MentalHealthBot: A Personalized AI-Powered Chatbot for Mental Health Support

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ABSTRACT

This paper is about a personalised AI-powered chatbot for mental health support that uses natural language processing techniques by leveraging Python Django and sentimental analysis through the NLTK library. This is a user-friendly platform that has user and doctor registration, and also it has some resources like a diary section, an online forum and a chatbot for mental health queries and personalised support. Also, its platform has a section for English and mathematics skill tests that evaluate the user's mental health condition level, either risk or no risk level. After the covid-19 pandemic period, many people suffered from mental health issues. By solving the condition, the chatbot and its services support the people more efficiently. Therefore this paper aims to give the people a positive impact for struggling with mental health issues and promoting timely interventions and improved mental well-being.

Keywords: Mental health chatbot; Natural language processing; Python Django; AI-powered chatbot; Digital mental health support.

1. INTRODUCTION

In today's world, the mental health disorders are increasing daily due to anxiety, depression and other mental health disorders. After the covid-19 pandemic, the services of mental health support are highly needed for people. The traditional mental health services have limited accessibility, long waiting periods, and social stigma, making it difficult for individuals to seek timely help.Nowadays, the use of artificial intelligence and natural language processing is highly demanded for mental health concerns. The help of AI chat helps the people to give support for mental health issues. This chatbot helps the people to share their concerns as well as gives them a safe and anonymous space to access the relevant resources.

The paper aims to develop the AI-powered platform by using Python-Django, leveraging natural language processing techniques and sentimental analysis through the NLTK library. This is a user-friendly platform that has user and doctor registration, and also it has some resources like a diary section, an online forum and a chatbot for mental health queries and personalised support. Furthermore, its platform has a section for English and mathematics skill tests that evaluate the user's mental health condition level, either risk or no risk level.

The development of this platform is highly motivated by the needs of the people due to their mental health conditions. Its platform to give support and doctor advice helps the people to return back to their normal, stress-free lives.

The World Health Organisation (WHO) emphasises the need for accessible and supportive mental health services due to the importance of mental health in recent years. However, traditional mental health services have limited accessibility, long waiting periods, and social stigma, making it difficult for individuals to seek timely help.

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Therefore, this AI-powered chatbot helps to address these challenges. This chatbot aims to give the people a positive impact for struggling with mental health issues and promoting timely interventions and improved mental well-being. Several studies have proved that chatbots help with mental health concerns. However, there is a need for further research and development to create comprehensive and accessible platforms that can provide personalised support and resources to individuals struggling with mental health issues.
However, this is an AI-powered platform using Python-Django, leveraging natural language processing techniques and sentimental analysis through the NLTK library. Also, the user-friendly platform has user and doctor registration, and also it has some resources like a diary section, an online forum and a chatbot for mental health queries and personalised support.

2. LITERATURE REVIEW

The development of chatbots has increased globally in recent years due to the need for accessible, scalable, and effective mental health support systems. Studies have shown that AI-driven chatbots can use NLP and sentiment analysis for identifying emotional distress, providing real-time support, and offering guidance on mental well-being.
Sumit Pandey et al. [1] developed a mental health chatbot called "Ted the Therapist" using NLP and deep learning approaches. The advantages of the paper are to provide personalised support and therapy to users and demonstrate improved user engagement, emotional understanding and therapy outcome prediction capabilities. The disadvantages of the paper are limited accessibility and personalisation and inadequate integration of AI-powered support and healthcare professionals.
Akbobek Abilkaiyrkyzy et al. [2] proposed a dialogue system for early mental illness detection using a digital twin solution. The paper is developed by using natural language processing, machine learning and deep learning techniques. The advantages of the paper are the development of a dialogue system for early mental illness detection and integration with digital twin technology for personalised mental health support.
J. Aina et al. [3] developed a hybrid learning architecture for mental disorder detection using emotion recognition. The paper uses deep learning techniques. The advantage of the paper is proposing a novel hybrid learning architecture and emotion recognition-based mental disorder detection. The disadvantages of the paper are limited accuracy and robustness and lack of hybrid learning architectures for multimodal analysis.
T. Saha et al. [4] proposed a method for mental health disorder identification from motivational conversations. The architecture is developed by using machine learning techniques. The advantages of the paper are its novel approach to mental health disorder identification and the development of a virtual agent for mental health support. The disadvantages of the paper are only having text-based interactions and a lack of human expertise.
R. A. Rahman et al. [5] conducted a systematic review of machine learning methods in mental health detection. The development of the system is using machine learning techniques. The advantage of the paper studies is a systematic review of machine learning methods for mental health detection, highlighting strengths and limitations and identifying relevant features and effective algorithms for mental health detection.
However, the mental health chatbot using the NLTK concept contributes to the existing research on mental health chatbots by providing a unique approach to mental health support using NLP techniques.

