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AI CHATBOT FOR MENTAL HEALTH

R. Kiruthika [1], R. Ajay [2], P. Balakrishnan [2], S. Giridharan [2]

[1] Faculty, Department of Computer Science and Engineering, Mahendra Engineering of College Mallasamudram, Namakkal, Tamilnadu, India
[2] Student, Department of Computer Science and Engineering, Mahendra Engineering of College Mallasamudram, Namakkal, Tamilnadu, India

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ABSTRACT

Modern artificial intelligence (AI), and machine learning in particular, is being utilized to develop prediction, detection, and treatment solutions for mental health care with the emergence of digital approaches to mental health. AI is being used in therapy to improve user experience and maximize individualized mental health care through digital interventions, including web and smartphone apps. Modern sources of copious amounts of data allow for the development of prediction/detection models for mental health disorders through the use of data-driven AI techniques. Specifically, behavioral or mental health insights can be extracted from an individual's "digital exhaust," which is the data obtained from their multiple personal digital devices and social media activities. Language has traditionally been seen as a window into the human mind, but with the help of potent computer-based natural language processing, it can now be statistically used as data to infer mental health. Furthermore, conversational agents for therapeutic intervention can be created using natural language processing.

Keywords: Artificial Intelligence, Mental Health, Digital Phenotyping, Chatbots, Natural Language Processing

1. INTRODUCTION

An AI Chabot for mental health offers a fresh and approachable way to assist people on their mental health journey, marking a revolutionary junction of technology and well-being. In a world where awareness of mental health issues is growing, these clever chatbots provide users with a private, accepting environment to share their ideas and emotions. These chatbots, which use sophisticated machine learning and natural language processing algorithms, are capable of sympathetic dialogues and can provide resources, coping mechanisms, and assistance based on the individual's requirements. AI chatbots have the ability to close the gap in mental health services, offering prompt and scalable support to those who might be reluctant to seek conventional forms of care, since mental health concerns remain a global concern. But when these technologies are developed and implemented, user privacy and ethical issues must be taken very seriously. This highlights the necessity of carefully and responsibly integrating AI into mental health support systems.

1.1. ARTIFICIAL INTELLIGENCE

The field of artificial intelligence (AI) is interdisciplinary and revolutionary, utilizing computer science, mathematics, and cognitive science to develop intelligent computers that can replicate human behavior and decision-making. Fundamentally, artificial intelligence (AI) seeks to create systems that are able to sense their surroundings, make sense of complicated data, and modify their behavior accordingly. The field includes a wide range of applications, from robotics that imitate human movements to machine learning algorithms that identify patterns in data. AI has the power to completely transform a range of sectors, including healthcare, banking, transportation, and education. It does this by improving productivity, automating processes, and opening up new avenues for creative problem-solving. The pursuit of artificial intelligence is driving advancements in several critical areas, including ethical considerations, responsible development, and the influence of intelligent systems on society.

1.2. MENTAL HEALTH

A person's emotional, psychological, and social aspects of their life are all included in their mental health, which is a basic component of total well-being. People's thoughts, feelings, and behaviors are shaped by their mental states, which also affect how they manage stress, interact with others, and make decisions. Acknowledging mental health's significance is crucial to building resilience and preserving a balanced, satisfying existence. The importance of mental health awareness has grown in today's world, when demands can be overwhelming and life moves at a fast speed. Encouraging constructive coping strategies, lowering stigma, and guaranteeing access to suitable resources and assistance are all part of addressing mental health. Understanding and placing a high priority on mental health are essential to creating a culture that values each individual's overall well-being as we negotiate the complexity of the modern world.

