

INTERACTIVE AI CHATBOT FOR MENTAL ILLNESS

A PROJECT REPORT

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BONAFIDE CERTIFICATE

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ABSTRACT

This project focuses on developing a chat bot at the intersection of mental illness and technology, drawing from cognitive behavioral therapy principles and natural language processing techniques. It provides a confidential space for users to express emotions, receive psychoeducation, and access coping strategies tailored to their needs. The chat bot aims to destigmatize mental illness, facilitate early intervention, and promote self-care practices. Integrating expertise from psychology, computer science, and user experience design, ethical considerations are carefully addressed. User feedback and testing ensure effectiveness and satisfaction. The goal is to contribute to research on technology-assisted mental health interventions and provide a scalable solution for supporting individuals in an accessible and empathetic manner, fostering resilience, improving well-being, and promoting inclusivity in mental health care.

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CHAPTER 1

INTRODUCTION

In today's dynamic landscape of mental health support and services, harnessing technology is essential to ensure widespread access and effective intervention. Introducing the Mental Health Chatbot, a groundbreaking initiative designed to revolutionize the way individuals access mental health resources and support. As a pioneering AI-driven platform, the Mental Health Chatbot stands as a beacon of modern mental health care, offering an intuitive interface and real-time assistance to those grappling with mental health challenges.

At its essence, the Mental Health Chatbot serves as a virtual companion and resource hub, bridging the gap between individuals and mental health resources. With advanced natural language processing capabilities, the chatbot can comprehend and respond to users' inquiries with precision and swiftness. Whether it's information on managing symptoms, accessing therapy resources, or finding community support, the chatbot provides tailored responses, ensuring users receive the guidance they need promptly.

A primary objective of the Mental Health Chatbot is to promote transparency and accessibility in mental health support. By centralizing information and making it readily available, the chatbot empowers individuals to make informed decisions about managing their mental well-being. Additionally, the chatbot serves as a valuable tool for dismantling stigma and simplifying access to mental health services, thereby fostering greater inclusivity and engagement across diverse populations.

Beyond offering information, the Mental Health Chatbot also facilitates access to mental health interventions. Through interactive interfaces and guided workflows, users can explore self-care strategies, connect with therapy resources, and even schedule appointments with mental health professionals, all within the comfort of a secure digital environment. Moreover, stringent security measures are implemented to protect user privacy and adhere to regulatory standards, fostering trust and confidence in the platform.

In summary, the Mental Health Chatbot represents a transformative approach to mental health care, leveraging technology to provide personalized support, enhance accessibility, and foster well-being for individuals navigating mental health challenges.

1.1 PROBLEM STATEMENT

The pervasive challenges of mental health disorders are exacerbated by stigma, resource scarcity, financial constraints, and limited accessibility, impeding millions from obtaining necessary and affordable treatment..

1.2 SCOPE OF THE WORK

The scope of this project involves developing an AI chat bot tailored specifically for mental illness support, with a focus on providing accessible and empathetic assistance to individuals facing various mental health challenges. The chat bot will be designed to offer personalized conversations, deliver psychoeducational resources, facilitate coping strategies, and provide referrals to professional help when necessary. Emphasizing user privacy and data security, the project will explore the integration of natural language processing algorithms to enhance the bot's ability to understand and respond to users' emotional states effectively. Additionally, the project will conduct thorough testing and evaluation to ensure the chat bot's usability, effectiveness, and ethical considerations in promoting mental well-being.

1.4 AIM AND OBJECTIVES OF THE PROJECT

The aim of this project is to develop an AI chat bot tailored for addressing mental illness, with the objective of enhancing access to mental health support, reducing stigma, and providing personalized assistance to individuals in need. Through the integration of natural language processing, machine learning algorithms, and ethical design principles, the chat bot will strive to offer empathetic and effective interventions, facilitate early detection of mental health issues, and connect users with appropriate resources and professional help, thereby contributing to improved well-being and mental health outcomes in diverse populations.

1.5 RESOURCES

This project has been developed through widespread secondary research of accredited manuscripts, standard papers, business journals, white papers, analysts' information, and conference reviews. Significant resources are required to achieve an efficacious completion of this project.

