Jarvie: AI-Driven Mental Health Companion

PROJECT SYNOPSIS

BACHELOR OF ENGINEERING

Artificial Intelligence and Data Science

SUBMITTED BY

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1. Title of the Project

Jarvie : AI-Driven Mental Health Companion

2. Domain

Web development with Artificial Intelligence and Machine Learning

3. Keywords

AI (Artificial Intelligence), Mental Health, Natural Language Processing (NLP), Machine Learning, Chatbot, Mental health Companion, Sentiment Analysis, Human-Computer Interaction, Emotional Intelligence, Conversational AI, and Generative AI.

4. Team

Group Id: 14

Team Members:

Sr. No	Name	Roll No.	Role	Contact No.
1.	Pratik Deepak Bandpatte	24129	Team Leader	7666592010
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5. Literature Survey

Sr. No.	Paper Details	Problem Discussion	Algorithm /Technique used	Parameter Consider	Result
1	Sakhi: AI-Generated Mental Health Companion aims to provide AI-driven mental health support	The paper addresses the lack of scalable solutions for mental health issues, proposing an AI chatbot	Random Forest and Gradient Boosting Classifiers were used for mental health data analysis	Factors like age, gender, habits, and work changes were analyzed to assess mental health	The Random Forest model achieved 36.87% accuracy, while Gradient Boosting achieved 33.13%
2	Chatbot for Mental Well-being	The project aims to create a 24/7 generative chatbot for emotional expression and stress relief, enabling users to track their mood over time.	It employs an SVM classifier for mood detection and a Seq2Seq model with RNNs for generating responses based on tokenized input.	The system uses user mood from the SVM classifier and tokenized input vectors, with an attention mechanism to improve response generation.	The Seq2Seq model achieved 96.53% accuracy and 90.69% validation accuracy after 30 epochs, providing a user-friendly interface for mood classification and response generation.

3	Artificial Intelligence-Based Chatbot For Mental Health	Depression affects 264 million people globally, with high stress and anxiety in those aged 15-29, often leading to unresolved mental health issues..	The AI chatbot uses machine learning and NLP, including sentiment analysis and entity recognition, to interact with users and provide advice.	It evaluates users' mental health through targeted questions to tailor responses to their needs.	Chatbots like Woebot, Wysa, and Joy show promise in offering emotional support and resources, improving access to mental health care.
4	A Mental Health and Well-Being Chatbot: User Event Log Analysis	The study analyzes user interactions with a chatbot designed for mental health support, focusing on understanding user engagement patterns and retention over time. It identifies different user types based on their interaction frequency and duration of use.	The k-means clustering algorithm was employed to categorize users into distinct groups based on their behavioral usage of the chatbot. Principal component analysis was also utilized to visualize the clustering results and reduce the dimensionality of the data.	Key parameters for clustering included the number of unique days users accessed the chatbot, tenure (the duration from first to last use), mood logs completed, conversations accessed, and total interactions with the chatbot.	The analysis identified three user clusters: "abandoning users" (81.7%), "frequent transient users" (2.2%), and "sporadic users" (16.1%), with abandoning users displaying the lowest engagement.

6. <u>Objective</u>

- ➤ To Create a Conversational AI for Mental Health Support
- ➤ To Enhance Personalization and User Engagement
- ➤ To Facilitate Access to Mental Health Resources
- ➤ To Ensure Privacy and Ethical Use of Data

7. <u>Scope</u>

- ➤ The scope of this project is to create an AI-driven mental health companion designed to offer personalized emotional support and relevant resources to users.
- ➤ The initiative focuses on improving accessibility to mental health resources and providing guidance, without substituting professional mental health services.

