A Project Report on

Developing Chat Server For Addressing FAQ's about Creative Learning

Submitted in partial fulfillment of the requirements for the award
of the degree of

Bachelor of Engineering

in

Information Technology

by

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Under the Guidance of

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Approval Sheet

This Project Report entitled ***"Developing Chat Server For Addressing FAQ's about Creative Learning"*** Submitted by ***"Harsh Rathod"(19104057)*** is approved for the partial fulfillment of the requirenment for the award of the degree of ***Bachelor of Engineering*** in ***Information Technology*** from ***University of Mumbai***.

(Prof. Anagha Aher)
Guide

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Place:A.P.Shah Institute of Technology, Thane
Date: 26/04/2023

CERTIFICATE

This is to certify that the project entitled ***"Developing Chat Server For Addressing FAQ's about Creative Learning"*** submitted by ***"Harsh Rathod" (19104057)*** for the partial fulfillment 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 2022-2023.

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Acknowledgement

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Harsh Rathod
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Declaration

We declare that this written submission represents our ideas in our own words and where others' ideas or words have been included, We have adequately cited and referenced the original sources. We also declare that We have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in our submission. We 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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(Harsh Rathod - 19104057)

Date:

Abstract

During the pandemic, We all have seen a rapid growth in the online learning and educational platforms. However, the major problem faced by the learners is that they were missing the student-teacher interaction as well as peer-to-peer interaction. To cover up this gap, features like forums, live-chat etc. were introduced. Hence we will be building a live-chat server with support features before-mentioned. But another thing to be aware of is that the users may not always consider the sentiments and feelings of other users present in the live server. To prevent the use of slang, vulgar language and inappropriate words, we would be using an analysis bot which will scan for such inappropriate words and if found, the message will be highlighted and will not be uploaded to the server unless corrected. This helps to maintain the quality of chats on the website considering that the website is meant to be a learning platform where users from various backgrounds, age groups and nationality will be present. Sentiment analysis, Data Mining, Natural Language Processing will be used to analyse the message. The degree of inappropriateness of the text message will be calculated based on classification of words done using Decision Tree Classifier.

Keywords: Live server, Offensive language detection, Generative chatbot, Decision Tree, Analysis bot

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List of Abbreviations

NLP	Natural Language Processing
RNN	Recurrent Neural Network
CRS	Complaint Resolution System
TA	Text Analysis
REST	Representational State Transfer
SO	Stack Overflow
API	Application programming interface

Chapter 1

Introduction

This section discusses three topics related to technology and communication. The first topic is dedicated live chat servers, which provide several advantages for companies running their chat service on them. The second topic is text mining, which enables businesses to extract useful insights from unstructured text data, using machine learning methods like text analysis. The third topic is offensive language on social media and other online platforms, and the strategies employed by major SE platforms like SO to minimize it through community moderation.
The increase in the computing power has paved the way for new technological advancements. Artificial intelligence has played a very crucial role in these technological advancements.In the recent times live chat systems have gained popularity because of its wide applications. From the customer's point of view live chat systems present a unique experience of availability of help and support during anytime of the day.

As the name implies, a dedicated live chat server is a live chat server that is only for you. A computer that controls access to your live chat channel is known as a live chat server. When anything is devoted to you, it means that it solely hosts your live chat service. No other company can access the server, and they don't host their chat there either. However, why would you possibly want to employ a dedicated live chat server? Here, we look at a few advantages of running your live chat channel on a dedicated server.

The technique of turning unstructured text into organized data for quick examination is called text mining. Text mining employs natural language processing (NLP), which enables computers to comprehend and automatically interpret human language. The massive amount of data produced each day by organizations is both an opportunity and a difficulty. On the one hand, data offers businesses wise insights into what customers think about a certain good or service. Consider all the possible ideas you may discover by looking through emails, product evaluations, social media postings, customer reviews, support requests, etc. On the flip side, there is the conundrum of how to handle all of this data. And here is where text mining is so important.

A machine learning method called text analysis (TA) is used to automatically extract useful information from unstructured text input. Text analysis tools are used by businesses to swiftly consume web data and documents and turn them into useful insights. Using text analysis, you may sort survey replies by attitude and subject or extract particular data from

tens of thousands of emails, such as names, company names, or keywords.
Any communication that can be construed as objectionable morally, socially, religiously, or culturally is considered offensive if it uses foul language, swears, or uses racial phrases or material. Language that is rude or abusive is a persistent problem in all prominent social networking sites. Online users have been noted to Communities in the SE are not exempt from this problem. Although there isn't currently a cure for this unwelcoming habit, Major SE platforms like SO have begun to develop strategies for minimizing crude language. Communities like GitHub and SO have a method for community moderation, which involves a chosen community.

Chapter 2

Literature Review

The purpose of literature review is to gain an understanding of the existing research on live chat server relevant to area of study. While conducting the literature review for this study, a number of aspects were taken into account. The usage of improper language in online educational platforms was one of the major issues found. Another problem was the inability to quickly connect with classmates and teachers in case of need, which motivated us to choose this topic to work on in order to address real-world problems.

- A chatbot is one of the most convenient ways of studying for students and it also rectifies student doubts at any time without human support. The chatbot created by E.Kasthuri in 2021 can answer the students with exact answers.Students can ask a question in the chatbot in the form of text then, the question is processed with natural language processing and deep learning technology.In this way, the user's queries and questions can be sorted out [3] without human help. This chatbot will improve the practical performance of an E-learner.

- By examining the types of foul language used in comments made by users on four well-known SE platforms—GitHub, Gitter, Slack, and Stack Overflow—Jithin Cheriyan's study from 2021 intends to investigate this topic more thoroughly (SO). By using deep learning and natural language processing techniques, it suggests a method for identifying and categorizing abusive language in SE communities. A Conflict Reduction System (CRS) has been proposed, [1] which first analyzes offense before outlining potential modifications that might be done to lessen offense. In order to find and lessen offending in SE communities, the CRS system has the ability to significantly minimize manual moderating efforts.

- As per V.Selina Annie Retna et al research, in the year 2021, they had used Deep Learning, Natural Language Processing, Sentiment Analysis and Text Mining. Using these methodologies they proposed a system that is intended to perform a flirt analysis and time analysis.The project may be used in a variety of situations, such as by a parent who wants to review their child's chats; by the criminal branch to gather important information from suspect conversation; and by business owners to learn the current state of their company in the group chat. This project also makes it possible to determine the quantity of positive and negative phrases [9] each individual uses.

This will make it easier to assess that person's mental condition. The execution of this model appeared to be delayed, and its storage costs were expensive. These were its shortcomings.

- According to R.S.Ramya et al's research, in the year 2021, they had created a deep learning model that is utilized to process the user remarks and to create a potential user rating for user comments.The feature vector generated by the sentiment analysis is based on the positive and negative comments made by people about products in their remarks. The suggested model [8] uses wordnet sentiment analysis to identify the terms and deep learning to predict user ratings from user comments.

- Using machine learning methods such as, Naive Bayes Classifier and Support Vector Machine, In the year 2020, Thae Ma Ma has has made a project which will classify the emails into spam or ham based on the body or content of the emails.They found that spam, or unsolicited emails, employed by spammers, can result in significant losses for both email users and email servers. A technique for classifying email spam has been created [5] in order to detect it. This approach was developed to differentiate between spam and authentic emails. In comparison to Naive Bayes Classifier, Support Vector Machine has demonstrated superior accuracy in training emails of various sizes, according to the findings of the classification research.

- The proposed system by Pankaj Choudhary et al in the year 2020, using pattern matching, content analysis can be used to measure the similarity of the model answer with the posted answer of the student to discuss the topic [2] and their relevance. A similarity measure is calculated for assigning the grade to the student answer and the result is compared with the teacher grade which shows the significant results. With the help of pattern matching, model answer string is compared with the student answer and similarity is calculated.They have concluded that pattern matching gives better results as compared to cosine similarity and The content analysis method is used to measure the similarity of the model answer with the posted answer of the student to the discussion topic and their relevance.

