



Emotion-Based Music Recommender Bot System

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ABSTRACT –

In this paper, we introduce an Emotion-based Music Recommender Bot System new approach for playing music from a playlist given by a bot which will be based on the user's current emotion, which is analysed by the communication between the user and the bot system. Music recommendations have existed for a long time, but in a majority of the scenarios the recommendation is determined after learning the user's preferences over a while, like looking at his past song preferences, the time he listens to the music etc. and the most of the existing approaches involve playing music manually, using wearable computing devices, or classifying based on audio features. Instead, we propose to change the manual sorting and playing through machine learning algorithms. And by using this users can get the responses on limited and current data which is given to the system.

The objective of the bot system is to provide adapted and personalized suggestions to users using a combination of collaborative filtering and content-based techniques. The recommendation is based on inferences about a user's emotions and sentiments. This paper also discusses the system's requirement phase and design and development phase, as well as its evaluation procedure. We believe that our system provides a much better recommendation to users because it enables the users to understand the relationship between their emotional states and the recommended music and the major factor that the communication between user and bot is chat base as well as voice command based at a same time which makes it more user friendly in the terms of UI and UX.

Keywords – Emotion-based Music Recommendation System using AI, Voice Chatbot, Emotion detection, recommender system

I. INTRODUCTION

When radios first came out and then we upgraded to smartphones, it has become one of the main mediums for entertainment nowadays for every human being and a part of the lifestyle. Soon enough a new player emerges in the market. with the introduction of Spotify, Gaana Music Player, Hungama Music Services and many others like YouTube Music Services changed the perspective completely. More and more people around the world are pulled towards these services as this service can be accessed from any platform and also it provides a personalized interface to their user through the recommendation engine. By using all these currently available services and smartphones or electronic device user can listen to songs anywhere anytime, but It's not always easy to pick the right music to listen to. Sometimes you're in a state of mind when you don't what's going on in your mind and you are just totally confused about whether to listen to joyful, disgusting songs or you need to just listen neutrally to whom you relate or any emotion-based music. Settling on this decision can't generally be understood by attempting to pick something. This is why we get the idea to design something like an "Emotion-based Music Recommender Bot System based on AI", which solves this problem and enables us to choose music based on how we want the experience to feel good.

We have designed a system like a communication bot with a voice command accepting feature which will use user's commands to propose a recommender system for emotion recognition that can detect user emotions and suggest a playlist of appropriate songs based on the LAST FM API sorted song dataset.

The proposed system detects the emotions of a person, if the person has a negative emotion, then a certain playlist will be shown that includes the most related types of music that will enhance his mood. And if the emotion is positive, a specific playlist will be presented which contains different types of music that will inflate the positive emotions. The dataset we used for emotion detection is from the Kaggle Emotions dataset for NLP. The song playlist is created by LAST FM API which is pre-processed based on tags. And voice recognition(vice-to-text) and vice-versa are done by Javascript available services. And the machine learning model implementation of emotion detection is performed using logistic regression and gives approximately 78.60% of accuracy. Overall, the system is also used for mental health awareness and depression therapy as well as mental trauma reduction.

II. PROBLEM STATEMENT

Nowadays, we all are living in a time where we know that nothing is certain. The same goes with our mind, at regular instances of time our mood, our choices and our priorities change. Considering the constantly changing behaviour of human beings we have developed this system. We had a goal of developing a system considering that humans experience frequently changes in their mood and somehow, at a particular moment in time, frequently changing of mood would also result in a change in the mood of the music of their choice. Hence, with the help of our system, a person can listen to music according to their current mood described to our system. The system would use user input which can be in text assigned by a keyboard or a voice

command, and then process intent will be passed to the machine learning model and the developed pipeline will predict the user's emotion, and based on it the song playlist will be passed by system.

