Mental Health Chatbot with Mood Visualization

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Abstract— **Stress, anxiety, depression, and emotional imbalance are measurable trends among the student population and young adults. Even though the understanding of these issues has been raised, still a great number of people reluctant to ask for professional help because of the social stigma, limited accessibility, lack of time, and financial barriers. This paper introduces the design and implementation of a Mental Health Support Chatbot, which offers the initial emotional support through a text-based conversation. The envisaged framework implements a rule-based mood detection method, wherein the user statements are examined with the help of the predetermined keywords and patterns. The chatbot, based on the recognized emotional state, thus, composes the empathetic and encouraging utterances which are generally based on the supportive counseling principles**

Index Terms—**Mental health chatbot, rule-based system, emotion detection, artificial intelligence**

I. INTRODUCTION

Mental health is the main factor that determines an individual's emotional well-being, productivity, and overall quality of life. Though it wasn't as evident before, the mentioned factors such as the pressure of school, the uncertainty of a career, isolation from society, and the rapid changes of lifestyle have caused mental health to become an issue among students and young professionals in the last few years. The occurrence of stress, anxiety, and emotional distress is so common that these problems are often overlooked because the people who suffer from these issues are reluctant to come out due to stigma, fear of judgment, lack of awareness, and limited access to mental health professionals. The progress of AI and web tech has made it possible for people to create conversing interlocutors which thus can provide support that is both immediate and reachable.

Mental health chatbots provide a user with a certain degree of confidentiality, an everlasting availability, and a non-judgmental atmosphere, thus allowing the user to express their feelings more. This article emphasizes the creation and deployment of a chatbot that is able to provide mental health support and at the same time act as the first-level emotional assistance system. The chatbot is a device that helps in the transition from one level to another; i.e., it neither replaces professional therapy nor diminishes its importance. The chatbot, however, is a tool to foster emotional expression, stimulate self-awareness, and eventually, guide users in adopting better coping mechanisms.

II. LITERATURE REVIEW

The rising number of mental health issues has led scientists to consider digital means of providing easy access to emotional support. One such method is the use of conversational agents or chatbots which gained the attention of the researchers. Chatbots in mental health became one of the promising solutions as these programs can simulate human interaction in the text-based manner. Early studies revealed that even simple rule-based chatbots could lead users to express their feelings and contemplate their psychological state.

Many investigations were conducted to find out how mental health chatbots can play a role in emotional support, stress relief, and self-reflection. The researchers discovered that such software is extremely helpful in situations outside the clinic, e.g., in schools, where students might be reluctant to contact the school psychologist because of the stigma or fear of being judged. Using a chatbot, a talking partner is always there and you do not need to disclose your identity, which results in more openness and trust in sharing one's thoughts

and feelings with it. Current research works also emphasize the proficiency of rule-based conversational tools in handling sensitive issues. The main difference between these systems is that rule-based models follow a set of predefined instructions while learning-based models are not transparent and have unpredictable behaviour. This feature is of great importance for such a delicate sphere as mental health, where the unjust or uncontrolled response of the program may lead to users' harm. With the help of a rule-based approach the developers have full control over the content of their chatbots' responses and hence can ensure ethical and supportive interaction. Besides that, there is a stress on the significance of being emotionally aware of one's mood and tracking it in the context of mental health. Services that support individuals in identifying their emotions over time will not only foster self-reflection but also lead to the adoption of healthier coping strategies. By presenting the emotional fluctuations visually, users are empowered to regulate their emotions and also recognize the distress at its earliest stage. The proposed Model, which is informed by the body of research, features a rule-based chatbot system that identifies the user's emotion and generates a comforting reply. The safety, ease, and the non-clinical nature of the academic environment supported by the idea of such a preliminary mental health intervention are the reasons behind this design option.

III. SYSTEM ARCHITECTURE

The chatbot to be developed will have a modular client server architecture to keep it scalable and easy to maintain. The core components of the system are as follows:

1.User Interface: A web interface through which users can communicate with the chatbot by typing their queries.