- Liu Yingi reviewed the text analysis based on deep learning in the year 2020 . They have analyzed the process of the text learning, then text analysis learning models are summarized, including convolutional neural networks, recurrent neural networks, deep learning algorithm fusion [11] and so on.Deep learning technology not only improves the accuracy of the model while compressing the training time of the model, but also digs out potential features in the massive data.

- The Chatbot implemented by Prof Shabana Tadvl in the year 2020 will reply to queries 24/7 in real time using Natural Language Processing,Natural Language Understanding, SQL Server Management Studio . The Chat bot will be able to create the query list, which will help understanding the areas [10] that need to be improved.This information could be valuable for the HR team. With the employee's hectic schedule today,deployment of a chat bot could be a way to reduce the time and burden from the employees. The data collected will be more reliable and with the help of that data,bots can analyze the data and schedule the tasks accordingly. The chatbot has proven to meet the demand of users who want data and resources on instant access and availability.

- Numerous industries have used and created chatbot systems.The recent papers have been reviewed with special attention to the type of knowledge given to these systems, the domain for which these systems have been developed, among other things. The research conducted by Tatwadarshi P. Nagarhalli in 2020 contains a detailed study of some of the recent chatbot systems/papers developed in different domains.They found that chatbot systems have evolved into a highly practical means for understanding contemporary trends in the development of chatbots [6] and interacting with the public. It's now a really practical and engaging way that even complicated information may be accessed and can be effectively communicated to the users.

- The study conducted by Nithuna S in 2020 offers a critical analysis of chatbots and the present tactics that are in-depthly investigated and discussed. The currently available chatbots are made using retrieval-based, rule-based, or rudimentary machine learning methods [7], however they do not produce satisfactory results. The system is executed by a variety of lightweight AIML files and packages that are extra versatile and interactive for practice in a variety of subjects. A system based on automated conversational operators also carried out certain significant client-related tasks. By doing this, the specialist offers automated conversational agents at a lower cost than a private conversational agent.

- The potential for educational chatbots to assist students, instructors, and other staff members is enormous. Inquirers might access beneficial knowledge from them in the educational fields. By utilizing the Sequence to Sequence model with Attention Mechanism based [4] on RNN encoder decoder model in 2020, Naing Naing Khin investigated the methods of communication through neural network chatbots. For frequently asked questions regarding the university and its relevant information, this chatbot is designed to be utilized in the higher education sector. The end result demonstrates that it is capable of producing the necessary data in response to the user's inquiry concerning university information. The chatbot provides information about the university to students, teachers, and others.

Objectives

Objectives refer to specific goals which are aimed to achieve within a given period. These goals are usually specific, measurable, achievable, relevant, and time-bound and serve as a guide to focus efforts and resources towards a desired outcome. They provide direction and a clear sense of purpose for individuals and teams, and are used to evaluate progress and success towards achieving a desired outcome.

We intend to do this project implementation to meet following objectives:

- To build a live-chat server using Node.js, Express.js, React.
- To create a community forum for educational discussion using HTML5, CSS3 and JS5.
- To use "Bag of Words" approach and Naive-Bayes, Decision Tree classifiers to categorize the sentiment of the comments and filter out inappropriate data.
- To create a Generative chatbot and train the bot for guiding users.
- To provide reliable results by aggregating and extracting valuable information by all the data collected and display it on the dashboard.

Chapter 3

Project Design

The project's key features, structure, criteria for success, and major deliverables are all planned out in these steps. The aim is to develop design in a way so that it can differ from existing system that can be used to achieve the desired project goals.

3.0.1 Existing System

- Live chat servers in educational platforms typically have features that are specific to the needs of students and teachers. Students can communicate with teachers or academic advisors via a one-on-one or one-to-many chat feature.
- Some live chat servers offer analytics and reporting features, allowing you to track metrics such as response times, chat volume, and customer satisfaction.But all this process starts once you have posted the message.
- In some cases, students on live chat servers can behave inappropriately, such as cyber-bullying or harassment. In that case that user is sent a warning and flagged but its already late and the integrity of platform has been compromised.

3.0.2 Proposed System

Understanding the working of a project is very important before we make it live. As explained earlier Live-chat server and Forums play an important role in building of a website based on creative learning. It enables the user to get solutions for their difficulties which are specific to user experience.
The user will login using their respective account, followed by he/she can click on the chat-bot to activate it and enter their doubts/queries. The bot will generate an answer which it may seem as the relevant solution. If the users are satisfied with the solution, they can close the chat bot. If not, they will be provided with an option to be redirected to the live-chat server where their peers or the instructor can resolve their queries.

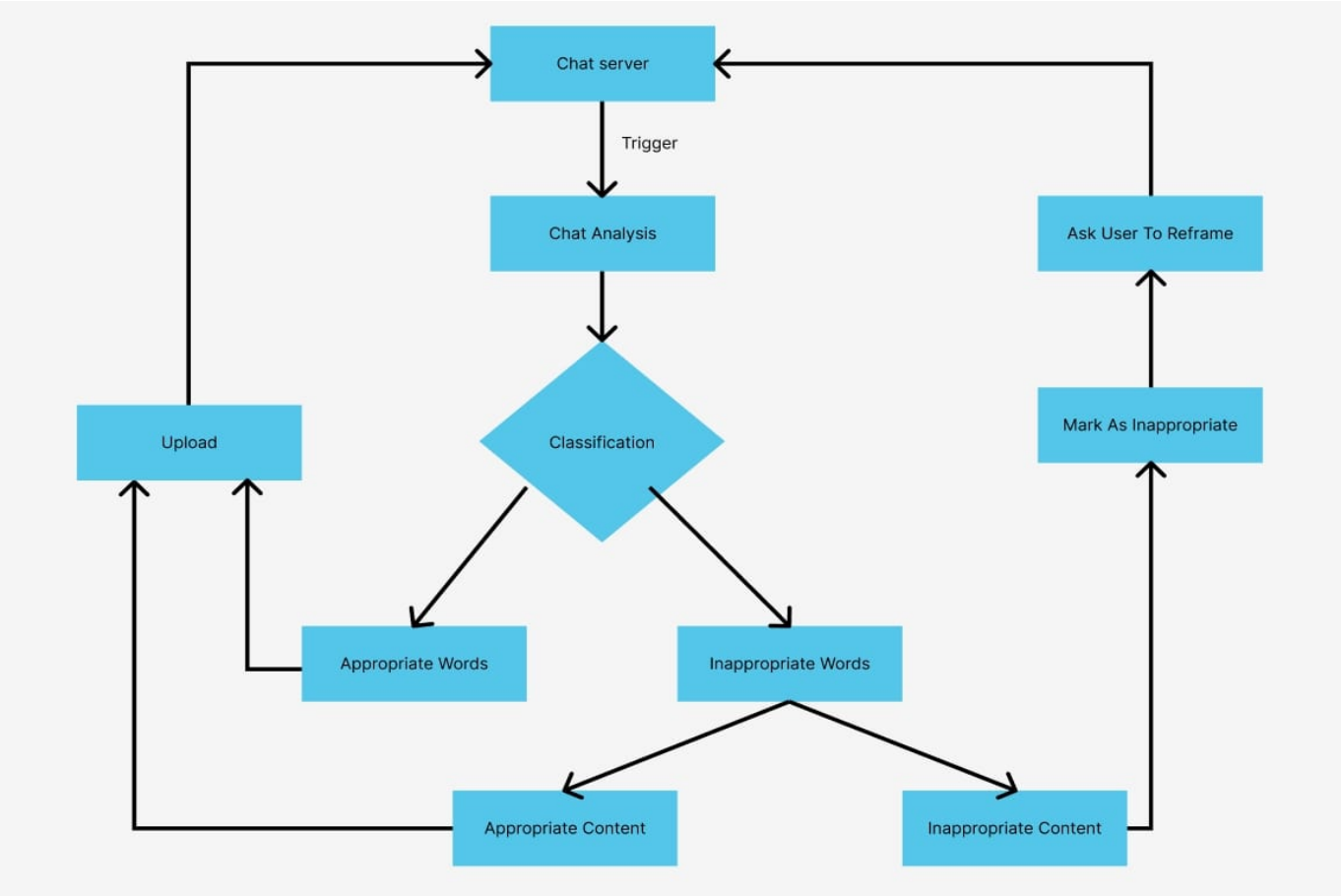

Figure 3.1: Working of Analysis Bot

To enhance the functionality of our chat server, we will utilize Node, Express, and Socket. Using his or her login, the user will sign up. Before the user's query or answer is uploaded to the live chat, it will first pass through our analysis bot when the user inputs it and clicks the "send" button.