The following prospectus details a list of resources that will play a primary role in the successful execution of our project:

- A properly functioning workstation (PC, laptop, net-books etc.) to carry out desired research and collect relevant content.
- Unlimited internet access.
- Unrestricted access to the university lab in order to gather a variety of literature including academic resources (for e.g. Prolog tutorials, online programming examples, bulletins, publications, e-books, journals etc.), technical manuscripts, etc. Prolog development kit in order to program the desired system and other related software that will be required to perform our research.

1.6 MOTIVATION

The project's primary motivation arises from the exploration of innovative approaches, particularly the integration of evolutionary algorithms like NEAT, in the field of mental health support. By leveraging NEAT in the development of an AI chatbot for mental illness, the project aims to demonstrate the AI's potential to learn, adapt, and refine its support strategies over time. This presents an intriguing avenue to observe how neural networks autonomously enhance their ability to provide personalized assistance without explicit programming.

Another driving force is the aspiration to create an adaptive AI companion capable of dynamically adjusting its responses to users' emotional states and needs. The project seeks to showcase the AI's capacity to learn from user interactions within the mental health support environment, iteratively refining its responses and coping strategies. This adaptability not only underscores the potential of NEAT-driven evolution but also signifies the AI's ability to tailor support in response to diverse individual circumstances and evolving mental health challenges.

CHAPTER 2

LITRETURE SURVEY

A comprehensive literature survey on AI chat bots for mental illness reveals a burgeoning field marked by diverse approaches, ranging from sentiment analysis to cognitive behavioral therapy (CBT) techniques, aimed at addressing the multifaceted challenges of mental health support. Researchers such as Fitzpatrick et al. (2017) have explored the potential of AI chat bots to provide timely interventions and support for individuals experiencing symptoms of depression and anxiety. By employing machine learning algorithms to analyze user input and deliver personalized responses, these chat bots demonstrate promising results in enhancing user engagement and symptom management. Similarly, studies by Abd-Alrazaq et al. (2019) have highlighted the efficacy of AI chat bots in delivering psychoeducation, coping strategies, and emotional support to users, thereby complementing traditional therapeutic approaches and expanding access to mental health resources.

Moreover, the literature underscores the importance of ethical considerations in the development and deployment of AI chat bots for mental illness. Researchers such as Torous et al. (2018) emphasize the need for transparency, privacy protection, and informed consent in the design of these technologies to safeguard user trust and confidentiality. Additionally, studies by Huckvale et al. (2019) caution against the potential risks of algorithmic biases, unintended consequences, and overreliance on AI chat bots as substitutes for human interaction in mental health care. By critically examining the ethical implications and societal impact of AI chat bots, scholars aim to foster responsible innovation and ensure that these technologies prioritize user well-being and adhere to ethical guidelines and regulations.

In summary, the literature survey underscores the growing interest in leveraging AI chat bots as a promising tool for mental health support, while also highlighting the need for ethical considerations, user-centered design, and evidence-based approaches to maximize their potential benefits and mitigate potential risks. Continued research efforts in this area hold promise for advancing the field of digital mental health interventions and improving access to quality care for individuals experiencing mental illness.

CHAPTER 3

SYSTEM DESIGN

3.1 GENERAL

In this section, we would like to show how the general outline of how all the components end up working when organized and arranged together. It is further represented in the form of a flow chart below.