8. <u>Problem Statement</u>

- ➤ Despite increasing awareness of mental health issues, many people encounter barriers to accessing timely and personalized support due to limitations in traditional services. This project aims to address these challenges by developing an AI-powered mental health companion that uses advanced natural language processing to offer real-time and empathetic support, thereby improving access to mental health support and enhancing overall well-being.
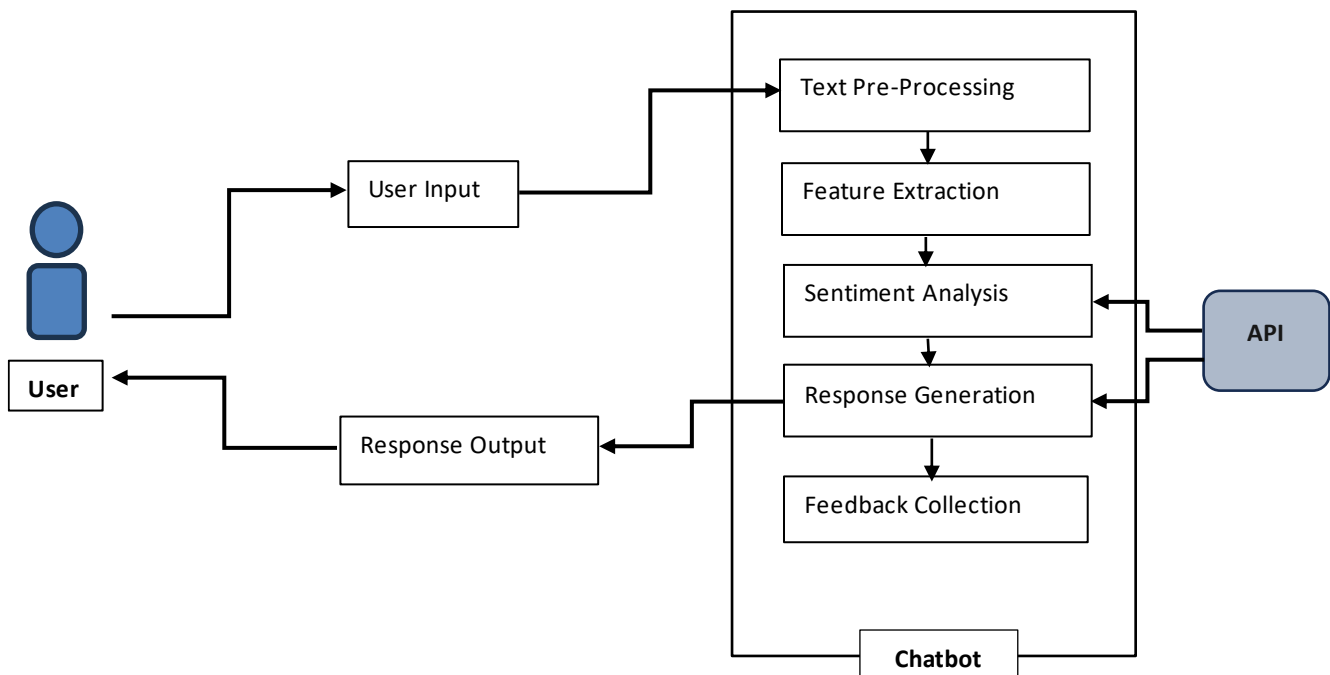
9. <u>System Architecture:</u>

Fig 1.System Architecture Diagram

1. **Speech Recognition:**

   Depending on how the chatbot is set up, we use off-the-shelf algorithms that transcribe user input into natural text. For text-based chatbots, this step would be excluded.

2. **Natural Language Understanding:**

   This step aims to process the user input using natural language processing. In a nutshell, the system tries to grasp the user's intent and emotional state (sentiment analysis). The software also tries to extract various entities (parameters/attributes) relating to the user's input.

3. **Dialogue and Task Manager:**

   This module tries to control the flow of dialogue. This is based on the different pieces of information that are stored throughout the conversation. In other words, the dialogue manager develops a strategy (or rules) to effectively navigate the dialogue based on user input information and the overall context.

4. **Natural Language Generation:**

   The dialog manager decides how to respond to the user, and the natural language generation module creates a response in a human-friendly format. Responses can be predefined or have a more free form.

5. **Text-to-Speech Synthesis:**

   As an optional step, the speech synthesis module converts the text back to speech so the user can hear it.

10. <u>Technical Details</u>

- **Software Requirements:**
  - ➢ Windows/Ubuntu OS
  - ➢ Python3 and suitable IDE
  - ➢ Flask/ Django, Required Libraries
  - ➢ MySQL/ SQLite

- **Hardware Requirements:**
  - ➢ i5 Processor
  - ➢ 256 SSD/1TB HDD
  - ➢ 8GB RAM
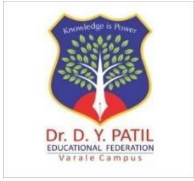 - ➢ GPU 4GB VRAM with CUDA support.

11. <u>Probable Date of Completion:</u>

March 2025

12. References

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