3.0.3 Critical Workflow Diagram

Users are linked in real time through the live-chat server. This server, or group of servers, is in charge of securely receiving a message, determining its intended destination, queuing it, and then sending it on to the recipient's chat client. Given all of these factors, we constructed this live chat server utilizing a REST API, a WebSocket server, Node, and Express.

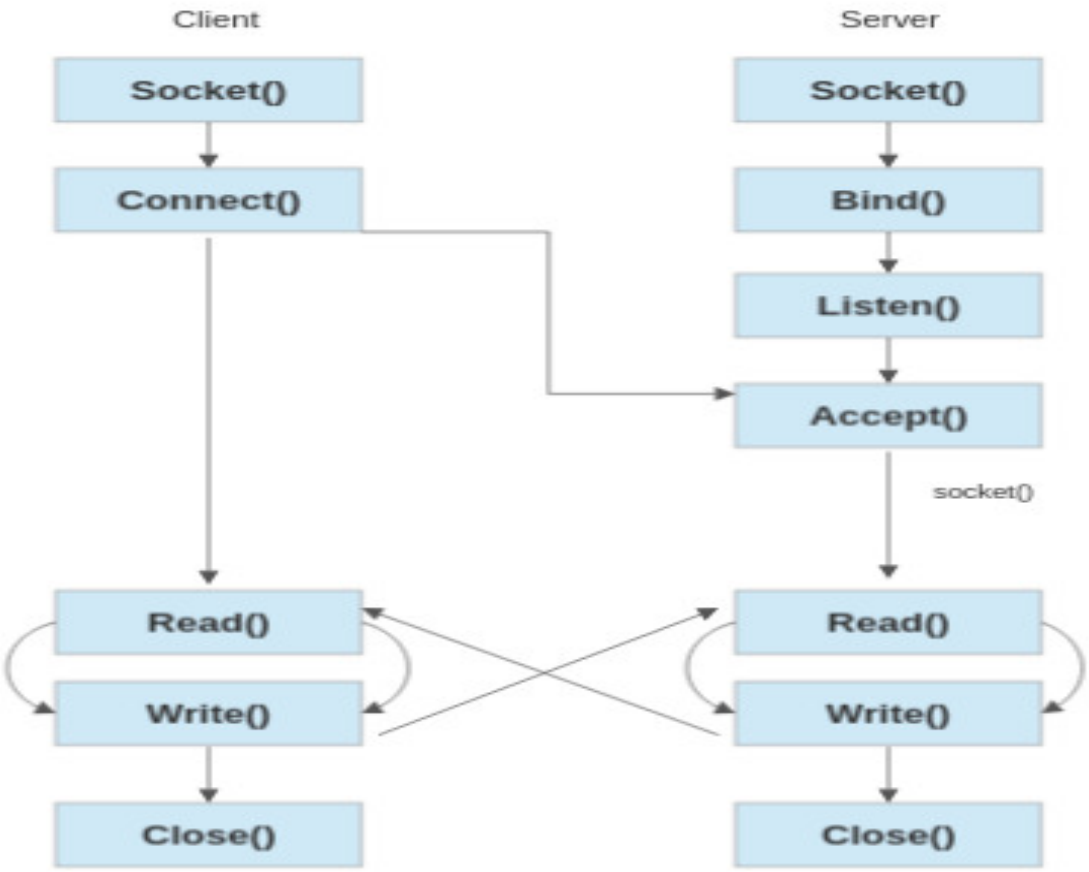

Figure 3.2: Working of Socket.io

An online community forum is created using HTML, CSS, JS where teachers and students can congregate, ask questions, solve queries, receive peer-to-peer support, discuss their similar interests, and make social connections.

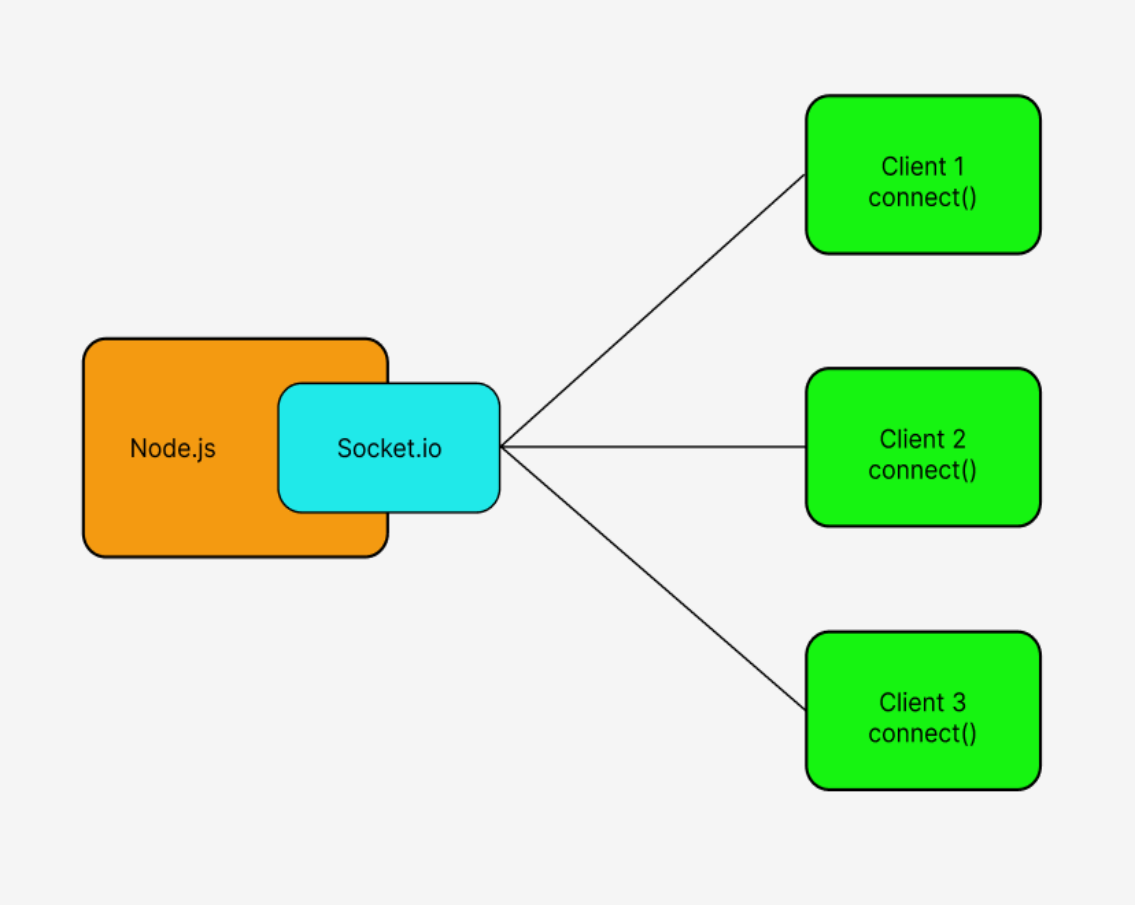

Figure 3.3: Working of live chat server

A user/client initiates a connection request to the server to start a chat session. The server receives the connection request from the client and accepts the connection.Once the user is authenticated, they can start sending messages to the server. The server receives the messages and forwards them to the appropriate recipients.In the case of a live-chat server with sentiment analysis, the server uses natural language processing algorithms to analyze the sentiment of the incoming messages.The server delivers the response back to the client, and the chat session continues until the user decides to end it.

