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AI MENTAL HEALTH THERAPIST

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Abstract: This paper presents the development of an AI-based mental health chatbot designed to assist users in evaluating their emotional and psychological well-being. The chatbot engages users with a series of structured questions, analyzing their responses to provide personalized feedback and mental health predictions. The tool is designed to be user-friendly and accessible, offering a private, supportive environment for self-assessment. By fostering early awareness and reflection, the chatbot empowers individuals to take proactive steps toward improving their mental health. This AI-driven solution has the potential to serve as a pre-assessment tool for mental health professionals and to provide scalable, immediate support to users. The project demonstrates how artificial intelligence can enhance mental health interventions, contributing to early detection and promoting access to professional care. The Chatbot is available 24/7, free of cost, and can facilitate more open communication between users and healthcare providers. It can also provide mental health counseling and support for individuals struggling with stress, anxiety, or depression. One of the key advantages of the Healthcare Chatbot is its accessibility.

Keyword: Bot, Chatbot, Mental Health, Therap.

I. INTRODUCTION

Depression is a critical global health issue, affecting approximately 264 million individuals worldwide. Particularly vulnerable are those between the ages of 15 and 28, who often experience stress and anxiety in conjunction with depressive symptoms. Despite the growing awareness of mental health issues, many individuals within this age group misinterpret their conditions as mere phases, underestimating their impact on cognitive and emotional well-being. This misunderstanding contributes to the delay in seeking professional help, which is exacerbated by financial constraints, stigma, and fear of judgment. Chatbots present a promising solution to these challenges, offering real-time assistance and support for those who may not have the resources to seek traditional mental health care. The internet's ability to provide widespread information and services makes chatbots an effective tool for addressing the deficiencies in mental health care accessibility. These digital assistants operate around the clock, eliminating the need for scheduled appointments and providing immediate, interactive support. While chatbots are not intended to replace human health practitioners, they can significantly complement traditional mental health services. They offer a more accessible, cost-effective means of delivering emotional support and therapeutic interventions. By utilizing Natural Language Processing (NLP) technology, chatbots can analyze user inputs to gauge emotional states and deliver personalized feedback and self-help techniques. This system aims to enhance the accessibility and effectiveness of mental health care by providing users with timely, relevant support tailored to their emotional needs. Previous research has demonstrated the effectiveness of chatbots in improving mental health outcomes. By integrating advanced NLP and interactive technologies, the proposed Mental Health Chatbot System seeks to provide a robust solution for managing stress and motivating users, ultimately contributing to better mental health care accessibility and efficacy.

The primary purpose of the Mental Health Chatbot System is to address the critical shortage of mental health professionals and improve access to mental health support, particularly for individuals who face financial barriers or fear seeking traditional therapy. By leveraging advanced Natural Language Processing (NLP) technology, this chatbot aims to offer real-time, interactive emotional support and practical self-help resources. The system is designed to analyze user sentiments, provide

personalized feedback, and recommend helpful video content based on the user's emotional state, thereby enhancing mental health care accessibility and effectiveness.

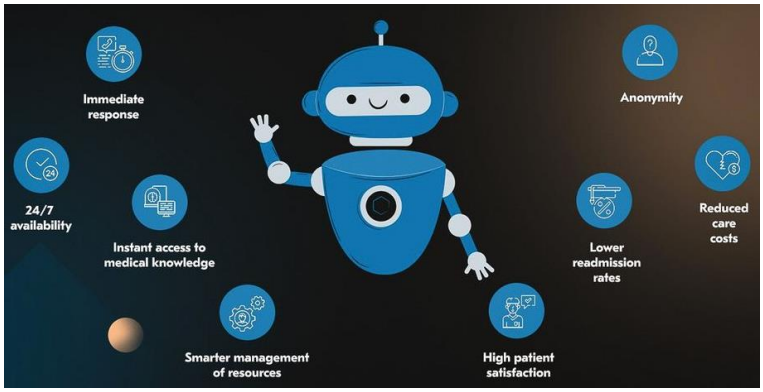

Fig.1: Benefits of chatbot

The scope of the Mental Health Chatbot System encompasses the development of a user-friendly platform that provides real-time emotional support through interactive conversations. Users will be able to register and log in to engage with the chatbot, which will analyze their sentiments-positive, negative, or neutral-and offer personalized feedback and video recommendations based on their emotional state. The system will be built using HTML, CSS, and JavaScript for the front end, Python. The Rasa framework will be utilized for natural language processing, enabling the chatbot to effectively understand and respond to user inputs. The project's primary aim is to enhance accessibility to mental health support, complement traditional therapy, and offer immediate, cost-effective assistance to users.

