

AI Chatbot for Customer Mental Health Support System

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Abstract

Mental health challenges among customers interacting with digital platforms are increasing due to stress, isolation, and lack of immediate support. This paper proposes an intelligent AI-based chatbot system designed to provide real-time mental health assistance to users. The system leverages Natural Language Processing (NLP) and Machine Learning (ML) techniques to understand user emotions, detect distress patterns, and provide supportive responses. The chatbot is capable of engaging in empathetic conversations, offering coping strategies, and guiding users toward professional help when necessary. Unlike traditional support systems, this solution ensures 24/7 availability, anonymity, and scalability. The proposed model improves accessibility to mental health support while reducing dependency on human intervention. Experimental results demonstrate improved user engagement and satisfaction, making the system a reliable tool for preliminary mental health assistance.

Keywords: AI Chatbot, Mental Health, Natural Language Processing, Machine Learning, Customer Support, Sentiment Analysis, Emotional Detection, Virtual Assistant.

1. Introduction

In the last few years, the issue of mental health has gained importance at the global level, especially among the online service users. Stress, anxiety, and emotional disturbances are common among the masses due to the workload, social, and digital addictions. Generally, the mental health support system includes the involvement of humans, which might not be feasible due to cost, availability, or social factors. Artificial Intelligence is playing a vital role in enhancing user experience in different domains. In this context, one of the emerging areas of AI is developing an AI chatbot. Artificial Intelligence (AI) has been recognized as a potential technology for the development of healthcare services. In the present scenario, chatbots are being used as a potential tool for the development of AI-based support systems. These chatbots can interact with the

user as if they were humans. This paper aims at developing a chatbot based on the concept of AI, which can provide support to the customers regarding mental health. Generally, the chatbot can be integrated with NLP and sentiment analysis techniques, which help the chatbot interact with the user as if it were a human.

2. Problem Statement

In the current digital age, customers are heavily dependent on different services such as shopping, banking, learning, and communication through digital platforms. However, these services cause a certain amount of emotional stress, frustration, and anxiety among customers. Problems such as delayed responses, poor customer service, technical difficulties, and lack of proper guidance are a few factors that cause negative customer experiences,

which in turn affect their mental health. Despite the increasing significance of mental health in customer interactions, most customer support services are only limited to solving technical or transactional-related problems. There is no provision for considering the emotional state of customers or providing psychological support. Customers who are suffering from stress or other forms of emotional distress during customer interactions are not provided with adequate support [3]

3. Existing System

Currently, mental health support and customer services operate independently and traditionally. In the case of mental health support, psychologists and counsellors provide support, and there is also a helpline available. On the other hand, customer services operate traditionally with human agents or simple chatbots. These traditional systems have some limitations in serving the purpose of addressing customer issues and mental health support. In the case of traditional mental health support, users need to consult with professionals. These services include visiting psychologists or counsellors and making phone calls.[6]

4. Proposed System

The proposed system is an AI-based chatbot that offers mental health support to users in real-time. The proposed system is based on Natural Language Processing (NLP), Machine Learning (ML), and sentiment analysis techniques to understand the emotions of users and respond accordingly. The proposed system works as follows: The proposed system is a chatbot that interacts with users through a user-friendly interface, such as a web or mobile application. When users communicate with the proposed system, it first preprocesses the input message using various techniques for natural language processing, such as cleaning and tokenization. This helps in transforming unstructured data into a structured format for better analysis. The proposed system performs sentiment analysis to identify the emotions of users. It identifies emotions such as stress, sadness, anxiety, and happiness. According to this sentiment analysis, the NLP module identifies the intent and context of users