1.3. DIGITAL PHENOTYPING

At the nexus of technology and healthcare, digital phenotyping is a cutting-edge strategy that provides a novel way to comprehend and track people's mental and physical health. This new discipline passively gathers physiological and behavioral data by utilizing the abundance of data produced by wearables, smartphones, and other digital devices. Digital phenotyping looks for trends in user interactions, such as typing speed, social media use, sleep patterns, and levels of physical activity, in order to draw important conclusions about an individual's mental state, cognitive abilities, and general well-being. This continuous, non-invasive monitoring has the potential to completely transform customized medicine by allowing for the early identification of health problems, monitoring the effectiveness of treatments, and giving medical personnel access to vital information that will enable them to provide more timely and individualized interventions. But as digital phenotyping in healthcare continues to develop, ethical questions, privacy issues, and appropriate use of this technology are important factors to take into account.

1.4. CHATBOTS

One notable example of artificial intelligence in action is the chatbot, which is revolutionizing human-technology interaction. These computer systems are made to mimic human dialogue, answering questions, giving forth information, and even taking on more complex jobs. Chatbots are getting better at comprehending context and user intent by using machine learning and natural language processing to produce responses that sound human. Chatbots are extensively utilized in a range of sectors, including e-commerce, healthcare, and education. They improve productivity, provide immediate assistance, and provide a smooth user experience. Chatbots are developing along with technology, opening doors for increasingly complex uses and assisting in the continuous integration of AI into our daily lives.

1.5. NATURAL LANGUAGE PROCESSING

The cutting edge of artificial intelligence is Natural Language Processing (NLP), which is transforming how computers comprehend and communicate with human language. NLP is essentially a branch of artificial intelligence that works on giving computers the capacity to understand, interpret, and produce meaningful, contextually relevant human language. NLP algorithms, which combine computer science and linguistics, allow robots to process large volumes of textual data, extracting insights, recognizing sentiment, and even producing replies that like those of a human. NLP is

being used extensively in a wide range of fields, such as sentiment analysis, language translation, and virtual assistants. As it develops, it pushes the limits of what robots are capable of comprehending and interacting with the complexity of human communication. A new era of intelligent and context-aware computing could be ushered in by more intuitive and natural human-machine interactions as natural language processing (NLP) advances.

2. LITERATURE SURVEY

2.1. PATIENT PERCEPTIONS AND VIEWS OF MENTAL HEALTH CHALLENGES: SCOPING REVIEW

In this research, Alaa A. Abd-Alrazaq et al. suggest that during the past ten years, there has been a notable progress in the application of chatbots in mental health care services. The goal of these digital tools is to improve mental health assistance accessibility. Patients' views and opinions play a major role in determining whether chatbots are accepted and integrated into healthcare systems, even with their increasing frequency. Several investigations have been carried out to explore these facets, providing insight into the patient's perspective concerning chatbots for mental health. There is, however, a significant vacuum in the literature since patient perceptions and opinions have not been thoroughly reviewed. Our study conducts a scoping review in order to close this gap, following the recommendations provided by the PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) extension for scoping studies. Eight electronic databases were carefully searched as part of the review process, including well-known ones like MEDLINE and Embase. In order to guarantee a thorough analysis of the available data, we also carefully examined the included studies' backward and forward reference lists as well as pertinent reviews. The selection of studies and the extraction of pertinent data were handled by two impartial reviewers. The compiled data was subjected to a thematic analysis in order to extract important perspectives on how patients feel about chatbots for mental health. Our scoping review's main conclusions showed that patients generally reacted favorably to chatbots intended to provide mental health help.