A Generative chatbot is developed that generates original combinations of language rather than selecting from predefined responses. The chatbot is trained using Multinomial Naive Bayes so that it can generate answers based on the questions asked and also take the previous context well into account.The effectiveness of Generative chatbots can easily be leveraged to deliver a great customer experience.

- Activity Diagram
  The figure shown is the complete system diagram of the proposed system. The user will first interact with the chatbot which will help them with their queries and then accordingly redirect them either to the forums or live-chat server.

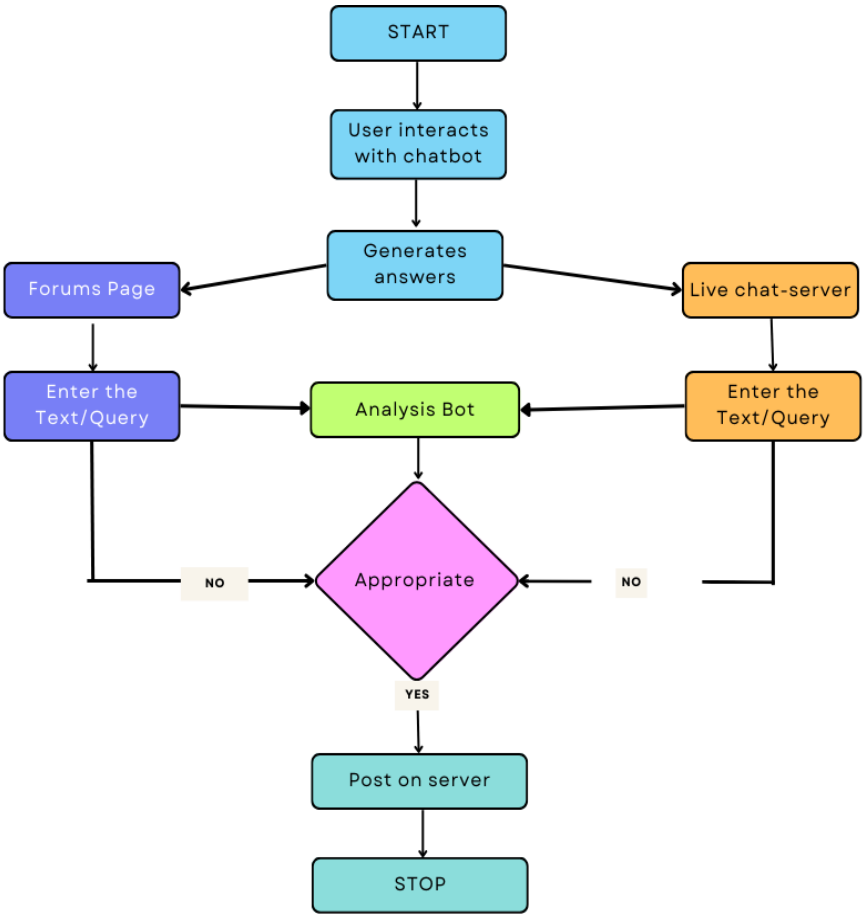

Figure 3.4: Activity Diagram

When a particular user enters their query in the form of text, that particular message will be first sent over to the analysis bot to check the level of appropriateness of the message. If the message is appropriate, it will be posted on the server, else it will be discarded and the user will be asked to re-frame their message in an appropriate manner.

- Use Case Diagram
  A use case diagram is a visual representation of the functional requirements and interactions between actors and the system under consideration. It provides a high-level view of the system and its usage from the perspective of its users.

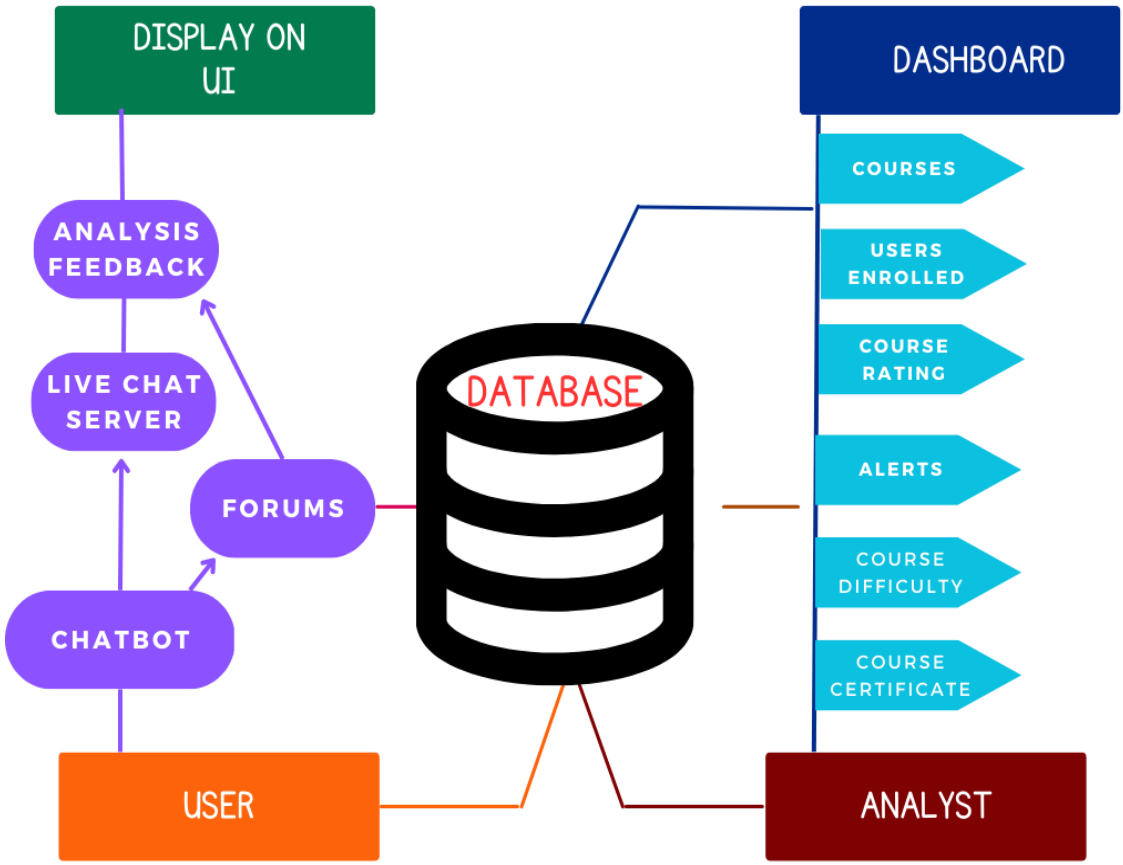

Figure 3.5: Use Case Diagram

- Sequence Diagram
  The following flowchart represents a process for a chatroom application. When a user logs in or signs up to the application, they are able to select a desired chatroom. Once in the chatroom, the user can enter a text message.

  The text message is then sent to an analysis bot, which verifies the message for appropriateness and compliance with the chatroom's rules and guidelines. If the message is deemed appropriate, the bot will provide a response and the message will be updated on the live server for other users to see.

