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A COMPREHENSIVE REVIEW ON AI IN HEALTHCARE USING MENTAL HEALTH THERAPIST CHAT-BOT

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ABSTRACT

Since 2022, chatbots with artificial intelligence have been more popular. They provide all possible outcomes for algorithms used in Natural Language Processing (NLP) and Machine Learning. It would be appreciated if the underlying capacity expansion, productivity improvement, and provision of guidance and help in colorful areas were carried out. The idea behind mortal artificial intelligence (HAI) is to facilitate the fusion of artificial and mortal intelligence. We will implement several adjustments that relate to the value of empathy and ethical consideration, which increase the efficacy of AI chatbots, in order to solve their limits. Global health is significantly impacted by mental health, which is a global concern. AI and ML are used to link data analytics to mental health outcomes. to minimize hidden dangers and optimize their benefits. collaborative strategies and cutting-edge. In addition to reducing impulses in AI operations, educational and practical outcomes may improve responsible usage and increase the effectiveness of cognitive and computational training programs. For all providers of digital internal health, digital internal health means operating more efficiently and inclusively.

Keywords

Artificial intelligence, Mental health chatbot, Generative-AI Chatbot, Natural language processing, Machine learning, Deep learning.

1. INTRODUCTION

An intelligent conversational computer system that thinks, learns, and accomplishes tasks with the help of people or independently using large data, natural language processing, and machine learning techniques is known as artificial intelligence. to boost their efficacy, enhance their capacity, and compel support, dialogue, and conversation. Also known as conversational agents or generative AI, they use massive language models and are the outcome of advancements in robotics, machine learning, artificial intelligence, and natural language processing during the past 15 years. Since ChatGPT's November 2022 debut, AI chatbots have gained prestige. Sometimes, AI chatbots are able to provide insightful responses that are beyond the capabilities of a human. They could, nevertheless, merit a kind and supported touch It is suggested that mortal-artificial intelligence (HAI) could assist in overcoming comparable constraints. where AI and humans complement one another's abilities to work together on a shared project or goal for safer, more sustainable, more enjoyable work and lives. The idea of HAI Because of the lowered life expectancy and deteriorated health, this costs the thrifty people billions of bones. Unfortunately, because of colorful walls, many people with internal illnesses refuse to acknowledge the care they require. Lack of access to internal health services, treatments, and expenses is a significant hedge. As an example, AI and ML models for the vaticination of internal sickness and AI chatbots for providing cerebral

support are examples of digital internal health outcomes that target adolescents using technology for internal health evaluation, support, prevention, and therapy.

Process- A chatbot for mental health services is the suggested idea. An artificial intelligence-based system that can diagnose stoner questions and provide background information on them before a doctor is consulted. Textbook support is provided by the system, and you may interact with bots that are nice to you. Based on the user's symptoms, the bot will identify the sort of internal sickness they have and answer all of their questions. Only when a chatbot is able to identify and provide information about any inside illness will its true worth be recognized.

Fig.(a) Chatbot

2. LITERATURE SURVEY

The global mental health crisis has underscored the urgent need for innovative approaches to mental health care. Among the digital tools gaining attention are AI-driven mental health care chatbots. These conversational agents simulate human interaction and provide users with on-demand support, often leveraging evidence-based therapeutic frameworks like cognitive-behavioural therapy (CBT) [1].

Mental health care chatbots are designed to provide psychoeducation, self-help strategies, and emotional support. Their implementation spans various use cases, including stress management, anxiety reduction, and even prevention of burnout [2]. These chatbots, such as Woe-bot and Wysa, employ AI to deliver interventions grounded in CBT and mindfulness. For example, Woe-bot was found to significantly reduce symptoms of depression after two weeks of consistent use [3].

The success of these systems often lies in their ability to form pseudo-therapeutic alliances with users. This is achieved through empathetic language, personalized feedback, and tailored interventions. Fulmer et al. (2018) emphasize the importance of this relationship in making chatbots feel supportive and relatable to users [4]. Chatbots also cater to users who may be reluctant to seek traditional therapy due to stigma or geographic barriers, providing a private and stigma-free space for mental health support [5, 6].