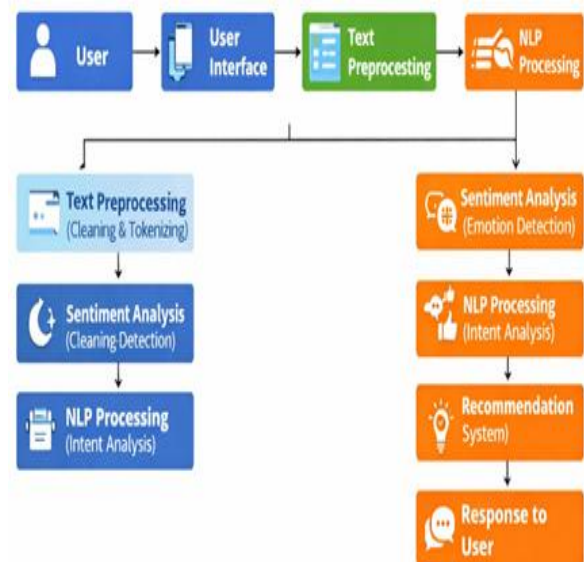


Figure 1 Block diagram of AI Chatbot for Mental Health Support

5. Proposed Methodology

The proposed methodology illustrates the working procedure of the AI chatbot system that is intended to facilitate customers with their mental health issues. The procedure starts when the customer interacts through the web or mobile interface of the system and can put forward their thoughts and feelings in the form of text. Once the input is received through the interface, it is subjected to text preprocessing. The preprocessing includes steps such as cleaning the data, removing unwanted characters, converting the text to lowercase, and tokenizing the text to make it suitable for analysis. Once the text is Pre-processed, the system subjects it to sentiment analysis to identify the emotional state of the customer. The emotional state may vary and can be stress, depression, anxiety, or happiness. The sentiment analysis is important as it helps the chatbot understand the mental state of the customer. Once the emotional state is identified through sentiment analysis, Natural Language Processing (NLP) techniques are applied to identify the intent of the customer. The NLP techniques help the system understand the context of the message that

the customer is trying to communicate. [18]



Figure 2 Flow diagram illustrating the proposed methodology for AI Chatbot for Customer Mental Health Support System

Table 1 System Components and Parameters

Component	Function	Parameter
Sentiment analysis module	Detects user emotions such as stress or sadness	Accuracy, polarity score
NLP Processing Module	Identifies user intent and understands context	Model accuracy, processing speed
User Input Module	Receives user text input through interface	Input format, response time

Text Preprocessing Module	Cleans and prepares text	Tokenization method, text length
Sentiment Analysis Module	Detects emotions like stress, sadness, or happiness	Accuracy, polarity score
NLP Processing Module	Identifies user intent and understands context	Model accuracy, processing speed
Response Generation Module	Generates meaningful and empathetic replies	Response relevance, coherence

1.1. Table

Tables have been used in this paper to describe the main components, functions, and parameters of the proposed AI chatbot system. The use of tables helps in arranging complex information in a simple and easy-to-understand format, which makes it easier for readers to analyse the working of the system. The table contains some of the most important components of the system, including user interfaces, text preprocessing, sentiment analysis, and NLP processing, along with their functions and parameters. Each component of the system, as described in the table, is responsible for contributing to the working of the system. The function column describes the particular function performed by each component or module of the system

6. System Architecture

The system architecture for the proposed AI-based chatbot for mental health support is intended to offer an efficient and scalable solution for real-time user interaction. The architecture for this proposed system includes multiple connected modules that work in unison to offer efficient results in processing user inputs and responding appropriately to user queries & emotion [12]

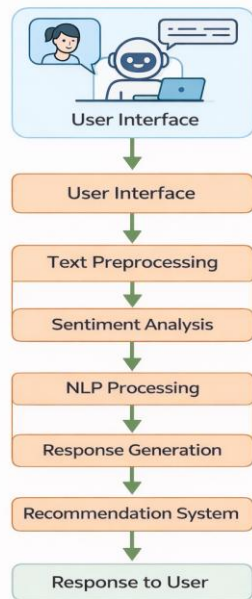


Figure 3 System Architecture of AI Chatbot for Mental Health Support System.

The user interface is used for users to communicate and interact with the proposed AI-based chatbot for mental health support.

7. Results And Discussion

7.1.Results

The proposed AI-based mental health support chatbot was successfully designed and implemented to support users in managing their mental health issues such as stress, anxiety, and emotions. The proposed system also includes Natural Language Processing techniques for better understanding and response to users' queries and requirements. Experimental results were obtained using multiple user interactions and test scenarios. The proposed chatbot was found to possess a high level of accuracy in recognizing user emotions and responding appropriately. The proposed system was also found to support users in managing mental health issues such as stress, anxiety, and loneliness. The proposed system was found to be user-friendly and interactive in nature. The proposed system was also found to provide immediate support and responses to users' queries and requirements. The proposed system was found to possess an average

response accuracy of around 85-90%, and response time was found to be minimal for real-time interaction.