2.2. A SCOPING REVIEW OF THE ASPECTS OF CHATBOTS IN MENTAL HEALTH

According to Mohannad Alajlan et al.'s proposal in this research, chatbots have the potential to be useful tools for people with mental problems because of their versatility in interacting with users through spoken, written, and visual languages. The stigma associated with seeking mental health assistance makes chatbots especially pertinent to certain people. There is an urgent need to methodically compile this evidence despite the fact that this topic has been the subject of many studies. The purpose of this synthesis is to alert mental health professionals and prospective users to the salient characteristics of chatbots, their possible applications, and the gaps in the current literature that warrant further investigation. Seven bibliographic databases, including well-known ones like Medline, Embase, PsycINFO, Cochrane Central Register of Controlled Trials, IEEE Xplore, ACM Digital Library, and Google Scholar, were thoroughly searched in order to achieve these goals. Comprehensive reference list checking of included research and pertinent reviews was also performed, both forward and backward. The careful selection of papers and the extraction of pertinent data were handled by two impartial reviewers. Because the data synthesis was done using a narrative approach, chatbots could be categorized according to a number of factors, including their goals, platforms, response production, dialogue initiative, input and output modalities, embodiment, and targeted illnesses. This categorization offers a thorough comprehension of the heterogeneous environment of chatbots employed for mental health applications. The assessment emphasizes the early stage of the field's investigation into chatbots in mental health, pointing out that there is a plethora of chatbots available for a range of mental problems and objectives.

2.3. A PRELIMINARY ASSESSMENT OF THE EFFECTIVENESS AND ENGAGEMENT OF A MENTAL HEALTH CHATBOT

In this research, Kate Daley et al. make the case that the prevalence of mental health issues is a global issue and that access to care is restricted because of stigma, availability, and cost. These difficulties are particularly more noticeable in low- and middle-income nations. Digital technology presents a viable approach to surmount these obstacles, and studies have demonstrated the efficacy of digital interventions for mental health. Low engagement, on the other hand, is a widespread problem, especially in the absence of human support. Chatbots offer a more cost-effective and scalable alternative to human service in this situation. This study focuses on the initial assessment of Vitalk's efficacy and engagement. Vitalk is a mental health chatbot that addresses stress, anxiety, and depression. The research is based on

actual data from 3,629 Vitalk participants who finished the program's first phase ("less anxiety," "less stress," or "better mood"). The programs, which are given via written dialogue with the chatbot, are designed to determine whether chatbots might lessen mental health symptoms in the general public, particularly in Brazil. The number of responses given to the chatbot divided by the number of program days was used to quantify engagement, which is a crucial component of the success of digital interventions. The results point to a promising future for Vitalk's capacity to lessen mental health symptoms. The study does, however, highlight the necessity for additional investigation to fully explore the efficacy and engagement dynamics of this chatbot for mental health. One unique feature of Vitalk, an automated chatbot, is the way it presents mental health information in a conversational style. Hosted within an instant messaging platform, the service is available to users on a variety of internet-enabled devices and is free to use.

2.4. DIRECTING A CHATBOX FOR INTERNET COUNSELING

In this research, Gillian Cameron et al. address the urgent global issue of mental health problems substantially increasing the burden of disease by proposing the building of a chatbot specifically intended for use inside mental health counseling. Heart disease and cancer together account for 16% of the disease burden in the UK, whereas mental health accounts for 28%. The astonishing 15.8 million days of sick leave in the UK in 2016 that were ascribed to stress, anxiety, or depression demonstrate the significant impact of mental health concerns. More affordable and scalable methods of providing mental health treatment are desperately needed, since the demand for mental health services is predicted to surpass the National Health Service's (NHS) capacity by 2020. A potential way to bridge this growing resource gap for mental health care is through digital interventions. These treatments, which address conditions including depression, stress, and anxiety, offer a way to get mental health care that is more widely available and easily accessible. Chatbots are one of the most flexible digital tools accessible; they can be used as stand-alone solutions or as part of larger digital interventions. Chatbots have the potential to provide consumers with a more engaged experience while they are looking for information, using diagnostic tools, or even getting counseling.