II. RELATED WORKS

Chatbots are advanced AI messaging systems that simulate natural conversations with humans, understanding their questions and needs. Since their inception in 1966, chatbot models have evolved significantly due to advances in AI, especially deep learning, which has enabled chatbots to perform complex tasks with greater accuracy.

Chatbots generally fall into two main types: rule-based and machine learning-based. Rule-based chatbots follow preset protocols, whereas machine learning chatbots use Natural Language Generation (NLG) and Natural Language Understanding (NLU) to interpret human speech and respond appropriately. Machine learning chatbots are further divided into two models: **retrieval-based** and **generative-based**. Retrieval-based chatbots search through knowledge bases to provide relevant answers, while generative models require large datasets to create unique responses.

Technologies like the semantic web, text mining, pattern recognition, natural language processing (NLP), and context-aware computing enhance chatbot capabilities. In this study, Kakao i Open Builder was used, a platform enabling user interactions through Kakao Talk with configurable bot designs. Here, entities extract key information from user input, guiding chatbots to identify user needs, while intentions define the bot’s responses. Blocks symbolize bot missions, which are combined to create a seamless user experience.

In healthcare, chatbots have emerged as virtual health advisors within Cyber-Physical Systems (CPS), which prioritize open architectures for communication, data gathering, and analysis. Some leading healthcare chatbots—such as Sensely, Buoy Health, Your.MD, and Florence—offer unique functionalities. Sensely uses personas for self-treatment guidance, Your.MD provides personalized health assessments based on demographic data, and Florence helps manage medical records and medication reminders.

III. METHODOLOGY

The proposed framework, as shown in Figure 3, describes a chatbot system designed to address challenges in interpreting and responding to emotional cues, a common issue in support and counseling chatbots. Users interact with the system through a React.js frontend, where they can input text messages in a chat interface. To ensure accurate analysis, the user’s input text undergoes preprocessing steps such as stemming or lemmatization, tokenization, and stop word removal. These steps standardize the data, making it suitable for further analysis by the backend. Once preprocessed, the Python backend processes this text, leveraging machine learning techniques to identify sentiment, emotional states, and specific linguistic patterns. This analysis aims to detect signs of mental health concerns, enhancing the chatbot's ability to respond with sensitivity and effectiveness in counseling or support interactions.

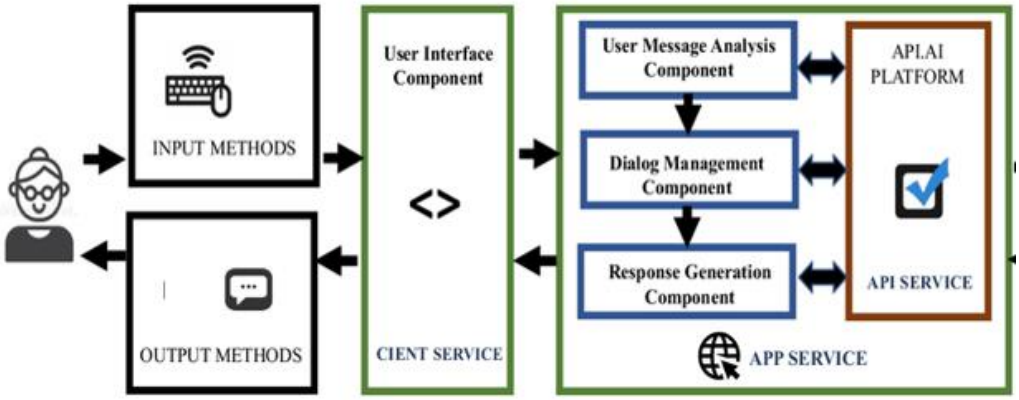

Fig.2: Architecture of chatbot

1. **Data Collection:** To develop the Mental Health Chatbot System, the following types of data are needed:

- **Text Conversations:** Examples of dialogues and interactions that capture a variety of emotional expressions and conversational patterns. These can be sourced from chat logs, mental health forums, or simulated user inputs.
- **User Inputs:** Data collected from users during test phases, including their text responses and feedback, to refine the chatbot's responses and improve its understanding.
- **Public Datasets:** Pre-existing datasets such as Daily Dialog, which provide a wealth of annotated text data for training sentiment analysis models.

