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# Interactive Chatbot with Songs Recommendation Based on Emotion

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**ABSTRACT:** In recent years, the digital devices are dominating the daily routines, the stress and depression are becoming more common. Recognising the importance of mental health and its impact on daily life, we are making the evolution of an interactive chatbot. By Leveraging the ChatterBot library for effective conversation, where it works with Natural Language Processing (NLP) techniques, users can engage flawlessly through voice messages, converted to text by the SpeechRecognition library for responsive interaction. Prompted by every ten responses, users are simulated to take a musical break, enhancing mental well-being. Through analysis of user emotions using Mel Frequency Cepstral Coefficients (MFCC), personalized songs are recommended in the YouTube, aligning with the user's mood. This dynamic integration helps the users to get free from stress and depression, ensuring their mental health. With continuous adaption to user messages, the chatbot ensures offers an interactive approach to alleviate stress, depression and promotes healthy habits and enhanced emotional well-being.

**KEYWORDS:** Natural Language Processing, ChatterBot, Mel Frequency Cepstral Coefficients, Speech Recognition, Emotion Detection, Songs Recommendation.

## I. INTRODUCTION

In today's technological world, characterized by the use of various electronic devices in everyday life, individuals face stress and depression challenges, in addition to digital screens for long hours. The presence of computers, mobile devices, and other digital platforms has transformed the societal interactions and daily routines. However, the excessive use of these devices and the workloads effects the mental health of the people and creates a challenge and necessity to innovate interactive solutions. The SpeechRecognition library supports several engines and APIs, online and offline which converts the user speech into text. Where the text is given as a message to the chatbot and then it gives responses. The interactive chatbot with the effective use of the ChatterBot library, which uses the Natural Language Processing (NLP) techniques and conversational models, providing an effective and dynamic responses, giving the user a feel of interacting with a human. The chatbot gives a more relative, personalized and natural responses such that the user can have a pleasant mind, offering a therapeutic solution to alleviate the negative effects of prolonged use of electronic devices.

Additionally, the incorporation of the algorithm Mel Frequency Cepstral Coefficients (MFCC) extracts the features of the user audio or speech, allowing the system to detect the emotion of the user. The MFCC paves the way to recommend the music with reference to the emotion of the user. The songs are then recommended on YouTube with reference to the most frequent emotion. Overall, our research project aims at enhancing the mental well-being of the user, making the user to free from the stress and depression caused by the digital devices and their workloads, with a therapeutic song recommendation.

The structure of the paper is as follows, Section 2 focuses on the literature review, the research gap and the research studies that has undergone previously by various researchers relevant to the problem, while Section 3 focuses on the methodology and the architecture of the proposed system. Section 4 focuses on the results of the proposed system, and the Section 5 is the conclusion on this research project.

## II. LITERATURE SURVEY

The solution by Amrita Nair et al [1] states that develops a personalized system, where the user's current emotion is analyzed by utilizing the chatbot. The chatbot identifies the user's sentiment by asking some general questions. With context to the input provided by the user, a score is generated for each response, which adds up to a final score, this score is used to generate the playlist. The proposed recommendation system utilizes the Spotify platform and API for the playlist generation and recommendation.

The solution by Shivam Sakore, Pratik Jagdale, Mansi Borawake, Ankita Khandalkar deals with frontend is gonna show us how the ui look like but whenever user talk with chatbot it will eventually reflects on the frontend. And the server side there are mainly two api's would be working to detect the emotion of the text of user by using IBM Emotional API and after the detection of the emotion it will recommend the song through Last.FM API . Conversation is initiated by the user The IBM Emotional API is used to analyze the conversation's emotional content The Cakechat Chatbot will reply to your conversation by utilizing the Last.fm songs API, the app retrieves the top songs based on the Emotion it perceives After listening to a song for some time, a similar song will be recommended to the user using the Last.fm API.