2.Input Preprocessing Module: The module gets rid of special characters from the user input, changes the text to lowercase, and normalizes the input format.

3.Emotion Detection Module: Detects emotions such as stress, anxiety, sadness, anger, and happiness using a set of predefined keywords.

4.Response Generation Module: Chooses the most appropriate empathetic and supportive response from the ones available to the correspondingly detected emotion.

5.Mood Tracking and Visualization Module: Keeps the records of the user's emotions detected over time and shows the emotional trends through graphical representations.

This modular layout makes it possible for each individual component to be upgraded or extended independently of the rest of the system.
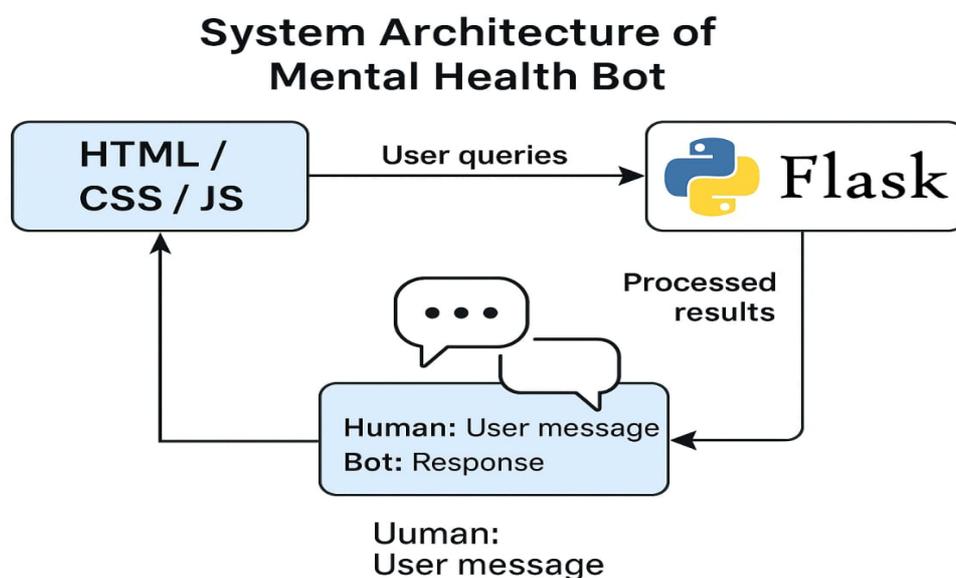

Fig:1 System Architecture

IV. METHODOLOGY

4.1 Requirement Analysis and Data Preparation

The system requirements were determined by looking at the common mental health issues that students might have. The emotional categories and their corresponding keywords were set by analyzing the sample mental health conversations and by referring to the literature. Supportive responses that would be ethically correct, empathetic, and non-intrusive were facilitated.

4.2 Emotion Detection Technique

The chatbot utilises a rule-based mechanism for emotion detection. Some predefined emotional keywords are looked for in user inputs, and the emotional state that is most prominent is figured out by checking the number of times the keywords occur and their relevance. This method guarantees that the behavior is stable and predictable and, at the same time, that there are no unintended responses.

4.3 Response Generation

The chatbot gets the response which is most appropriate to the users emotional state from a predetermined response repository after the detection of the emotion. These are basically general supportive techniques like emotional validation, encouragement, grounding suggestions, and positive reframing, through which the user is made to understand that they have been acknowledged and that they are being supported.