3.2 SYSTEM ARCHITECTURE DIAGRAM

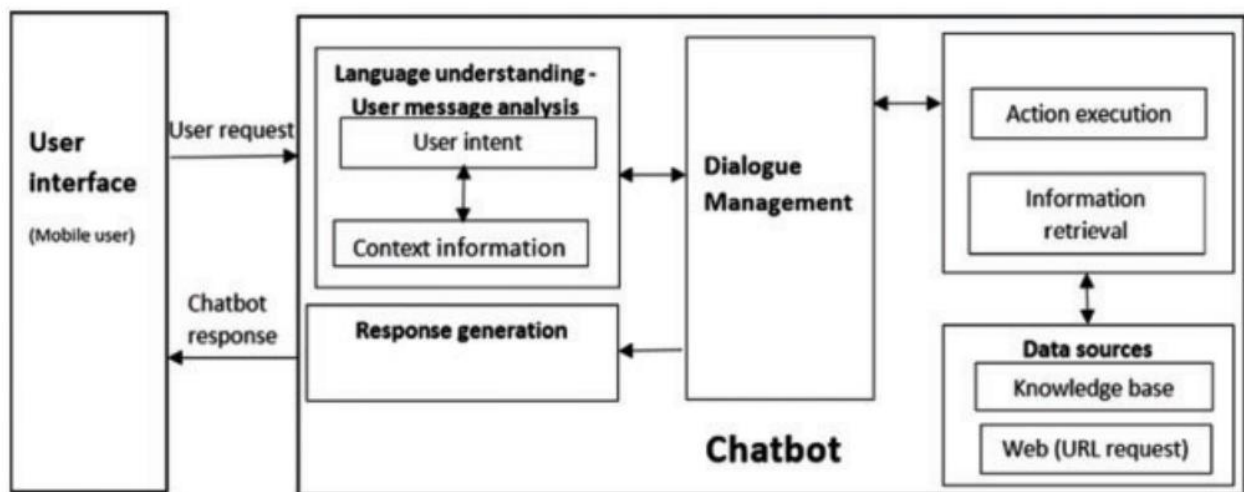


Fig 3.1: System Architecture

3.3 DEVELOPMENTAL ENVIRONMENT

3.3.1 HARDWARE REQUIREMENTS

The hardware requirements may serve as the basis for a contract for the system's implementation. It should therefore be a complete and consistent specification of the entire system. It is generally used by software engineers as the starting point for the system design.

Table 3.1 Hardware Requirements

COMPONENTS	SPECIFICATION
PROCESSOR	Intel Core i5
RAM	8 GB RAM
GPU	NVIDIA GeForce GTX 1650
MONITOR	15" COLOR
HARD DISK	512 GB
PROCESSOR SPEED	MINIMUM 1.1 GHz

3.3.2 SOFTWARE REQUIREMENTS

The software requirements document is the specifications of the system. It should include both a definition and a specification of requirements. It is a set of what the system should rather be doing than focus on how it should be done. The software requirements provide a basis for creating the software requirements specification. It is useful in estimating the cost, planning team activities, performing tasks, tracking the team, and tracking the team's progress throughout the development activity.

Python IDLE, and **chrome** would all be required.

CHAPTER 4

PROJECT DESCRIPTION

4.1 METHODOLOGY

Developing an AI chatbot for mental illness demands a systematic methodology to ensure it effectively supports users while upholding ethical standards. Initially, a thorough needs assessment is conducted to pinpoint the specific mental health issues to be addressed and identify the target audience. Clear objectives are established, delineating the chatbot's role in providing support, offering resources, or conducting assessments. This step lays the foundation for the subsequent phases, guiding the development process toward addressing the identified needs of users.

Subsequently, a comprehensive literature review is undertaken to explore existing AI chatbots designed for mental health support. This review delves into successful implementations, scrutinizes their design and functionality, and identifies gaps or opportunities for innovation. By analyzing previous research, developers gain insights into effective strategies, potential challenges, and emerging trends in the field. These findings inform decision-making during the design and development phase, guiding the creation of a chatbot that integrates best practices while offering unique solutions tailored to the identified needs.

In the design and development phase, user personas are crafted based on demographic data and mental health concerns, providing a human-centered framework for decision-making. Conversational flows are meticulously designed to foster engaging and supportive interactions, while empathetic language and responses are incorporated to enhance user trust and rapport. A robust knowledge base of mental health information, resources, and coping strategies is developed to empower users with relevant insights and tools. Throughout this phase, iterative testing and refinement ensure the chatbot's functionality and usability align with user expectations and needs.

Ethical considerations and privacy are paramount throughout the development process. Stringent privacy measures are implemented to safeguard user data and maintain confidentiality in accordance with applicable regulations such as GDPR or HIPAA. By prioritizing ethical principles and user privacy, developers ensure that the chatbot serves as a trustworthy and responsible resource for individuals seeking mental health assistance.

4.2 MODULE DESCRIPTION

The AI mental health support platform comprises interconnected modules aiming to enhance accessibility and effectiveness. Users securely authenticate and manage profiles, access comprehensive information, and receive personalized assistance. Electronic submission and real-time tracking streamline application processes, while feedback mechanisms enable continuous improvement.

