

Original Article

AI-POWERED CONVERSATIONS: THE DIAGNOSTIC POTENTIAL OF CHATBOTS IN MENTAL HEALTH CARE

Odunuga, K., Akinyemi, K., Adeniran, KO. Igboke, HC

Affiliations: ¹Olabisi Onabanjo University Teaching Hospital

²Oxford Brookes University

³Devon Partnership NHS Trust, Langdon Hospital, Dawlish, Devon, UK.

⁴Federal University of Technology Owerri

Corresponding Author: Odunuga, K.

Olabisi Onabanjo University Teaching Hospital, Sagamu Ogun State

ABSTRACT

Background: AI has brought new opportunities for mental health treatment; among them is the application of chatbots based on Artificial Intelligence. They also represent the conversational agents that are programmed to act like human companions to provide immediate intervention encouragement and even evaluate a user's mental health status. Its use in mental health care is the most significant diagnostic tool in increasing accessibility, early detection/ identification, and individualized treatment of mental health diseases. The study examined the diagnostic potential of AI-powered chatbots in mental health care, assessing their ability to detect symptoms of mental health disorders and provide appropriate interventions or referrals.

Methods: The study focuses on Breezy, an AI-powered chatbot developed to engage users in social conversations while addressing depressive symptoms, set to be operational by 2025. It is targeted at young Nigerians, Breezy will converse in both English and Pidgin, providing a unique mental health support service. Breezy's capabilities include understanding and responding to user inputs, with a feature that explains how users can answer specific questions. Breezy stands out as Nigeria's first and only open-domain mental health chatbot, meaning it can discuss a wide range of topics beyond depression. This versatility enhances its realism and effectiveness as a tool for understanding how individuals seek social support. Breezy will be accessible via a website and mobile app, ensuring broad reach and engagement. The chatbot's design was inspired by datasets from Kaggle, which included sentences containing depression-related keywords like "depressed," "sad," "feeling low," and "hate me." Breezy is not designed for clinical diagnoses but aims to provide social support to users experiencing depressive feelings. It will be available as a premium service across Nigeria, offering a new way to address mental health issues through accessible AI technology.

Results: The primary distribution of the intent of the chatbot was "sleep", "about", "sad", "depressed", "learn more", "help", "something else", "scared", "user-meditation", "thanks". These keywords are depressive (containing depression- or sadness-related keywords), happy (containing happiness- or excitement-related keywords), and general (indicating all utterances in the same period).

Conclusion: This study adds to the discussion on the application of AI chatbots in mental health care. It provides valuable knowledge about how the usage of such technology can transform the diagnostic approach and try to improve global access to mental health services. The findings show that chatbots may share valuable information about depressive states, particularly in users who cannot describe their feelings to others.

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INTRODUCTION

Digital mental health aims to reach the youth demographic with technology in evaluating, supporting, preventing, and treating mental health ¹. Over the past few years, one of the most promising trends is the integration of AI chatbots into mental health care assistance. These are the chatbots, which implement natural language processing (NLP) to conduct conversations like humans and are opening new possibilities to increase access to mental health care, especially diagnostic ones². Despite the limitations to implementing AI-regulated chatbots, their applicability in the field of mental health screening is evident because of factors like accessibility, early interventional approach, and cost-effective care solutions ³.

Chung & Park, (2019) revealed that AI chatbots are conversational agents or generative AI using large language models. Djalo, (2023) revealed that there are situations where an AI chatbot can give a much more profound answer than human therapist. However, the need to have the feel of one-on-one interaction where clients can be attended to with the required level of understanding ⁴. It introduced the notion of human-artificial intelligence (HAI), the synergetic cooperation between humans and AI to achieve a shared purpose often faster, safer, more sustainable, and more fun than otherwise

DATA METHODOLOGY

The datasets were obtained from kaggle datasets for Breezy Chatbot.