2.1 Advantages of Mental Health Care Chatbots

One of the most significant benefits of mental health care chatbots is their accessibility. They provide round-the-clock availability and cater to underserved populations, including those in rural or remote areas [7]. These tools are also cost-effective compared to traditional therapy, making mental health care more inclusive and scalable [8]. Additionally, chatbots have demonstrated their ability to provide timely interventions. For example, they can guide users through stress management techniques or grounding exercises during moments of acute anxiety [9]. The integration of gamification elements, such as progress tracking and rewards, has also been shown to enhance user engagement [10].

2.2 Challenges and Limitations

Despite their potential, mental health chatbots face several limitations. Data privacy and ethical concerns are among the most significant challenges, as users share sensitive personal information with these systems [11]. Ensuring that chatbots adhere to strict data protection standards is critical to maintaining user trust [12]. Moreover, chatbots are not yet capable of handling complex or severe mental health conditions. Users with suicidal ideation or severe depression often require human intervention, which these tools cannot provide [13]. Bennion et al. (2020) highlight the importance of recognizing chatbots as supplementary tools rather than replacements for traditional therapy [14].

2.3 Future Directions

The future of mental health care chatbots is shaped by advancements in AI technologies, cross-disciplinary collaborations, and a growing emphasis on inclusivity and personalization. Key areas of development include:

- Improvements in NLP will enable chatbots to better understand complex conversations, context, and nuanced emotional expressions, making interactions more meaningful [15].
- Chatbots could integrate with wearable devices to monitor real-time physiological data, such as heart rate and sleep patterns, allowing for proactive interventions [16].
- Leveraging user data, chatbots could provide highly personalized interventions tailored to individual needs and preferences [17].
- Incorporating voice recognition, facial expression analysis, and even virtual reality (VR) could enhance the user experience and make interactions more immersive [18].
- Expanding chatbot capabilities to support diverse languages and culturally sensitive interactions will make them accessible to a global audience [19].
- Developing robust ethical guidelines and regulatory frameworks will ensure data privacy, safety, and trust in chatbot applications [20].
- Combining chatbot interventions with human therapists in a hybrid care model could address more complex cases, ensuring comprehensive mental health support [21].
- Ongoing research into the long-term efficacy of chatbots, particularly in diverse populations, is crucial to establish their credibility and effectiveness [22].

3. METHODOLOGY

The process of creating a Gen AI chatbot for the healthcare industry includes many crucial steps: gathering data, choosing and training models, using the Enhanced Policy Optimization Method, and quickly developing different Transformer models. For the chatbot to be accurate and productive overall, each step is essential.

3.1 Data Collection and Preprocessing

The initial stage of the design involved collecting a comprehensive dataset of problems of cases and classes of that problems. The dataset was attained from intimately available sources and included a wide variety of problems to insure diversity and robustness in the model training. Each problem and symptoms was captured from multiple spots and under different classes to pretend real- world scripts. This dataset was also pre-processed to enhance the quality of the images, including resizing, normalization, and addition ways to increase the dataset's diversity.

3.2 Pretraining and Fine-tuning

Pre training and Fine tuning are two of the most essential way in developing Generative AI models, specifically Transformer- grounded models like GPT or BERT, for healthcare chatbots. Pretraining refers to the step of originally training a model on an enormous quantum of general- purpose data, similar as a wide range of textbook from books, websites, and other sources. This step is intended to enable the model to learn the introductory structure and patterns of language so that it can understand the alphabet, syntax, and introductory knowledge about the world. During this phase, the model isn't specialized in any sphere but gets general language proficiency. In healthcare chatbots, pretraining might involve vast quantities of non-medical textbook to help make a strong base in general language appreciation.

3.3 Transformer Models

Transformer models Mills are one of the core technologies of AI chatbots in the healthcare domain that have revolutionized NLP, enabling GPT, BERT, and Bio-BERT models to understand and induce human like textbook amazingly well. It's the tone- attention medium that forms the core strength of the Motor model, making it possible for it to reuse each word in a judgment in relation to others, landing environment and long- range dependences commodity that's absolutely necessary when dealing with complex medical queries. Mills enable healthcare chatbots to learn the complications of medica language and respond consequently by being fine- tuned on medical datasets, similar as clinical knowledge bases or health- related discourses. This proves veritably useful in symptom- checking tasks, where the chatbot would need to reuse detailed inputs from cases and induce informed advice or answer questions related to medical conditions, treatments, and specifics.