2.5. EVALUATING A CHATBOT'S APPLICABILITY FOR MENTAL HEALTH CARE

This paper focuses on evaluating the usability of a chatbot created for mental health treatment within the framework of a social enterprise, as suggested by Gillian Cameron1 et al. As chatbots become more and more integrated into everyday life—from financial management to travel arrangements—they have become increasingly prevalent in the field of mental health care, giving rise to the idea of "virtual therapists." The particular chatbot that is being studied in this study is called iHelpr, and it was designed to provide guided self-assessment and advice in a number of mental health areas, such as stress, anxiety, depression, sleep, and self-esteem. The study used the System Usability Scale (SUS) and a questionnaire created by Chat bottest to assess iHelpr's usability. The study's participants said they had a good time interacting with iHelpr and that it was simple to use. But the evaluation also highlighted areas that need a lot of work, especially in the areas of intelligence and error management. A set of suggestions for improving the iHelpr chatbot's usability are included in the study's conclusion, with a focus on how quickly the shortcomings found must be fixed. Although the study's participants expressed gratitude for the chatbot's reliable demeanor and efficient onboarding process, it also highlights the necessity of fixing errors in the intelligence and error management features. Based on the results of the questionnaire, these areas were determined to require immediate attention in order to improve iHelpr's overall usefulness.

3. EXISTING SYSTEM

The cost, stigma, fear, and lack of accessibility surrounding mental health counseling continue to be significant obstacles in today's society. We propose that by reducing access obstacles, generative artificial intelligence (AI) models created for mental health counseling could help improve results. With this goal in mind, we have created Serena, a deep learning (DL) dialogue system. The system is composed of post-processing algorithms and a central generative model. A 2.7 billion parameter Seq2Seq Transformer, refined on thousands of transcripts of person-centered therapy (PCT) sessions, is the basis of the generative model. The set of post-processing algorithms eliminates repetitious responses, strengthens coherence, and finds conflicts. The conversation system can respond in an engaging and qualitatively empathic way, but it can also occasionally exhibit long-term incoherence and hallucinations. Overall, we show that a deep

learning mental health dialogue system could be an affordable, useful, and less restrictive replacement for traditional human counselors.

4. PROPOSED SYSTEM

The system under consideration incorporates state-of-the-art artificial intelligence (AI) and machine learning methodologies into mental health services with the objective of transforming the processes of diagnosis, treatment, and prediction. The system leverages tailored algorithms to adjust therapy techniques depending on individual user data and progress, leveraging digital interventions through web and smartphone apps. Many data streams are mined for behavioral insights, including an individual's "digital exhaust" from social media and personal gadgets. This process enables the construction of reliable prediction and detection models for a range of mental health disorders. By analyzing text data from sources like social media posts, natural language processing (NLP) is used to quantitatively analyze language and provide a window into users' mental processes. Furthermore, the system integrates NLP-powered conversational bots for therapeutic interventions, offering support that is both scalable and easily accessible. The suggested system, which combines cutting-edge AI technologies with a patient-centric approach, has the potential to revolutionize mental health treatment by emphasizing early intervention and prevention.

4.1. QUESTIONER MODULE

When someone needs help with mental health, the Questioner Module is the sympathetic first point of contact. It uses thoughtfully constructed open-ended questions with Natural Language Processing (NLP) to enable users to express their feelings, ideas, and experiences. This module uses context awareness and sentiment analysis to determine the user's current state of mental health. Through the establishment of a dialogue-based and encouraging atmosphere, the Questioner Module seeks to discreetly gather pertinent data, laying the groundwork for efficient support.

4.2. ANSWER MODULE

The Answer Module, which provides empathetic and educational responses based on user input, is the central component of the chatbot for mental health. By utilizing NLP, it creates sympathetic responses that exude support and understanding. In addition to providing emotional engagement, the module offers crisis response methods and emergency services or helplines in case of need. Additionally, interwoven is instructional material on self-care techniques, coping mechanisms, and mental health, guaranteeing users get accurate information. By providing users with information and helpful advice, this module hopes to improve their general mental health.

4.3. CHAT BOT FOR MENTAL HEALTH USING NLP

The Questioner and Answer Modules are combined by the integrated Chat Bot to produce a dynamic and individualized mental health care system. The bot creates user profiles via NLP, which allows it to provide customized support over time. Through constant learning from user interactions, it gets better at responding and changing to suit different demands. Ensuring privacy and security is crucial, and data usage should be communicated clearly. Beyond just providing automated answers, the bot also integrates external resources and expert help-seeking information with ease. The knowledge base is regularly updated to keep the bot up to date, and user input informs ongoing improvements, resulting in the Chat Bot for Mental Health being an intelligent and sympathetic companion on the path to mental well-being.