The main challenge in developing such a system is training the machine learning algorithms to accurately detect or classify human emotion and sentiment. This would require a large dataset of sentences with proper emotion, as well as careful selection and optimization of the machine learning algorithms. Additionally, the system would need to be designed to operate in different commands and input by the user, and if it does not classify the emotion, it should pass proper error. Another challenge is developing an efficient and effective mechanism for transmitting information about the detected emotion to the appropriate sentiment in real time. The system is designed to reduce the loneliness of human beings and feel them relaxed and simultaneously suggest songs which are based on their mood at that time.

Overall, an emotion-based song recommender voice bot system using machine learning and natural language processing has the potential to significantly improve mental health and mental trauma of the constantly changing behaviour of human beings. This system will also reduce the device usability time by directly helping people with what they want.

III. RELATED WORK

Recommendation systems are any system that produces individualized recommendations as output or has the effect of guiding the user in a personalized way to interesting or useful objects in a large space of possible options [Burke 2000]. Emotions are an incredibly important aspect of human life and basic research on emotions over the past few decades has produced several discoveries that have led to important real-world applications.

In the literature, there are many solutions for recommending music suited to the listeners' environment, and in general, in all areas that refer to IT for "well-being", e.g., gyms [1] or home settings [2]. From a musical point of view, music generation takes place either by selecting existing music from platforms such as Spotify or Youtube or by using sophisticated generative music composition techniques [3,4]. From a technological point of view, most such systems combine Artificial Intelligence (AI) and Internet of Things (IoT) techniques to ensure intelligent musical choices that satisfy listeners [2]. Asghar et al. [7] proposed an emotion detection system for emotion detection from social media text using a hybrid classification scheme. The input text is pre-processed and then made input to a series of classifiers which classify the emotions detected from text, emojis and slang terms. The system's performance can be improved by increasing the size of the dataset and further experiments are required to be conducted using supervised learning techniques. Shaila and Vadivel [8] proposed an emotion detection system using a supervised learning technique. For this purpose, an artificial neural network system is designed to isolate positive and negative emotion signals from the text.

There has also been research done on the Music Recommendation System. According to one such research [6], a preliminary approach to Hindi music mood classification has been described, that exploits simple features extracted from the audio. MIREX (Music Information Retrieval Evaluation eXchange) mood taxonomy gave an average accuracy of 51.56% using the 10-fold cross-validation. In addition to this, there is an article [5] that states that the current music recommendation research results from the perspective of music resources description. It is suggested that there is a lack of systematic research on user behaviour and needs, a low level of feature extraction, and a single evaluation index in current research. The situation was identified to be an important factor in the music personalized recommendation system. Finally, it was concluded that when the weights given to all the contextual factors were the same, greatly reduced the accuracy of the recommendation results.

There are various emotional tone analysis methods provided by various developers and authors used to build better models for the prediction of emotional tone. As we all know that music has a huge effect on the listener's mood and emotional state it might either compliment the user's mood or change it. Each song has an emotional tone upon which it is built this analysis of the song gives us insight into the lyricist's mood while writing the song this understanding and analysis of tone is necessary to develop interactive applications, and music players to use this understanding to recommend songs based on listeners mood and interest IBM Watson Tone Analyzer API is there which is also used to analyse language and emotional tones from song lyrics a dataset of 300 songs is extracted using the API is executed [9]. Emotion detection and recognition from text uses the Natural Language Processing analysis that may show valuable input to a variety of input data but there is various form of writing such as social media posts, news articles, customer reviews, micro-blogs and more and text mining of these content can be useful for creating a larger emotional dataset, this is achieved by a novel neural network architecture is implemented called as SENN (Semantic-Emotion Neural Network) that can use both semantic/syntactic and emotional information.

