

A Project Report on

Sentimental Analysis on Social Media

Submitted in partial fulfillment of Project-II Semester-VIII
of the degree of

Bachelor of Engineering

in

Information Technology

by

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CERTIFICATE

This is to certify that the project Synopsis entitled "*Sentimental Analysis on Social Media*" submitted by "*Dilesh Tanna (16104064), Manasi Dudhane (16104068), Amrut Sardar (15104050)*" for the partial fulfilment of the requirement for award of a degree *Bachelor of Engineering in Information Technology* to the University of Mumbai, is a bonafide work carried out during academic year 2019-2020.

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Declaration

I declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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1 Introduction

1.1 Abstract

Social media consists of various kinds of emotions and sentiments of its users in the form of electronic media. To analyze the reactions or sentiments of the users on a certain post is also a challenging task. Our project aims to automate this task of analyzing the reactions and the posts and generate a report based on the outcome. A custom social media platform is proposed that would give the ability to the users to perform activities such as post, like, comment and share. The users can be enrolled into different groups such as business or university. This platform would have the ability to perform sentiment analysis on all the activities of the users in a group and create a report according to their reactions and their posts on the platform. Every activity would be rated based on the sentiments behind it on a scale of -1 and +1, 0 being a neutral sentiment. The appropriate admin would receive the reports which can be used for the further actions. The analysis would be performed on various factors such as the response of other users on a post. According to the user's posts, its home page would display other relevant posts. The analysis would facilitate the decision-making process for the admins (around other activities on the platform) and also help detect any need to give special attention to any user in a group, such as a student coping up with depression. Also, the proposed platform can be used to share content on other social media platforms as well. As a result, the users would have a single platform with the ability to do a lot more than any existing social media platform facilitates.

1.2 Introduction

As in today's world, everyone shares their emotions online, through social media platforms and thus, the data generated by these platforms can be used for analysis of the sentiments expressed by the users on various different posts. Emotions such as anger, sadness, happiness, excitement can be extracted from the posts and further analyzed for reporting and decision-making purposes.

Existing social media platforms don't give us the privilege to track the activities of the users and analyze the user's behavior for future predictions such as what to post, when to post and whom to target.

The user would receive feeds based on their interests recorded by the system through their past behavior. A user would also be able to share a post on other supported social media platforms. Sentiment analysis on a user's activities would generate a report for the admin of a group that the user belongs to; such as the Head of a department or a college counselor. Reports can be generated by the analyses done on the data of the users on the platform. According to the posts and the actions of the users, the data that is generated is analyzed by the sentiment model. The administrators may take further actions based on the reports that can be generated using the results of the sentiment analysis model. In a corporate world or a university, it can be considered important to keep track of the related population's sentimental behavior towards the institution as it gives a great amount of detail on how a user feels about being a part of that institution and in what way should the institution engage further with the concerned user. The right kind of analysis performed on the students might help determine their 'attitude'

which the companies visiting the Institute for hiring the students can use to choose the right candidate. A social media platform with the ability to perform sentiment analysis and produce a report for the 'high level' users is not a mere content sharing platform anymore. It becomes a full-fledged authoritative tool which would facilitate the decision-making process.

1.3 Objectives

The main objective of this project is to develop a social media platform and perform sentiment analysis on the content posted on it, hence taking every counter measure to help any user in any possible way in case if some sort of extremity in behavior is noticed, such as depression.

2 Literature Review/ Project Conception and Initiation

2.1 Literature Review

Hutto C.J., Gilbert E.[1] have proposed VADER, which is a simple rule-based model for general sentiment analysis, and compare its effectiveness to common state-of-practice benchmarks including LIWC, ANEW, SentiWordNet, and machine learning oriented techniques relying on Naive Bayes, Maximum Entropy, and Support Vector Machine (SVM) algorithms. It uses a combination of qualitative and quantitative methods. VADER then combines these lexical features with consideration for five general rules that embody grammatical and syntactical conventions for expressing and emphasizing sentiment intensity. When compared to sophisticated machine learning techniques, the simplicity of VADER has several advantages. First, it is both quick and computationally economical. It takes a fraction of a second to analyze with VADER can take hours when using more complex models like SVM. Second, rules used by VADER are accessible. [1]

Anees Ul Hassan [2] has presented that how to program a machine to analyze the different grammatical words, cultural variations, take out emotions, and get sentiment and meaning behind that words using machine learning techniques. Author has made a comparison among Support Vector Machine, Naïve Bayes and Maximum Entropy classifiers regarding sentence level sentiment analysis for depression measurement. Author has examined the performance of our proposed methods on two datasets, twitter dataset and 20newsgroups. [2]

Fabio Persia and Daniela D'Auria[3] have discussed challenges and opportunity in Online Social Networks (OSN). They have highlighted two main challenges; first, it is very important for OSN users not only to share media content but also to receive the specific media they want to see more. Second, to secure users who are followed by more number of users and for them who share too much of their personal information. Author has focused his attention on the relevant research challenges regarding semantics and security. Author has introduced the challenges of sentiment detection, and coping with phishing attacks, Sybil attacks, and spamming. Thus this paper has outlined a new research agenda in the field of OSN as well as it is a knowledgeable for the everyday users. [3]

