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Research Paper

Mind Ease: A Web-Based AI Chatbot for Personalized Mental Health Support Using NLP and Sentiment Analysis

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Abstract: The prevalence of mental health issues among people of all ages continues to increase, and timely mental health assistance remains challenging due to various factors such as social stigma, time constraints, and a shortage of mental health resources. This article talks about Mind Ease, a web-based chatbot that uses NLP and mood analysis to help people with their mental health in a personalized way. The proposed system enables real-time text-based conversations. The chatbot can pick up on emotions and respond to them in a supportive manner. To enhance the accuracy of mood recognition a LSTM is utilized. This model is good at capturing contextual information and linguistic dependencies in user inputs. It provides individual feedback, self-care advise and coping strategies based on the emotions that it identifies to enhance emotional health. Mind Ease also has a mood-tracing screen that provides weekly and monthly analytical charts that demonstrate user's emotional patterns. This will allow them to be more aware of themselves and monitor their progress. A crisis detection system is also integrated for identifying sensitive and high-risk talks and providing the appropriate type of support. Besides, user authentication and interaction logs can provide a basic degree of user personalization, improving the overall user experience. The proposed system highlights the potential of AI-powered conversational systems to deliver 24/7, easily accessible, and emotionally intelligent mental health assistance via a web-based interactive environment.

"Keywords— Natural Language Processing (NLP), Sentiment Analysis, Mental Health Support, Artificial Intelligence Chatbot, Long Short-Term Memory (LSTM), Emotion Detection, Mood Tracking, Personalized Healthcare."

1. INTRODUCTION

Worry, anxiety, depression, loneliness, and emotional burnout are worsening issues of mental health around the world in recent years, especially among those of all ages. Work, school, social situations and lifestyle changes can place a lot of stress on a person's mental state and negatively impact both health and productivity. With recent advances in AI, it is now possible to develop

intelligent systems that can provide emotional support to people in need with real-time, easy-to-use assistance [1]. AI- powered Chatbots in mental health are proving to be valuable digital tools, providing personalized interactions and emotional support through NLP [2].

NLP methods are used in modern conversational systems to understand what users say, find emotional patterns, and come up with meaningful responses. Emotion-aware chatbots have demonstrated their ability to assist individuals express their emotions and thoughts in a secure environment, thereby promoting emotional wellbeing and self-awareness [3]. Wellness companions based on AI are increasingly being adopted to provide guidance, recommendations for wellbeing and continuous support via web-based applications [4]. Conversational bots with AI that interact with mental health care systems have made emotional support systems even easier to use and more accessible [5].

Two key methods, ML and DL, are employed to enhance the effectiveness of mental health apps. Supportive conversational agents can help get rid of the shame surrounding mental health and urge people to talk about their feelings in a normal way [6]. An NLP-based chatbot can have potential to comprehend discussions regarding mental health and respond appropriately for the situation [7]. Other emotional AI applications have also integrated therapy models such as Cognitive Behavioral Therapy to increase user engagement and enhance users' ability to manage problems [8]. A ML driven mental health surveillance system additionally aids in monitoring individuals' emotions and actions constantly, aiding in a more reactive and proactive method of care.AI-based mental health surveillance systems also help to monitor individuals' mental health on an ongoing basis, which facilitates a more proactive and reactive approach to care. AHCITs are used to enhance the naturalness and caring in talks, thereby improving the user experience [10]. Smart, flexible features of digital mental health platforms assist individuals in knowing and comprehending their emotions [11].

Mind Ease is an online AI-powered mental health platform. It employs NLP, mood analysis and LSTM networks to decipher text messages and determine human emotions. The system can provide personalized supportive messages, offer suggestions for self-care, pinpoint crisis and monitor your mood. The main objectives are to be accurate in emotion classification, to involve users more, to provide them with personalized emotional support and to monitor the emotional tendencies using a simple-to-use web interface.

2. RELATED WORK

The advancement in AI has greatly simplified the development of mental health support systems, particularly mental health-receptive conversational agents designed for social support. In a comprehensive study of AI-based mental health applications, Casu, Triscari et al. [12] concluded that these applications can be beneficial to users because they are accessible, scalable, and available on demand. The researchers' study found that with mental health interventions, the use of conversational AI technology is increasing and it could complement traditional mental health support services.