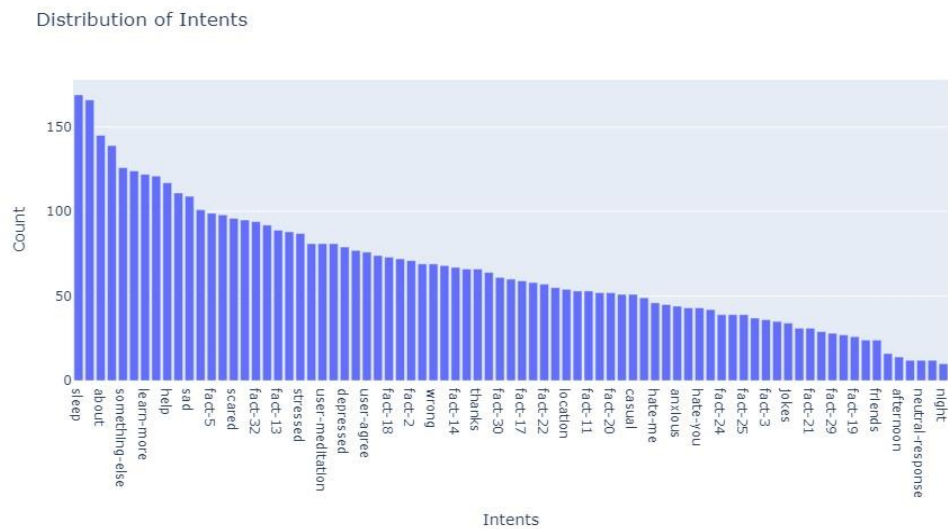
This dataset contained interactions between individuals and chatbots about depressive symptoms.

Breezy is to be an AI model specifically developed to engage in social conversation and ensure the user has fun. Breezy will be in operation in 2025 and cater to young Nigerians in English and pidgin. Inputs are anything that the user types into the chatbot or anything that the chatbot might say. It also has an explaining feature where the application also shows users how to answer a given question, which is called Breezy. The specifics provided by the user within this function are stored in the overall central database maintained for the activity. The service subsequently queries this database to produce the optimum response for subsequent user inputs. Breezy is unique and serves as the only mental health chatbot in Nigeria. It is the only one that could be described as an open-domain machine chat service, meaning it can

talk about anything at all. This makes Breezy more realistic as a tool for analysing how humans participate in the social support-seeking process. Breezy would be present on the web, and it would be downloadable as a mobile application, which would be convenient. This guarantees that Breezy has many users and is suitable for the collection of data. It would be a premium service therapist.” Breezy would offer it to all users across Nigeria. The datasets were imaginary and were obtained from Kaggle to create Breezy. The data included sentences that contained specific words corresponding to the depressive mood. The following were identified as depression keywords: depressed, distressed, dejected, gloomy, cheerless, sad, feeling low, hate me, ashamed of myself. Breezy is concerned with depression among people and not persons clinically diagnosed with the disease.

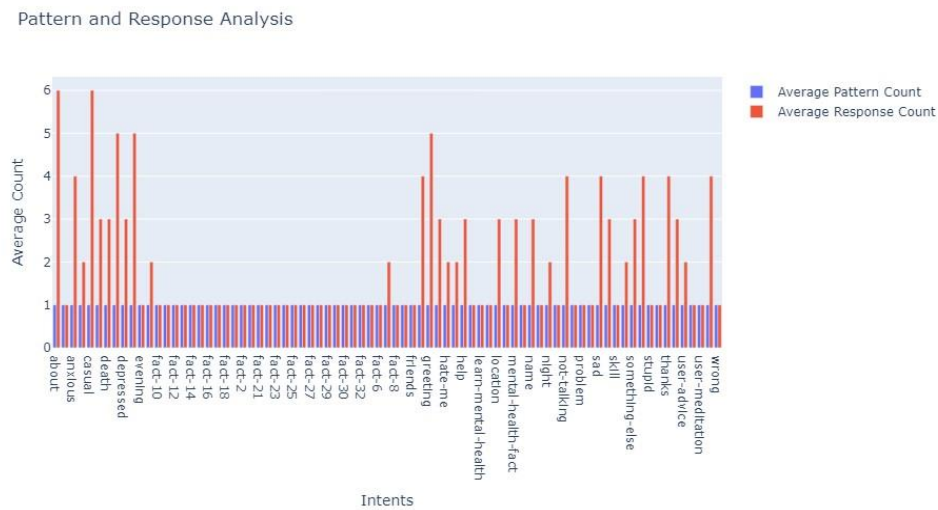
RESULTS

Chat Distributions of Intents



The major distribution of the intent of the chatbot was “sleep”, “about”, “sad”, “depressed”, “learn-more”, “help”, “something-else”, “scared”, “user-meditation”, “thanks”.

Pattern and Response Analysis



These key words depressive (containing depression- or sadness-related keywords), happy (containing happiness- or excitement-related keywords), and general (indicating all utterances in the same period). The plot demonstrates that depressive emotions varied throughout the day. The chat emotions differed among individuals.

