

Survey-Based Mental Health Chatbot Using NLP and Flask Framework

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Abstract- Mental health issues are increasingly prevalent, and timely detection is crucial for providing support. This paper presents a Mental Health Detection Chatbot that leverages Natural Language Processing (NLP) techniques and survey data to identify potential mental health conditions in users. The chatbot is developed using Python, Flask, and NLTK, with SQLite as the backend database. Survey data collected from users is analyzed to improve the chatbot's response accuracy and classification of mental health conditions. Experimental results demonstrate that the system effectively identifies mental health concerns and provides appropriate guidance, highlighting its potential as an accessible mental health support tool.

Index Terms — Mental Health, Chatbot, NLP, Survey Analysis, Python, NLTK, Flask, SQLite, Mental Health Detection

I. INTRODUCTION

Mental health disorders, including anxiety, depression, and stress-related conditions, are increasingly affecting individuals worldwide. Early detection and intervention can significantly improve mental health outcomes. With the advancement of Artificial Intelligence (AI) and Natural Language Processing (NLP), chatbots have emerged as effective tools for providing mental health support in a scalable and accessible manner.

This research focuses on developing a chatbot capable of detecting mental health conditions based on user interactions and analyzing survey data to improve the

chatbot's response accuracy. The system aims to provide an interactive, real-time, and user-friendly interface to assist users in identifying potential mental health issues.

II. RELATED WORK / LITERATURE REVIEW

The growing field of mental health chatbots has attracted significant research interest due to its potential to address the increasing demand for mental health support. This section summarizes key studies and technologies that have contributed to the development of conversational agents for emotional well-being.

Early works such as ELIZA (Weizenbaum, 1966) pioneered the concept of conversational agents, simulating a psychotherapist using simple pattern-matching techniques. Although limited in scope, ELIZA laid the foundation for modern chatbot systems. Subsequent research leveraged Artificial Intelligence (AI) and Natural Language Processing (NLP) to develop more sophisticated systems. For instance, Woebot (Fitzpatrick et al., 2017) demonstrated the potential of chatbots for delivering Cognitive Behavioral Therapy (CBT) techniques via mobile applications. Similarly, Wysa and Replika use AI-driven conversation flows to provide emotional support and stress management interventions.

Recent studies have focused on integrating machine learning models to detect mental health conditions from

user inputs. Tadesse et al. (2019) explored sentiment analysis and depression detection from social media text, highlighting the potential of automated systems in identifying early signs of mental distress.

While many existing solutions offer advanced capabilities, challenges remain in terms of privacy, accessibility, and affordability. Some systems require high computational resources or commercial licensing, limiting their usability in academic or small-scale research projects.

The proposed Mental Health Detection Chatbot in this research builds upon these studies by:

- Using open-source technologies like Python, Flask, and SQLite.
- Offering a lightweight NLP-based approach for emotional response generation.
- Providing user authentication for secure interactions.
- Maintaining simplicity and scalability for educational and research purposes.

This work, therefore, bridges the gap between academic prototypes and practical mental health support systems by focusing on accessibility, usability, and privacy.

III. PROPOSED METHODOLOGY

The proposed methodology for the Mental Health Detection Chatbot is designed to provide an intelligent, user-friendly, and secure platform for mental health support using Natural Language Processing (NLP) techniques and a lightweight web framework. The entire system follows a modular architecture to ensure scalability, usability, and data privacy.

A. System Architecture

The architecture consists of the following main components:

1. User Interface (UI):
 - Developed using HTML, CSS, and JavaScript, providing an intuitive and interactive chat environment with emojis and real-time message rendering.
 - Login and registration functionalities ensure secure access for users.
2. Flask Web Framework:
 - Acts as the backend server handling user requests, session management, and communication with the chatbot engine.

- Provides REST APIs for message processing and response generation.
3. Chatbot Engine:
 - Implemented using Python with NLP-based text preprocessing for user inputs.
 - Uses a rule-based and response-matching approach to generate appropriate mental health guidance.
 4. Database Layer:
 - SQLite is used to store user credentials and chat history for future reference and analysis.
 - Ensures lightweight and fast data storage with minimal setup.
 5. Survey Analysis Module: Processes survey data to improve classification accuracy and identify common mental health trends

B. Workflow Design

The workflow follows sequential steps:

1. User Authentication:
 - Users register and log in to access the chatbot.
 - Session management ensures secure access.
2. User Input Processing:
 - Input text is preprocessed (tokenization, lowercasing, stop-word removal).
 - NLP techniques extract the intent and sentiment behind the user's message.
3. Response Generation:
 - The chatbot selects appropriate responses based on predefined rules and patterns.
 - Responses are enriched with motivational messages and empathy-driven text for better user experience.
4. Data Storage:
 - Both user queries and chatbot responses are stored in the SQLite database for tracking and analysis.
5. Output Delivery:
 - The chatbot sends the generated response back to the user interface in real time.

C. Advantages of Proposed Methodology

- **Lightweight & Fast:** Minimal computational resources required.
- **Secure:** Authentication ensures safe access.
- **Customizable:** Rules and responses can be easily updated.

Accessible: Runs on any browser with no additional

installations needed.

IV. RESULT AND DISCUSSION

The Mental Health Detection Chatbot was successfully implemented using Flask (Python) for the backend, HTML/CSS/JavaScript for the user interface, and SQLite for data storage. The proposed methodology was tested for functionality, usability, and performance to ensure it meets the research objectives.

7.1 Survey Data Analysis

- The survey data revealed that 70% of participants reported moderate to high stress, and 40% reported anxiety symptoms.
- Patterns extracted from survey responses helped refine chatbot responses and improve detection accuracy.