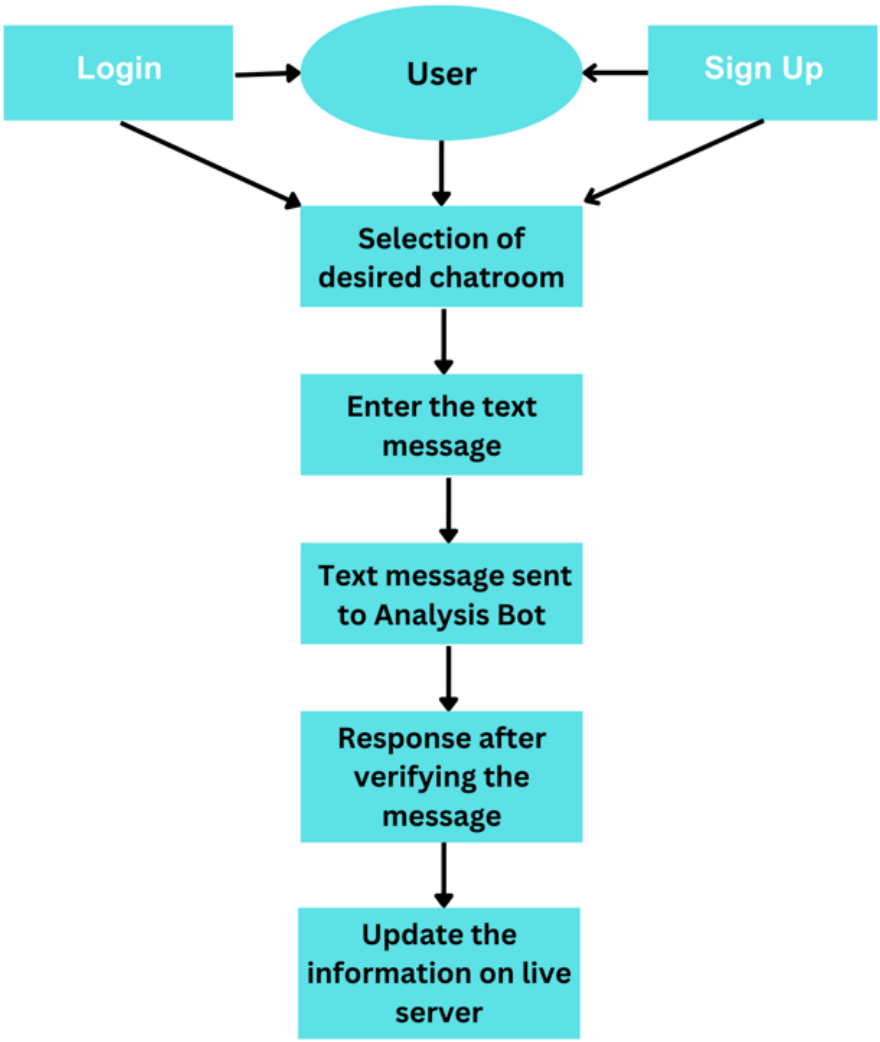

Figure 3.6: Sequence Diagram

This flowchart demonstrates a common process for online chatrooms, which often rely on automated analysis tools to ensure that messages meet community standards and guidelines. By automating this process, chatroom operators can maintain a safe and welcoming environment for all users. Additionally, by updating information on the live server, other users can stay up-to-date on the latest messages and engage in real-time conversation with others in the chatroom.

Chapter 4

Project Implementation

Project implementation consists of visions and plans with which we are supposed to build the end product. This includes the logical conclusion, after evaluating, deciding, visioning, planning and finding the other resources for the project. Technical implementation is one of the major aspects of executing a project.

4.0.1 Chatbot

One of the advantages of chatbots is their ability to provide 24/7 support, which can be especially useful for online and distance learners.Educational chatbots can assist students in a variety of ways, such as answering questions related to a subject, providing study materials, and offering feedback on their progress.

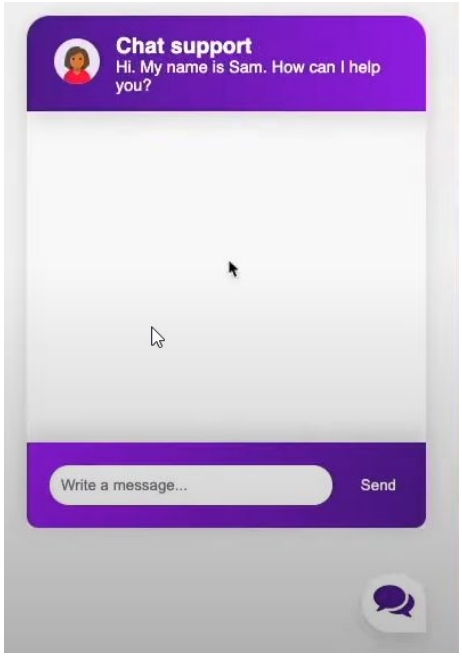

Figure 4.1: Providing chat support to users

4.0.2 Live Chat Server

The landing page gives the user the option to select the chat room you want to join along with your username. This is the username that will be visible on the live-chat so that the users can identify each other.

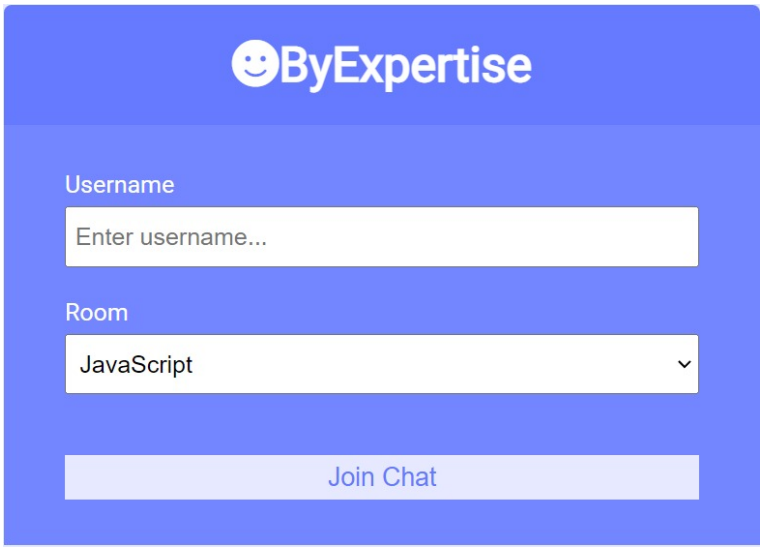

Figure 4.2: Selection of Chat Room

The educational based live chat server answer the repetitive questions and queries with diligence as their processes involve such interrogation.There is no need for the students to consult any other tool or platform because the chat server delivers accurate and instant answers to queries along with the name of the user and timestamp.

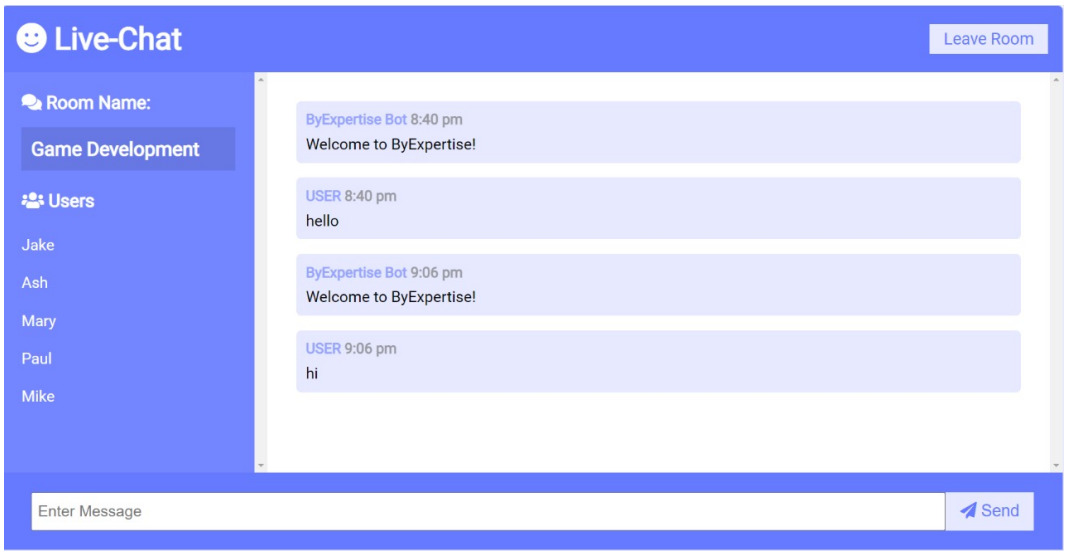

Figure 4.3: Entering Live Chat Server

Whenever a client connects or disconnects, it is displayed on the chat so that the other users can know who left the chat. This can be helpful to understand whether the instructor or the peer answering the queries is active on the chat server or not.