3. IMPLEMENTATIONS

The mental health chatbot is developed to provide a comprehensive and accessible platform for mental health support and resources. This AI-powered platform uses Python-Django, leveraging natural language processing techniques and sentimental analysis through the NLTK library. It has a user and doctor registration that has some details of name, email and password to be used for sign-up. Using encryption, the login data should be secure and protected.

3.1 User Dashboard

After logging user can see the dashboard for further features like

- Doctor Directory: The user is able to view the details of doctor information and their contact details.
- Messaging System: The user is able to message the particular doctors for advice only after booking that doctor for consultation.
- Booking System: It helps the users to take appointments for consultation. Consultation only happens if the booking is approved for that particular doctor. Doctor can approve or reject those bookings.
- Diary Section: The user is able to keep a diary for day-to-day activities, feelings and thoughts for reference.
- Online forum: The user can use the online forum to note down their day-to-day activities and improvements.
- Chatbot: It is the platform for users to be able to ask their mental health queries and doubts to, like, an AI chat. The chatbot helps to provide only mental health-related doubts and advice. The chatbot is trained by using the Kaggle dataset for ensuring accuracy and effectiveness.
- Test and Results: Users can take English proficiency and mathematics skill tests, which are evaluated by teachers or parents. The result is based on the user condition for assessing the test , which is no risk or have risk.

3.2 Doctor Dashboard

Doctors have their own dashboard, providing features such as:

- Booking: Doctors can view and manage bookings, approving or rejecting the user appointments.
- Messaging: The doctor can give replies to the user queries and advice.
- User Information: Doctors can view user information and also their mental health history.

3.3 Admin Dashboard

The admin dashboard provides some features like:

- User Management: Admin able to view and manage their user accounts, registration and login information.
- Doctor Management: Admin able to view and manage doctor accounts, registration and login information.
- System Settings: Admins can configure system settings and chatbot processes.

Therefore, the mental health chatbot provides a comprehensive and accessible platform for mental health support and resources.

4. DATASETS

The mental health chatbot utilizes various datasets to train and evaluate the chatbot's natural language processing and sentimental analysis capabilities. A dataset plays an important role in developing for any platform. In this paper, to develop the mental health chatbot by using the dataset called Kaggle.

- *Kaggle Datasets*

Kaggle offers a vast array of mental health, natural language processing, and emotive analysis-related data sets.
The primary datasets used in this chatbot are:
i. Mental Health Dataset: This dataset contains survey responses from individuals discussing their mental health. It provides valuable insights into mental health conditions, symptoms, and treatment options.
ii. 20 Newsgroups Dataset: This dataset consists of approximately 20,000 newsgroup documents, divided into 20 categories. It is used to train and evaluate the chatbot's natural language processing capabilities.
iii. Stanford Sentiment Treebank Dataset: This dataset contains sentiment annotations for a large corpus of text. It is used to train and evaluate the chatbot's sentimental analysis capabilities.

These datasets are used to provide accurate and helpful responses for the users' queries and also to evaluate the capabilities of natural language processing and sentiment analysis capabilities.
The datasets provide a comprehensive and diverse range of texts, allowing the chatbot to learn and improve its natural language processing and sentimental analysis capabilities. The datasets provide understanding for the chatbots and ensure the correct data should pass to answer those mental health queries.
Therefore, the Kaggle dataset plays a significant role in the development of the mental health chatbot, and it helps to provide accurate data while chatting with the users by using natural language and sentimental analysis techniques.