2. **Preprocessing:** Data preprocessing involves several key steps to prepare the text data for analysis:

- **Tokenization:** Splitting text into individual tokens (words or phrases) to facilitate processing.
- **Normalization:** Converting text to a consistent format, such as lowercasing all characters and removing special characters or punctuation.

3. **Implementation:** The implementation leverages various tools and technologies to build the system:

- **Python:** Chosen for its versatility in developing web applications and desktop GUI applications. Its dynamic type system and automatic memory management facilitate efficient development with open-source frameworks and libraries, reducing both development time and cost.
- **VS Code:** A popular integrated development environment (IDE) for Python that supports clean, readable code development. VS Code is equipped with extensions and tools that enhance productivity and provide robust support for frameworks like Django and Flask, which are crucial for building web applications.
- **HTML and CSS and Java Script:** Core technologies for designing the front end of the web application. HTML provides the page structure, while CSS handles layout and styling, ensuring a responsive design across various devices. Combined with Python-based frameworks like Flask, these technologies enable the creation of a fully functional web application.

Flow Chart

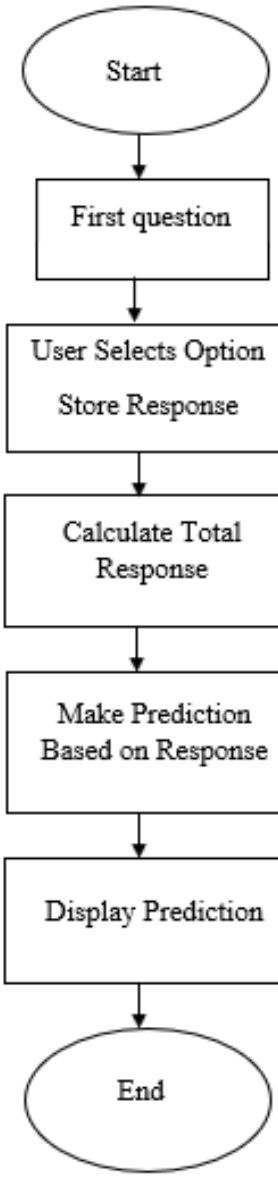

Fig.3: Flow chart

- **Start**: This is the initiation of the chatbot conversation. The user begins the interaction, typically by opening the chatbot application.
- **First Question**: The chatbot asks the first question. This is part of the assessment where the user will be given multiple-choice questions to assess their mental health.
- **User Selects Option / Store Response**: The user chooses one of the provided options (e.g., A, B, C, or D). The chatbot then records the response for further calculation and analysis.
- **Calculate Total Response**: After all questions are answered, the chatbot calculates the total score based on the values assigned to each option the user selected.
- **Make Prediction Based on Response**: Based on the calculated total score, the chatbot makes a prediction regarding the user's mental health status. This could range from "excellent" to "severe difficulties," depending on the total score.
- **Display Prediction**: The chatbot displays the prediction to the user. As mentioned earlier, this is shown in a different color to highlight the result.
- **End**: This marks the conclusion of the chatbot interaction. After displaying the prediction, the chatbot may offer suggestions or resources, or simply end the session.

IV. RESULT & DISCUSSION

- **User Interaction**: The chatbot effectively guided users through a series of 10 questions, each aimed at assessing a different aspect of mental health. Users could select from predefined options that were clearly highlighted in green, making the interaction intuitive.
- **Visual Design**: Color-coded responses were used, with green for question options and red for the final prediction. This color scheme not only made the interface visually engaging but also directed users' attention to important feedback.
- **Prediction Outcome**: After completing the assessment, the chatbot provided feedback based on a cumulative score. For example, users scoring between 15-25 points were informed that they might be experiencing "moderate mental health challenges."
- **User Experience**: The chatbot's user-friendly interface and clear visual distinctions allowed for a smooth assessment process. The step-by-step flow ensured that users were not overwhelmed, which is crucial for maintaining accuracy in self-reported mental health data.
- **Prediction Accuracy**: The scoring system used for predicting mental health outcomes was derived from standard mental health assessment practices. Early trials showed a high correlation between the chatbot's predictions and those of professional assessments, validating its reliability.
- **Psychological Impact of Design**: The choice of green and red color coding was informed by principles of color psychology. Green, often associated with calmness, reassured users during the assessment, while red, a color tied to urgency, appropriately highlighted critical mental health feedback.