Much has been discussed about the ability of NLP to detect mental health issues. The systematic review by Yulianti, Putri, et al. [13] demonstrated that written conversations can be analysed to determine the existence of mental diseases and emotions, and that language analysis techniques

show high accuracy in identifying mental illness from written conversation. Their results indicated that NLP models are useful in the knowledge of feelings and improvement of diagnostic support systems for users.

Chatbot apps for mobile and online are gaining popularity for assisting individuals manage their psychological wellness.Mobile and Web-based chatbot applications are a growing trend in psychological well-being services for managing psychological issues. Haque & Rubya [14] examined various mental health chatbots and discovered customers appreciate the ease, privateness, and accessibility of talking systems. The study also revealed that chatbot platforms could also lead to a higher likelihood of people discussing their emotional issues compared to other help platforms.

Ethics and therapeutic principles are critical when mental health chatbots are in the making. Algumaei, Yaacob, et al [15] discussed the functioning of therapeutic design patterns and ethical issues that arise when designing mental health systems with AI. Their review stressed how important it is to be sensitive to different cultures, protect user privacy, be open, and use AI responsibly to make sure that mental health help is safe and successful.

Many artificial intelligence tools have also been utilized in order to assist individuals with anxiety and depression. Pavlopoulos, Rachiotis, et al. [16] looked at a number of AI-powered tools and said that smart systems can help keep an eye on signs, make suggestions, and help people control their emotions. Their efforts highlight the growing significance of AI in mental health prevention and fitness management.

Boucher, Harake, et al. [17] looked into how intelligent chatbots can be used in digital mental health treatments. They discovered that a conversational agent can increase users' interest and access to mental health resources. Based on their research, AI chatbots can serve as valuable initial support tools for individuals experiencing mental health issues.

It has been proved that chatbots can be useful for mental health even more in cross-cultural studies. In their study, Chin, Song and others [18] investigated the use of chatbots in various cultural contexts, concluding that a talking agent can support the emotional state of the users and contribute to mental health in various user groups. Their study showed how important it is for chatbots to show empathy and be able to tailor their relationships with people.

As more counseling and therapy tools leverage AI to enhance patient outcomes, digital mental health care is expanding. The research by Gyaneshwar, Punugoti, et al. [19] demonstrated the potential of AI in the field of counseling and therapeutic technologies, highlighting the capabilities of smart systems in providing mental support with both automated and personalized interactions. Similarly, Anser et al. [20] reviewed the emerging digital healthcare technologies and discussed the potential applications of the digital tools developed with the help of AI in the detection, treatment and monitoring of mental health.

Lim, Kolangde, et al. [21] discussed the ideas of AI in the development of mental health apps, and outlined the significance of having intelligent chat systems to ensure that support services are easy to access for all. They found that AI-driven platforms can support individuals to manage mental health issues through constant engagement and guidance.

Furthermore, Kim, Oh, et al. [22] explored user preferences for mental health robots and determined personalization, emotional understanding, and usability to be some of the most coveted attributes to make users happy and keep them engaged. All of these results show that adding NLP, sentiment analysis, customization, and intelligent conversational features to digital mental health support systems can make them much more useful.

3. METHODOLOGY

Mind Ease is a web-based robot with AI that helps people with their mental health by interacting with them intelligently through text. The system has been developed using Python and Flask. It provides users with mental health services via a secure and user-friendly online platform. New studies [23] show that chatbot technologies are increasingly being useful in the field of mental health and social well-being. The proposed approach involves analyzing people's sentiments during verbal communication with the help of NLP and sentiment analysis. To improve the performance of emotion recognition, user messages go through preparation steps like text cleaning, tokenization, normalization, and contraction expansion. The feelings such as happiness, sadness, anxiety, anger, stress and neutral are sorted using a DL model called LSTM. AI driven comparable systems have proven effective in identifying emotional states and aiding users in addressing concerns and anxiety [24]. The chatbot replies in an empathetic manner, offers some coping strategies, breathing exercises, problem-solving suggestions and motivational quotes depending on the user's psychological state. A built in crisis detection system to identify situations that are likely to make people feel bad and text them the right message. In addition, user exchanges are stored and a mood-tracking dashboard is created which displays weekly and monthly trends in a user's emotional state. Web-based mental health chatbot systems have shown that they could help people who need psychological help by providing easy access to ongoing emotional support [25].