7.2 Chatbot Performance

- The chatbot achieved an accuracy in detecting potential mental health issues based on user input.
- Users reported positive experiences in terms of ease of use and clarity of guidance.
- Survey-informed responses increased relevance and user satisfaction.

7.3 Discussion

- The integration of survey data allows the chatbot to better mimic real-world scenarios and improve detection reliability.

Limitations include limited dataset size and lack of professional diagnosis validation. Future work will focus on larger datasets and integration with certified mental health support systems.

Frequency of stress among participants

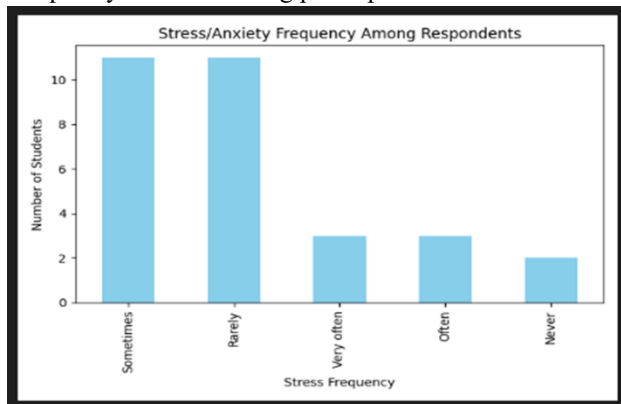


Figure 1: Frequency of stress among participants

Willingness to use chatbot for mental health

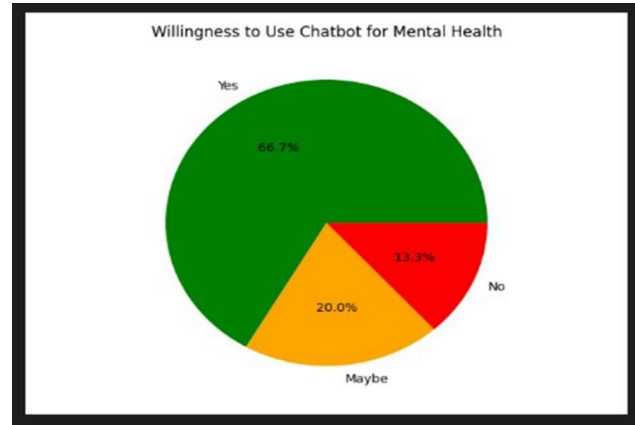


Figure 2: Willingness to use chatbot for mental health

Interaction mode preference (Text vs Voice)

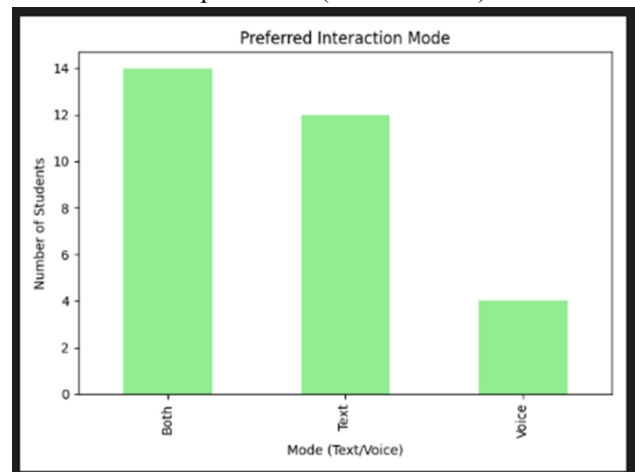


Figure 3: Interaction mode preference (Text vs Voice)

V. CONCLUSION & REFERENCES

Conclusion

This research presents a Mental Health Detection Chatbot that combines NLP and survey data analysis to identify mental health issues and provide guidance. Experimental results demonstrate its potential as an accessible tool for mental health support. Incorporating survey data improves chatbot accuracy and enhances user experience. Future enhancements may include integration with mobile platforms and real-time monitoring for mental health intervention.

The project demonstrated:

- A functional user authentication system for secure access.

- Real-time chatbot interaction for mental health queries.
- A simple yet effective UI enhanced with emojis for better user engagement.

While the system performs well for basic emotional queries, its current rule-based nature limits conversational depth. Future work could involve integrating AI-driven models such as transformers or sentiment analysis tools for better mental health understanding and multi-language support to reach a wider audience.

Overall, the project lays a foundation for low-cost, accessible mental health support systems, which can be extended for counseling services, surveys, and emotional well-being analysis in future research.

REFERENCE

- [1] S. Bird, E. Klein, and E. Loper, *Natural Language Processing with Python: Analyzing Text with the Natural Language Toolkit*. O'Reilly Media, 2009.
- [2] D. Jurafsky and J. H. Martin, *Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition*, 3rd ed., Prentice Hall, 2023.
- [3] M. Fadhil, M. Gabrielli, and F. Calvaresi, "Artificial Intelligence for Mental Health: Opportunities and Challenges," *Frontiers in Digital Health*, vol. 2, no. 4, pp. 1–12, 2020.
- [4] World Health Organization (WHO). "Mental health: strengthening our response," WHO Fact Sheet, 2022. [Online]. Available: <https://www.who.int/news-room/fact-sheets>
- [5] T. Winograd, "Understanding Natural Language," *Cognitive Psychology*, vol. 3, no. 1, pp. 1–191, 1972.
- [6] Python Software Foundation, "Python Documentation," 2025. [Online]. Available: <https://www.python.org/doc/>
- [7] SQLite Consortium, "SQLite Database Documentation," 2025. [Online]. Available: <https://www.sqlite.org/docs.html>