Jarvie: AI-Driven Mental Health Companion

Pratik Bandpatte[1], Neha Medar[2], Devesh Mahajan[3], Vishal Wagh[4], Mrs. Mayuri Fegade[5]

[1-4]U.G. Student, Department of Artificial Intelligence and Data Science, DYPCOEI, Varale,Maharashtra, India
[5]Assistant Professor, Department of Artificial Intelligence and Data Science, DYPCOEI, Varale, Maharashtra, India

Peer Review Information	Abstract
	With the increasing incidence of mental health challenges, individuals often face limitations in receiving timely and effective care due to stigma, lack of resources, or professional support. This paper introduces "Jarvie," an AI- powered Mental Health Companion designed to provide real-time, empathetic, and personalized emotional assistance. Utilizing advanced Natural Language Processing (NLP), machine learning models, and sentiment analysis, Jarvie interacts meaningfully with users, suggests coping strategies, tracks mood variations, and offers contextually relevant mental health resources. The system continuously adapts through user interactions, providing a scalable solution to supplement traditional mental health services.

INTRODUCTION

Mental health disorders represent a growing concern worldwide, significantly affecting the emotional, social, and professional lives of individuals. The World Health Organization (WHO) reports that one in eight people globally are living with a mental health condition, underscoring the urgency of addressing this crisis. However, millions of individuals still face significant barriers when seeking mental health support, including social stigma, high treatment costs, and a shortage of licensed professionals.

These obstacles have led to delays in intervention and worsening conditions in many cases. With the rapid advancement of artificial intelligence and natural language technologies, there exists a promising opportunity to create scalable, personalized, and empathetic digital tools. This paper presents "Jarvie," an AI-driven mental health companion that provides real-time emotional support using conversational AI techniques. Jarvie leverages Natural Language Processing (NLP), sentiment analysis, and generative AI to deliver contextually sensitive and personalized mental health support.

LITERATURE SURVEY

Several studies and systems have laid the groundwork for the development of AI-driven mental health companions.

1. **Sakhi:** M. Agarwal et al. developed "Sakhi," which focuses on empathetic conversations for emotional support. It uses NLP to analyze text and tailor responses, showing a marked improvement in users' mental states over time.

2. **MOODIFY:** J. Limbachia et al. introduced "MOODIFY," a personalized AI assistant for young adults. The system integrates adaptive learning and sentiment analysis to customize mental health support, increasing engagement through contextual understanding.

3. **Empath.AI:** N. Kallivalappil et al. presented "Empath.AI," a chatbot with a strong emphasis on emotion detection and context-aware responses. It employs affective computing principles and showed success in improving user emotional resilience.

4. **KrishnaVani:** Kumbhar et al. developed "KrishnaVani," a chatbot targeting students facing academic and social stress. It uses cognitive behavioral therapy (CBT) and mindfulness techniques, successfully improving emotional regulation and focus.

5. **General Trends:** Other works, including those by Booth et al. and Sagar et al., highlight the increasing role of chatbot-based therapy in replacing or augmenting traditional therapy, especially in remote or under-resourced environments. These studies validate the efficiency, adaptability, and cost-effectiveness of AI companions.

METHODOLOGY

1. **Data Collection & Preprocessing:** User data is gathered through chat-based interfaces. Inputs are cleansed by removing noise, correcting spelling, and applying NLP, techniques like tokenization and lemmatization. External APIs from OpenAI or Hugging Face are employed for contextual language understanding.

2. **Sentiment Analysis:** Sentiment detection is central to emotional understanding. APIs analyze user inputs and classify them as positive, negative, or neutral. This classification directly influences the tone and intent of the response.

3. **Model Integration & Architecture:** The system integrates pretrained models such as GPT for conversation generation and BERT for classification. Django is used for backend processing and React for frontend interaction. The system architecture supports RESTful API calls between modules.

4. **Personalization Engine:** User-specific patterns such as frequently discussed topics, recurring emotional states, and coping styles are logged. This enables Jarvie to tailor responses uniquely for each user across sessions.

5. **Real-Time Interaction Design:** A user-friendly, intuitive UI captures inputs, displays chatbot responses, and offers additional resources like breathing exercises, motivational content, or therapy suggestions.

6. **Feedback Loop & Continuous Learning:** The system collects feedback in the form of user ratings and textual comments. This information is used to update response strategies, refine model accuracy, and reduce bias in replies.

7. **Deployment & Scalability:** Cloud platforms like AWS and Azure are considered for deployment. The system ensures data security, supports session management, and enables load balancing for high user volumes.