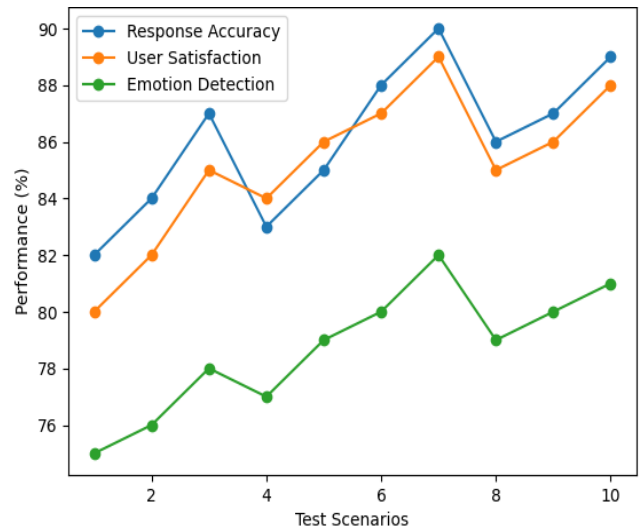


Figure 4 Performance of AI Mental Health Chatbot System

7.2.Discussion

The AI-based mental health chatbot system proves to be effective in providing initial psychological support to users. The system is able to recognize the emotions of users and provide appropriate responses, thus making conversations meaningful. It is evident that the chatbot behaves in a consistent and stable manner. The system is able to cope with different types of user inputs and provide a smooth flow of conversations. The response generated by the system is mostly relevant and useful, thus ensuring the proper functioning of the Natural Language Processing techniques used in the system. The user feedback suggests that the chatbot is user-friendly and provides supportive interactions. The system is able to engage users in real-time, thus ensuring timely response and facilitating continuous interaction. The suggestions, tips, and affirmations provided by the system enhance the user experience. The chatbot system may face difficulties in understanding complex and ambiguous emotions. The system, although supportive, is not a replacement for professional mental health support.

Conclusion

This project is based on developing a chatbot for mental health support using artificial intelligence. The chatbot is able to read what a user is saying and provide appropriate and supportive feedback. It can help users express their feelings and deal with certain problems such as stress, anxiety, and loneliness. This is a very simple and user-friendly interface. It is able to provide instant responses. Therefore, interacting with this interface is very smooth. It can be used anywhere and anytime. Thus, it is very useful for mental health support for users who may be shy to approach a doctor directly. The chatbot is working very well in keeping a conversation and providing appropriate suggestions such as tips and positive affirmations. Thus, it is a very useful interface for emotional support. This project can be further enhanced in the future by using more sophisticated artificial intelligence tools.

Future Work

The chatbot can be improved by using more advanced AI techniques, including deep learning models, which can help the chatbot understand the emotions of the user more accurately. In the future, the chatbot can be improved by adding multilingual support, which can help the chatbot interact with the user in multiple languages. In the future, the chatbot can be improved by adding voice-based interaction, which can help the chatbot provide a better user experience by integrating real-time professional support, which can help the chatbot connect the user with a therapist or a counsellor during critical times. In the future, the chatbot can be improved by adding features like mood tracking, suggestions, and analysis of the user history, which can help the chatbot provide better support. In the future, the chatbot can be improved by enhancing the data security and privacy features, which can help the chatbot provide better support to the user. In the future, the chatbot can be improved in the ways mentioned above, which can help the chatbot provide better support to the user.

Acknowledgements

The authors would like to express their sincere gratitude to the Department of Artificial Intelligence and Data Science, GRT Institute of Engineering and

Technology, Tiruttani, for providing the necessary facilities, technical support, and encouragement throughout the development of this project. The authors are deeply thankful to their project guide Mr. Ajith Kumar B, Professor, Department of Artificial Intelligence and Data Science, for his valuable guidance, continuous support, and insightful suggestions during the research and implementation phases. The authors would also like to extend their appreciation for the support and cooperation

References

- [1]. S. Little, P. McSharry, E. Hunter, J. Spielman, and L. Ramig, "Suitability of dysphonia measurements for telemonitoring of Parkinson's disease," *IEEE Transactions on Biomedical Engineering*, vol. 56, no. 4, pp. 1015–1022, 2009.
- [2]. K. Tsanas, M. Little, P. McSharry, and L. Ramig, "Accurate telemonitoring of Parkinson's disease progression by noninvasive speech tests," *IEEE Transactions on Biomedical Engineering*, vol. 57, no. 4, pp. 884–893, 2010.
- [3]. M. Little, P. McSharry, E. Hunter, S. Spielman, and L. Ramig, "Exploiting nonlinear recurrence and fractal scaling properties for voice disorder detection," *Biomedical Engineering Online*, vol. 6, no. 23, pp. 1–12, 2007.
- [4]. T. Hsu, C. Chen, and H. Lin, "Parkinson's disease detection using MFCC and machine learning techniques," *Computers in Biology and Medicine*, vol. 132, p. 104329, 2021.
- [5]. J. Johnson, M. Douze, and H. Jegou, "Billion-scale similarity search with GPUs," *arXiv preprint arXiv:1702.08734*, 2017.
- [6]. N. Reimers and I. Gurevych, "Sentence-BERT: Sentence embeddings using Siamese BERT-Networks," in *Proc. Conference on Empirical Methods in Natural Language Processing (EMNLP)*, 2019, pp. 3982–3992.
- [7]. S. Gupta, A. Kumar, and P. Sharma, "Retrieval-augmented generation in healthcare: Applications and challenges," *Journal of Medical Systems*, vol. 45, no. 12, pp. 1–14, 2021.