Rosa, R. L. [4] and co-authors have introduced the procedure to identify the intensity of the sentiments behind the phrase put on social media platform by a user and phrases with emotional contents will be filtered through a Machine Learning program such as pronouns and adjectives verbs, etc. They have introduced to a solution that notify to other persons such as doctors or relatives about the potential emotional behavior of the user. An authorized person will have the information about the specific user for considering as counter action. [4]

2.2 Problem Definition

User data is precious and would reap great results for an institution like a college or a business to make their decisions. Decision making can be a very risky job when it comes to taking huge decisions although, small decisions such as what to perform, when to perform and with/for

whom to perform a certain task can collectively result into benefits. The existence of a system that facilitates this using the social media behavior of the point of interest of the institute can be a game changer when it comes to decision making. The electronic media serves a great role in data mining and making effective use of it right from the beginning is something that would help everyone. The ability to enroll a set of users in a group, share a message to various platforms from one place and also analyzing the users in the group is something that can be considered a problem to solve.

2.3 Proposed System Architecture/Working

A social media platform with the ability to perform sentiment analysis for 'high level users' is the desired outcome of this project. The platform would allow almost all activities that a normal social media platform does. The users would be able to share content and view other users' content and also express their personal views on the same. A user can be enrolled into different groups by an entity such as a business or a university. The user would also be able to share content from this platform to other social media platforms. Also, certain privileges are given to the admins using which the admins can make their posts compulsory. As a result, all the users for whom the post is made compulsory will have to respond to the post. This can be used by universities where the admins want certain action on their posts in the form of feedback. The users can also share the post privately with a group of users on the platform. The other aspect of the project is the sentiment analysis part where all the activities of a user in a group would be analyzed. The flow diagram above depicts a high level view of the proposed architecture. The user, as on any other social media platform, would perform an activity such as to post something. User's reactions such as likes or comments on the other users' post will also be rated, such as if the comment is positive then the user who is commenting, its score will be increased, similarly if a user posted something depressing then the user will get negative score. For argument's sake, let us say that the user expressed their grief about the decision of their university to increase the minimum required attendance from 75 percent to 80 percent. This post, in a traditional platform would be stored in the DB as it is. However, in our proposed system, the post would be rated first and then stored in the DB along with the rating. The rating would be from -1 to +1. This rating and the post stored in the DB would be further used by the system to analyze it along with other related items in the DB and then generate a report for the high level user to study. Let's say that in our case, the report suggests that about 79 percent of the concerned population is unhappy with the new decision of the university. With these results, the admin may further decide to take an action or may simply ignore it. The mechanism of the model is such that it analyses the likes, comments and

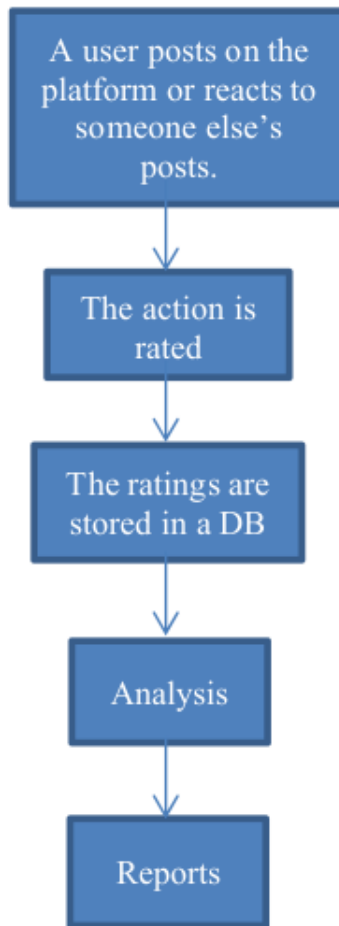


Figure 1: Flow of the Data

posts of the users. A model which contains different lexicons and NLP libraries and has a set of grammar and positive and negative words is used. According to the analyses, reports are generated and displayed on the dashboard of the admin. Sentiment analyses is performed and the over-all score of the users according to their activities on the platform is calculated. Through these analyses, the admins can take necessary actions on it.

3 Project Design

3.1 Use case diagram



Figure 2: Use case Diagram

As given in the above diagram use cases are defined. This diagram describes a list of actions or event steps typically defining the interactions between the roles of administrator, user and a system to achieve a goal of analysing sentiments. Administrator would almost have rights to intervene in any of the given cases. On the other hand user has limited access to the system. So in short administrator maintains the role of regulator and users are just the part of system, who use social media platform for posting, sharing and groups.