ALGORITHM

1. **Input Acquisition:**
   - User submits message via web interface.
2. **Text Preprocessing:**
   - Tokenize, normalize, and lemmatize the message.
3. **Sentiment Analysis:**
   - Classify input as positive, neutral, or negative using sentiment analysis API.
4. **Intent Recognition:**
   - Identify intent (e.g., stress, anxiety, loneliness) using keyword mapping and transformer models.
5. **Contextual Response Generation:**
   - Based on sentiment and intent, generate response via GPT-API.
6. **Feedback Logging:**
   - Collect feedback for ongoing optimization.
7. **Response Delivery:**
   - Display personalized empathetic reply via UI.
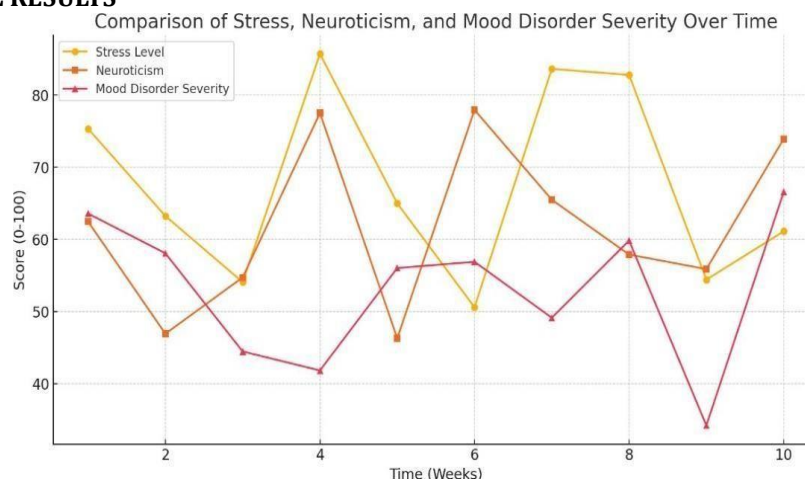
EXPERIMENTAL RESULTS
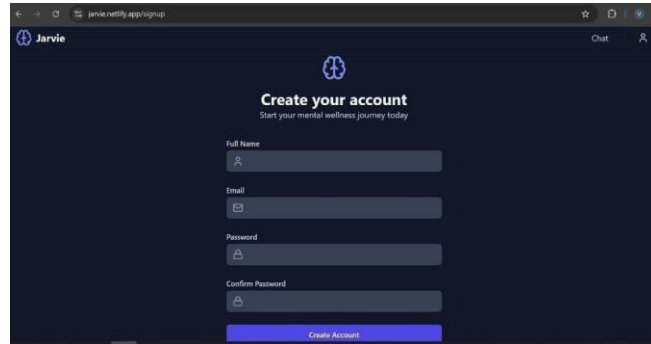

Fig. 1. Comparision Diagram
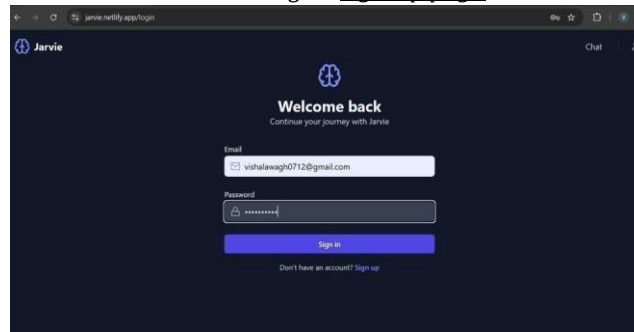
Fig. 2. Sign-up page
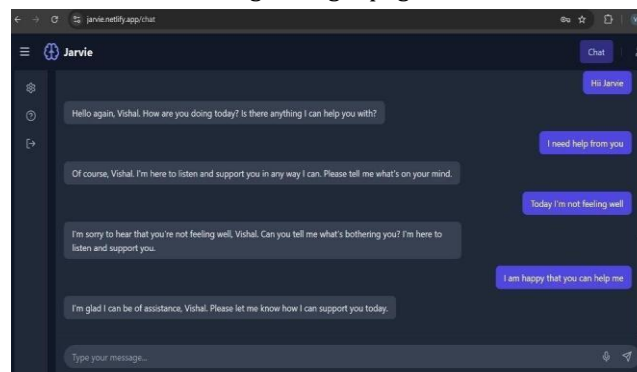

Fig..3. Login page
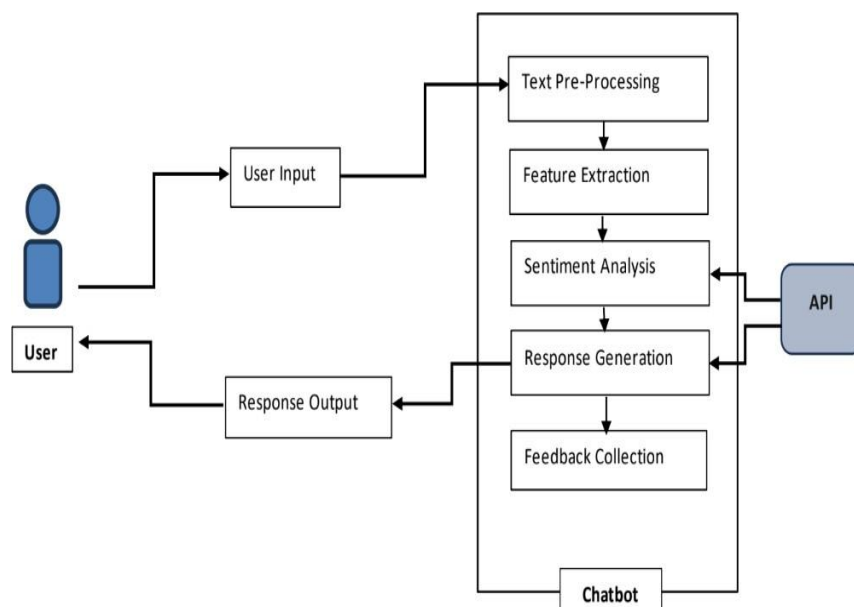

Fig. 4. Responding page

SYSTEM ARCHITECTURE

Fig. 5. Architecture Diagram

CONCLUSION

Jarvie exemplifies the integration of AI and emotional intelligence to create a responsive and scalable mental health solution. By combining sentiment analysis, contextual AI models, and real-time engagement through an accessible platform, it bridges a critical gap in mental healthcare. Jarvie offers users a private, always-available, and empathetic support system, empowering them to manage their mental well-being more effectively. It not only complements existing mental health infrastructure but also paves the way for future innovations in AI-driven emotional support.

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