4.4 Implementation Details

The system backend is built with Python and the Flask framework, which is responsible for handling requests and delivering responses. The frontend is built with the help of HTML, CSS, Bootstrap, and JavaScript to make an interactive and user-friendly interface. Emotional data is kept confidential and is used for mood tracking and visualization.
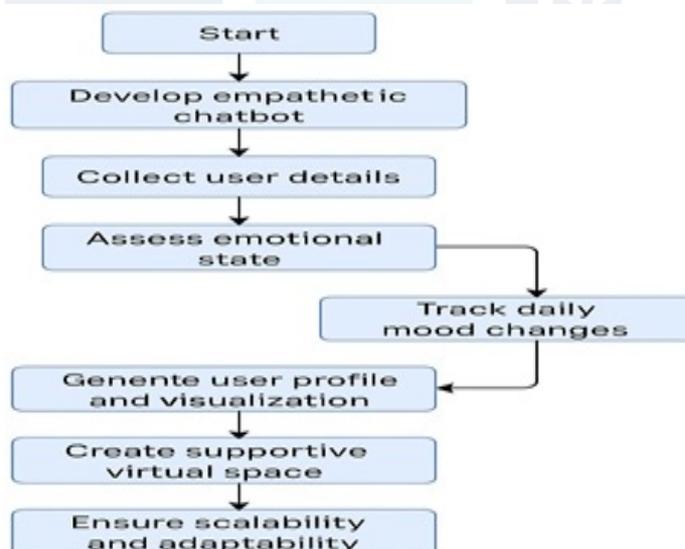

Fig:2 Flow Chart

V. RESULTS

The mental health chatbot, which was developed, underwent an evaluation process through various test inputs that reflected different emotional states that students and young adults might have. The dialogue samples were purposely made to have the characters expressing stress, anxiety, sadness, anger, as well as neutral or positive feelings. The outputs of the system were reviewed considering the correctness of emotion recognition, the appropriateness of the responses, and the general user experience.
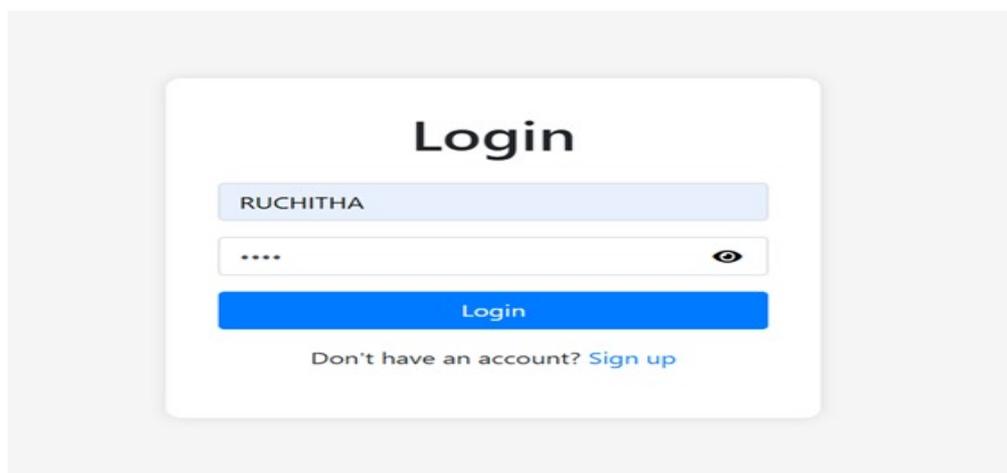
Fig:3 Login Interface