3.2 Class diagram

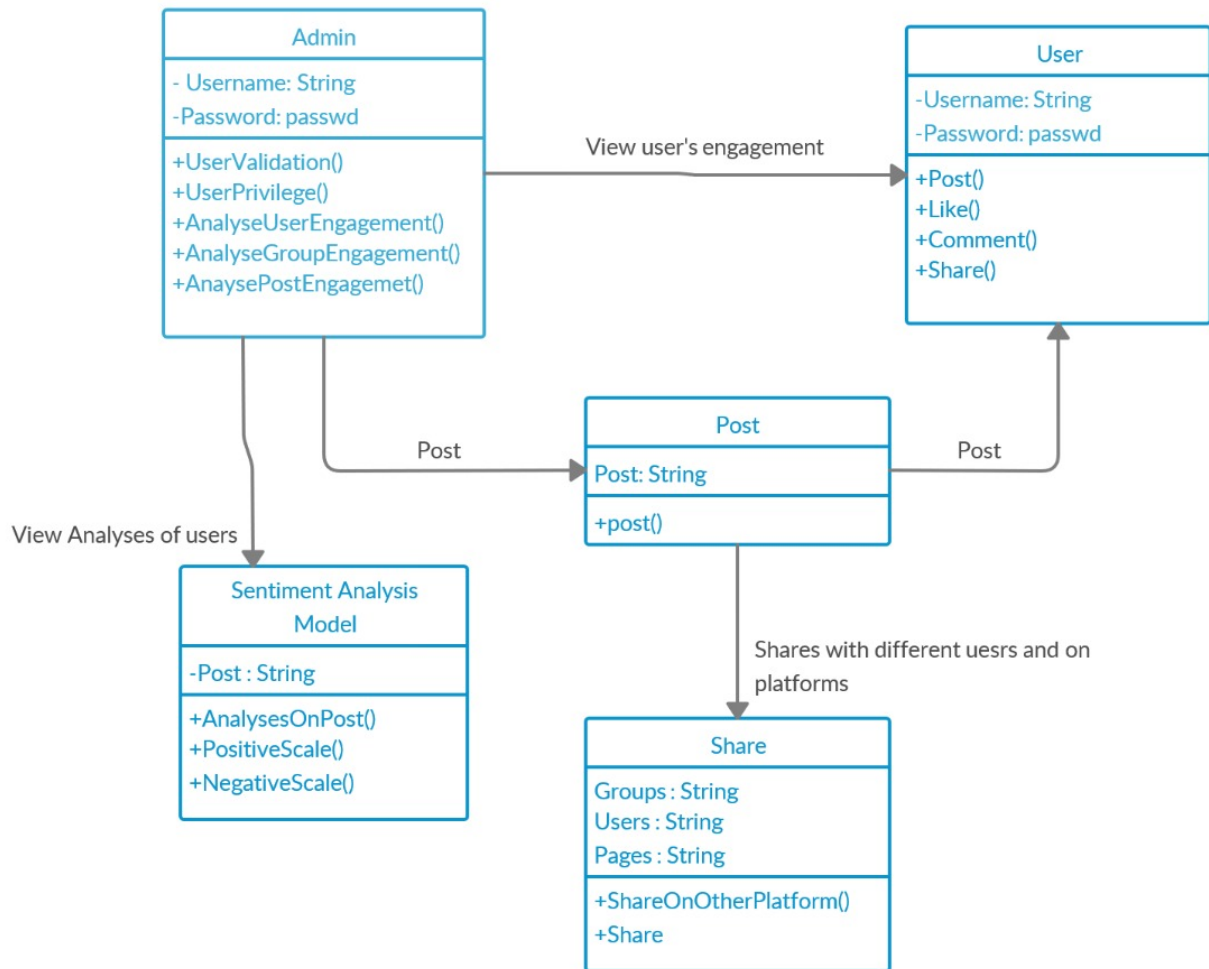


Figure 3: Class Diagram

This is the Class diagram of the project. Here you can see the Unified Modeling Language is a type of static structure diagram which is class diagram, that describes the structure of a sentimental analysis system by showing the system's classes- Admin, User, Post, Sentiment Analysis Model, Share. Their attributes, operations, and these classes are interlinked with each other through relationships among Classes. The top compartment contains the name of the class. The middle compartment contains the attributes of the class. The bottom compartment contains the operations the class can execute.

