



A Machine Learning Based Chatbot Song Recommender System

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Abstract: - Music is an integral part of our lives. However, since the social media platforms like TikTok and Instagram have a huge influence on the music charts worldwide, users are exposed solely to mainstream music, therefore the recommendations on music streaming platforms are not very personalized. An song and emotion-based recommendation system permits the users to listen to music based on their emotions. Existing systems use audio signals using the CNN approach and collaborative filtering to recommend songs based on the user's history. The proposed research work develops a personalized system, where the user's current emotion is analyzed with the help of the chatbot. The chatbot identifies the user's sentiment by asking some general questions. Based on the input provided by the user, current emotion or mood is analyzed by the chatbot and it will generate the playlist. The proposed recommendation system utilizes the APIs for the playlist generation and recommendation.

Playlist generation, IBM Tone Analyzer API, Last.fm API, CakeChat server.

Introduction: - Everyday, each and every person undergoes lot of troubles and the reliever of all the stress that are encountered is Music. If it is so, the vital part of hearing the song has to be in a facilitated way, that is player able to play the song in accordance to the person's mood. The paper proposes such a player and hence named Emotion based music player. Recognizing the human emotions is considered to be a global consistency but depict variability among the humans on the basis of their abilities. The different approaches being the classification of emotions that are existing are depicted as knowledge-based, statistical and hybrid techniques. However there relies several difficulties while retrieving the music information such as querying by singing, genre classification, etc. The most possible implementation is by producing music suggestion that is based on the content. The multiple efforts to detect and describe the feeling, to classify based on features are all wanted to obtain outstanding music recommendation system. For describing a music taxonomy, a feeling descriptor is found to be useful.

Keyword:- Interactive Chatbot, Application Program Interface, Interactive Systems, Recommender Systems,

In this project, we would be building an extensive Chatbot service, to which you can talk to. And talking to a chatbot wouldn't be business-driven. It would just be casual conversations. Further, on top of it, the chatbot would also be recommending songs to the user based on the tone of the user. This song recommendation feature employs the use of Last.fm API, very much similar to the popular Spotify API. Also for tone/emotion analysis of the conversation we will be using the IBM Tone Analyzer API. Collaborating with these types of APIs is very much critical as in today's world the popular chatbots do much more than simply having a data-driven conversation; to supplement additional user-oriented features. Also the reason to choose python to build the chatbot is because python boasts a wide array of open-source libraries for chatbots, including scikit-learn and TensorFlow. It is great for small data sets and more simple analyses; also Python's libraries are much more practical.

Literature Survey: - Few of the key features emphasized by the papers that have been surveyed are:

1. Nikhil et al. [1] use algorithms and technologies which include Haar cascade, Canny edge, Blob detection for the process of emotion detection. The system captures pictures of the user and according to that mood gets detected. Inputs like face and emotions are taken from the picture, and the system also provides a chat box to give responses. The proposed system in the paper presents a new approach for building desktop application for chat bot using text and gestures. The system is able to make a conversation through the chatting application. The system will send some links, web pages or information depending on the response from the user. The system detects smile and stress. When a smile is detected by the system, jokes pop-ups will be shown on the screen, and when stress is detected, inspirational quotes pop-ups will be shown on the screen. Also, happy songs are played when a smile is detected. And similarly, inspirational songs are played when stress is detected.

2. Ai Thanh Ho et al. in their paper [2], introduce an Emotion-based Movie Recommender System (E-MRS) which is intended to solve the problem that the conventional system of user profile does not take into consideration how important user's emotions are and how they affect user's choices, which the recommender systems are unable to understand and capture the constantly changing preferences of user. According to the paper, the objective of EMRS is to give the users a list of suggestions that are customized using a combination of collaborative filtering and content-based techniques. Here the user's emotions as well as his preferences are taken into account when providing a

recommendation, also other similar user opinions are considered. The design of the proposed system, its implementation along with its evaluation procedure is also discussed. In order to relate emotions to movies, the users have to answer a questionnaire about what movies or which categories of movies they liked to watch according to each emotion. Furthermore, the system captures user emotions by asking them to use 3 colours to decorate their avatar