5. SYSTEM ARCHITECTURE

The mental health chatbot platform working model is illustrated in Fig. 1. The Home page shows in Fig. 2 that it has 3 sections, which are user registration, doctor registration and an admin portal to check the system settings.
In the user registration platform, the user can access resources like a diary, an online forum, booking doctors, and chatting with other users, and it also has the main section for AI chat shows in Fig. 3 that helps the users to ask their mental health queries. The user can attend a test, which is an English and mathematics proficiency test to evaluate the mental health risk level, either high or low risk.
Fig. 4 shows the no-risk level, which evaluates that the patient has no mental health issues.
But Fig. 5, which shows the high-level risk patients who participate in the test, not well. This shows the patient is associated with some mental health issues. A notable feature of the platform is the inclusion of a Teacher’s/Parents' Questionnaire, which allows carers to contribute additional insights into a user’s mental health, facilitating a more comprehensive evaluation.The admin section which shows to monitor all over the system settings as well as the chatbot activities.
Overall, the system architecture describes the overall activities that perform the system and their results. The paper mainly points out the process and the activities that show the results. However, the mental health chatbot system provides an efficient system for reducing the increasing mental health disorder in people.

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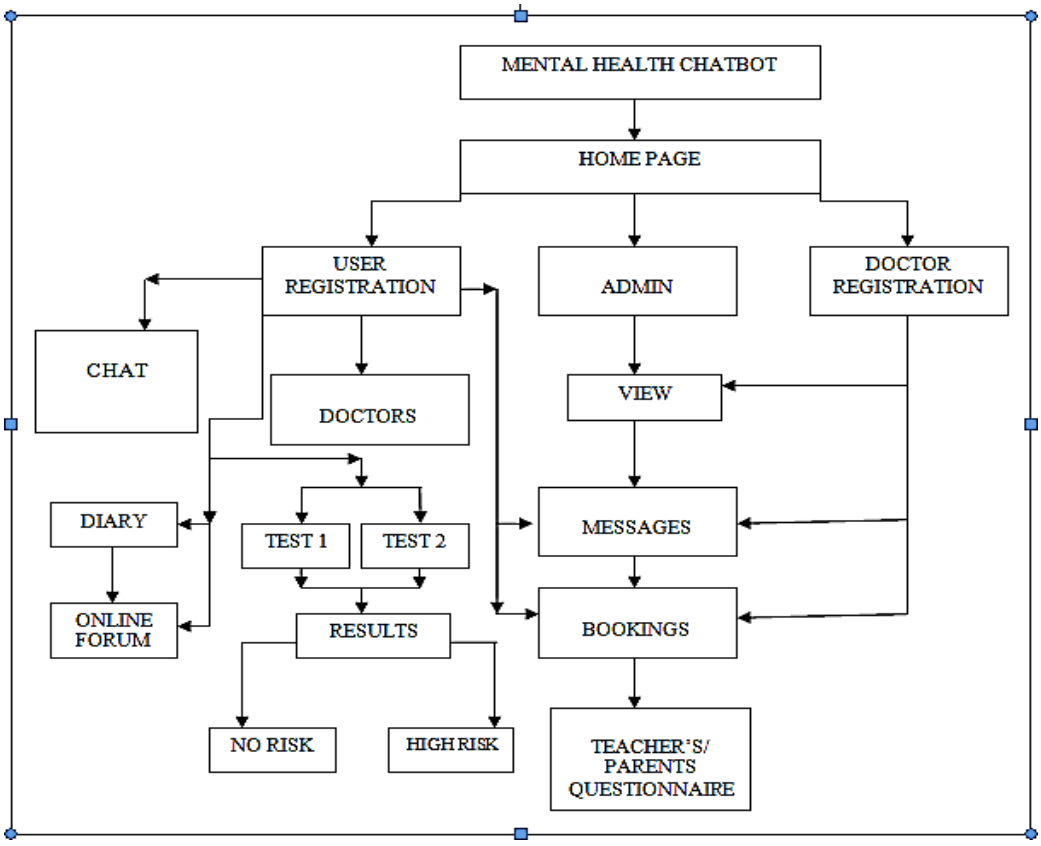