Figure 3 displays a login screen for the planned Mental Health Support Chatbot. This module offers secure user verification as it allows only the registered users to sign in with their username and password. The interface is constructed with a basic and intuitive design that facilitates the users' accessibility and is likely to attract more users. To ensure that user data is protected, password masking is included in the process. On a successful verification, users are directed to the chatbot dashboard where they can have personalized interaction and their activities can be monitored. The present login method is a way of ensuring that access to the system is through certain credentials only, thus, keeping the user's information confidential.
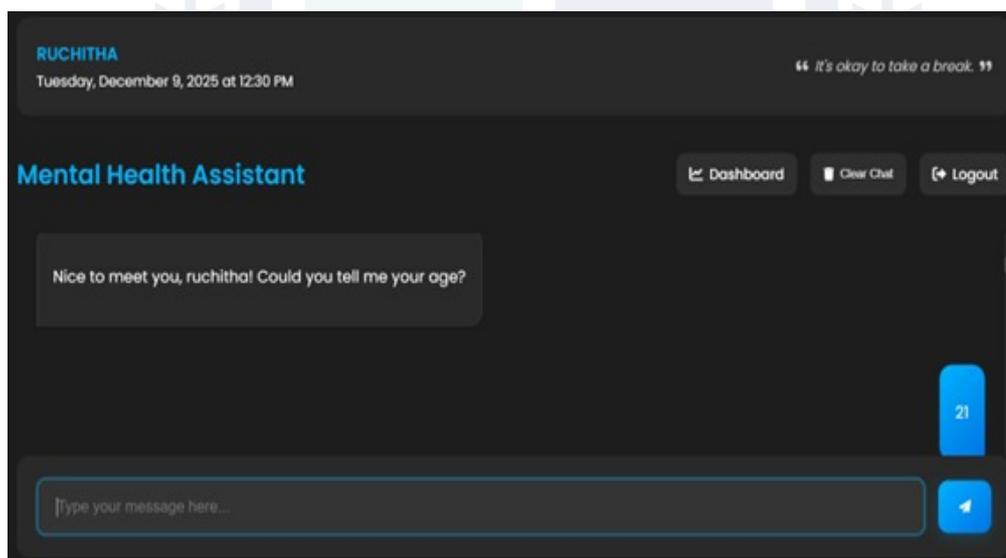

Fig:4 Chatbot Interaction

Figure 4 represents the user interaction interface of the proposed Mental Health Assistant. To begin a personalized conversation, the chatbot greets the user and gathers some basic information to comprehend the interaction's context. The inputs that included explicit emotional keywords like stressed, anxious, overwhelmed, and sad were correctly identified. In a simple text-based manner, users may send their messages, and the system will, without delay, reply with supportive and empathetic statements. Besides these, the dashboard access, chat reset, and logout options are there to improve the usability and user control further. The interface here is an excellent example of the efficient, interactive, and engaging real-time communication of the users within a safe environment.

Fig:5 Mood Analysis Dashboard

Figure 5 shows the mood analysis dashboard created by the proposed Mental Health Support Chatbot. The Mood Trend Over Time chart reflects the users changing emotional state across different sessions, thus, it is an emotional state tracker for the user or the users counselor. The Mood Distribution bar chart indicates the number of times the emotional states of happiness, sadness, neutrality, and depression have been recognized. These graphical tools serve to pinpoint the users emotional ups and downs as well as the most frequent emotions over a certain period of time. The dashboard is a tool that the user can use to become more aware of their own emotional state and to help them judge the correctness of the chatbots emotional support responses.

VI. CONCLUSION AND FUTURE SCOPE

This paper describes the creation of a chatbot that listens to people suffering from mental health issues and offers them morale support through a rule-based approach to emotion detection. The system delivers convenient, morally acceptable, and empathetic emotional relief by means of conversational interaction and mood tracking. Due to its modesty and openness, it is appropriate as a first-level mental health care tool in a pedagogical and non-clinical setting. The design and implementation of a Mental Health Support Chatbot that provides easy and immediate emotional support is described. The system proposed in this study utilizes a rule-based method to examine user statements and detect emotional states so that it can respond with the most suitable supportive remarks within seconds. A secure authentication system, a user-friendly chatting interface, and a graphical mood analysis dashboard are all integrated to demonstrate the system's effectiveness in increasing user engagement and emotional awareness. The findings demonstrate that the chatbot is capable of being a helpful tool for preliminary mental health intervention and stress management. Work planned for later may involve improving emotion recognition precision, adding multilingual options, allowing voice interaction, creating a mobile app, and linking up with professional mental health resources for additional help. Included is the improvement of emotion recognition accuracy through the use of machine learning-based classification methods. The system may become multilingual and voice-interactive to a diverse user base to be more accessible. Personalized mood tracking and long-term mental health analytics could be implemented to provide more profound insights into user well-being. Besides, collaborating with expert mental health helplines and launching as a mobile app will increase the feasibility, outreach, and real-life effect of the suggested system.

VII. REFERENCES

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