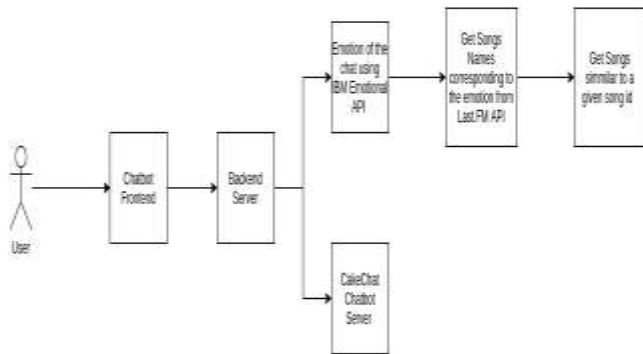
3. Jae Sik Lee et al. [3] have used the concept of context reasoning wherein the context data is utilized to understand the user's situation. They propose a music recommendation system that comprises the ability of context reasoning in this paper. Their proposed system contains modules such as Intention Module, Mood Module and Recommendation Module each of which provide a unique functionality to the system and play a vital role for the system's performance as a whole. Context reasoning is done by the Intention Module with the help of environmental context data and concludes whether the user is interested in listening to music or not. Next, the type of music that is deemed to be most appropriate to the user's context is determined by the Mood Module. Lastly, the music is recommended to the user by the Recommendation Module

4. Renuka R. Londhe et al. in [4] have studied the concept of recognizing facial expressions by taking into account the various properties that are associated with a person's face. Whenever there is a change in the facial expression, changes can be noticed in the curvatures on the face as well as features of the face such as nose, lips, eyebrows and mouth area. And accordingly, there will be changes in the intensity of the corresponding pixels of the images. These features are then classified into six expressions which include anger, disgust, fear, happy, sad and surprise with the help of artificial neural network. The Scaled Conjugate Gradient back-propagation algorithm is used to train and test the two-layered feed forward neural network. They acquired a 92.2 % recognition rate. Here, they have made use of the JAFFE database which consists of seven expressions for analysis through the computer.

5. Dolly Reney et al. in their paper [5] address the importance of face and emotion identification in the field of security and how it helps give solutions to the different challenges faced. Database plays a major role when comparing the facial attributes and sound Mel frequency components, when it comes to whichever face and emotion identification system. The database is created for which facial characteristics are computed and these are then stored in the database. Various algorithms are used in order to

analyze the face and emotion with the help of the aforementioned database. The implementation of the process of recognizing the person's face and the emotion being expressed by him uses an effective method for the creation of a database comprising the facial expressions and emotion. They have used the Viola-Jones algorithm for the face identification process and the face and emotion identification is evaluated by the KNN classifier.

Architecture:-



Algorithms:-

❖ **SVD (Singular Value Decomposition)**

Algorithm:

SVD could also be a matrix factorization technique that is typically used to diminish the quantity of feature of a dataset by reducing the matrix from N space to K space where $K < N$.

For the point of the guidance framework be that as it may, we are just interested about by the matrix factorization part keeping same dimensional.

The matrix factorization is completed on the user-item ratings matrix built.

Each item is often represented with a q vector. Similarly, each client are often represented by a p vector such the inner product of these 2 vectors is that the expected rating. Find p and q such it minimizes the following:

Figure:-

$$expected\ rating = \hat{r}_{ui} = q_i^T p_u$$

$$minimum(p, q) \sum_{(u,i) \in K} (r_{ui} - q_i^T \cdot p_u)^2$$

$$minimum(p, q) \sum_{(u,i) \in K} (r_{ui} - q_i^T \cdot p_u) + \lambda(\|q_i\|^2 + \|p_u\|^2)$$

❖ **Nearest Neighborhood Model:**

Nearest Neighborhood model involves collecting data from numerous clients at that point making forecasts according to the similarity measures between users and between items.