3.4 Enhanced Policy Optimization Method

EPOM is an enhanced version of Proximal Policy Optimization (PPO), a technique in reinforcement learning that optimizes the policy of an agent in a stable and efficient manner. It aims at improving the learning process by avoiding drastic policy updates, which might destabilize the training, ensuring that the actions of the agent are optimized while

maintaining stability. EPOM introduces a clipping mechanism that constrains policy changes within a predefined range and uses advanced stabilization techniques to reduce training variance. EPOM improves sample efficiency, allowing the agent to learn from fewer interactions with the environment, and adapts the learning rate dynamically to improve convergence. The method is well suited for environments with continuous action spaces, for example, robotics, and can be further specialized to complex, high-dimensional settings.

3.5 Prompt Engineering

The practice of prompt engineering in generative AI chatbots entails the careful design and refinement of input prompts provided to an AI model, aiming to steer its responses towards specific, desired outcomes. Within the realm of chatbots, the significance of prompt engineering cannot be overstated, as the formulation of a question or request can profoundly affect the relevance and quality of the AI-generated response. By employing effective prompt engineering techniques, one can enhance the chatbot's comprehension of user intent, thereby facilitating the production of responses that are accurate, contextually relevant, and exhibit human-like qualities.

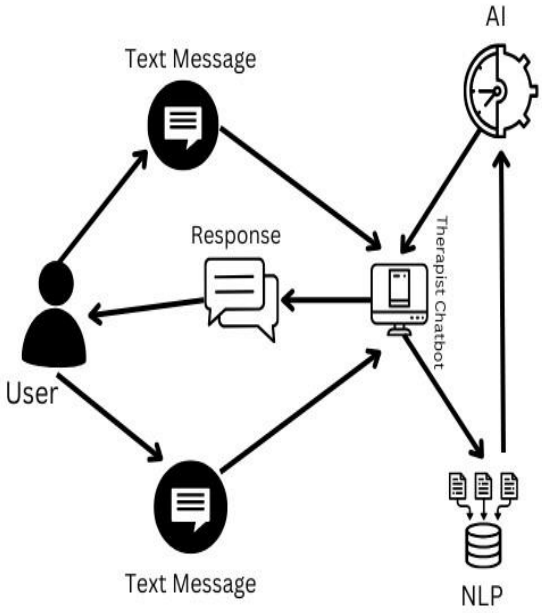

Fig.(B) Methodology

4. COGNITIVE BEHAVIOURAL THERAPY

With the use of cognitive behavioural therapy, all negative and ineffective ideas, actions, and emotions may be replaced with constructive ones. Some related realities, particularly stoicism, have been recognized by several philosophical systems. Epictetus, a stoic philosopher, believed that false beliefs that evoke bad feelings may be recognized and refuted by logic. In modern CBT techniques, this aided in identifying cognitive distortions that cause anxiety and depression. Albert Ellis developed the ABC method and rational emotive behaviour therapy (EBT), whereas Aaron Beck invented cognitive therapy, which later developed into cognitive behavioural therapy (CBT). "People assume that the situation, environment, or person is what makes us feel a certain way," he said.

For example, when we are sad, angry, or depressed, we frequently place the blame for our feelings on others. But the reality is that no one can make you feel inferior without your permission. To illustrate this, the ABC model was developed. A (antecedent) represents the scenario that preceded the response, B (beliefs) represents our comprehension of the situation, and C (consequences) represents our response or conduct. The ABC model is a part of cognitive behavioural therapy. Therefore, rather than replacing any feelings or sensations, CBT seeks to help people behave appropriately. Given the specifics of cognitive behavioural therapy, the therapist would mostly concentrate on your thoughts, emotions, and actions, along with the many ways in which they interact.

It would examine the ways in which your thoughts contribute to difficult emotions, such as sustaining a state of rage, sadness, or fear, or whether there are any ways in which you might be able to think differently about other people, circumstances, or yourself in order to feel better. Cognitive behavioural therapy (CBT) is strongly advised as it is a successful and scientifically validated approach to treating a variety of issues and difficulties. You will realize that the process is really collaborative and that the problems you face are truly looked at as a team when you work with a CBT therapist.

The assignment component of CBT treatment is another element that some people could find challenging to accept or get used to. A skilled cognitive behavioural therapy therapist will assign homework or an action item to do between sessions, much like in school. In addition to enabling you to apply the strategies and techniques you are learning in sessions outside of them, doing your homework will help you go through your therapy more rapidly. CBT combines behavioural and cognitive psychology. The interconnectedness of thoughts, emotions, and behaviour is depicted in the following image.