The paper by Rishit Jain et al [3] focuses on The music genre classification model is outlined by a ChatBot model built using NLTK, which can simulate an intelligent conversation with a user, and it employs a feature that enables it to recognize and process audio file with the input from the user. The GTZAN dataset [2] was used for training the music genre classification model, and the trained model for this purpose yielded an accuracy of nearly 68.9%. The accuracy so obtained is relatively better in comparison to other classification models that we had researched.

The paper by Raichal Rose Jaison C, M. Rajeswari [4] suggests method that uses deep learning models such as Artificial Neural Networks, which provide better accuracy to train the model. The major challenge in creating that system is to successfully determine the data for the recommendation process by accurately and consistently detecting the user's emotional state from speech. The proposed system introduces fresh ways for exploration in the artificial intelligence field and music recommendation and has the potential to alter the way people listen to music.

The proposed Solution of Rula M Ali Farkash [5] deals with the chatbot's intents that are defined and integrated into a feed-forward neural network. User messages are analyzed using IBM Watson's natural language analysis function, which returns a sentiment score indicating either a positive, negative, or neutral sentiment. Finally, the chatbot generates a song recommendation from the dataset with user's sentiment score and favorite music genre. In this research study, two neural network models are developed: one for predicting song moods and the other for training the chatbot. The accuracy results illustrate that both the models achieve high accuracy, scoring 80.4% for predicting song moods and 90% for training the chatbot.

The proposed Solution suggested by Gerry Fernando, et al [6] works by conducting a conversation between the system and the user, by a chatbot. This system is a knowledge-based recommender system and uses an ontology that serves as a knowledge base for recommending music. We evaluate the system based on two parameters, such as recommendation accuracy and also the influence of explanation for user satisfaction.

The research work by Neenumol Mathew, et al [7] ensure users can engage in a dialogue whereby the system can better interpret the user context and preferences. This work presents the development of a chatbot personalised music recommender system, based on Natural Language Processing (NLP) techniques, coupled with a web UI that can provide song recommendations based on the user's emotions.

The research study by Anusha, Dr.Srinivasan V [8] utilizes machine learning, a prominent application of Artificial Intelligence, enabling systems to learn and adapt autonomously without requiring explicit programming by a developer. This system aims to construct a song recommendation that offers songs to users based on their behaviors, activities, or preferences. By leveraging information such as user similarity and previous playlist data, the system predicts user preferences, facilitating the recommendation of songs that suits their interests.

Researchers are exploring using emotions to recommend music. Chatbots are a common approach, analyzing user conversation to identify emotions. Sentiment analysis and music genre classification are used to match user emotions to songs. Deep learning exhibits promise for accurate emotion detection. Challenges include accurately detecting





the bot interacts with. Furthermore, the chatbot is trained for the custom data to produce more customized and personalized interactions, enhancing user interaction and satisfaction.

iv) *Speech Recognition*: The user gives his voice message as input and then it is converted into text using the SpeechRecognition library in Python. The SpeechRecognition library supports various APIs such as CMU Sphinx (works offline), Google Speech Recognition, Microsoft Azure Speech, Microsoft Bing Voice Recognition, OpenAI whisper, Tensorflow, Wit.ai and IBM Speech to text, etc. The speech of user is converted to text for the more precise communication.

v) *Emotion Detection*: The speech which is given as input by the user for every conversation is processed for analyzing the emotion. Since, our model is already trained, it is then loaded and the emotion is predicted. For every interaction the emotion is detected and stored. After 10 interactions, the most frequent emotion is found, and then this emotion is used for the personalized songs recommendation.

vi) *Songs Recommendation*: With context to the emotion detected, the songs are then recommended on YouTube by implementing the string manipulation techniques to construct search queries on the detected emotions. As a result, the songs are recommended to user with correspondence to the user’s emotional state. This method provides a personalized user experience, enhancing the relevance of the song recommendations.