4.2.1 Login Page

Login Page module serves as the gateway for users to securely access the application. It includes features for user authentication, allowing registered users to log in using their credentials. This is also helpful to identify users to prevent unauthorized access by outsiders. It requires a Username and a Password for that profile to login into the application. Upon successful authentication, users are granted access to their personalized dashboard and application functionalities.

4.2.2 Chatbot

The Chatbot module integrates a conversational interface powered by natural language processing (NLP) to provide users with personalized assistance and guidance throughout their interactions with the application. Users can engage with the chatbot to ask questions, seek information about government schemes, and receive real-time support for their queries. The chatbot is designed to understand and interpret user inputs accurately, leveraging NLP algorithms to analyze and respond to queries in a human-like manner. It offers a wide range of functionalities, including answering FAQs, providing step-by-step guidance on application procedures, and offering personalized recommendations based on user preferences and eligibility criteria. The chatbot may also integrate with backend systems to fetch relevant data and perform tasks such as application status checks or document uploads on behalf of the user. Through continuous learning and optimization, the chatbot aims to enhance user satisfaction, streamline user interactions, and improve overall accessibility and usability of the application.

CHAPTER 5

RESULTS AND DISCUSSIONS

5.1 OUTPUT

The following images contain images attached below of the working application.

Starting of chatbot:

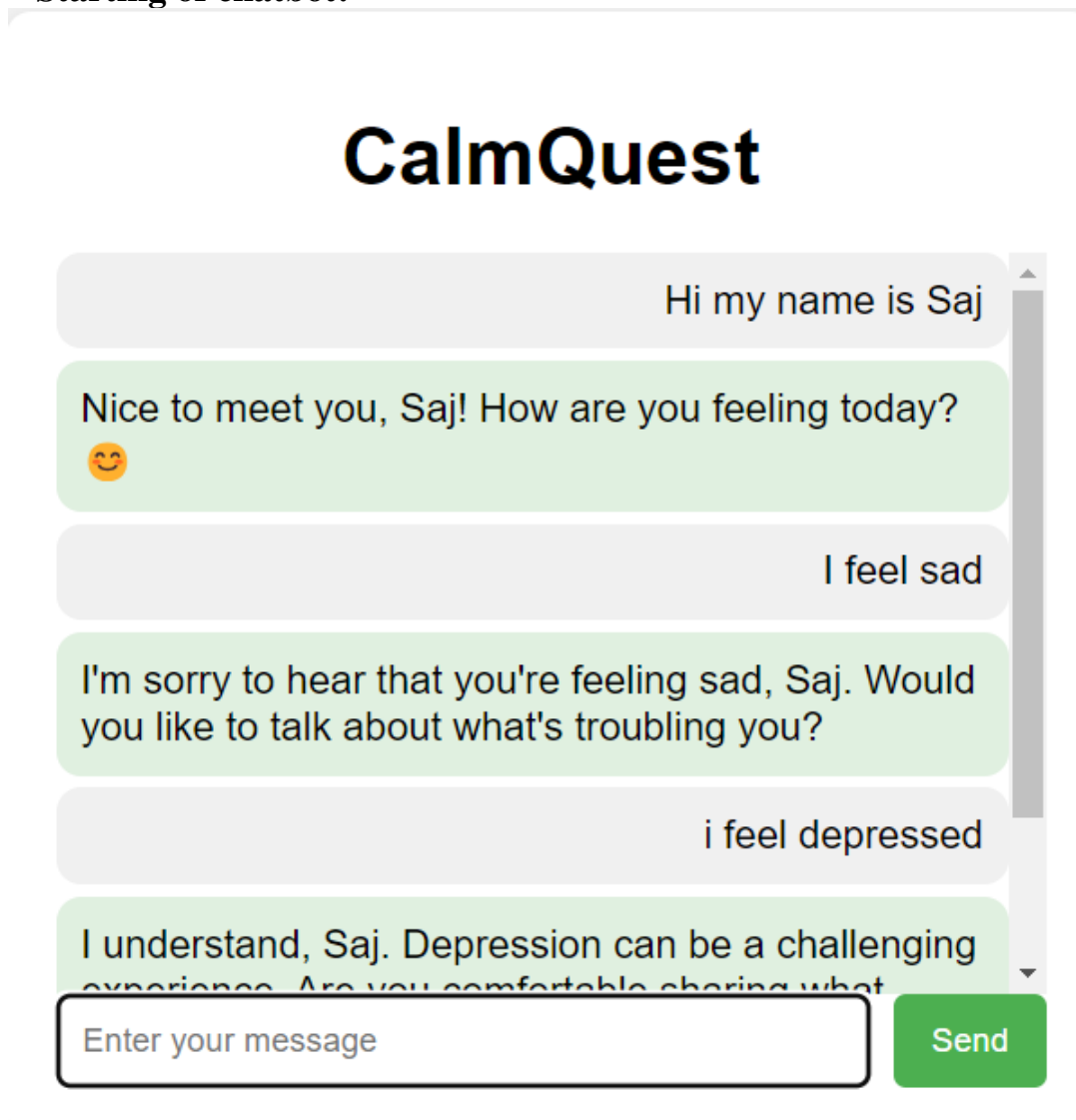
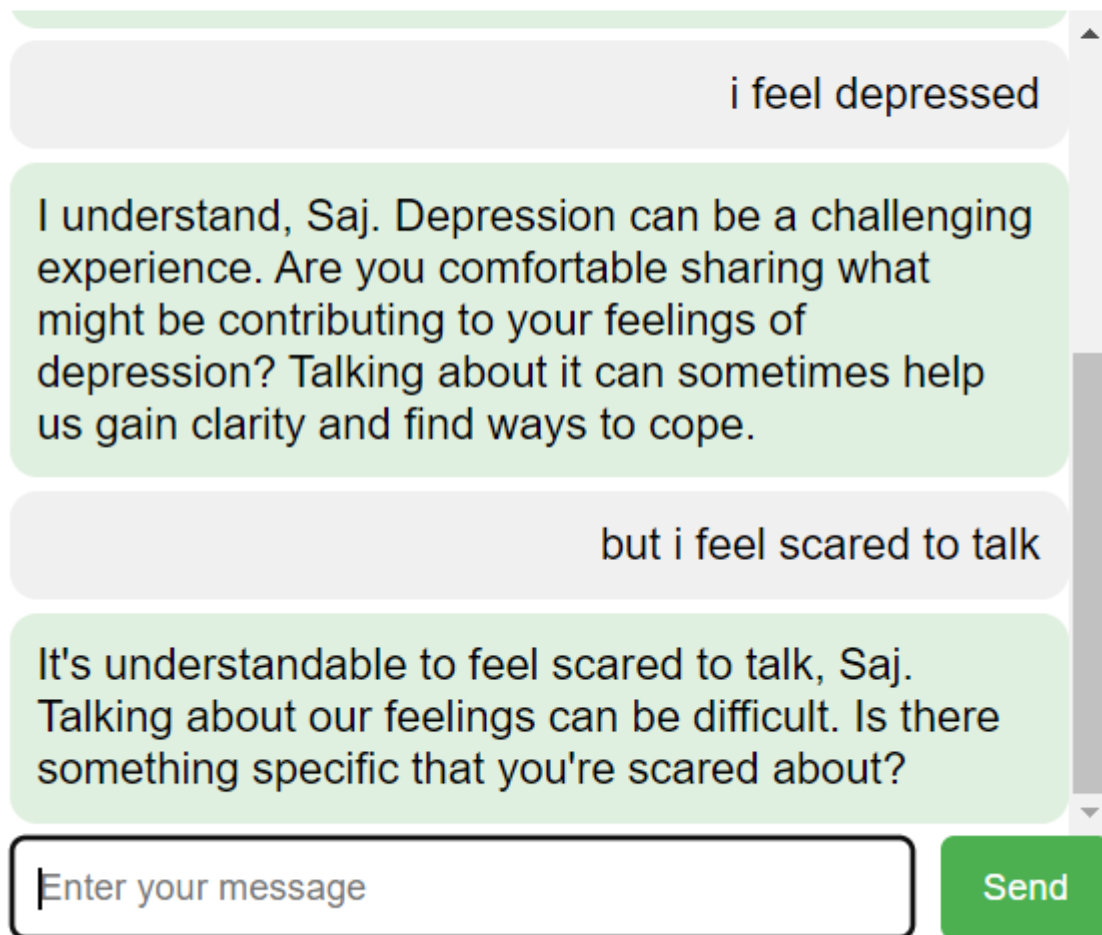