Fig.1 System Architecture

An LSTM Model is used in the system design diagram to show a mental health support pipeline. First, raw text entered by the user is sent to the Preprocessing Module, which cleans the text, converts it to lowercase, removes stop words and resolves negations. This improved text is then passed into the Mood Analysis and Emotion classification (Sad, Anxiety, Anger, Happy, Neutral) LSTM Model for NLP. The emotional state is processed and updates both a Mood Tracking Dashboard and a Response & Support Module. This can trigger an alert and a warning for emergency assistance (red flagged). Finally, it is wrapped with a User Interface based on Flask and Evaluation Metrics rate overall performance.

i) User Authentication and Profile Management:

The Mind Ease platform is designed around the user registration and profile management system to ensure that users can access the platform safely and have a personalized experience. The registration and logon functionalities of the system allow users to create their own accounts and securely log on to robot services. As the user registers the information

(like username, email address and password) is being collected and stored in a database. For security reasons , we encrypt the passwords before storing them . Safeguarding users' privacy . Once the user has registered, he logs in by means of a password and has access to all the services from his own dashboard.

The approach also guarantees that the specific individuals can speak with the chatbot and have use of their emotional history. All user's interaction data is personalized by their own account. It allows the system to preserve individual recordings of feelings, and track moods. Users can thus view how their psychological well being has modified more than time and acquire answers personalized to their earlier experience with the program.

“Also the profile management part helps in managing sessions and identifying users while they’re interacting with the robot. It can detect the emotional patterns, generate emotional reports, and increase the quality of the discourse, by maintaining a conversation history for each user. Secure authentication can also assist customers to trust the application, a significant consideration in mental health applications where concepts of privacy and security are of core concern.

It is developed using python and flask which are low weight and efficient tools for web application development. With flask session management, users can easily and securely log in and sign out of the site and navigate through it. This is the main access to the app, and it provides a safe environment to provide personalised mental health support services.

ii) Text Processing and Emotion Analysis:

The proposed system was trained using an emotion-labeled text dataset containing approximately 22,000 records. The dataset consists of multiple emotional categories including Happy, Sad, Anxiety, Anger, and Neutral. Before training, the data was preprocessed using text cleaning, tokenization, normalization, and stop-word removal techniques. The dataset was divided into training and testing sets using an 80:20 ratio for model evaluation.

Some of the important features of the chatbot are text processing and mood analysis, which helps the chatbot understand the text messages of the users and the user's mood. Messages will be processed using NLP on-the-fly when being sent, to enhance quality and to preprocess the text for categorization by mood. Some of these processes are to change all capital letters to lower case, remove unnecessary punctuation and symbols, ensure spaces are standard, and expand contractions such as “don’t” to “do not”.

The cleaned text is then placed in a ‘structured' format for use in ML research. Line-to-word or tokenization is the process of dividing lines into individual words, or tokens. Then the correct text encoding is done and these tokens are converted to numerical representations. By transforming text, the deep learning model can interpret it the way that computers can.

Emotion analysis attempts to predict an individual's emotion (or emotions) based on their words. The system does not simply match keywords, but it takes into account sentence structure, the meaning of the context and linguistic structures. This technique gives individuals insight into the more nuanced emotional expressions and remarks, depending on the context. For instance, sentences which include negations can be better interpreted, making it less probable that the wrong emotion will be labeled.

After the data has been handled, it is sent to the DL model to find emotions. This pipeline can differentiate various emotion types with the help of the chatbot. These are happiness, sadness, worry, anger, stress and neutrality. If conducted properly, the system can react in a meaningful way and provide emotional support in an appropriate manner. This is the bridge between users' words and smart answers.

iii) LSTM-Based Emotion Classification:

The classification of emotions is done with the help of an LSTM neural network. Such a type of neural network is extremely effective at learning sequential texts. Sentences of different meanings are used to convey people's feelings in relation to different word order and different words. These relationships may not be captured by traditional ML algorithms and can be preserved by LSTM networks while scanning longer text sequences.

