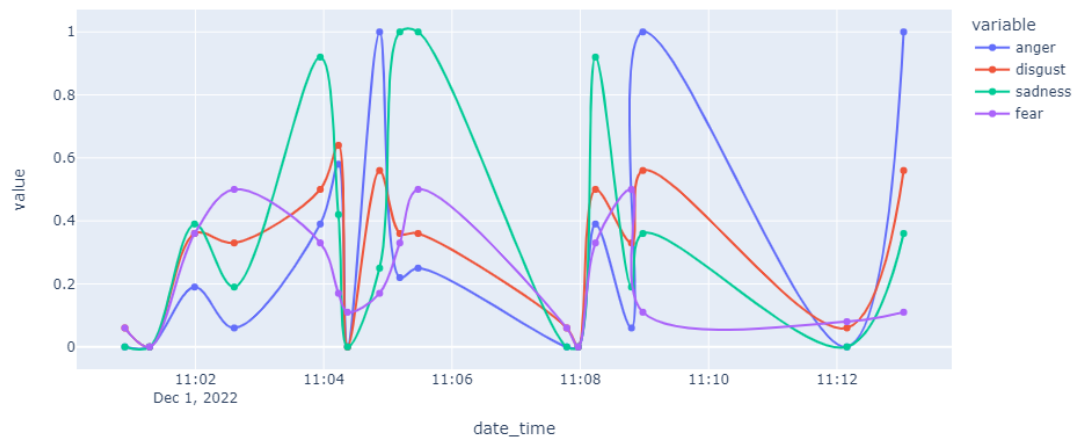1. Line graphs

Figure 4.2.2.1 – Positive Chart

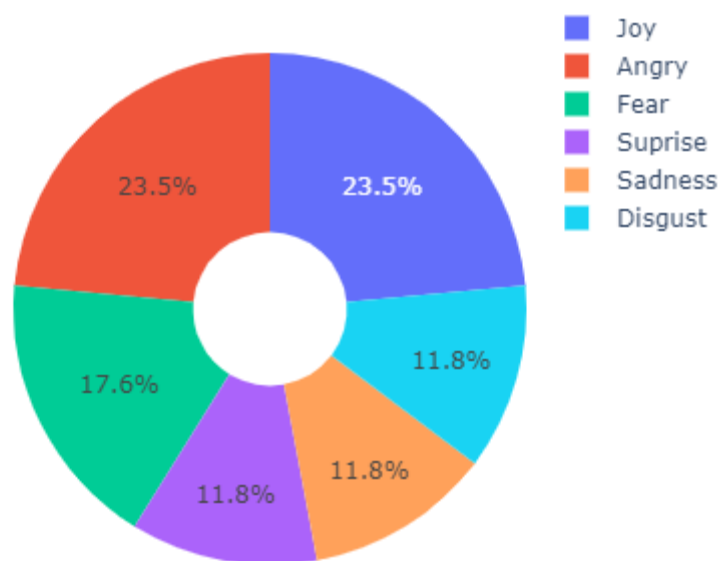Figure 4.2.2.2 – Negative emotions line graph