Fig 5.1: Output

Talking about feelings:

CalmQuest



The screenshot shows a chat interface for 'CalmQuest'. It features a vertical scrollable area with alternating light green and light gray message bubbles. The first gray bubble contains the text 'i feel depressed'. The first green bubble contains a response: 'I understand, Saj. Depression can be a challenging experience. Are you comfortable sharing what might be contributing to your feelings of depression? Talking about it can sometimes help us gain clarity and find ways to cope.' The second gray bubble contains 'but i feel scared to talk'. The second green bubble contains a response: 'It's understandable to feel scared to talk, Saj. Talking about our feelings can be difficult. Is there something specific that you're scared about?'. At the bottom, there is a text input field with the placeholder 'Enter your message' and a green 'Send' button to its right.

i feel depressed

I understand, Saj. Depression can be a challenging experience. Are you comfortable sharing what might be contributing to your feelings of depression? Talking about it can sometimes help us gain clarity and find ways to cope.

but i feel scared to talk

It's understandable to feel scared to talk, Saj. Talking about our feelings can be difficult. Is there something specific that you're scared about?

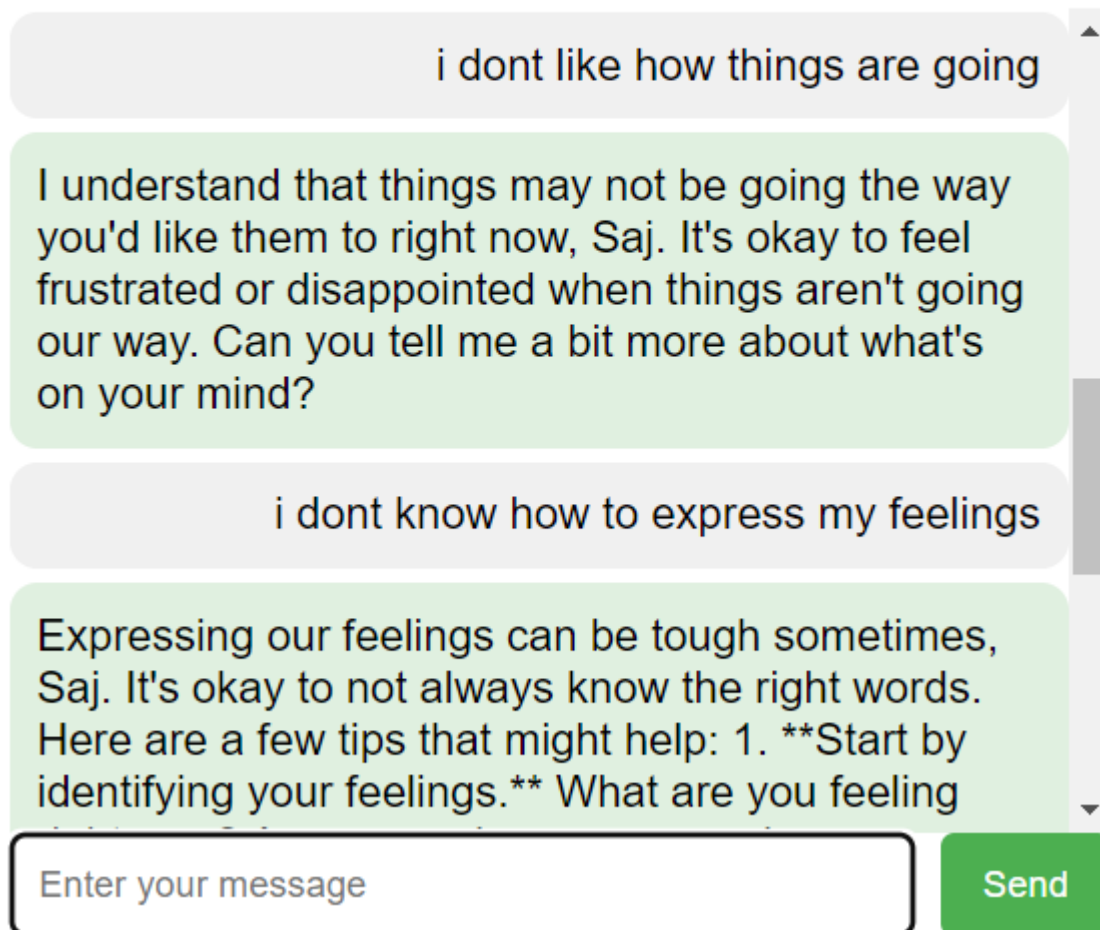
Enter your message

Send

Fig 5.2 Talk Output

Continuation:

CalmQuest



The screenshot displays a chat interface for 'CalmQuest'. It features a vertical scrollable area with alternating light gray and light green message bubbles. At the bottom, there is a text input field with the placeholder 'Enter your message' and a green 'Send' button. The first user message is 'i dont like how things are going', followed by an AI response: 'I understand that things may not be going the way you'd like them to right now, Saj. It's okay to feel frustrated or disappointed when things aren't going our way. Can you tell me a bit more about what's on your mind?'. The second user message is 'i dont know how to express my feelings', followed by an AI response: 'Expressing our feelings can be tough sometimes, Saj. It's okay to not always know the right words. Here are a few tips that might help: 1. **Start by identifying your feelings.** What are you feeling'.

i dont like how things are going

I understand that things may not be going the way you'd like them to right now, Saj. It's okay to feel frustrated or disappointed when things aren't going our way. Can you tell me a bit more about what's on your mind?

i dont know how to express my feelings

Expressing our feelings can be tough sometimes, Saj. It's okay to not always know the right words. Here are a few tips that might help: 1. **Start by identifying your feelings.** What are you feeling

Enter your message

Send

Fig 5.3 Response Output

5.2 RESULT

