

Chatbot for Mental Health Treatment using Face Detection

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Abstract: *The advent of chatbots may influence many treatment procedures in the medical and psychological fields. In particular, chatbots may be useful in many situations before and after medical procedures when patients are back at home. For example, while being in the preparation phase of a colonoscopy, a chatbot might answer patient questions more quickly than a doctor. Moreover, it is more and more discussed whether chatbots may be the first entry point for (urgent) medical questions instead of the consultation of a medical expert, as there exist already well-established algorithms for some of these situations. For example, if a new medical symptom occurs, a chatbot might serve as the first “expert” to relieve a patient’s condition. Note that the latter situation to use chatbots is mainly driven by the trend that patients often have to wait too long for appointments with a proper medical expert due to capacity problems of many healthcare systems. While the usage of supporting “at home actions” of patients with chatbot technologies is typically welcomed by medical experts, the use of this technology to “replace” them in their core competence, namely diagnosis and therapy, is generally seen highly critical. Apart from the domain side, it must be carefully considered what currently available chatbot technologies can do or cannot do. Moreover, it has also to be considered, how existing technologies can be established in highly critical medical and interdisciplinary fields with possible emergency situations (e.g., if a chatbot gets the message of a patient that indicates to commit suicide), involving ethical questions as well as questions of responsibility and accountability. Therefore, this work raises aspects that might be the basis for medical as well as technical experts to better work together for proper chatbot solutions. Thereby, the work at hand proposes an architecture that should serve as a reference for various medical and psychological scenarios. When using suitable technical solutions, we argue that chances emerge, which mitigate upcoming challenges significantly.*

Keywords: Chatbot

I. INTRODUCTION

In recent years, the integration of artificial intelligence (AI) and machine learning into mental health treatment has emerged as a promising approach to address the complex challenges faced by individuals experiencing depression and related conditions. Despite advancements in therapeutic interventions, issues such as incomplete alleviation of symptoms, attrition from treatment, and loss of follow-up remain significant barriers to effective care delivery. AI-powered chatbots offer a unique opportunity to augment traditional mental health services by providing personalized, accessible, and scalable support to individuals in need. This paper explores the purpose and scope of leveraging AI chatbots and machine learning in mental health treatment, aiming to enhance intervention effectiveness, increase engagement, and ultimately improve outcomes for those grappling with depression and related mental health challenges.

Chatbot for Mental Health:

The Chatbots were developed for different purposes, namely: therapy (e.g. Woebot), training (e.g. LISSA), and screening (e.g. SimSensei) with a specific focus on depression and autism. The majority of chatbots (70%) were implemented as stand-alone software and a minority of the chatbots were implemented as web based platforms [2]. This

chatbot is for therapy and the aim of the chatbot is to cure the mental health patients. This chatbot helps to cure from the mental health and lead a life without stress. The AIML templates are encoded to support four types of queries: what is, what is the type of, what are the causes of, and what are the symptoms of. The chatbot was designed to support the most common queries described above, by encoding the relevant AIML templates [9].

Effects on Mental Health Outcomes:

Digital mental health interventions (DMHIs) can often be disseminated to large populations suggests this is an effective mechanism for boosting engagement, In one study, researchers found that Woebot users had significantly greater improvements in depressive symptoms compared to participants in the control group, who read an e-book with psychoeducational content [3]. Like this chatbot gives greater improvements in depressive symptoms and in a easy way. Improvements in mental health outcomes may also depend on engagement, one study showed that users who had high engagement levels had significantly greater improvement in depressive symptoms relative to those with lower levels of engagement [3].

Perceptions of AI in Mental Health:

AI analyses the mental health like a human and gives a better solution than a normal chatbot. AI takes care the people, monitoring all the time the user visited, and provides a solution after analysing the human. AI keep tracking of their mental health and improving their mental health. Beyond assessing perceptions of AI, developers of mental health chatbots need to consider this task a collaboration between themselves, mental health professionals, and users/patients in order to develop chatbots that meet patients' needs, goals and lifestyles, ensure trust in AI, and improve mental health outcomes [3].

Classification of mental disorder:

The mental and behavioural disorders are,

- Organic, including symptomatic, mental disorders.
- Mental and behavioural disorders due to use of psychoactive substances.
- Schizophrenia, schizotypal and delusional disorders.
- Mood [affective] disorders.
- Neurotic, stress-related and somatoform disorders.
- Behavioural syndromes associated with physiological disturbances and physical factors.
- Disorders of personality and behaviour in adult persons.
- Mental retardation.
- Disorders of psychological development.
- Behavioural and emotional disorders with onset usually occurring in childhood and adolescence.

In addition, Unspecified mental disorders are classified.

Face Recognition:

So Face Recognition will be used to determine mental health quickly and accurately. Facial recognition could be used to alleviate stress for users who are confused while understanding a quiz. Analyzing facial expressions during the quiz could also provide valuable feedback on which questions or topics are causing the most stress for users.