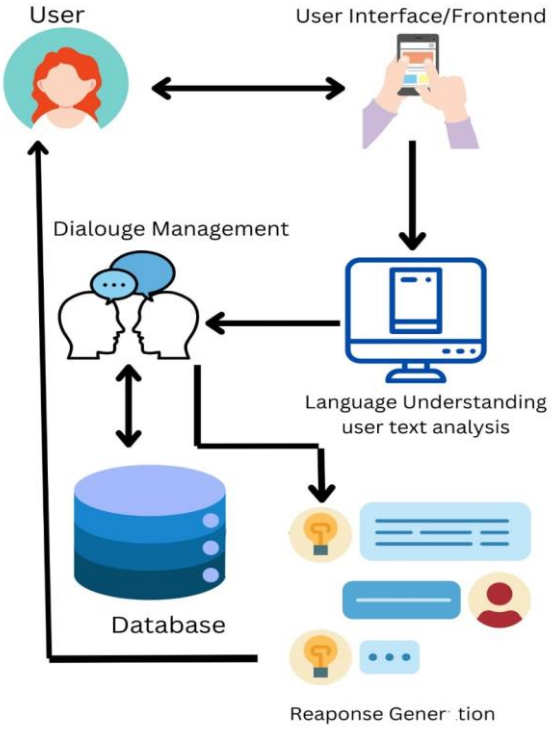

Fig.(C) Architecture

5. HEALTHCARE MARKETING AND PUBLIC RELATION

Healthcare companies may benefit from Gen AI's marketing and advertising capabilities. Individuals are interacting with public relations (PR) through content personalization, advertising automation, digital marketing, re-customer service, and pinpointing areas where customer service in marketing campaigns has to be optimized [23]. Gen automation can provide personalized information, like lifestyle or health recommendations, by evaluating big databases. They help to improve the interaction between patients and healthcare practitioners in their community by offering lectures and articles that promote patient-provider involvement [24]. It improves individualized patient care. Through total individualized care based on individual demands, each customer's service is improved.

Support Live Agents give agents and clients real-time tracking and feedback. resulting in quicker reaction times and increased customer satisfaction. Additionally, by anticipating

disturbances, Gen AI may optimize supply networks. The supply chain is described by an enabling scenario, which identifies disturbances and makes sure they can be avoided or eliminated. supporting supplier assessments and helping suppliers with supplier evaluations, enabling them to help with analysis and determining what constitutes an acceptable assessment. improved operational skills efficiency and quicker market adaption [25]. Research shows that one-third of Americans go online for hospital health care services before looking for medical information online. Do not follow any medical advise prior to obtaining care [26].

Research shows a rising trend in individuals investigator research. mental health symptoms online queries increasing significantly [27]. The development of Digital mental health tools, i.e. AI chatbots and AI-powered medications have gained ground in the past few years.

The order was escalated to meet this growing demand. This highlights the in order for emotional intelligence to be highly valued in a society it is important to demonstrate enhanced emotional intelligence.

This includes general AI systems in particular providing empathy and intelligence to the affected persons i.e. improving communication skills personalized user **interactions**. Generative AI revolutionizes Strategic content analysis in marketing by identifying high potential audiences and topics [28]. How can I successfully apply message techniques and content kinds in my work? The game gains a competitive edge because to the integrated Gen AI features. Giving patient information and engagements of care to health organizations benefits such entities. The project's transformational power of public involvement and participation, as well as its potential for health marketing and public relations, were highlighted in its development for the general public and public encounters [10].

6. CONCLUSION

In this research, we have shown how advancements in digital technologies, especially AI chatbots, have been fueled by the rising need for scalable and easily accessible mental health care solutions. In order to address the need for efficient, individualized, and compassionate mental health assistance, we have created a generative AI-driven chatbot for mental health care. Our chatbots are designed to emulate human discussions in light of the most recent developments in generative AI, which enables people to engage in meaningful and encouraging exchanges.

Generative AI enables contextually adaptable chats and conversations, which significantly improves the user experience, in contrast to standard rule-based AI systems that restrict context and conversational relevance. Our chatbot uses psychological concepts that have been proven to be scientifically sound in order to provide users with personalized mental health therapies (e.g. cognitive behavioural therapy and mindfulness practices). In order to recognize user requests and provide adaptive solutions, advanced natural language processing is also used for emotion detection. This initiative tackles the stigma, expense, and accessibility of mental health care.

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