IV. METHODOLOGY

The emotion-based music recommendation voice chatbot system is an application that focuses on implementing real-time emotion detection. It is a prototype of a new product that comprises two main modules: Emotion detection from user's input/ emotion detection and Music recommendation:

1. Chatbot

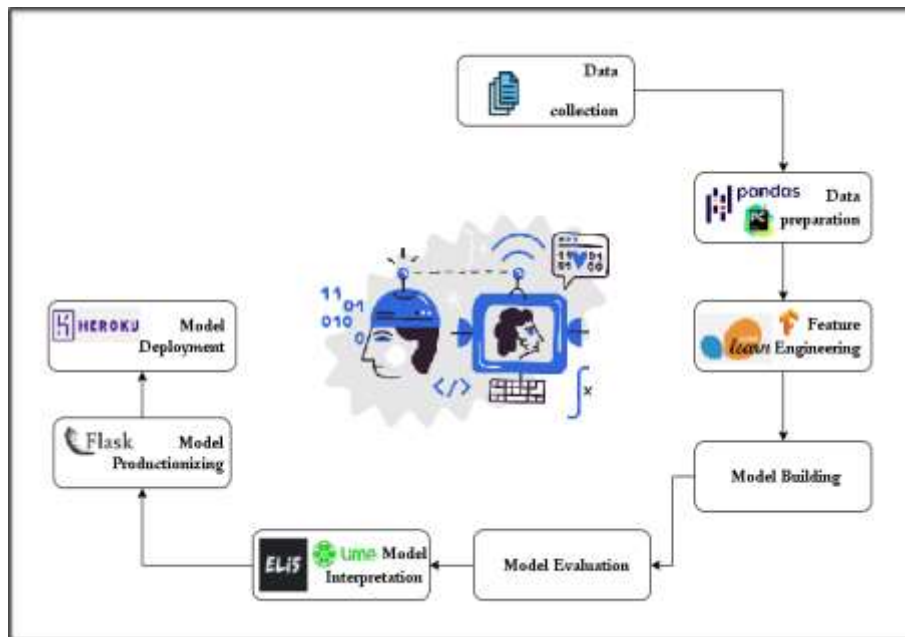
Since the voice Chatbot is the main part of the project, we have designed a bot system. The process of detecting a user's emotion from the conversation between bot. and based on that sentiment the machine learning model should return the emotion with the highest confidence (its factor used to check the probability of output emotion). Chatbot Frontend and Backend Chatbot is the frontend of our project where our users interact, we are deploying this module using flask, HTML, CSS, and a chatbot backend this is developed by Microsoft HuggingFace, this backend module can be found on Github under microsoft/JARVIS repository. The chatbot frontend is built on flask framework we use html, CSS, js and bootstrap framework to build our webpage on a

localhost to deploy our chatbot we collect the user input using a get parameter and this input is sent to our second module emotion classifier. We will be using the POST request to get the chat response we will be providing the post request with two parameters context and emotion. The context is the user input, and the emotion is analyzed from the emotion classifier machine learning pipeline which can recognize only one of the following emotions ('joy', 'sadness', 'fear', 'anger', 'surprise', 'neutral', 'disgust', 'shame'), emotion to condition the response on, optional param if not specified, 'neutral' is used. Once the emotion is detected, we passed it to LAST.FM.API with the emotion tag and it will return a response which is a song playlist based on that emotion.

2. Emotion Detection

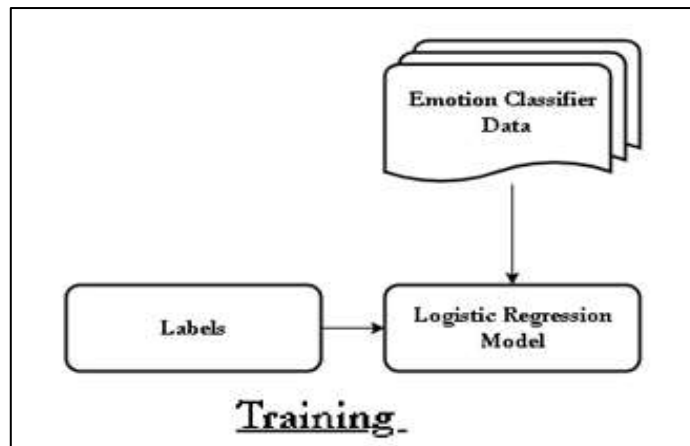
Sentiment analysis (also known as mood or emotion AI) refers to the use of natural language processing, text analysis, computational linguistics, and biometrics to systematically identify, extract, quantify, and study affective states and subjective information. The implementation of such a system involves several steps, including data collection, data pre-processing, machine learning model development, real-time implementation, reporting, system integration, and testing and optimization.