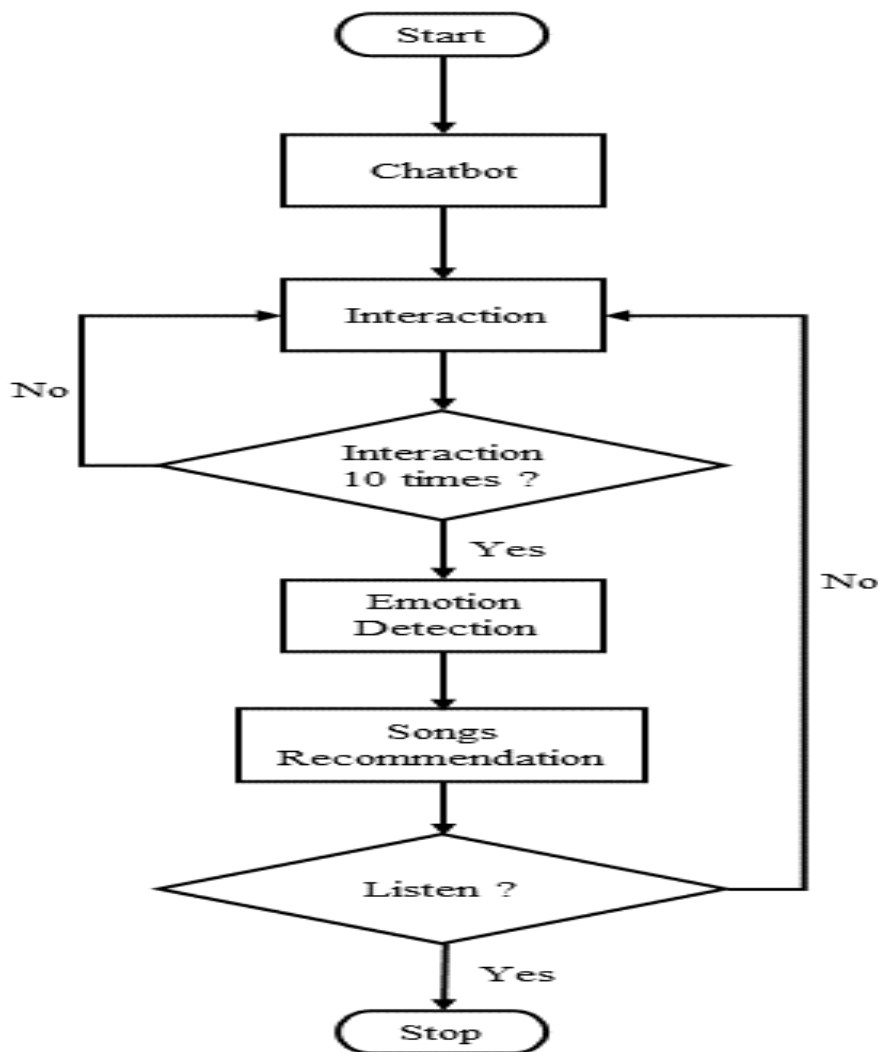


Fig 2. Flow Chart of Proposed System

At first, when the user opens the application the chatbot interface is displayed. And then:

- The user can interact with the chatbot, where the chatbot gives precise responses. The user can give text messages and voice messages as input. The voice messages are converted into text for effective communication.
- The user continuously interacts with the chatbot and when ten interactions are reached, then based on most frequent emotion of the user the songs will be recommended on YouTube.
- If the user do not want to listen songs then he can again have the conversation with the chatbot. For every ten interactions a modal is displayed to give a musical break to the user.

The process is repeated until the user closes the application.

#### IV. EXPERIMENTAL RESULTS

By offering consumers therapeutic support through the interactive chatbot, the results are encouraging in terms of improving their mental health. Through the integration of Speech Recognition, Emotion Detection and personalized song recommendations, the system aimed to alleviate stress and depression caused due to excessive workloads and digital device usage.