Developing an AI mental chatbot for mental health represents an inspiring exploration of merging artificial intelligence with mental wellness support. The project involved crafting a chatbot within Python's frameworks, incorporating advanced natural language processing techniques to understand and respond empathetically to users' mental health concerns. By integrating machine learning models and sentiment analysis algorithms, the chatbot evolved to provide personalized and insightful responses tailored to users' emotional states and needs. Through iterative training and improvement cycles, the chatbot progressed from basic scripted responses to nuanced, empathetic interactions, reflecting its growing understanding of human emotions and mental health nuances. This initiative yielded profound insights into the potential of AI in mental health support, showcasing its capacity to offer empathetic and accessible assistance to individuals facing mental health challenges. It also emphasized the significance of ongoing refinement and ethical considerations in optimizing the chatbot's performance and ensuring responsible deployment in real-world settings. Despite complexities, this endeavor underscores the transformative impact of AI in augmenting mental health care, paving the way for future advancements in AI-driven support systems for mental wellness.

CHAPTER 6

CONCLUSION AND FUTURE ENHANCEMENT

6.1 CONCLUSION

In the culmination of this enthralling expedition into merging artificial intelligence with the classic game of Pong, a compelling narrative of evolution and adaptability comes to fruition. The integration of the NeuroEvolution of Augmenting Topologies (NEAT) algorithm within the Pong gaming environment resulted in the birth of an AI player that transcended mere programmed responses, evolving through successive generations. Witnessing the AI's transformative journey from rudimentary gameplay tactics to sophisticated strategies showcased the profound impact of evolutionary algorithms on gaming dynamics. The iterative training sessions not only honed the AI's ability to control the paddles but also unveiled its capacity to adapt and refine its gameplay approach, reflecting the remarkable resilience and learning capabilities embedded within NEAT-driven neural networks.

This exploration ventured beyond the confines of a simple gaming scenario, offering invaluable insights into the realm of autonomous learning and adaptive decision-making. Despite encountering challenges, the gradual maturation of the AI player stood as a testament to the remarkable potential of evolutionary algorithms in enabling AI agents to navigate and excel in intricate gaming environments. The evolving strategies and responses underscored the nuanced adaptability and learning prowess of NEAT-driven neural networks, hinting at their boundless applicability across various domains.