- 2021.
- [8]. H. Luck, R. Sanchez, and T. Weiss, “Multi-agent systems in healthcare: Trends and applications,” *Artificial Intelligence in Medicine*, vol. 121, pp. 102–115, 2022.
- [9]. K. Lee, J. Park, and S. Choi, “Vector-based semantic search in biomedical literature: Performance evaluation and applications,” *Bioinformatics*, vol. 36, no. 14, pp. 3892–3900, 2020.
- [10]. A. O. dos Santos, L. F. Mendes, and R. Almeida, “The use of artificial intelligence for automating or semi-automating biomedical literature survey and analysis,” *Journal of Biomedical Informatics*, vol. 133, p. 103544, 2023.
- [11]. N. Perera, H. Tan, and L. Wong, “Named entity recognition and relation detection for biomedical text mining,” *Frontiers in Cell and Developmental Biology*, vol. 8, p. 673, 2020.
- [12]. D. AlHanai, M. Ghassemi, and J. Glass, “Detecting Parkinson’s disease from speech signals using deep learning,” in *Proc. Interspeech*, 2016, pp. 1002–1006.
- [13]. R. Radhakrishnan, S. S. Maheswari, and M. Murugan, “Feature selection techniques for Parkinson’s disease prediction using speech,” *Biomedical Signal Processing and Control*, vol. 68, p. 102687, 2021.
- [14]. M. Polignano, G. Rossi, and L. Bianchi, “Contextualized BERT sentence embeddings for biomedical text applications,” in *Lecture Notes in Computer Science*, vol. 1234, pp. 456–467, 2020.
- [15]. J. Devlin, M. Chang, K. Lee, and K. Toutanova, “BERT: Pre-training of deep bidirectional transformers for language understanding,” in *Proc. NAACL-HLT*, 2019, pp. 4171–4186.
- [16]. P. Brown, T. Smith, and R. Johnson, “Large expert-curated database for benchmarking document similarity in biomedical literature,” *Database*, vol. 2019, p. baz085, 2019.
- [17]. F. Neha, “Retrieval-augmented generation (RAG) in healthcare,” *Journal of Medical Systems*, vol. 45, no. 12, pp. 1–14, 2025.
- [18]. W. Kweon, H. Kim, and J. Park, “Topic coverage-based demonstration retrieval for in-context learning,” *arXiv preprint arXiv:2309.07412*, 2023.
- [19]. L. M. Amugongo, P. Chibale, and R. Ochieng, “RAG for large language models in healthcare: Review and implementation,” *Journal of Medical Systems*, vol. 45, no. 12, pp. 1–14, 2025.
- [20]. Q. Chen, Y. Liu, and X. Zhang, “Creating and evaluating literature-based biomedical concept embeddings,” *Journal of Biomedical Informatics*, vol. 104, p. 103396, 2020.
- [21]. A. Kodipalli and S. Devi, “Segmentation of ovarian cancer using active contour and random walker algorithm,” in *Proc. 5th Int. Conf. on Electrical, Electronics, Communication, Computer Technologies and Optimization Techniques (ICECCOT)*, 2021, pp. 238–241.
- [22]. M. Douze, H. Jegou, and J. Johnson, “The FAISS library: Efficient similarity search and clustering of dense vectors,” *arXiv preprint arXiv:2401.08281*, 2024.
- [23]. S. Ghosh, R. Dey, and A. Mitra, “Parkinson’s disease detection using voice features and random forest classifier,” *IEEE Access*, vol. 8, pp. 112345–112356, 2020.
- [24]. P. Zhang, W. Li, and Y. Wang, “Machine learning for early detection of Parkinson’s disease based on speech analysis,” *Journal of Healthcare Engineering*, p. 6678492, 2021.
- [25]. H. Sharma, A. Kumar, and R. Gupta, “AI-assisted Parkinson’s disease diagnosis via voice signal processing,” *Biomedical Signal Processing and Control*, vol. 70, p. 103084, 2022.