Review Article

Artificial intelligence and mental health: a review article

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ABSTRACT

The term AI was originally coined by a computer scientist, John McCarthy, who defined it as the science and engineering of making intelligent machines. The father of AI authored a 1950 article, "Computing Machinery and intelligence" that discussed the reasons for considering a machine to be intelligent. Artificial intelligence is useful to facilitate faster disease detection. It helps to understand disease progression, improve medication/treatment dosages, and discover innovative treatments. The artificial intelligence tools mostly used for psychosis risk screening are chatbots and large-scale social media data analysis. Chatbot is a computer program that allows human-computer interactions in the form of textual dialogue based on the technology of natural language processing. The world's first chatbot, ELIZA, was designed in the 1960s and responds to special rules by recognizing keywords in user-entered text. Chatbots in the mental healthcare field include Tess, Florence, Buoy Health, and Your. Md. In addition to natural language processing, the machine learning methods adopted by chatbots also include natural language understanding, artificial neural networks, and recurrent neural networks.

Keywords: AI, Chatbot, Mental health, Machine

INTRODUCTION

The term AI was coined by computer scientist John McCarthy, who defined it as the science and engineering of making intelligent machines. McCarthy et al who is often referred to as the father of AI, wrote an article in 1950 titled "Computing Machinery and Intelligence," which discussed the criteria for considering a machine intelligent.

Artificial intelligence (AI) has proven incredibly useful in facilitating faster disease detection, understanding disease progression, improving medication/treatment dosages, and discovering innovative treatments. Clinical data such as patient statements and written notes are often subjective and qualitative, especially in mental health cases. Nonetheless, AI can still greatly benefit mental health.[1] Recent advancements in artificial intelligence have led to improvements in the methods and technologies used to treat mental illnesses in humans.

These AI-based technologies are now being applied to psychiatric research and practice. Adolescent psychosis risk screening, assisted by AI, offers several benefits. For instance, it speeds up the identification of patients who already have the disease or are at a potential risk, allowing for early intervention and treatment. This can help correct risky behaviors and prevent the worsening of symptoms.[2] Recent advancements in artificial intelligence have led to improvements in the methods and technologies used to treat mental illnesses in humans. These AI-based technologies are now being applied to psychiatric research and practice. Adolescent psychosis risk screening, assisted by AI, offers several benefits. For instance, it speeds up the identification of patients who already have the disease or are at a potential risk, allowing for early intervention and treatment. This can help correct risky behaviors and prevent the worsening of symptoms. AI leverages advanced technologies and objective data to enhance the accuracy and objectivity of screening methods. However, the screening tools

developed for adolescent psychosis risk are relatively inadequate, and the clinical significance of human-computer adolescent self-assessment results is limited. On the other hand, AI has reduced the burden of medical resources and increased the coverage of screening. Chatbots and large-scale social media data analysis are the AI tools commonly used for psychosis risk screening.

It's interesting to learn about the history of chatbots and how they've evolved. It's also fascinating to see how chatbots are being used in various fields, including mental healthcare.

DISADVANTAGES

As an AI-powered assistant, the capabilities go beyond just searching and summarizing existing data. It can generate new content for people. However, it's important to acknowledge that like any technology, there are potential drawbacks. Experts like Gilat and Cole have cautioned that there may be major errors and biases in the chatbot's output. Additionally, there is a risk of misinformation and the spread of deep fakes if chatbots are weaponized for nefarious purposes. It's crucial to use AI-powered assistants like me with caution and critical thinking.[3] Chatbots are being used in suicide prevention and cognitive-behavioral therapy. chatbots may help provide treatment for those who are uncomfortable disclosing their to a human being. Therefore, virtual therapy probably a chatbot could not only improve access