3.3 Activity diagram

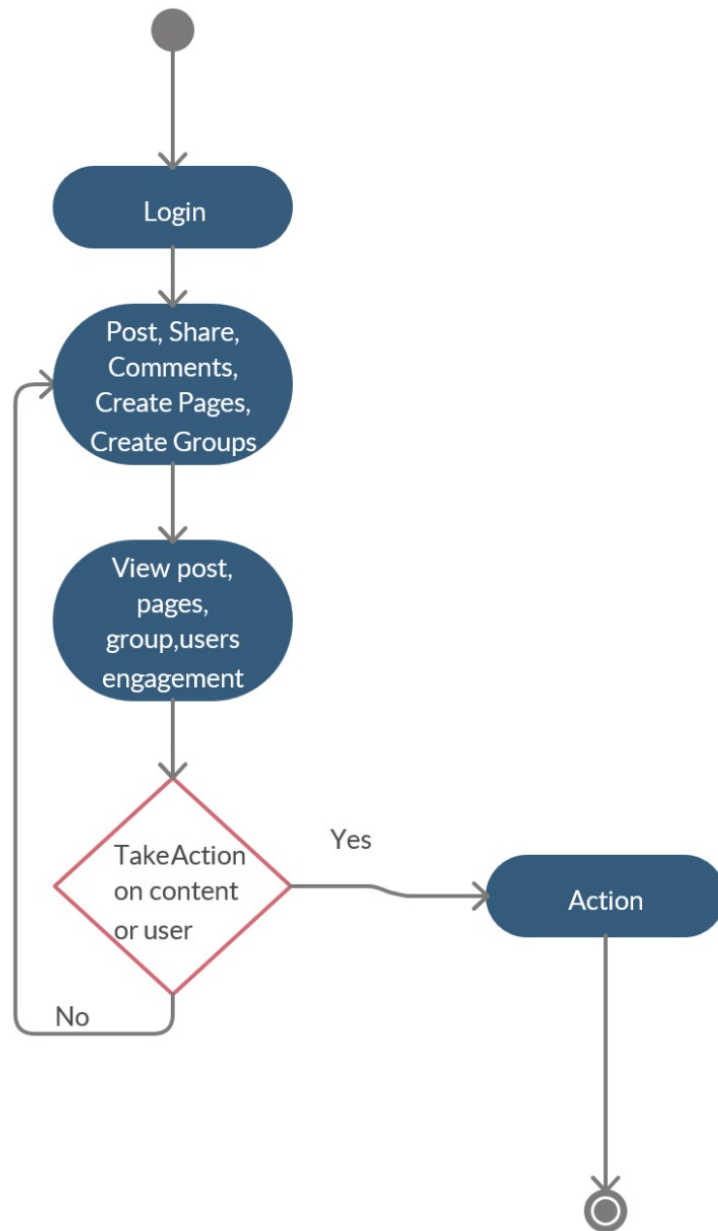


Figure 4: Activity Diagram

The above activity diagram shows the flow of the analysis on the platform. First need to login to access the social media platform. Once they log in into the system, user's posts will be analysed by the Sentiment model and then by observing the extremity of the users sentiments administrator will take action.

4 Project Implementation

4.1 Snippets of the system

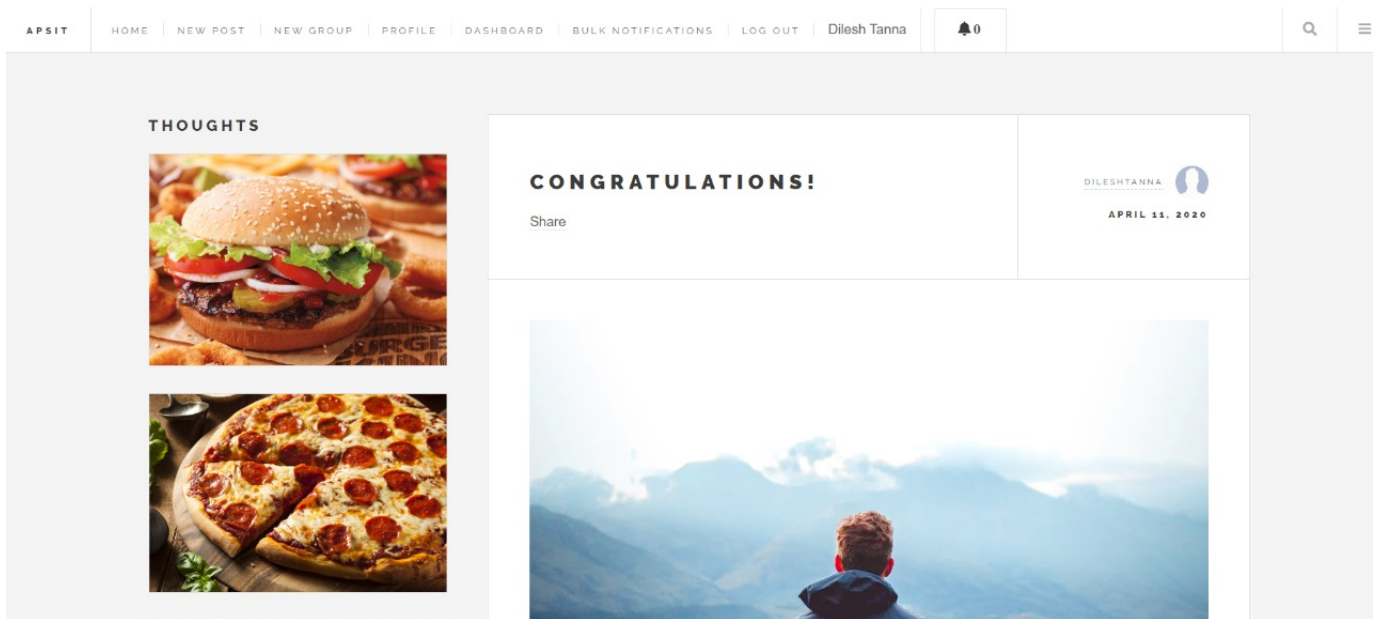
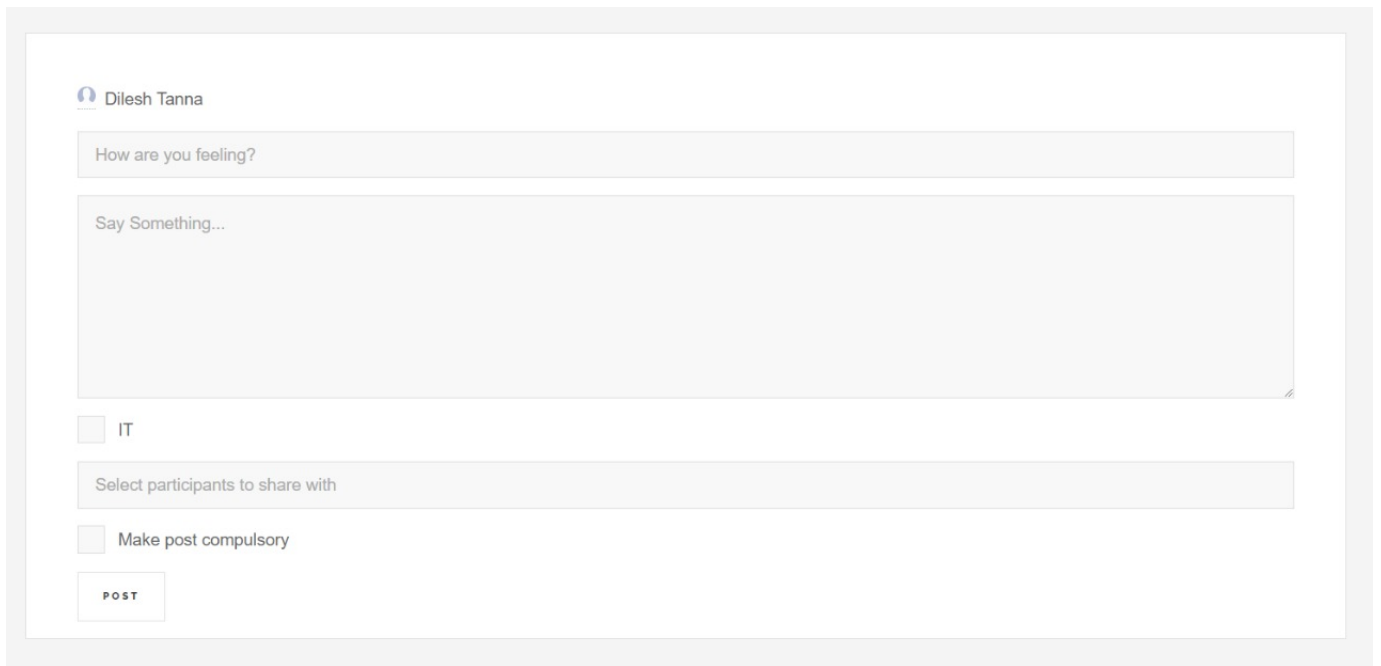