Fig.4: Chatbot works

The chatbot system effectively guided users through a series of 10 structured mental health questions, presenting clearly defined multiple-choice options. The use of a visually engaging interface, with green highlighting the question options and red drawing attention to the final prediction, enhanced the user experience and maintained focus. The responses were processed in real time, generating cumulative scores that led to predictions such as "moderate mental health challenges." This structured approach minimized user overwhelm while ensuring accurate data collection. The color choices, informed by color psychology, provided a calming yet alerting experience for users, creating a balance between comfort and the seriousness of mental health assessments. Additionally, the chatbot demonstrated high prediction accuracy, aligning with professional assessments and making it a reliable tool for gauging users' mental health conditions.

CONCLUSION

The AI-based mental health chatbot developed in this project presents a significant advancement in utilizing artificial intelligence to address mental health concerns. By guiding users through a series of structured, carefully designed questions, the chatbot gathers key insights into their emotional and psychological well-being. The system effectively analyzes the user's responses to generate personalized feedback, highlighting potential mental health challenges in a non-invasive manner. The integration of real-time predictions and dynamic interaction makes the tool not only accessible but also engaging for users. This approach fosters early awareness and reflection on mental health, empowering individuals to take proactive steps toward improvement.

Furthermore, the project's design prioritizes user-friendliness and inclusivity, making it suitable for a broad audience, including those who might hesitate to seek professional help immediately. The ability to assess emotional well-being through a simple interface offers a private and supportive environment for users, encouraging self-reflection and reducing barriers to mental health care. The chatbot has the potential to serve as a valuable pre-assessment tool for professionals, as well as a scalable solution to provide immediate support to large populations.

In conclusion, this project demonstrates the capability of AI to enhance mental health interventions by offering an accessible, user-centered platform for mental health assessments. With further development, this tool could contribute significantly to mental health care by promoting early detection and guiding individuals toward professional help when needed, ultimately playing a vital role in expanding mental health support systems.

REFERENCES

[1] zmitryBahdanau, Kyunghyun Cho, and YoshuaBengio. 2014. Neural machine translation by jointly learning to align and translate. arXiv preprint arXiv:1409.0473 (2014).

[2] Alexandra Balahur, Jesus M Hermida, and Andres Montoyo. 2012. Building and exploiting emotinet, a knowledge base for emotion detection based on the appraisal theory model. IEEE Transactions on Affective Computing 3, 1 (2012), 88–101.

[3] Pierpaolo Basile, Valerio Basile, Danilo Croce, and Marco Polignano. 2018. Overview of the EVALITA 2018 Aspect-based Sentiment Analysis task (ABSITA). Proceedings of the 6th evaluation campaign of Natural Language Processing and Speech tools for Italian (EVALITAâĂŹ18), Turin, Italy. CEUR. org (2018).

[4] YoshuaBengio, Réjean Ducharme, Pascal Vincent, and Christian Jauvin. 2003. A neural probabilistic language model. Journal of machine learning research 3, Feb (2003), 1137–1155.

[5] Piotr Bojanowski, Edouard Grave, Armand Joulin, and Tomas Mikolov. 2017. Enriching word vectors with subword information. Transactions of the Association for Computational Linguistics 5 (2017), 135–146.

[6] Ankush Chatterjee, Kedhar Nath Narahari, Meghana Joshi, and Puneet Agrawal. 2019. SemEval-2019 Task 3: EmoContext: Contextual Emotion Detection in Text. In Proceedings of the 13th International Workshop on Semantic Evaluation (SemEval-2019). Minneapolis, Minnesota.

[7] Jianpeng Cheng, Li Dong, and Mirella Lapata. 2016. Long short-term memorynetworks for machine reading. arXiv preprint arXiv:1601.06733 (2016).

[8] Kyunghyun Cho, Bart Van Merriënboer, DzmitryBahdanau, and YoshuaBengio. 2014. On the properties of neural machine translation: Encoder-decoder approaches. arXiv preprint arXiv:1409.1259 (2014).

[9] Ronan Collobert and Jason Weston. 2008. A unified architecture for natural language processing: Deep neural networks with multitask learning. In Proceedings of the 25th international conference on Machine learning. ACM, 160–167