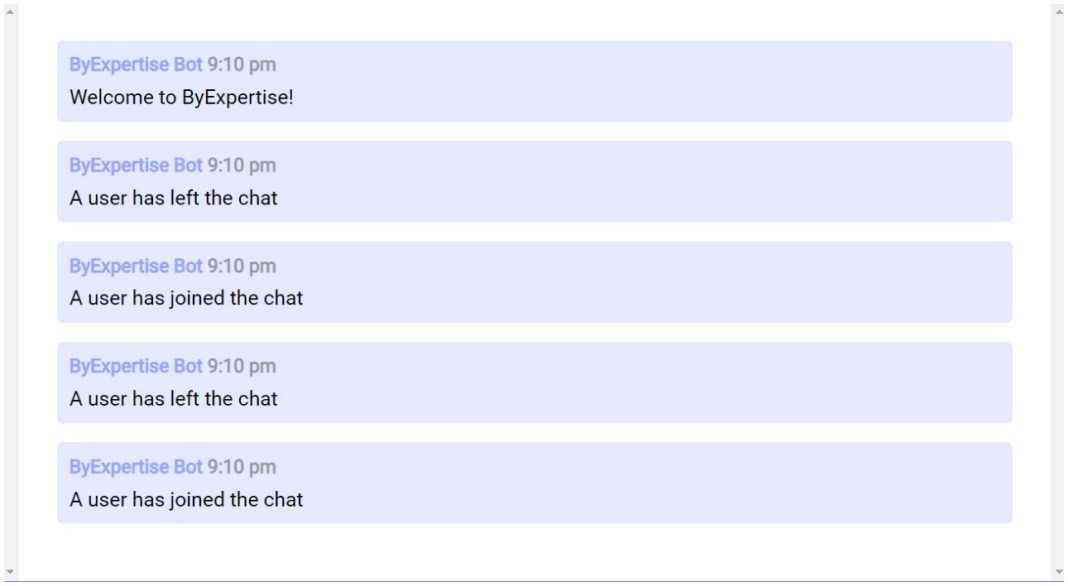

Figure 4.4: Real Time Notification of Users Leaving and Entering the Server

The user text will be sent from the Live chat server to the analysis bot for reviewing. If no offensive language is detected,the text will be displayed on the live server. Otherwise, the text would not be posted on the live chat server and the user will be asked to rephrase their text in an acceptable form.

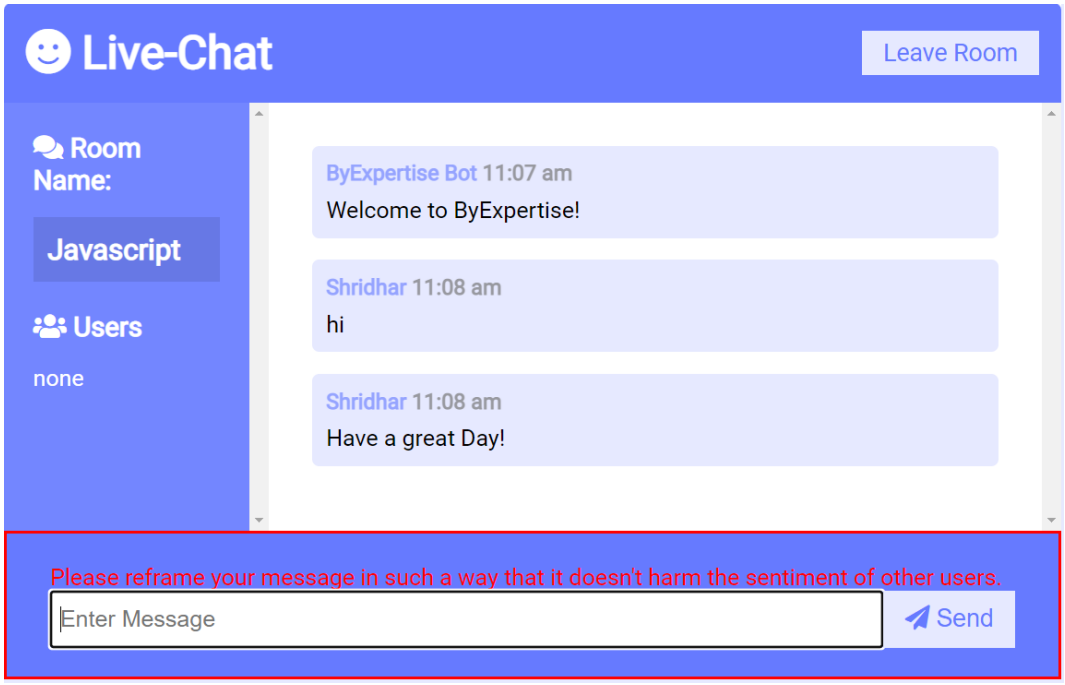

Figure 4.5: User asked to re-frame in case of an inappropriate message

The above figure shows how the server responds to inappropriate messages. When the input is given as "You are too fat", it is categorised as inappropriate and hence is not uploaded on the server.

4.0.3 Community Forums

Forums are online platforms or communities where people can share knowledge, discuss various topics related to education, and seek help and advice from experts and peers. These forums are an excellent source of information and support for students, educators, and anyone interested in learning.

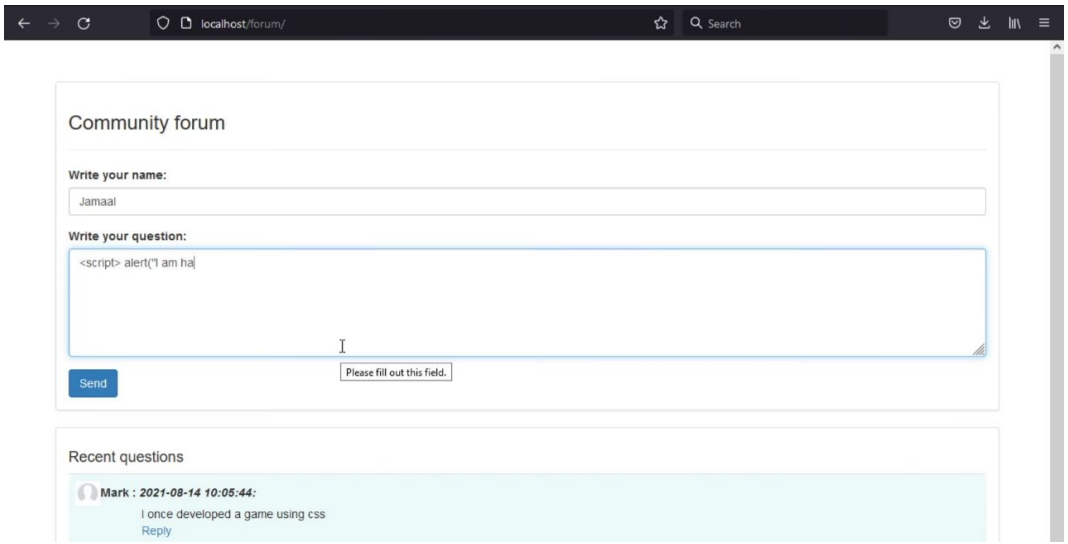

Figure 4.6: Use of Forums in educational platforms

Here, a function is created to act as a connecting bridge between different functions which manage users, chat-rooms, messages, server etc. in Fig 4.7

```
const chatForm = document.getElementById('chat-form');
const chatMessages= document.querySelector('.chat-messages');
const roomName = document.getElementById('room-name');
const userList = document.getElementById('users');

//Get Username and room from URL
const{ username, room } = Qs.parse(location.search,{
    ignoreQueryPrefix: true
});

const socket = io();

//Join chatroom
socket.emit('joinRoom',{username, room});

//Get room users
socket.on('roomUsers', ({room,users})=> {
    outputRoomName(room);
    outputUsers(users);
});

//Message from server
socket.on('message', message =>{
    console.log(message);
    outputMessage(message);