II. RELATED WORKS

A mental health patient can express their feelings using text, emojis or emoticons, voice, recorded audio/video clips or live audio/video. The main aim of the therapeutic chatbots is to understand the appropriate emotions from the user's conversations and suggest them with appropriate treatment or therapy. Sentiment analysis recognises how the mental health patient is feeling regarding something. It identifies the patient's message as well as emojis/emotions as positive, negative or neutral based on the context of the patient's conversation. The patient responses and emojis/emoticons are converted into a Unicode character set to train the model[11].

In video-based interactions, it is vital to detect, process and analyse the patient’s emotions and perceptions to adjust the treatment strategies. These physical emotions are classified into different categories, such as sadness, happiness, surprise, fear, and anger [11]. There are two facial features for mental health they are Geometric based and appearance based.

The geometric-based approach signifies the mental health patient face’s geometry by extracting the nodal points, the shapes and the positions of the facial components like eyebrows, eyes, mouth, cheeks and nose then compute the total distance among facial components to create an input feature vector. The appearance-based approach indicates mental health patient face textures by extracting the variations in skin textures and face appearances [11].

The process of developing a video-based emotional system is as follows: The chatbot detects the patient’s face from the video chat; The facial appearance detection gets the patient’s facial features and converts them to input feature vectors; The selected Machine Learning(ML) classifier categorises the patient emotions into different classes such as sadness, happiness, disgust, neutral, anger, surprise and fear; Finally, the accuracy metrics are calculated for subsequent analysis[11].

Reinforcement learning, including Q learning, has been integrated with advanced machine learning techniques to tackle difficult high-dimensional problems. In 2013, Google DeepMind used a deep neural network, called DQN, to approximate Q values in Q learning that overcomes the limitation of the traditional look-up table approach, and provide an end-to-end approach to allow an agent to learn a policy from its observations. To the best of our knowledge, ours is the first study and implementation of DQN in the field of dynamic multi-channel access [10].

AI provides two important elements that enable chatbots to provide an appropriate response to a user statement: machine learning and natural language processing (NLP). Machine learning algorithms are used to learn from data, either from training data or from the previous conversation with a bot that recognizes patterns or monitors the past conversations that help generate appropriate responses[2]. Deep learning is a type of machine learning that uses layered algorithm called artificial neural network(ANN), is used to discover representation in data that makes sense of raw data. Natural Language Processing (NLP), is the branch of artificial intelligence that deals with the interaction between computers and humans through natural language and encompasses tasks such as language understanding, language generation, machine translation, sentiment analysis, and more. NLP can help chatbots understand and interpret user input, detect patterns in a user statement, identify entities, co-occurrences, or determine relations in the user generated data [2].

Building AI-based chatbots indeed involves several challenges, particularly in acquiring and managing training data and ensuring the quality of generated responses. Despite these challenges, advances in NLP research and technology have led to significant improvements in chatbot capabilities. Techniques such as transfer learning, pre-training, and fine-tuning enable developers to leverage large-scale language models and adapt them to specific tasks or domains. Additionally, ongoing research focuses on addressing ethical concerns, bias mitigation, and enhancing user experience in chatbot interactions.