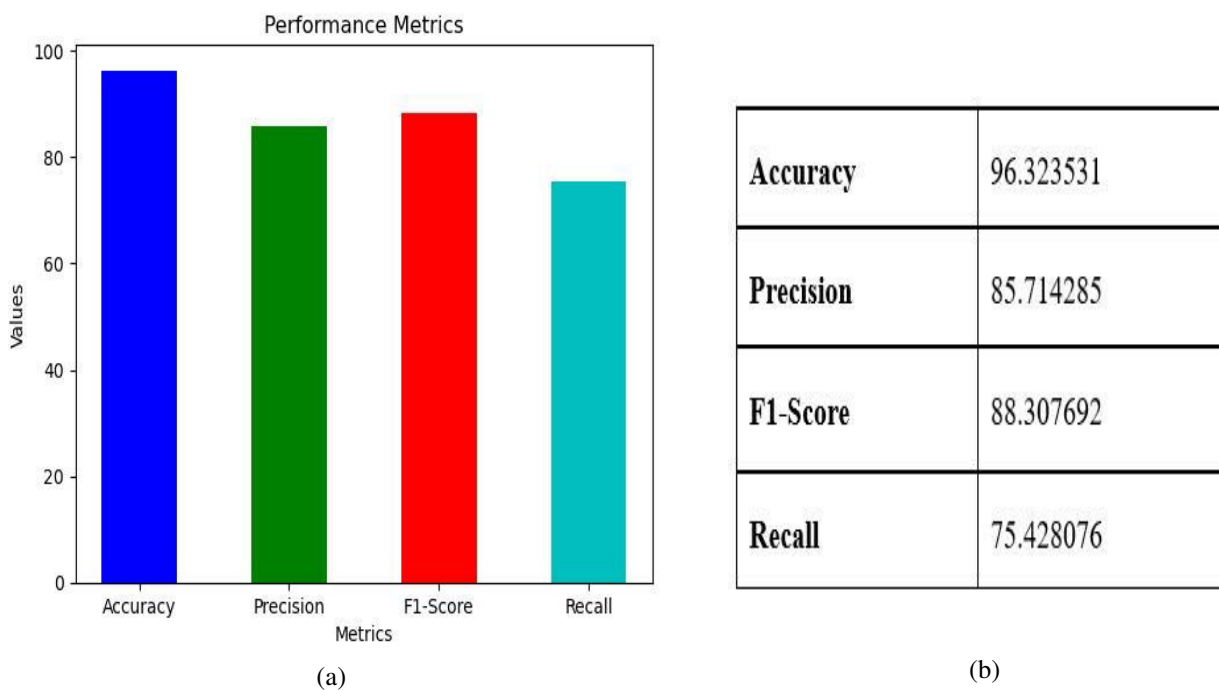


Fig 3. (a). Bar Graph Showing Performance Metrics, (b). Performance Metrics Table

Our proposed method works with an Accuracy of 96.32%, which is prominent and demonstrates over the existing systems. Further, the Precision is 85.71%, F1-Score is 88.30% and the Recall of the model is 75.42%. All these performance metrics demonstrates the overwhelming performance of the proposed methodology.

While the initial implementation showcased the promising results, there are further refinements and expansion of the system. Future developments could explore additional features such as mood tracking and cognitive behavioral therapy exercises to enhance the depth and effectiveness of mental health support.

#### V. CONCLUSION

Our research presents an interactive chatbot which gives precise responses that enhances the mental well-being of the people who get stressed or depressed with heavy workloads and excessive use of the digital devices. Through the

integration of the ChatterBot library which uses Natural Language Processing (NLP) techniques, voice recognition using the SpeechRecognition library and emotional analysis using Mel Frequency Cepstral Coefficients (MFCC), our system provides personalized, interactive responses and therapeutic emotion-driven song recommendations on YouTube. The F1-score, accuracy, precision, memory, and user engagement have all shown encouraging outcomes. Going forward, improvements like mood monitoring and cognitive behavioral therapy activities can be explored. Our study underscores the potential of technological-driven solutions that resulted in promising emotional resilience and fostering healthier digital habits.

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