Here is a proposed method for developing an emotion classifier using machine learning:



Logistic Regression

The Logistic Regression (LR) classifier is applied to classify emotions from the input text. Diagrammatic representation is shown in Fig. 1 that LR performs emotion classification using a supervised machine learning approach [13,14,15].



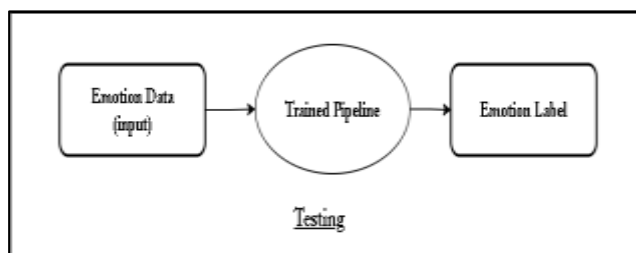


Fig: Text-based Emotion Classification Using Logistic Regression

we evaluate the performance of the proposed Logistic Regression Classifier using different performance evaluation metrics like precision, recall and f-measure (Fig.5). It is clear that satisfactory results are obtained for the detection of different emotions types.

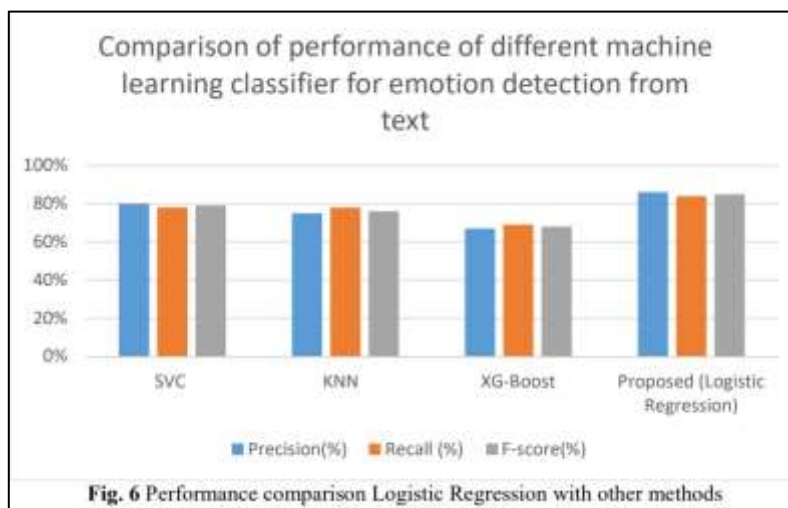


Fig. 6 Performance comparison Logistic Regression with other methods

The logistic Regression classifier-based supervised learning approach is proposed to classify text into different emotions classes. We applied the Kaggle Emotions dataset for NLP in the proposed model setup by splitting the dataset into training and testing splits. Pre-processing was applied to clean the text before its feeding to the classifier. Five emotion classes were used for text classification into emotions. The proposed system produced promising results when compared with other methods.

3. Music Recommendation

In this model, we would be setting up the Last.fm Songs API so that we can recommend some songs to the user based on the emotion of the user. We were using an API here as we don't have enough data, computational power and time to scrape the web for songs based on the specific information of tones we have extracted previously. But know the values will be transferred to last.fm. The songs will be played from the detected emotion. When the emotion is transferred the respective playlist and the emotions are numbered arranged and assigned to every song by Last.fm.