Figure 5: Homepage

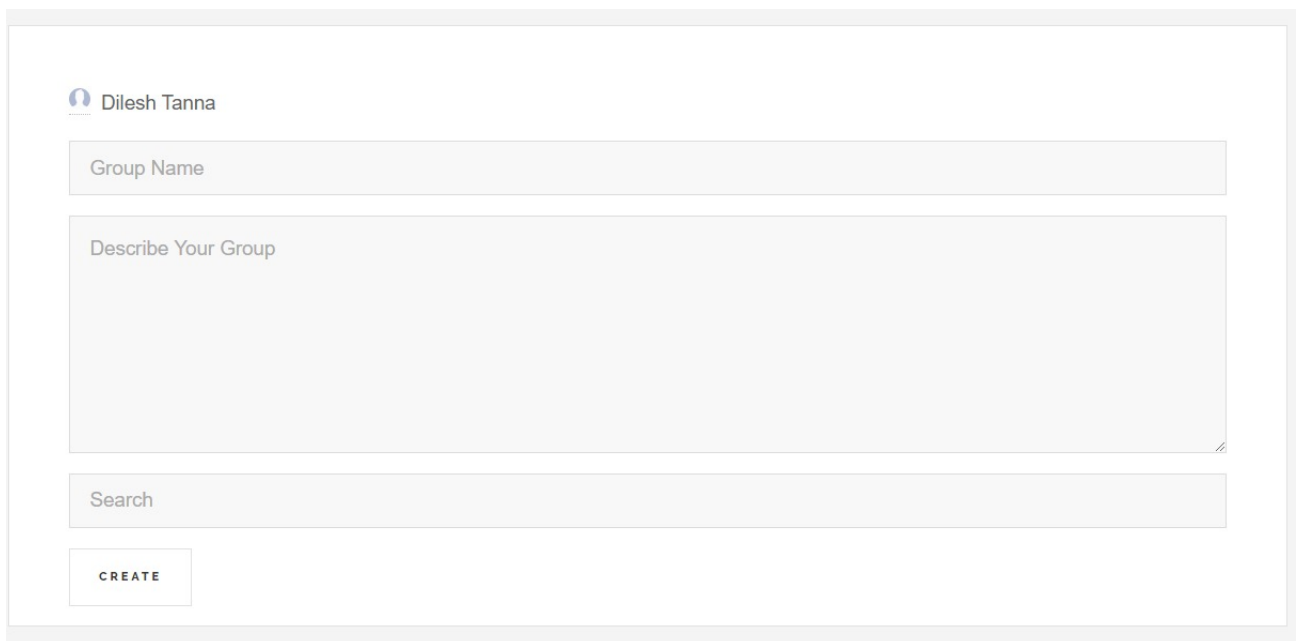
This is the home page like any other social media website . The first page a user will see as soon as he/she logs in to the system. The above snippet depicts a Menu bar on the top, thoughts generated by the system to a particular user according to his/her previous posts and sentiments, and the feed on social media website.



The image shows a user interface for creating a new post. At the top, the user's name 'Dilesh Tanna' is displayed next to a profile icon. Below this, there is a text input field with the placeholder text 'How are you feeling?'. Underneath that is a larger text area with the placeholder text 'Say Something...'. Below the text area, there is a small square icon followed by the text 'IT'. Below this, there is a text input field with the placeholder text 'Select participants to share with'. Below that, there is a small square icon followed by the text 'Make post compulsory'. At the bottom, there is a button labeled 'POST'.

Figure 6: New Post Page

New post page is for the user to generate a new post on the social media platform, where user would get a text box to type post, option to share it on groups and to make post compulsory.