Fig 1.System Architecture

6. RESULT

Fig 2. Home page

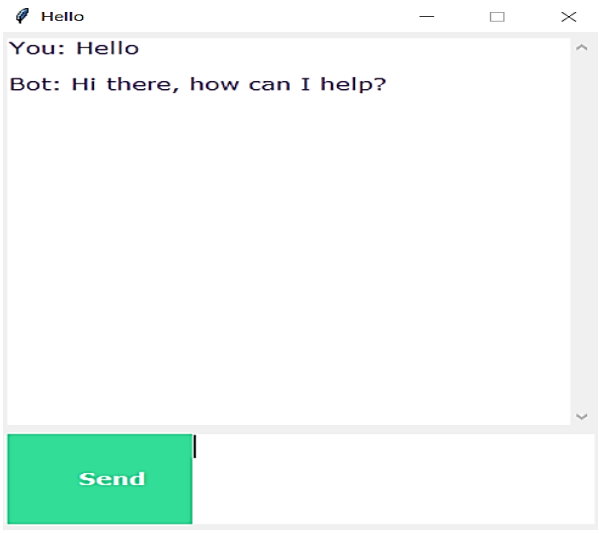

Fig 3. Chatbot

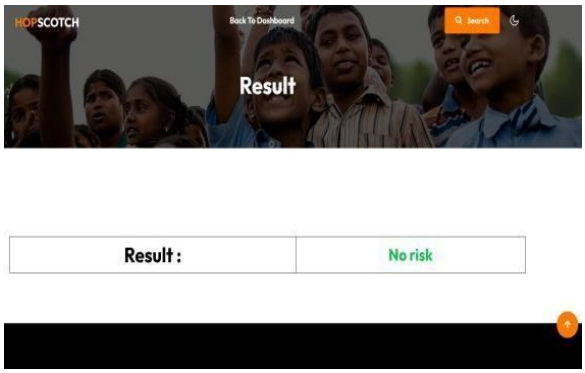

Fig 4. No risk

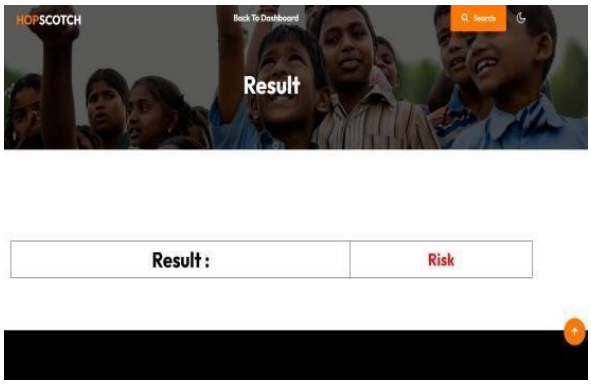

Fig 5. Risk

7. CONCLUSION AND FUTURE DIRECTIONS

The development of a mental health chatbot marks an important step for improving mental health care. Its platform is developed by using natural language processing and sentimental analysis techniques through the NLTK library. This paper has some features to have a doctor, user and admin platform that integrates to work efficiently for the platform that compares the existing technology. The

user has a personalised diary, online forum and chat section to easily understand the mental health issues. Also, the test section for English and mathematics proficiency helps the people to understand their risk level of mental health. Also, there is a messaging system for asking the mental health queries for doctors only after taking the appointment.

In the future, several directions to enhance the paper to improve the drawbacks, like giving responses for emotional nuances to integrate the advanced machine learning techniques.

Additionally, adding this platform to be wearable devices or mobile applications helps users to use this platform easily.Ultimately, with ongoing innovation and refinement, this paper has the potential to play a pivotal role in providing accessible, personalised mental health care, improving well-being for users worldwide.

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