FUTURE ENHANCEMENT

A potential future enhancement for a Pong game using NEAT AI could involve incorporating more advanced AI techniques or expanding the game's features to create a more immersive and challenging gaming experience. Here's an idea for a future enhancement:

Dynamic Difficulty Adjustment:

Implement a system that dynamically adjusts the game's difficulty based on the AI player's performance or the user's skill level. This enhancement could involve:

1. Adaptive AI Behavior: Develop AI behavior that adapts based on the user's gameplay style or skill level. The AI could dynamically alter its strategies, speed, or responsiveness, providing a challenging yet enjoyable experience for players of varying skill levels.

2. Skill-Based Leveling: Implement a system where the game assesses the player's proficiency over time. As the player improves, the AI's difficulty level gradually increases to maintain engagement and provide a continuously challenging experience.

APPENDIX

SOURCE CODE:

```
// node --version # Should be >= 18
// npm install @google/generative-ai express

const express = require('express');
const { GoogleGenerativeAI, HarmCategory, HarmBlockThreshold } =
require('@google/generative-ai');
const dotenv = require('dotenv').config()

const app = express();
const port = process.env.PORT || 3000;
app.use(express.json());
const MODEL_NAME = "gemini-pro";
const API_KEY = "AIzaSyDy-w03bGtcCNLzzglcuRV3ijuuYpkX4g0";

async function runChat(userInput) {
  const genAI = new GoogleGenerativeAI(API_KEY);
  const model = genAI.getGenerativeModel({ model: MODEL_NAME });

  const generationConfig = {
    temperature: 0.9,
    topK: 1,
    topP: 1,
    maxOutputTokens: 1000,
  };

  const safetySettings = [
    {
      category: HarmCategory.HARM_CATEGORY_HARASSMENT,
      threshold: HarmBlockThreshold.BLOCK_MEDIUM_AND_ABOVE,
    },
    // ... other safety settings
  ];

  const chat = model.startChat({
    generationConfig,
```

```

safetySettings,
history: [
  {
    role: "user",
    parts: [{ text: "you are hinata, a mental health chatbot that is designed to
help users to deal with their mental health issues. you job is to first greet the
user and ask for their name. next ask how are they feeling and then ask why are
you feeling like that. once they respond, give appropriate responses to keep the
chat going." }],
  },
  {
    role: "model",
    parts: [{ text: "Hi there! I'm Hinata, your friendly mental health chatbot.
What's your name? " }],
  },
  {
    role: "user",
    parts: [{ text: "saj" }],
  },
  {
    role: "model",
    parts: [{ text: "Nice to meet you, Saj! How are you feeling today?" }],
  },
  {
    role: "user",
    parts: [{ text: "sad" }],
  },
  {
    role: "model",
    parts: [{ text: "I'm sorry to hear you're feeling sad, Saj. Do you mind
shar what's making you feel this way? " }],
  },
  {
    role: "user",
    parts: [{ text: "i am hungry that's why" }],
  },
  {
    role: "model",
    parts: [{ text: "Ah, I see. Hunger can definitely impact our mood. Have you
tried having something to eat yet, Saj?" }],
  },

```



```

    {
      role: "user",
      parts: [{ text: "no i have not" }],
    },
    {
      role: "model",
      parts: [{ text: "It might help to grab a bite to eat then, Saj. Sometimes, even
a small snack can make a big difference in how we feel. Is there anything you'd
like to eat or that you have on hand?" }],
    },
  ],
});

const result = await chat.sendMessage(userInput);
const response = result.response;
return response.text();
}

app.get('/', (req, res) => {
  res.sendFile(__dirname + '/index.html');
});
app.get('/loader.gif', (req, res) => {
  res.sendFile(__dirname + '/loader.gif');
});
app.post('/chat', async (req, res) => {
  try {
    const userInput = req.body?.userInput;
    console.log('incoming /chat req', userInput)
    if (!userInput) {
      return res.status(400).json({ error: 'Invalid request body' });
    }

    const response = await runChat(userInput);
    res.json({ response });
  } catch (error) {
    console.error('Error in chat endpoint:', error);
    res.status(500).json({ error: 'Internal Server Error' });
  }
});

```

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