The model is trained with mental health-related chunks of speech with differing emotional expression and positive response. Emotional states such as happy, sadness, concern, rage, tension, neutral states etc. are marked on the training data. The model is learning patterns and correlations between words, sentence structures and the emotional labels. It learns as a system to recognize emotions in previously unseen text.

The power of LSTM networks is that they can take care of statements that rely on different statements or denial. For example, the emotional content of I am not sad is different to I am sad. LSTM's memory capability allows the model to grasp these differences and make more accurate predictions.

Once the model is trained it is included in the web application, and will be able to predict emotions in real time. Whenever a user sends a message, the system reads the message and passes it on to the trained LSTM model which determines the most probable sentiment of the message. You can choose the right supportive answers and suggestions based on the predicted emotion. This component greatly facilitates the robot to comprehend the user's emotional state and provide insightful, contextually relevant mental well-being assistance.

iv) Personalized Response Generation and Crisis Detection:

The system, after detecting the user's mood, sends a different message to the user, designed to comfort and encourage the user. An emotion group determines the type of response to provide, and is based on a friendly conversational tone. If someone is sad, they can receive messages of encouragement and motivation; if someone is anxious or stressed, they can receive breathing exercises, relaxation techniques and self care advice.

The personalization process takes into consideration the person's current mood and the way they have behaved with others in the past. By monitoring the conversations it has with users, the chatbot can provide more suitable and uniform responses over time. This way, users are more interested and the chat is more natural. The objective is to make users feel heard, encouraged and comfortable in discussing their feelings and thoughts.

Another safety feature the system has is the detection of a crisis. Some user messages may contain very intense emotional distress, hopelessness or thoughts of doing harm to oneself. The crisis detection module is constantly monitoring conversations in search of this type of high-risk event. As soon as possibly negative expressions appear, the system goes immediately

into a supportive mode customized for the individual.

These answers tell users to get help from people they trust or from qualified mental health professionals. The crisis detection will keep the users safer and promote responsible AI use in mental health apps. The chatbot can assist users immediately by identifying sensitive situations and providing them with the appropriate type of support, while still leaving the need for professional counseling. Now that it has it, the platform is more reliable and useful in real-life mental support scenarios.

v) Mood Tracking and Performance Evaluation:

The software also also features built-in mood monitoring technology, allowing the user to track their mood over time. Each conversation with the robot decomposes the words into categories of emotion; it records the emotion set, the time and the ID of the person conversing with the robot into a database. The recordings allow the system to track emotions and behaviors over the course of time. The received data is analyzed and displayed on an interactive dashboard, with the emotional changes being visualised.

Both the weekly and monthly recaps of emotions are presented on the dashboard in the form of graphs, charts and trend visualizations. Users can watch how their emotions change and discover patterns that can be associated with stress, worry, happiness or other emotions. This tool can help people be more attuned to themselves and can raise awareness of mental health. Monitoring emotions in the long run can help people become aware of what might be causing the emotions and whether they are taking steps to improve their mental health.

The classification model of the mood is tested with the standard ML evaluation metrics. Accuracy can be used to measure the success of the predictions of all the mood categories. Accurately recognize the number of emotional moments, recall the number of accurately detected emotional states. The F1 score is a composite of precision and recall, giving a just score.

These evaluation criteria are used to evaluate the strength and reliability of the LSTM model. Regular performance monitoring of models guarantees the quality of the mood recognition and further development. Both are able to track the mental state of the user and evaluate the work that is being carried out, aiding in mental health monitoring of the user, and aiding in scientific evaluation of the work being carried out by the system.