2. Pie Chart

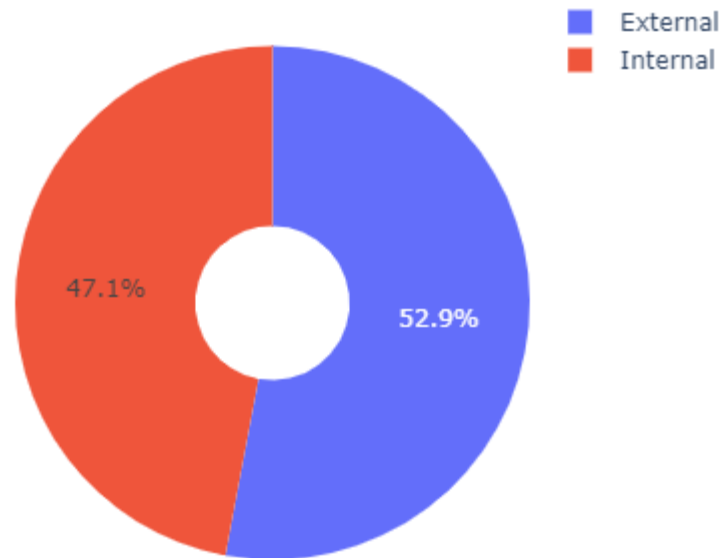Figure 4.4.2.3 – Pie Chart of Emotions

Figure 4.4.2.4 -Pie chart of Source

3. Heat Plot

Figure 4.4.2.5 – Heat Plot of week vs emotions

5. TESTING

5.1 TEST CASES

Table 5.1.1: Test Cases

SI No	Module Name	Test Case No	Test Case Description	Expected Result
1	Sign Up	TC1	When a user tries to sign up for the application, it tests whether all the fields are filled and not left blank.	If the user does not enter a value to a field that is compulsory and hits submit, the application should not proceed further and a display pops out on top of the empty field as 'Fill out this field'.
2	Sign Up	TC2	If the user tries to give the same username, it tests where that username already exists.	If the user name already exists, it gives a pop out message saying the username already exists.
3	Sign Up	TC3	If the user tries to set a password of full type 'numeric'. Then it is not considered.	When a user tries to set a full numeric password, the application displays a pop out message saying 'the password is fully numeric'.

4	Sign Up	TC4	If the user tries to set a password that is very common, the application does not proceed with it.	If the user tries to sign up using a very common password, then it throws a message saying the password is too common.
5	Sign Up	TC5	When a user tries to sign up to the application by setting password of length below 8, the application does not proceed with it	If the user tries to set a password of length less than 8, it throws a message saying it must contain at least 8 characters.
6	Sign Up	TC6	If the password given in the password field and password confirmation field does not match, the application does not proceed by signing in.	If the given passwords in the two fields did not match, the application throws a message saying the two password fields do not match.
7	Login	TC7	When a user tries to login with an unregistered username or password, the application does not proceed.	If the user who has not registered tries to login, the application will not redirect the user to the home page.

5.2 Testing Approaches

The main objective of testing is to check the functional and operational characteristics of this application. The goal of test the application is to make sure that the application can successfully operate in multiple different scenarios.

The following testing strategies have been applied on the web application:

1. **Unit Testing**: Unit testing's primary goal is to ensure that each and every unit performs as planned. The application was broken down into 5 primary modules: Single Prediction, Batch Prediction, Retention Strategies Recommendation, log-in, and Registration. Each of these modules underwent independent testing, and any flaws discovered were examined and later fixed.

2. **System Testing**: After the unit testing, this test was run. System testing's goal is to determine whether an integrated application complies with its specifications.

   The following System Tests were conducted:

   - **Performance Testing**: The application underwent testing to look for any memory usage, power use, or network connectivity problems. In order to operate multiple threads concurrently, some processes must finish a few others before starting. This was done to enhance the application's functionality.

   - **Interface Testing**: The programme was tested on many computers and web browsers. The user interface loads properly in accordance with the design, connects to the database and successfully retrieves accurate data.

   - **Usability Testing**: Usability testing determines whether an application is simple to use and comprehend from the perspective of the user. To ensure that everything was clear and visible to the ordinary user, the text size and button placement was double-

checked. For the user's benefit and a better understanding of the application, each input field and button has a label. The entire application is specifically designed with emojis to help the users in giving input.

- **Fields Testing**: All the required fields in different modules of the application were tested and verified that it works correctly. The mandatory fields show an error if the user tries to proceed without filling in the information required.

3. **Security Testing:** Users' passwords and other personal information are safeguarded from all types of attacks. The default method for managing passwords is PBKDF2. The hashing algorithm, the number of algorithm iterations (work factor), the random salt, and the final password hash are the elements used to store a user's password. They are all separated by the dollar-sign character. Even the administrator cannot read the raw passwords, which can only be changed.