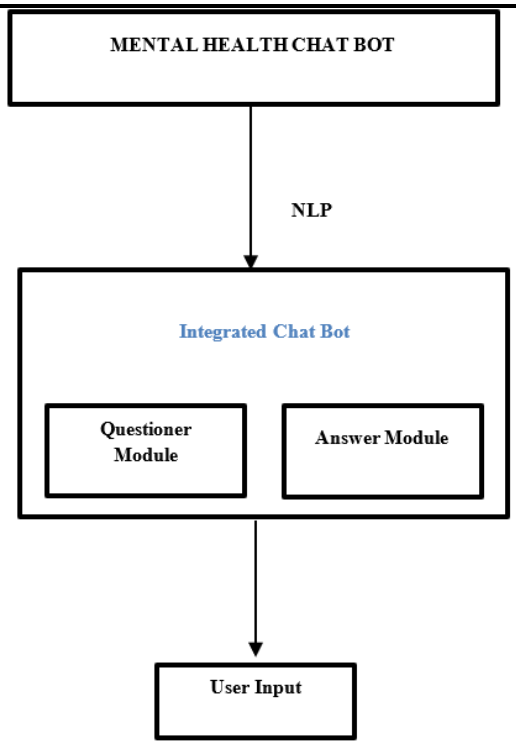

Figure 1. Block diagram

5. RESULT ANALYSIS

Table 1. Comparison table	
algorithm	**accuracy**
Existing	**75**
Proposed	**88**

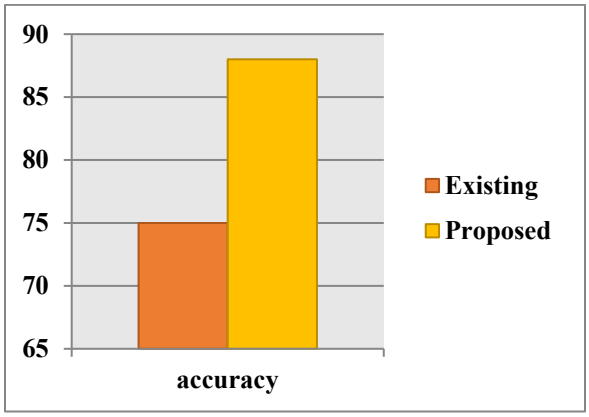

Figure 2. Comparison graph

The suggested approach shows a notable improvement in accuracy over current models in the field of mental health treatment. The suggested method shows a noteworthy improvement, obtaining an astonishing 88% accuracy, while the present techniques only reach a 75% accuracy rate. This development is especially significant when it comes to the personalization of treatment, mental health problem identification, and prognosis. Using cutting-edge machine learning and artificial intelligence techniques, the suggested algorithm combines digital interventions with improved user experiences in mobile and web applications.

6. CONCLUSION

In conclusion, the suggested mental health care system has the potential to completely transform how mental health care is provided and received since it makes use of state-of-the-art AI and machine learning approaches. Millions of people's lives and well-being could be enhanced by the system by offering scalable and easily available support, individualized and adaptive therapy techniques, and an emphasis on early intervention and prevention. Thorough planning and implementation are necessary for the successful deployment of this system. Incorporating users into the requirements collection and analysis phase, designing the system with scalability, security, and privacy in mind, properly developing and testing the system, and deploying it gradually are all crucial. The proposed mental health care system has the potential to significantly improve the world if it is carefully thought out and implemented.

7. FUTURE WORK

Future research will focus on creating prediction and detection algorithms for mental health disorders that are more precise and efficient. incorporating more personalization into therapeutic interventions by accounting for unique user characteristics including culture, personality, and life experiences. creating fresh, creative approaches to using digital interventions like chatbots, virtual reality, and augmented reality to provide mental health treatment. increasing the system's affordability and accessibility, particularly for those living in underprivileged areas.

CONFLICT OF INTERESTS

None.

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