DISCUSSION

AI-based chatbots can also enhance consumer access to cost and quality mental healthcare services as they can perform the work of clinicians (Fiske, Henningsen, & Buyx, 2019). These chatbots exist with a financial cost and are easily accessed through a person's phone, making help easily accessible at any time and place ⁵. The name Breezy was given since it is fun, casual and quirky, which is essential for a chatbot designed to help ease the mind and minimize stress. Chin et al. (2023) employed the global open-domain social chatbot SimSimi to sample

152,783 conversation utterances that had the terms "depress" and "sad" in three Western countries: Canada, the United Kingdom, and the United States and five Eastern countries: Indonesia, India, Malaysia, Philippines, and Thailand. Although participants did not report their mood overtly on the questionnaire, further analysis of self-reported words using Linguistic Inquiry and Word Count and n-gram revealed cultural differences in the treatment of depression and sadness with chatbots.

Breezy chatbots show a high potential for enhancing changes in the better delivery of mental health care services, but they have specific ethical and technical considerations. Some of these include failure to provide harmful or even toxic support, using loopholes to target the vulnerable in society and, arising from the fact that most algorithms are developed with bias, the AI may give out prejudicial advice.

However, it is more challenging for users to realize the type of interaction they have with chatbots consciously ⁶.

Omarov, Narynov, & Zhumanov (2022) also agree that there has been a remarkable increase in the use of AI in clinical systems in regard to mental health in the last couple of years. The AI-integrated chatbot software and application provide excellent health care that efficient and professional doctors previously offered (Shahsavari, & Choudhury, 2023). There remains a significant chasm between AI in mental health advancement and its actual usage by practitioners in their workplaces ⁷

There are quite different perceptions about the specificity of the chatbot, mainly in relation to the expectations of receiving care, the capacity to take into account the specificities of the users, and responsiveness in terms of the needs and the available resources/treatments (Iqbal, et al., 2023).

Therefore, the specific understanding is that the users, while engaging in the conversation with the mental health chatbots, cannot expect to have much of a therapeutic relationship with their bot ⁸

Designing and developing chatbots that can mimic affection and consolation to people with anxiety and depression has emerged as a significant task in artificial intelligence. One of the essential elements of creating such chatbots is the availability of a structured data set that acts as an initial input base for training models to understand empathy towards user's messages ⁹. The Breezy dataset constitutes an extensive pool of discussions on mental health. It comprises general conversations, frequently asked questions and answers about the human mind, classically therapeutic conversations, and general advice given to someone experiencing anxiety and depression.

The primary purpose of this dataset is to build a training data set for a chatbot that mimics that of a therapist in nature in order to console emotionally distressed people.

In order to aid the model training process, the data set introduced the concept of an "intent". Every intent corresponds to the motivation that exists behind each user's message. For instance, if a user posts that we are sad, then the intent that can be derived from that signal is sorry. Thus, each intent came with a set of patterns; these are example messages that fall under the particular intent of the chatbot and the corresponding responses that the chatbot should formulate to correspond to the identified intent. In order to perform the user intent identification as well as respond with meaningful and sympathetic answers, multiple intents are defined, together with their patterns and responses.

The consumption of such datasets will help researchers and developers create better chatbot models designed to handle individuals struggling with anxiety or depression (Djalo, 2023). It is to design an AI assistant that can engage in a conversation with the client and restore them with hope and encouragement to make an effective therapeutic intervention ¹².

Limitations

However, there are a few limitations related to the current research. However, first of it isn't easy to generalize the results obtained since the young adult dominate the participants of the chatbots studied. Second, we limited our study to only English-speaking conversations because of the challenges that come with analyzing multilingual content, so the conclusions that are made may only be valid for some of the users who engage the chatbots in the analyzed countries.

As such, future works could consider doing multilingual sentiment and topic analysis.

Conclusion: The data readily confirm that users expose a small-talk, open-domain chatbot to depressive moods or negative self-images. This is even more so in the developed nations, but it has never been the case in Nigeria. This paper has provided evidence that individuals can speak to a chatbot in a certain way and, in return, expect certain behaviours from the chatbot, such as responding with small talk and offering them social support.

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These results suggest that the next generation of conversational agents will also need to be developed to serve these social functions. There are possibilities for peer chatbot-supported mental health helping, calling for further technical and policy-wise work to enhance the functioning of chatbots for those in search of emotional support. The dataset showed that chatbots may be able to offer helpful information related to depressive moods where there is an inability to convey such to other people.

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