The image shows a user interface for creating a new group. At the top, the user's name 'Dilesh Tanna' is displayed next to a profile icon. Below this, there is a text input field with the placeholder text 'Group Name'. Underneath that is a larger text area with the placeholder text 'Describe Your Group'. Below the text area, there is a text input field with the placeholder text 'Search'. At the bottom, there is a button labeled 'CREATE'.

Figure 7: New Group

This page is for user to create a new group of users on the Social media platform.

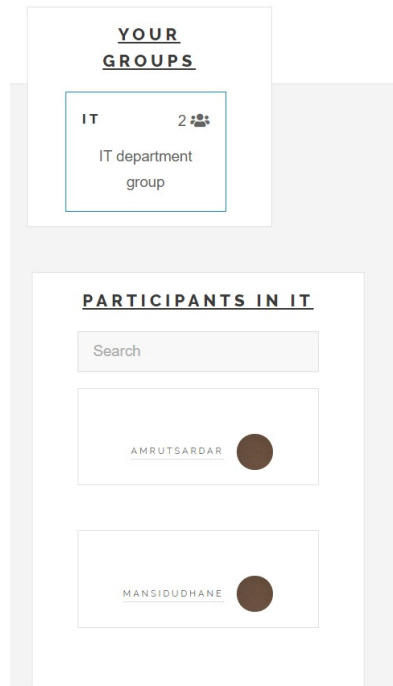


Figure 8: Dashboard

Dashboard is a feature which will appear on administrator's profile to see users, their involvements with groups, participants in a particular group.

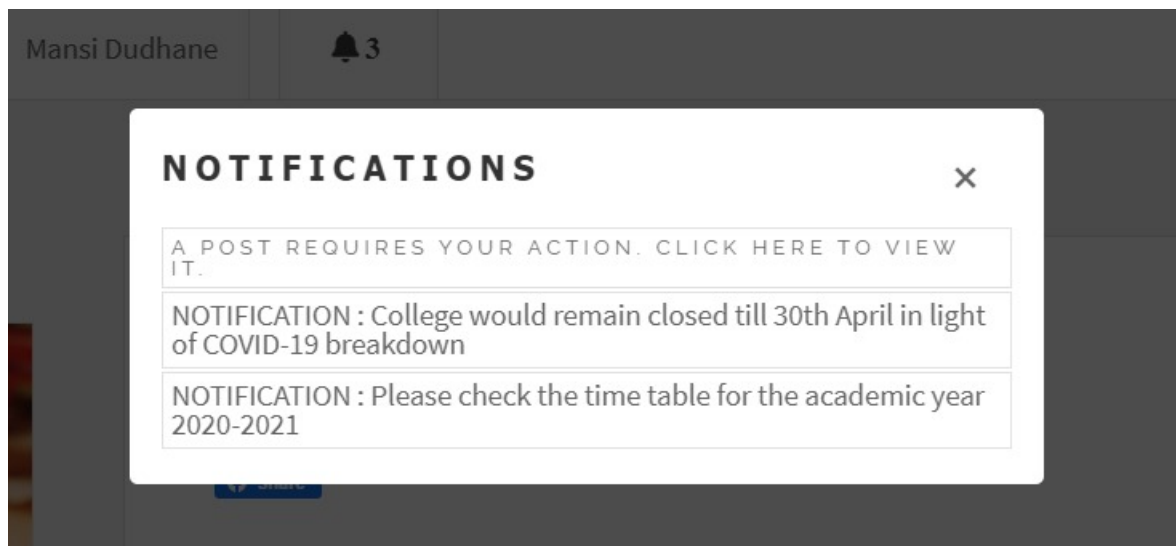


Figure 9: Notification

When user clicks on bell icon from his profile he will see the notifications from administrator/compulsory posts and until user clicks on it that notification box will keep showing the same message.