Overall, this proposed method involves the use of data collection, pre-processing, machine learning model development, testing, integration, evaluation, and optimization to develop an accurate and efficient Emotion-based Music Recommender Bot system using machine learning and natural language Processing.

V. IMPLEMENTATION

In these segments, we'll see the flow of our venture and how it'll work.

In Begin the home page of our website will be loaded on the index page all the pages are linked, if the user clicks on Get Started button it will be redirected to the chatbot page. And similar Services, Suggestion page buttons are there.

Now Let's Discuss one by one- Home Page: After running the application, then the index page.

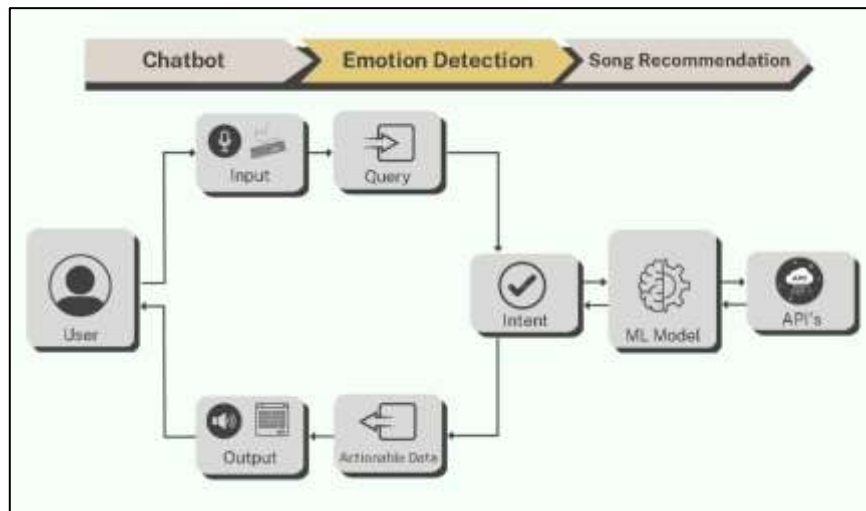
Vibzii Chatbot "Get Started":

We can also chat with our chatbot, after chatting with the chatbot the application will give suggestions for listening to songs as per the mood of the user (in my case you can see that in the below figures, the user's mood is "neutral"), these songs will come through to last. fm.

When We Click on Any Track whatever we want then it will redirect to me on this song through to Last.fm API.

VI. SYSTEM ARCHITECTURE

The architecture of the Emotion-based Music Recommender Bot System is designed to recommend music to users based on their emotions. To do so, the system captures user emotions by user and bot communication, which will be later proceeded by machine learning algorithms. It will search for like-minded users who have similar emotion profiles and recommend music with explanations. This system is a based-on technique of collaborative filtering. As illustrated by Figure 2, the system is composed of six modules: User profiles (bot communication interface), input processing, query creation, Emotion detector, and Recommendation module



V CONCLUSION

In conclusion, Music helps change the mood of the user and for some people, it is a stress reliever. Recent development shows a wide perspective in the development of the emotion-based music recommendation system. The methodology that enhances the automatic playing of songs is done by the detection of personal emotion. The music player that we are using can be used locally and the emotion of a person can be taken by different wearable sensors that would give us enough data to predict the mood of the customer accurately. This system will be able to benefit and the system with advanced features needs to be constantly upgraded. The alternative method, which is based on the additional emotions which are being excluded from our system

The implementation of such a system involves several steps, including data collection, data pre-processing, machine learning model development, real-time implementation, alerting and reporting, system integration, and testing and optimization. Each step requires expertise in machine learning, real-time systems development, and the system must be carefully designed and optimized to ensure accuracy, reliability, and efficiency.

Overall, an Emotion-based Music Recommender Bot System using natural language processing and machine learning has the potential to save time, reduce loneliness, and improve overall mental health. With advances in technology and increasing demand for better lifestyle-making tools, such systems are likely to become increasingly common in the coming years.

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