5.3 Test Reports

Table 5.3.1: Test Reports

SI No	Test Case Number	Test Status	Test Report
1	TC1	Successful	Figure 5.3.1
2	TC2	Successful	Figure 5.3.2
3	TC3	Successful	Figure 5.3.3
4	TC4	Successful	Figure 5.3.4
5	TC5	Successful	Figure 5.3.5
6	TC6	Successful	Figure 5.3.6

| 7 | TC7 | Successful | Figure 5.3.7 |

Screenshots of Test Cases:

Figure 5.3.1: TC1

Figure 5.3.2: TC2

Figure 5.3.3: TC3

Figure 5.3.4: TC4

Figure 5.3.5: TC5

Figure 5.3.6: TC6

Figure 5.3.7: TC7

6. CONCLUSION

All the design and implementation challenges encountered during the project's design and implementation are explained in this section. This clarifies the project's limitations and potential future improvements as well as how problems found with various existing systems have been fixed. This section also focuses on future scope of the project.

6.1. DESIGN AND IMPLEMENTATION ISSUES

6.1.1. Design Issues

- The application is designed in such a way to make the user experience much better. It has been developed by using emojis. Though emojis are easily understood by every age category, sometimes it may be misinterpreted due to the background of the user such as geography, region, and ethnicity.

- Though the emojis are chosen according to its scores under each category of the emotion, the emojis are being repeated in some cases which may lead to misleading results.

- The source page contains internal/external options and is very significant in terms of psychological perspective. Since there is no description about these options, the users may not understand what it signifies. A description about internal and external may provide the user with better understanding.

6.1.2. Implementation issues

- The application is implemented by using the django framework, this makes the implementation a bit complex as the django web framework is not suitable for smaller projects and products with only a few features and requirements. Django calls for a lot of coding, which takes server processing time and bandwidth while development.

- The database used is the default sqlite3 which is a drawback when the application goes live. The database should be shifted to a cloud in order to store and manage the users across.

- Since this project adheres to the Model View Template design of the Django framework, it can occasionally be very challenging to identify the source of an error when it appears on the webpage.

- A Python environment is required since we are utilizing a specific version of Python and packages from that version, and these packages may be upgraded in the future to remove functionality that is needed in the project.

6.2.   ADVANTAGES AND LIMITATIONS

6.2.1. Advantages

The main advantages of this application when compared to the existing applications are:

- The UI plays an important role in setting the application apart from its competitors. It is designed in such a way to reduce the input time, increase the efficiency and give a more user friendly experience.

- The final result is a creative interactive dashboard in which one can apply various filters. The dashboard is filled with interactive charts which can clearly display the emotional shift, downfall and constant improvement in the user's emotion.

- As compared to the existing applications, emojion stands out by taking in various details about one's state and the nature of the emotion. The displayed emotions are well organized and arranged according to its category along with the help of the domain experts. The source input is uniquely taken into consideration which sets emojion apart from its competitors.

- The main advantage of 'emojion' is its facility of taking an input with just a click of a button. Other applications require the user to type or do more action in order to give the input. Whereas in emojion it all comes down to just click. The time taken for a user to give the input once takes less than 1 min.

6.2.2. Limitations

There are a few limitations in the application:

- Though the application runs on the web, it may not be handy for users to use the application in the daily run. The accessibility of the application should be increased. It may require the application to run on mobile devices or as a plug in.

- As discussed earlier, the application has to be scaled across. This requires integration of the application with the cloud facility.

- This application helps the psychologist to assist and treat their clients. But since the approach of treatment may differ from counsellor to counsellor, it may not be utilized by all psychologists.

6.3. FUTURE SCOPE OF THE PROJECT

The Scope of this application is enormous which in turn helps the people to maintain and regulate their own emotion. Updates to the application can be made in order to increase its efficiency and significance. The following are the future enhancements that can be done:

- Making an interactive dashboard makes it easier to see one's emotional condition throughout the course of a certain time. It also aids in addressing issues like what sparked the emotional change, when and how the change occurs.

- This makes it easier to identify the elements contributing to one's emotions. We can also determine when, under what circumstances, and how long a certain emotion was felt.

- This supports our ability to control our emotions and monitor our mental health. Being conscious of our own mental condition at any given time is the first step toward maintaining good mental health. This is what psychologists refer to as "insight."

- Using the application, psychologists and counsellors can be more effective and impactful in dealing with their clients.

- Companies incorporating the application can see it benefiting its employees, thereby helping the employees to be more productive in the workplace. It has the potential to shift the energy, improve the work culture and enhance the organization environment.

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