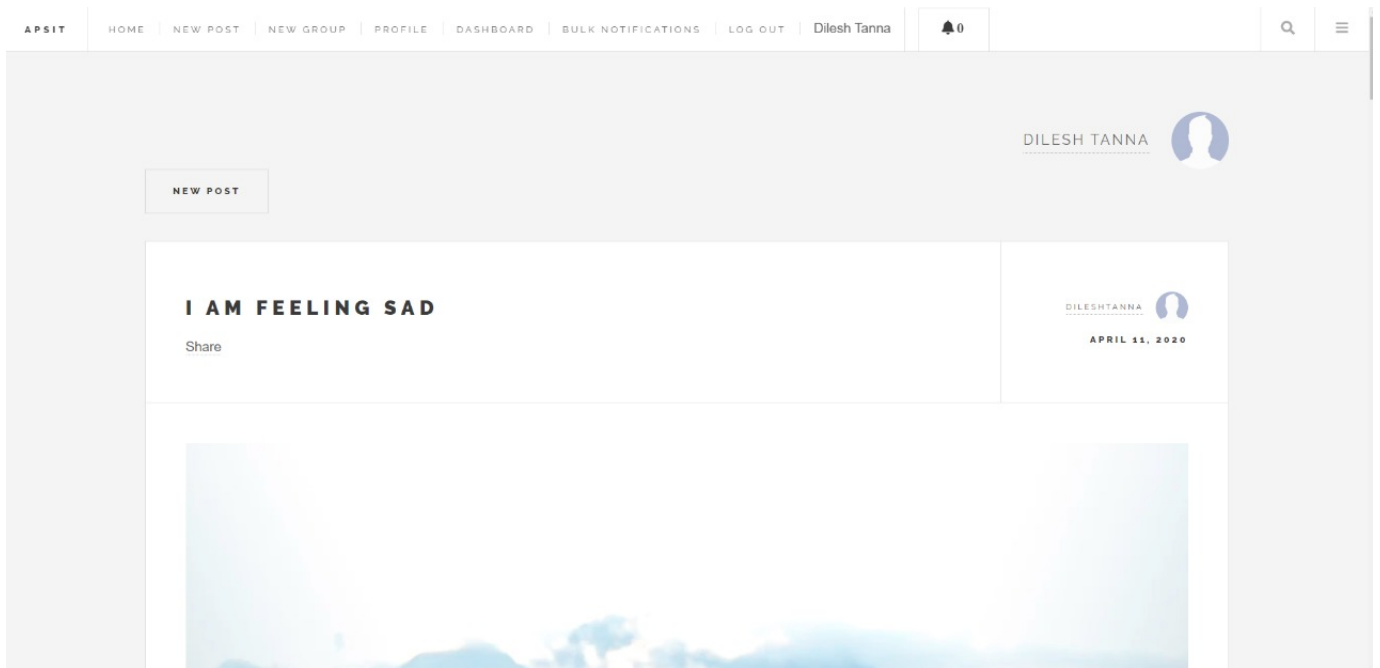


Figure 10: Profile View

Profile view will show the posts made by a particular profile, his name and details.

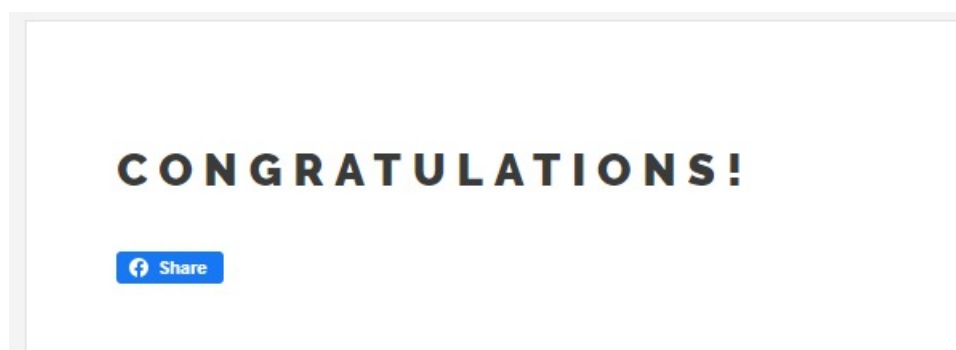


Figure 11: Facebook Sharing Option

Blue Facebook sharing button gives an option for user to share any post on Facebook.

Dilesh Tanna

What is the message?

☐ Broadcast Message

☐ IT

a|

☐ Mansi
Dudhane

☐ Amrut
Sardar

POST

Figure 12: Bulk Notification Feature

Bulk notification itself is self explanatory as it gives user an option to post and share with multiple users/ friends on social media.

4.2 Snippets of the code

```
src > App.js > ...
1 import React from "react"
2 import axios from "axios"
3
4 import "./App.css"
5 import Root from "./Root"
6 import Navbar from "./components/Navbar/Navbar"
7
8 import { BrowserRouter as Router, Route } from "react-router-dom"
9 import Home from "./components/Home/Home"
10 import NewPost from "./components/NewPost/NewPost"
11 import Dashboard from "./components/Dashboard/Dashboard"
12 import Login from "./components/Login/Login"
13 import SignUp from "./components/SignUp/SignUp"
14 import Profile from "./components/Profile/Profile"
15 import NewGroup from "./components/NewGroup/NewGroup"
16 import User from "./components/User/User"
17 import Post from "./components/Post/Post"
18 import BulkNotifications from "./components/BulkNotifications/BulkNotifications"
19
20 export default function App() {
21   const token = localStorage.getItem("token")
22   axios.defaults.headers.common["Authorization"] = `Bearer ${token}`
23   return (
24     <Root>
25       <Router>
26         <div id="wrapper">
27           <Navbar token={token} />
28           <Route exact path="/" component={Home} />
29           <Route exact path="/sign-in" component={Login} />
30           <Route exact path="/sign-up" component={SignUp} />
31           <Route exact path="/new-post" component={NewPost} />
32           <Route exact path="/new-group" component={NewGroup} />
33           <Route exact path="/dashboard" component={Dashboard} />
34           <Route exact path="/profile" component={Profile} />
35           <Route exact path="/user" component={User} />
36           <Route exact path="/post/:id" component={Post} />
37           <Route exact path="/notify" component={BulkNotifications} />
38         </div>
39       </Router>
40     </Root>
41   )
42 }
43
```

Figure 13: Entry point
Entry point for Web app where all the routes are defined

```

    }
  }

  render() {
    let score = this.state.score
    if (this.props.score) {
      score = this.props.score
    }
    const { history } = this.props
    console.log("new score", this.props.score)
    return (
      <Posts
        history={history}
        performLikeAction={this.props.performLikeAction}
        actionToDispatchUponLikeEvent={this.props.getAllPosts}
        posts={this.props.posts}
      />
      <section id="sidebar">
        <Thoughts score={score} history={history} />
        <Events history={history} />
        { /* <About history={history} /> */ }
        <Footer history={history} />
      </section>
    )
  }
}

const mapStateToProps = state => ({
  score: state.posts.score,
  posts: state.posts.posts
})
export default connect(mapStateToProps, { getAllPosts, performLikeAction })(
  Home
)