This might be grouped into client-based and item based models. In item-based model, it's expected that songs that are frequently listened together by certain clients will in general be indistinguishable and are bound to be listened together in future additionally by another client.

According to client based similarity model, clients who have similar listening histories, i.e., have listened in to similar songs inside the past will in general have comparative interests and may most likely hear similar songs in future as well.

Advantages:-

- **Chat-bots have 24/7 Availability:** Chat-bots are available to solve customer problems 24/7 whether it is day or night! They don't need to sleep after all! This is much more difficult to achieve using human customer service as it would require rotating teams that would be more complicated to manage as well. This means that chat-bots can answer customer queries whenever customers have queries which help in increasing customer loyalty. If companies don't address customer problems as soon as possible, then the customers may switch to another company that provides better customer service.
- **Chat-bots cause an Increase in Sales:** Customers can get instant support and solutions for their problems using chat-bots while using agents takes a longer time. When customers get such good service, chances are high that they will be more loyal to the company which will drive up sales. Companies can also use chat-bots to market their latest products directly to their customers. When customers get recommendations for a product while chatting to a chat-bot, it is much more personal than a mail or a random ad and they are more likely to buy the product. So chat-bots can increase sales in this manner as well.
- **Chat-bots provide Long-term Financial Savings:** Companies that have human customer support teams have to pay a large amount of money as salaries to their employees. And if the company is

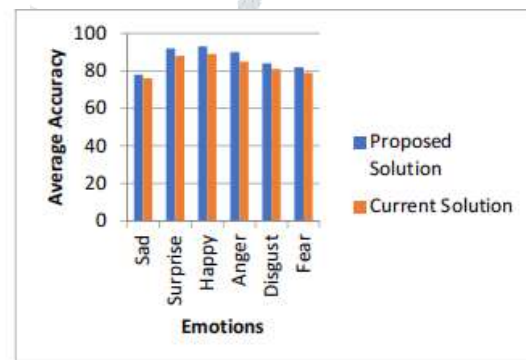
large then their expenditure will be equally large as well! Here, a chat-bot can reduce this expenditure so that the company has long-term financial savings. While it is true that initially, a company has to invest a lot of time and money in creating a chat-bot, after some time the chat-bot will be able to answer all the basic customer queries that would have taken a lot of time for humans. In addition to that, the chat-bot can give instantaneous replies which saves time. And time is money in business!

Disadvantages:-

- Chat-bots can only handle basic questions: Chat-bots are still a basic Artificial Intelligence technology and so they can only answer the basic questions of customers and provide general information that is already available to them. They cannot solve complicated queries or answer out of script questions and companies need to have human customer service employees that can manage these for them. However, this is changing with time and currently, more and more advanced chat-bots are entering the market.
- Chat-bots are difficult to create: Chat-bots are created using Natural Language Processing which is extremely popular for customer support applications. Natural Language Processing is a part of Machine Learning which can be used to interact with the users in textual form and solve their queries. However, this requires complex programming and is not easy for companies. This becomes especially difficult if companies have to create chat-bots from scratch and that is why many online platforms help companies to build and manage chat-bots easily.
- Chat-bots require constant maintenance: Companies cannot just create a chat-bot and then leave it hoping that it will correctly answer customer inquiries forever! The company products change with time and more advanced Natural Language Processing capabilities are also developed with time. All of these changes need to be programmed into the chat-bot so that it has the most up to date information. In addition to that, chat-bots also need to be periodically analyzed so that the most common questions that customers have can be identified and then their answers updated for future customers.

Conclusion:-

We have presented a survey and methodology for building the chatbot song recommender system. To perform this, we first identified various approaches for building a chatbot known to date. We then evaluated the considered algorithms which are useful in building of our system in terms of their ability to work on the recommendation process of the system. We also gathered all the requirements needed for building our system and studied the overall process involved in chatbot's working. Lastly we summarized the deployment requirements of our system. On the conclusion note our 'Chatbot Song Recommender System' is used to facilitate the use by physically challenged people to automate and give them better music player experience. The application solves the basic needs of music listeners without troubling them as existing applications do.



Average accuracy of various emotions

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