to mental health treatment but also be more effective for those reluctant to speak with a therapist.[4] It is made to mimic natural language conversations to facilitate interaction between humans and computers, they are also referred to as "conversational agents," "dialogue assistants," or "intelligent virtual assistants," and they can support speech and text conversation. Notable early chatbots include ELIZA (1966; a mock Rogerian psychotherapist), PARRY (1972; a chatbot simulating a person with paranoid schizophrenia, developed by a psychiatrist in response to ELIZA), and ALICE (1995; a general conversational chatbot, inspired by ELIZA). The development of chatbot technologies and the rise of messenger platforms have led to the widespread use and development of chatbots since 2016. Natural language processing (NLP), which includes speech recognition, text-to-speech, speech-to-text, natural language understanding, and generation, has improved significantly. This, coupled with the popularity of virtual assistants like Siri, Google Now, Cortana, and Alexa, has brought AI into many aspects of our daily lives. The development of chatbot technologies and the rise of messenger platforms have led to the widespread use and development of chatbots since 2016. NLP, which includes speech recognition, text-to-speech, speech-to-text, natural language understanding, and generation, has improved significantly. This, coupled with the popularity of virtual assistants like Siri, Google Now, Cortana and Alexa, has brought AI into many aspects of our daily lives.[5]
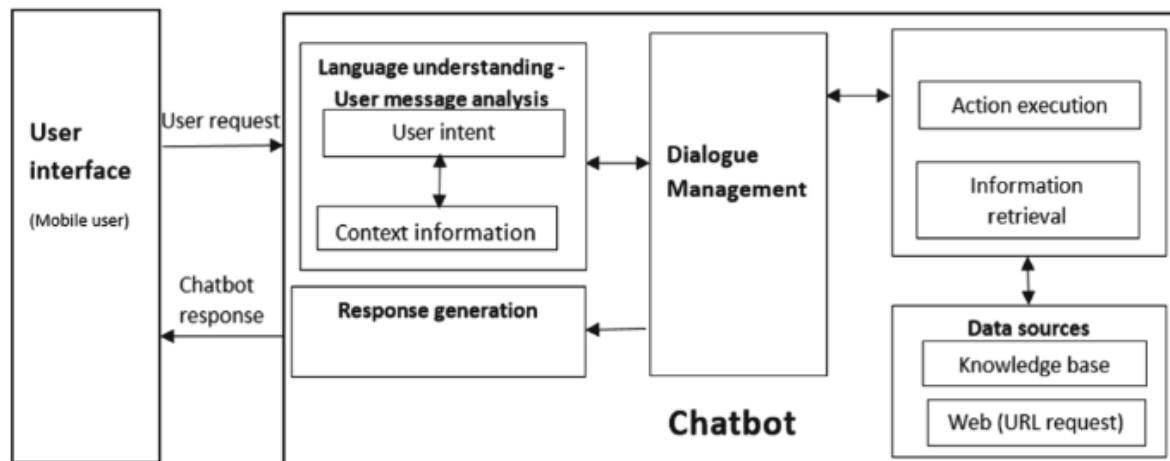

Figure 1: Chatbot technology.[6]

DIFFERENT CHATBOTS

TESS

Tess is a specialized chatbot designed to provide mental health support to caregiving professionals, patients, and family caregivers at a non-profit organization. Through its advanced psychological artificial intelligence services,

Tess has been able to reduce symptoms of depression and anxiety in just two to four weeks of interaction. This innovative approach to mental health is making a real difference in the lives of those who need it most. Tess is a highly advanced AI-powered system that is designed to provide empathic responses to people who are experiencing a range of emotions or scenarios. It has been extensively trained to deliver pre-scripted interventions

that are tailored to the input emotion or scenario. For example, if someone indicates that they are feeling anxious, Tess may offer a range of strategies to help them achieve a more relaxed state, or it may triage them to the appropriate resource based on their needs.

It's important to note that Tess is not a substitute for emergency services. At the start of each interaction, Tess clearly disclaimers that anyone in crisis should contact emergency services immediately. This ensures that people know the appropriate course of action if they require urgent help or support.