```

Figure 4.7: Connecting Various JS Modules

Fig 4.8 represents the integration of socket and all the various requirements that are needed in order to establish a chat room connection. It also handles the notifications for various events such as a user joining/leaving the room, providing time stamp for each message, etc.

```
const path = require('path');
const http = require('http');
const express = require('express');
const socketio = require('socket.io');
const formatMessage = require('./utils/messages');
const { userJoin, getCurrentUser, userLeave, getRoomUsers} = require('./utils/users')

const app = express();
const server = http.createServer(app);
const io = socketio(server);
//set static folder
app.use(express.static(path.join(__dirname,'public')));

const botName = "ByExpertise Bot";

//Run when client connects
io.on('connection', socket => {
    socket.on('joinRoom',({username,room})=>{
        const user= userJoin(socket.id, username, room);
        socket.join(user.room);

        //Welcome Message
        socket.emit('message', formatMessage(botName, 'Welcome to ByExpertise!'));
```

Figure 4.8: Connection of Socket and Express for providing functionality to the server

All the conversations taking place amongst users are stored in the database and can be retrieved easily.To ensure the smooth functioning of the forum, the database is designed to handle large amounts of data and user traffic.

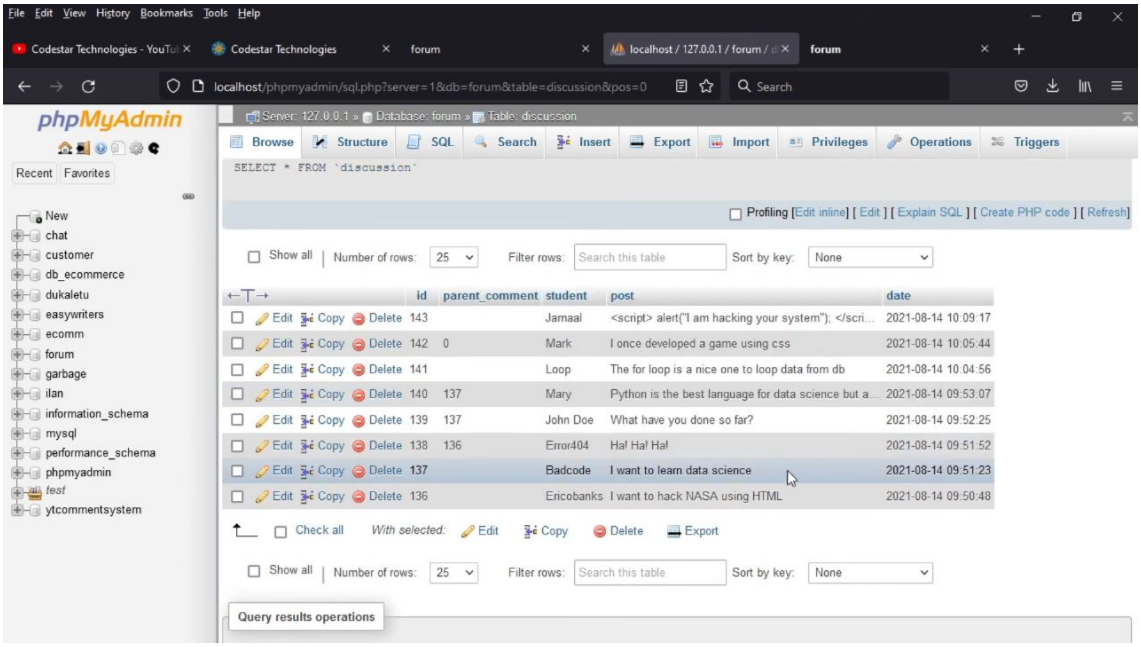

Figure 4.9: Chats of Forums stored in Database

Chapter 5

Testing

Testing is an organized summary of testing objectives, activities, and results. It is created and used to help stakeholders (product manager, analysts, testing team, and developers) understand product quality and decide whether a product, feature, or a defect resolution is on track for release. Test documentation includes all files that contain information on the testing team's strategy, progress, metrics, and achieved results. The combination of all available data serves to measure the testing effort, control test coverage, and track future project requirements.

5.1 Functional Testing

5.1.1 Unit Testing

Unit testing is the first level of testing, which is typically performed by the developers themselves. It helped us understand the desired output of each module, which we had broken down into separate units and in classifying the faces of users on the basis of the algorithm that we have used.

Test Case Number	Test Case Conditions	Test Case Procedure	Test Data	Expected Result	Actual Result	Pass/Fail
1	User sends a positive message	Send a message with positive sentiment	"I really like your product"	Server correctly identifies sentiment as positive	Server identified sentiment as positive	Pass
2	User sends a negative message	Send a message with negative sentiment	"I am very disappointed with your service"	Server correctly identifies sentiment as negative	Server identified sentiment as negative	Pass
3	User sends a neutral message	Send a message with neutral sentiment	"What time do you close today?"	Server correctly identifies sentiment as neutral	Server identified sentiment as neutral	Pass
4	Server receives a message with profanity	Send a message with profanity	"Your product is s***"	Server correctly identifies sentiment as negative and flags message for review	Server identified sentiment as negative and flagged message for review	Pass

5.2 Various Testcases

Here are some possible test cases for a sentiment analysis system:

Test Case	Sentence	Expected Result	Actual Result
Positive	I absolutely loved this Seminar	Positive	Positive
Negative	The Resources were terrible, I hated it	Negative	Negative
Neutral	Seminar was good and resources were terrible.	Neutral	Neutral

Chapter 6

Result

Results refer to the outcomes or achievements that are produced as a result of completing the project's goals and objectives. The results of a project can be evaluated against the initial goals and objectives to determine whether the project was successful or not.However, it is important to remember that the success of the system depends on the quality and quantity of data collected, the accuracy and stability of the algorithms used, and the ethics of student information. Therefore, it is necessary to ensure that transparency, integrity and confidentiality are taken into account when designing and using the system. Overall, a well-designed E-learning platform can be a valuable tool for teachers to enhance learning, successfully encourage student action, and support the development of continuing education.

6.0.1 Analysis Bot

Execution of the statement if the statement is appropriate to be posted on the server is depicted in Fig. 6.1. The input statement passed on was "I am a student".

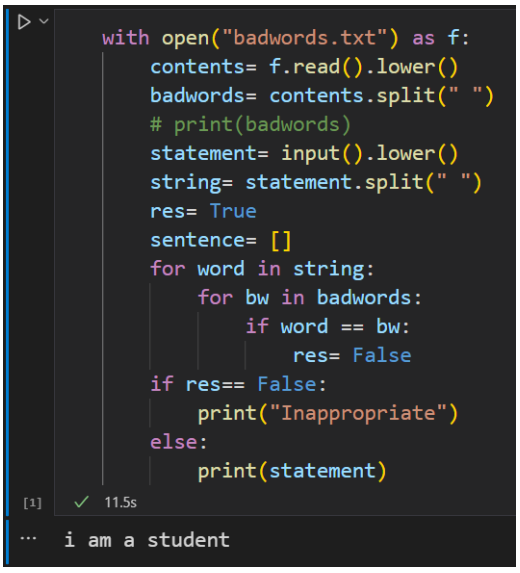

Figure 6.1: Code reflecting Working of Analysis Bot in case of an appropriate statement

Here, the Analysis bot returns "Inappropriate" when an inappropriate statement is detected using a bag-of-words approach in Fig 6.2. The input statement passed on was "You are too fat".