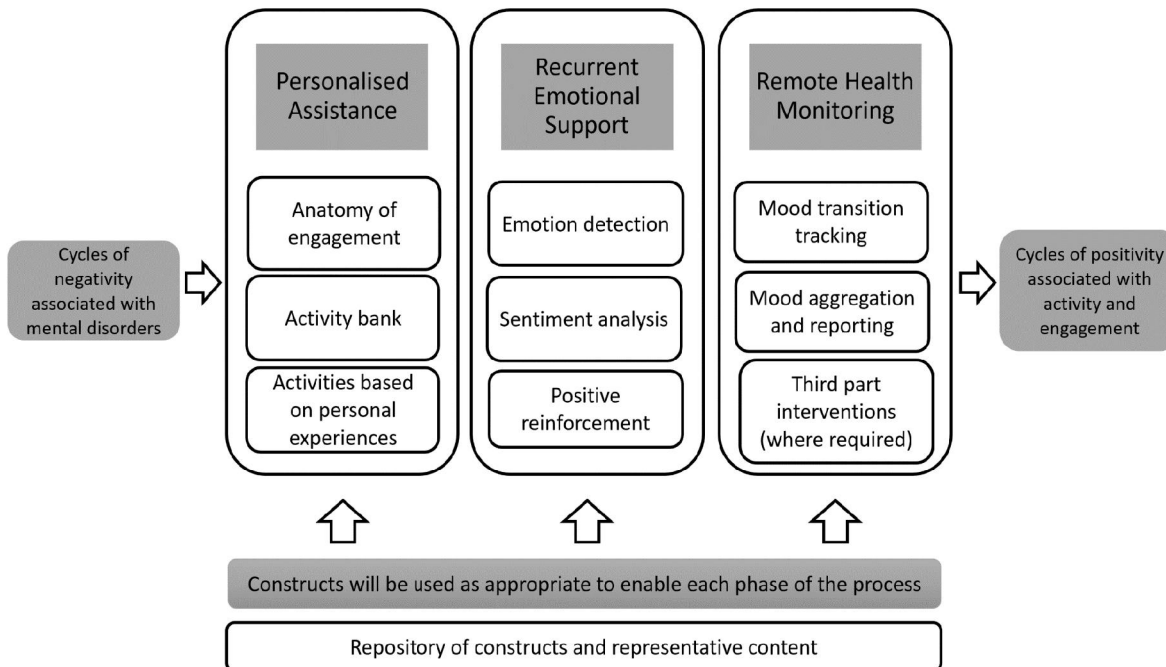
III. LITERATURE REVIEW

Reviews	Factors				
	AI	Chatbot	Mental Health	Face Recognition	Quiz
Artificial intelligence for chatbots in mental health: opportunities and challenges.	✓	✓	✓	–	–
Artificially intelligent chatbots in digital mental health interventions: a review.	✓	✓	✓	–	–

An Empathy-Driven, Conversational Artificial Intelligence Agent (Wysa) for Digital Mental Well-Being: Real-World Data Evaluation Mixed-Methods Study.	✓	✓	✓	-	✓
MedChatBot: An UMLS based Chatbot for Medical Students.	✓	✓	✓	-	-
Deep Reinforcement Learning for Dynamic Multichannel Access in Wireless Networks.	✓	-	-	-	-
Empathic Chatbot: Emotional Intelligence for Mental Health Well-being.	✓	✓	✓	✓	-

IV. SYSTEM ARCHITECTURE

In this system architecture, Cycles of negativity associated with mental disorders should be passed by the user. The negativity can be collected from the quiz and face recognition. In this chatbot, there are three methods to track the mental health they are Personal Assistance, Recurrent Emotional Support and Remote Health Monitoring. In Personal Assistance, chatbot assist the user on the basis of their mental health and keep the user in a healthy mind. In Recurrent Emotional Support, emotions can be detected and treated based on the emotions with the help of sentiment analysis. In Remote Health Monitoring, Mood can be tracked at all time when the user uses the chatbot, attending quiz and recognizing face and gives solution for the user based on the users mental health analysis. The datas are stored in the data repository. Each method collecting their processing data from the dataset. Atlast, the chatbot helps to keep mind health and keep user always in a positive way.



V. IMPLEMENTATION

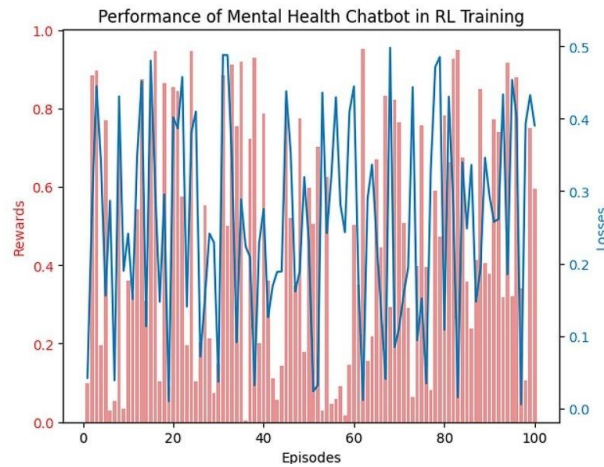
Step 1: First Login process can be done.

Step 2: Next Quiz can be conducted to analyse the mental health of the user.

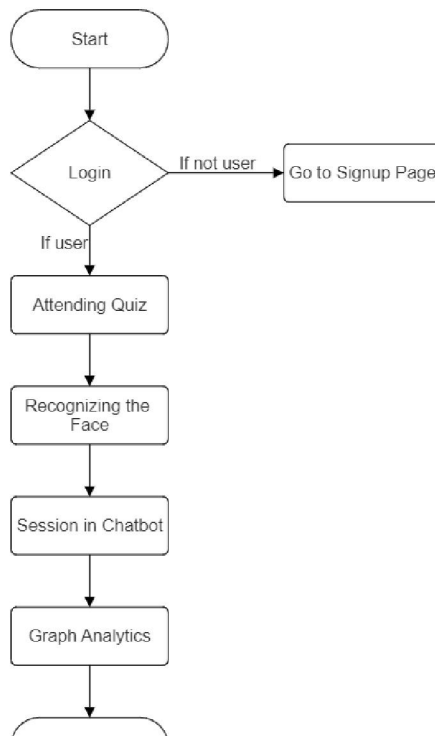
Step 3: Next Face Recognition can be done to predict the accurate mental health of the user because sometimes quiz cannot be attended properly due to the lack of understanding the question.

Step 4: Next chatbot will chat with the user to know the problem of the user and gives the better solution to the user using AI and machine learning.

Step 5: Atlast, A graph will be shown to the user for analysing their mental health and gives the suggestion to the user about their mental health.



VI. FLOWCHART



VI. CONCLUSION

There are numerous chatbots that are used for various mental disorders and purposes. Users can cure the mental health problems using this chatbot without becoming any stress and lead a happy life. They offer a unique and accessible way for individuals to seek support and guidance for various mental health issues associated with traditional therapy.

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