Overall, Tess is a helpful, fair, and safe assistant that is designed to provide support and guidance to people who may be experiencing a range of emotions or scenarios. Its advanced AI capabilities ensure that it can deliver appropriate responses that are tailored to each individual's needs, while its focus on safety and emergency services ensures that people are always directed to the appropriate resources if they require urgent help or support. Would you like me to share some resources with you? If you ever need support, simply type SOS and I'll be here to help. Moreover, I can provide a preliminary risk evaluation and send an SMS alert to a counselor or crisis center if necessary, to ensure that they can assist you further. Today, the Elizzbot version of Tess offers on-demand emotional support to improve the well-being of employees. Older adults can now talk to Tess through Amazon Alexa or Google Home.[7] This version is customized to deliver voice-enabled emotional support to older adults with a focus on social isolation, loneliness, depression, and anxiety. Before and after the Tess intervention, depression and anxiety symptoms will be evaluated using the patient health questionnaire (PHQ-9) and generalized anxiety disorder scale (GAD-7). The Tess intervention, which utilizes methods such as text messaging, Facebook Messenger, Alexa, and Google Home, acts as a supportive therapeutic tool that can supplement traditional therapy. Each physician is responsible for one TESS account, which can only be accessed by the physician.[8]

It is understood that the benefits of a chatbot are built using the RASA framework for medical checkups. It can save people time and help them get their medications on time by identifying and predicting the most likely disease along with the recommended treatment based on the user's symptoms.[9] Florence is an AI-powered assistant that provides users with timely reminders to take their medications and encourages them to stick to their prescribed regimens. In addition to this, Florence can also present medicine-specific information to help users better understand their treatment plan.[10]

Recently, in 2021, the WHO introduced a new digital health worker named Florence 2.0. This advanced version of Florence was developed as a response to combat misinformation during the COVID-19 pandemic. Florence 2.0 covers a wide range of health topics, including advice for mental health issues, tips to de-stress, guidance on how to maintain a healthy diet and exercise routine, and support to quit tobacco and e-cigarettes.

Overall, Florence and Florence 2.0 are valuable resources that provide reliable health information and support to users around the world.[11]

Buoy health

The innovative symptom checker, Buoy, was established by Harvard Medical School back in 2014. Leveraging the power of NLP, it boasts an impressive diagnostic accuracy of 90.8%-98%.[12] As a digital health worker, Buoy allows users to input their symptoms and receive personalized recommendations for care options. With advanced algorithms that continually learn from user data, Buoy only gets smarter with each use.[13]

Your Md

The company was originally established in Oslo, Norway in the year 2012, and has since shifted its operations to London. Its flagship service allows users to submit questions for free via its chatbot interface. In response, the chatbot presents a series of simple or multiple-choice questions to help identify the most relevant and accurate answer. While the details of the underlying algorithms are not disclosed to the public, available information suggests that they are highly sophisticated and effective.[14]

Chat GPT

With the advent of chat GPT, there is improvement in detecting medical errors and reducing the burden of paperwork. An algorithm in chat GPT achieved 66% and 72% success rates in basic and advanced cardiovascular life support. The disadvantages of Chat GPT are it is not a reliable tool for writing scientific research texts without strong human intervention; it lacks the knowledge and expertise necessary to accurately and adequately carry complex scientific concepts and information; it is crucial to standardize, validate, and give reliability to information fed to chat GPT to maintain its effectiveness.[15] Chat GPT can provide information based on data it has been trained on rather than considering it as diagnostic decision-making or professional medical advice. If there are biases or flaws in input data it may have the potential to give misleading pieces of information and amplification of harmful beliefs.[16]

CONCLUSION

From the above pieces of information, it has been clear that to avoid misinterpretations or misinformation one can adopt Chat GPT as a reliable AI in mental health.

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