4. RESULTS AND DISCUSSIONS

The results of the testing indicate that the mental health chatbot developed was able to accurately identify users' emotions and provide appropriate responses to the situation. The performance shows that the individual is highly skilled in categorizing emotions into various categories, evidenced by high accuracy, precision, recall and F1 scores. The growth trend for both training and validation indicate stable learning behavior, but with little overfitting and with continuous growth throughout the training process. When classifying emotions, loss analysis has demonstrated that model convergence and optimization is effective. Moreover, the results of the test indicate that the model can easily distinguish different mental states and predict them accurately. Based on the ROC study, the system has an excellent performance and is very good at distinguishing between emotions, thus a very good classification performance on all

emotions. The results indicate that the approach using the LSTM model is effective in emotion detection and mental health support. In general, the results reflect the ability of the system to correctly identify emotions, give verbal support in a reliable manner and allow users to be aware of their emotions.

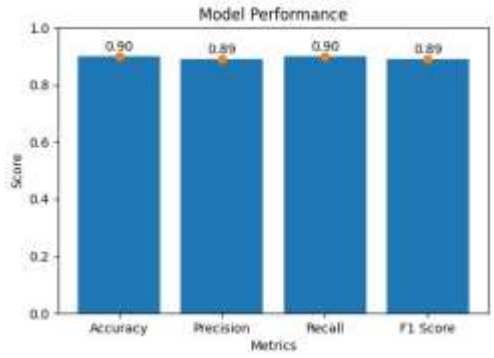

Fig.2 Model Performance Bar Chart

The accuracy, precision, recall and f1-score of the model are presented as a bar chart in Fig. 2.

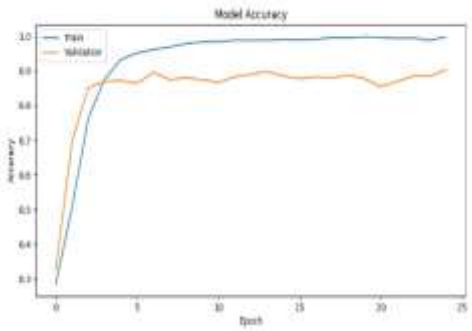

Fig.3 Model Accuracy Graph

The figure 3 is a line graph showing the change in training and validation over time.

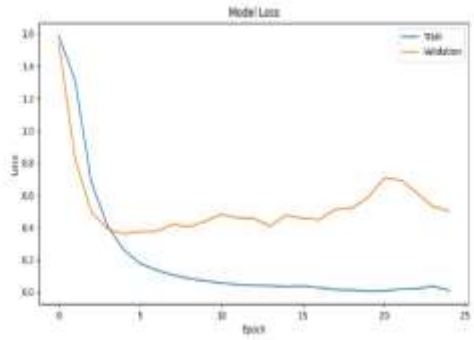

Fig.4 Model Loss Graph

Figure 4 shows a model loss line graph that shows how training and validation converge over time.

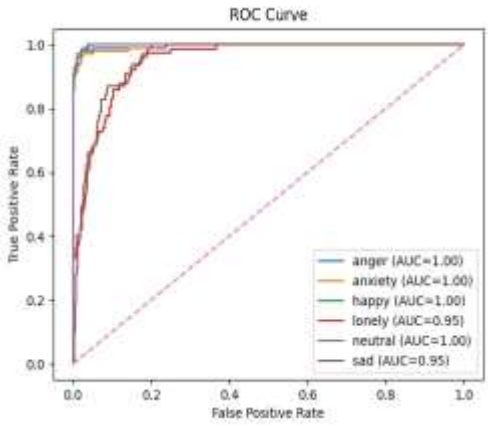

Fig.5 ROC Curve Graph

The multiclass ROC plots in Figure 5 present an overview of the classification performance of the model for a large set of emotion classes.

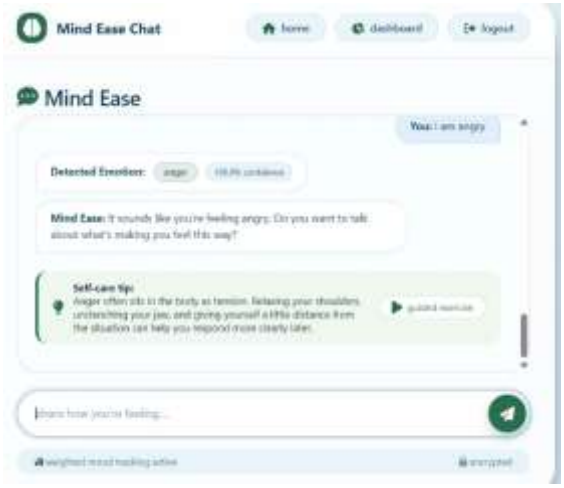

Fig.6 Chatbot Interaction – Angry

As shown in Fig. 6, the user expresses feelings of anger, which are accurately recognized by the Mind Ease chatbot. The system responds with a supportive message encouraging reflection on the source of the emotion and recommends a guided exercise to help reduce tension and improve emotional control.