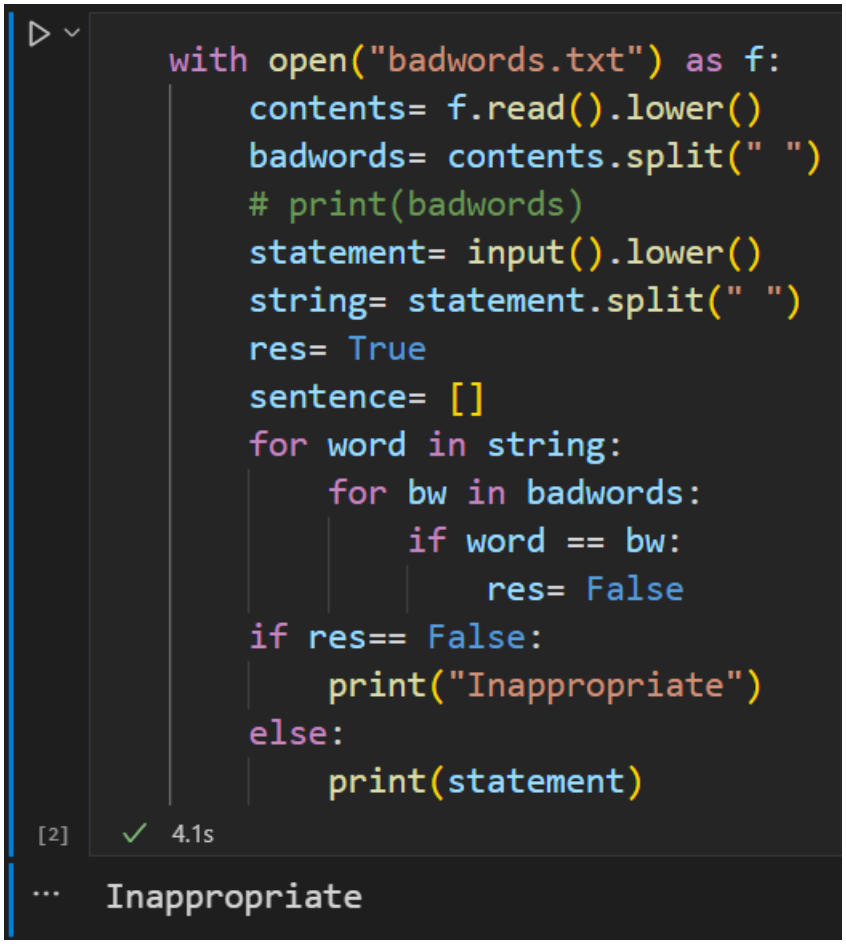

Figure 6.2: Code reflecting Working of Analysis Bot in case of an inappropriate statement

6.0.2 Analysis Dashboard

The dashboard provides visual representations of the data, such as graphs, charts, and tables, making it easier for users to interpret and analyze the information. It can also offer predictive analytics, suggesting future trends and opportunities for improvement.Teachers can use the dashboard analysis to monitor individual student progress and identify areas where students need extra support.The analysis can be used by different stakeholders to develop personalized learning plans and adjust teaching strategies to meet the needs of different students.

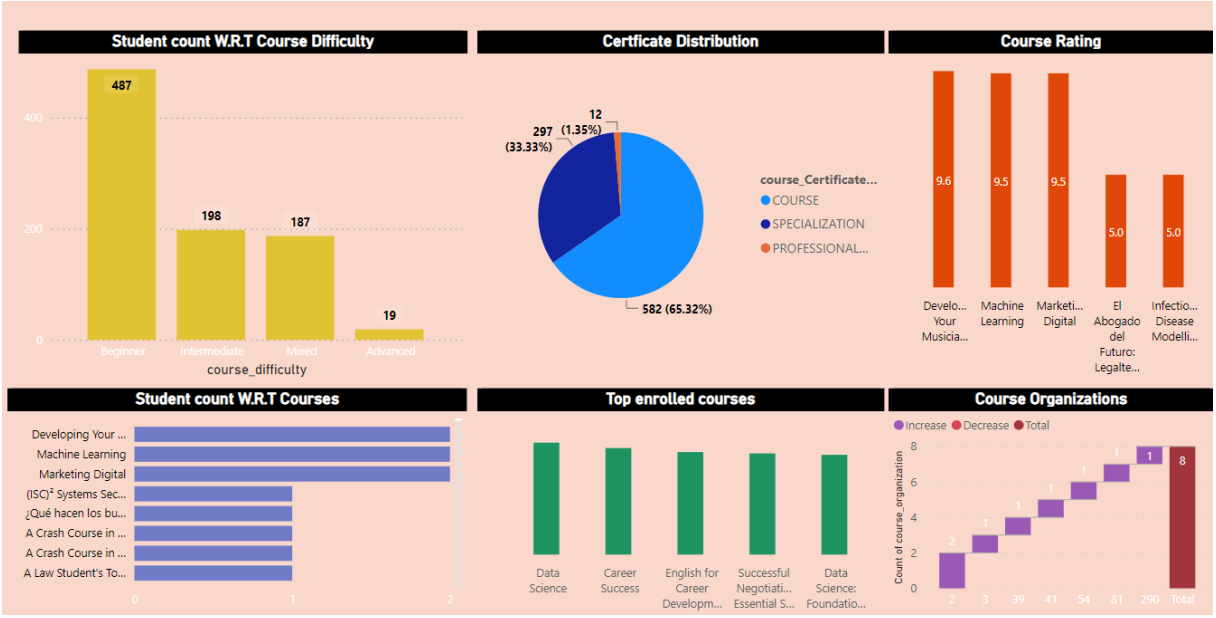

Figure 6.3: Analysis Dashboard

6.0.3 Model Results

Based on previous researches done in this topic, we can see that currently, live-chat server runs independently from the sentiment analysis algorithm.The drawback of this system is that by the time the messages are sent for sentiment analysis, the text is already being posted on the server and is read by users.The system built in this project passes messages as an API for sentiment analysis and only after the message is marked “appropriate”, it is passed on to be displayed either on the live-chat server or forums page.

Chapter 7

Conclusions and Future Scope

The system uses NLP approach to build this educational chat server. The system's primary benefits include group chat, instant messaging, and real-world contact. Students may quickly receive answers to their questions by using our live chat service which works in near real-time. As the number of e-learners are increasing nowadays, It is observed that the learners tend to be informal and use abusive words.The system which we have developed is a abuse detection bot which helps to identify and minimize offensive contents in online learning platforms. The goal of this study was to identify and categorize foul language in online learning platforms in order to decrease unfavorable posts by alerting the author to the offensive content and offering potential substitutes. We have created a generative chat bot that responds automatically, is available constantly, and also saves time by reducing the need for human interaction. With the use of precise technology integration, chatbot design and implementation is ensuring human-to-human communication whereas actually responding with automated responses to certain extent. The chat bot assists students, professors, and anybody else looking for information about a certain course.
In the future, our model may be built in such a manner that the chatbot can provide multilingual replies in many languages and be trained further with new datasets in other languages. Teachers and students can see each other and work together to find answers by adding a new feature of video calling and video conferencing. Features for voice recording can be added. The audio of the individual participating in the video conference may be captured for analysis and training reasons. The derogatory language used during video conferences can be recognized. It is possible to improve the system further for more precision and a solution.

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Appendices

Appendix-I: Installation of libraries

1. Install Python from https://www.python.org/downloads/
2. Install Node.js from https://nodejs.org/en/download
3. **npm install express**
4. **npm install socket.io**
5. **npm install moment**
6. **npm install -D nodemon**
7. **pip install numpy**
8. **pip install pandas**
9. **pip install sklearn**
10. **pip install regex**
11. **pip install nltk**
12. **pip install string**
13. **pip install Flask**

Publication

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