```

Figure 14: Home component

Checking the score of the user and rendering the posts. The score is passed as a prop to the Thoughts component

```

import React, { Component } from "react";
export class Thoughts extends Component {
  render() {
    const { score } = this.props;
    let imageType,
        extension = "";
    console.log(score);
    if (score >= 0) {
      imageType = "happy";
      extension = "jpg";
    } else {
      imageType = "sad";
      extension = "jpeg";
    }
    return (
      <section>
        <div className="mini-posts">
          <div className="title">
            <h2>

```

Figure 15: Thoughts component

Thoughts component uses the score to display the appropriate images to the user.

```

server > index.js > ...
1  const express = require("express");
2  const config = require("config");
3  const mongoURI = config.get("mongoURI");
4
5  const app = express();
6
7  const port = process.env.PORT || 5000;
8  const mongoose = require("mongoose");
9  mongoose.connect(
10     mongoURI,
11     { useNewUrlParser: true, useUnifiedTopology: true },
12     () => {
13         console.log("Connected To MongoDB");
14         if (process.env.NODE_ENV !== "test")
15             app.listen(port, () => console.log(`Server is listening on port ${port}`))
16         console.log(`Server is listening on port ${port}`);
17     });
18 }
19 );
20
21 require("./startup/logging")();
22 require("./startup/routes")(app);
23
24 module.exports = app;
25

```

Figure 16: Startup code for Nodejs server

```

module.exports.createPost = async ([req, res]) => {
    const username = req.user.username
    const {
        post,
        postTitle,
        selectedParticipants,
        compulsoryAction,
        group
    } = req.body
    const date = new Date()

    const intensity = vader.SentimentIntensityAnalyzer.polarity_scores(post)

    const newPost = new Posts({
        username,
        post,
        postTitle,
        date,
        group,
        intensity: intensity.compound,
        selected_participants: selectedParticipants,
        compulsory_action: compulsoryAction
    })
    let result = await newPost.save()

    const user = await Users.findOne({ username })
    console.log(user)
    let score = user.score
    score = +score + +intensity.compound
    await Users.findOneAndUpdate({ username }, { $set: { score } })

    res.status(200).json({
        status: 200,
        data: result,
        score,
        message: "Created One Post"
    })
}

```

Figure 17: Create post method

Create post method which calculates the score of the post and updates the user's overall score

5 Testing

Standard development methodologies describe a set of general testing mechanisms which must be incorporated in the product development life-cycle. These mechanisms start from testing very small of code piece by piece to testing the whole application functionality in the end. In our project we have tested our system with 3 types of testing in a basic manner.

1. Unit testing, 2. Integration testing, 3. Functional testing; these are three testing methods are the fundamental testing methods for any software testing.

1. Unit Testing: This is the most basic testing mechanism at the developer level. This covers very narrow and well defined scope. We isolate the code from any outside interaction or any dependency on any module. Unit tests focus on very small unit of functionality. They cover the interaction of the code with memory only and do not cover any interaction with network, database or file systems. These dependencies are hard coded into the code while testing. They provide a simple way to check smallest units of code and prove that units can work perfectly in isolation. However, we need to check further that when these units are combined they work in a cohesive manner which leads us to further types of tests.

2. Integration Tests: Integration Test forms the next class of tests at the developer level. They provide a mechanism to test the inter-operation of smaller units. Integration test involve testing the modules which access network, databases and file systems. They reveal out the issues with network modules or databases and more importantly in the connections between small units of code. Often when the units are wired together there are issues. Unit A might not be giving data properly to the Unit B and these issues come up in the integration tests.

3. Functional Tests: After the integration tests are performed, higher level tests are used. Functional tests check for the correctness of the output with respect to the input defined in the specification. Not much emphasis is given on the intermediate values but more focus is given on the final output delivered.

As our project is a Social Media website, there are multiple units which function unilaterally and also with the synchronization with other units. Most of them are co-dependent on each others' code or method. Suppose, if unit testing is to be implemented then any one section of the project for example: Login page, then in that page testing validation methods by back-end code is a unit testing. On correct entered credentials, signing in and showing home page is integration testing. Because it involves two separate sections of the codes. Finally to test overall functionality of all the components/units, functional testing could be done. Functional testing will show whether the system is accurately translating the results from the given inputs by the user/administrator.

6 Summary and Future scope

The main motive behind our work is to study the emotions of the users through the social media platform and analyze their behavior and how it affects everyone on the platform in a positive and negative way. In a way, use of sentiment analysis helps in feedback analysis, competitor monitoring etc. Our solution would provide various groups like business or universities to analyze the sentiments of the users related to their circle. The analysis will help universities to make their own social media platform for the use of their institute, The analysis would not only help them improve their future activities but would also help in finding alarming situations, such as depressed users. The solution uses modern technologies which makes the application more scalable, fast, robust and secure. The users would still retain their privacy as their activities won't be tracked. Rather, they would only be analyzed. It also gives escalated privileges to the administrators such as analyzing the content on the platform, broadcasting messages, creating groups, etc.

References

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