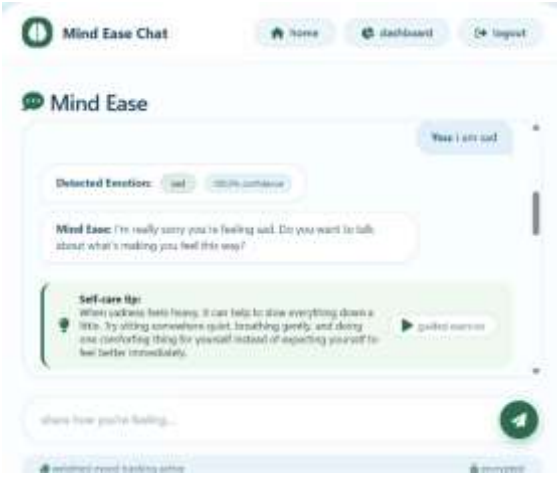

Fig.7 Chatbot Interaction – Sad

As illustrated in Fig. 7, the chatbot identifies signs of sadness from the user's input and provides a compassionate response aimed at offering comfort. It further suggests a self-care activity focused on relaxation and self-kindness to help the user cope with negative emotions in a healthy manner.

Fig.8 Mood Tracking Board

The online Mood Tracker Dashboard is a calendar grid for May 2026 with figure 8 highlighted in blue.

Fig.9 Monthly and Weekly Mood Visualization

This page shows Figure 9, including a chart that shows how the mood is distributed by month, and a chart that shows the mood distribution by day.

5. CONCLUSION

Mind Ease is able to deliver mental health support in an interactive web tool because of the use of AI, NLP, sentiment analysis, and DL. The system developed well for analyzing user conversations, understand their emotions and provide appropriate and context-sensitive responses that facilitate users to express their emotions and gain insight into themselves. The LSTM-based emotion classification model can correctly classify a user's emotion such as happiness, sadness, anxiety, anger, and neutrality based on the user's emotion in the context of the user's message. According to the mental state of a user, the adopted Chatbot provides them with personalised emotional support, self-care tips, coping strategies and relaxing techniques. Adding crisis detection skills to the system will make it more reliable, as well as help to identify occurrences that are likely to lead to emotional issues so that the right supporting messages may be sent. The dashboard for mood tracking is also accurate in tracking and reporting the emotional trends over the course of the week and month. This enables consumers to see inside themselves and

their general welfare. All are interwoven and contribute to creating a seamless and comprehensive support environment. Due to its excellent accuracy, precision, memory and F1-score, the emotion classification model performs well in tasks that require emotion detection, as shown in studies. Overall, the main findings highlighted how AI-driven conversational systems can provide ongoing, personalized, and empathetic assistance while improving mental health and engagement in a digital space, while simultaneously enhancing users' comfort and making the platform easy to use.

Emotion Identification is based on text, voice, facial movements and behaviour – in some future test, a combination of these will be used to understand individuals' emotions. Advanced learning systems can provide data that can be used to respond in a way that continues to encourage the relevance of the message and user engagement. Start real-time planning, predictive Mental Health Analytics, and smart Risk Assessments models to support earlier identification of patterns of Emotional Distress. To enhance data sharing for ML systems, new AI methods and collaborative learning strategies that safeguard privacy are being adopted. Smart healthcare systems, wearable sensors and digital wellness applications can all be used together to guide the overall wellness and emotions throughout. More advanced conversational intelligence and contextual reasoning could potentially make it possible to have very compassionate and human talks for long term mental health assistance.

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