

SYNOPSIS

Report on

CHATBOT SONG RECOMMENDATION SYSTEM

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ABSTRACT

Music is the universal language of mankind. However, since social media platforms like Facebook and Instagram have a huge influence on the music charts worldwide, users are exposed solely to mainstream music, and recommendations on music streaming platforms are not very personalized. In this era of technological advancement, recommending songs based on a person's emotions is much needed as it will improve users' listening experiences and help them relieve stress by listening to soothing music according to the emotion perceived. In this paper, we have implemented a chatbot that interacts with the user, analyses the emotions of chats, and recommends a song playlist based on the user's emotions. The objective of our application is to identify the emotion perceived by the user, and once the emotion is identified, a list of songs is suggested based on the emotion. A user can play these recommended songs and can simultaneously chat with the chatbot. Our proposed system is implemented as a web application. We have built a simple retrieval based chatbot which uses predefined input patterns and responses. We have used a special recurrent neural network named Long Short-Term Memory to classify the category of a user's message and get an appropriate response from the chatbot. Support Vector Machine, Linear Support Vector Machine, Random Forest, and Decision Tree Classifiers are used to detect the emotions expressed by the user in chats

Keywords: Deep Learning, Natural language processing, Long Short-Term Memory, SVM, Random Forest Classifier, Decision Tree, LSVM, Emotion Detection

TABLE OF CONTENTS

PAGE NO.

1. INTRODUCTION	4
2. LITERATURE REVIEW	5-6
3. PROJECT/RESEARCH OBJECTIVE	6-7
4. RESEARCH METHODOLOGY	8-9
5. PROJECT/RESEARCH OUTCOME	9-10
6. PROPOSED TIME DURATION	11-12
REFERENCES	12

INTRODUCTION

Natural language processing is the ability of a computer programme to understand human language and has a lot of applications in today's world. The most popular application is the recognition of emotions from text. Emotion Detection and Recognition from Text analysis is a recent field of research that is closely associated with sentiment analysis. Sentiment analysis is a branch of Natural Language Processing (NLP) that seeks to detect positive, neutral, or negative emotions in text. It is dedicated to the exploration of subjective opinions or feelings collected from various sources about a particular subject, whereas Emotion Analysis is a process of detecting and recognising different types of feelings through the expression of texts, such as anger, fear, disgust, happiness, sadness, and surprise. Detecting a person's emotions is a difficult task but detecting emotions using text written by a person is even more difficult as a person can express their emotions in any form. The context-dependence of emotions inside the text is one of the most difficult aspects of determining emotion. For example, consider the phrase "Shut up!" It has an element of anger without using the word "anger" or any of its counterparts. Emotion detection is a crucial process in our project. Recognizing these emotions from a text plays a vital role in our application. In our project, the process of emotion detection of the user is done with the help of four supervised machine learning algorithms, namely Support Vector Machine (SVM), Linear Support Vector Machine (LSVM), Random Forest, and Decision Tree. The proposed model will detect six basic emotions as „happy“, „sad“, „anger“, „surprise“, „fear“ and „neutral“. The Chatbot module of the application makes use of Deep Learning techniques for its implementation. We created a simple, retrieval-based chatbot that employs pre-programmed input patterns and responses. To classify the category of a user's message and obtain an appropriate response from the chatbot, we utilized a special recurrent neural network called Long Short-Term Memory.

LITERATURE REVIEW

A few of the key features emphasized by the papers that have been surveyed are: According to the paper "Approaches, Tools and Applications for Sentiment Analysis Implementation" in the year, September 2015 written by Alessia D'Andrea, Fernando Ferri, Patrizia Grifoni, and Tiziana Guzzo the machine learning approach is used for predicting the polarity of sentiments based on trained as well as test data sets. While the lexicon-based approach does not need any prior training in order to mine the data. It uses a predefined list of words, where each word is associated with a specific sentiment. A challenge in applying sentiment classification approaches and tools for sentiment analysis of posts in social media is to overcome the ambiguity that actually represents a particular problem since it is not easily made use of coreference information. Typically the analyzed posts contain irony and sarcasm, which are particularly difficult to detect. So the evolution of approaches and tools is required to overcome this limitation. According to the paper "Music recommendation system based on facial emotion recognition" in the year March 2020 written by Deny John Samuel, B. Perumal,

Muthukumaran Elangovan the Model recognizes the mood of the user from facial emotions and recommend music. The proposed system is both time and cost-efficient. Due to the unbalanced nature of each element set, effective approaches to incorporate different highlights and functionalities should be investigated. To improve the exactness of the arrangement framework the informational collection used to construct the grouping model could be expanded further.

According to the paper "Sentiment Analysis of Students' Feedback with NLP and Deep Learning: A Systematic Mapping Study" in the year 28th April 2021 written by Zenun Kastrati, Fisnik Dalipi, Ali Shariq Imran, Krenare Pireva Nuci, Mudasir Ahmad Wani In this model, both Sentiment analysis and opinion mining are used interchangeably. Applied systematic mapping as the research methodology for reviewing the literature. The sentiment/ opinion polarity, which could either be positive, negative, or neutral, represents one's attitude towards a target entity. Emotions, on the other hand, are one's feelings expressed regarding a given topic. Identifying figurative speech, such as sarcasm and irony, from student feedback text, in particular, is lacking and needs further exploration. Most of the datasets found in the studies discussed in this survey paper were unstructured. Perform more analysis in mapping study by conducting systematic literature reviews (SLRs). Papers that were written in English were selected in this study so, some relevant papers that are written in other languages were not included. According to this paper "Music Recommendation System" in year July-2019 written by Smt. Namitha S, the playlist is a special function of such systems. Many users find it difficult to create a list from a long list of songs. Hence, this particular approach provides them an option to create their personalized playlist through recommendations. A successful personalized music recommendation technique has become key to stay their members from jumping to another service. Facing a massive collection of music. Users are unable to make a decision and have no idea of what to listen to. Users sometimes have problems discovering new songs when using music streaming websites. To

involve such techniques that can give recommendations for new songs. Including methodologies for providing good and accurate music.

RESEARCH OBJECTIVE

The research objective of the project on a chatbot song recommendation system is to design, develop, and evaluate an intelligent chatbot that can provide personalized song recommendations to users based on their musical preferences and interact with users in a natural and engaging manner. This project aims to address the following specific objectives:

Data Collection and Analysis

Gather a diverse dataset of music tracks, user preferences, and user interactions with songs. Analyze the data to identify patterns and correlations that can inform the recommendation algorithm.

Recommendation Algorithm Development

Design and implement a recommendation algorithm that takes into account user preferences, listening history, and song features (e.g., genre, tempo, mood) to suggest relevant songs.

Natural Language Understanding

Develop a natural language processing (NLP) component that allows the chatbot to understand and respond to user queries and requests related to music, such as song requests, genre preferences, and mood-based recommendations.

User Interface and Experience

Create an intuitive and user-friendly chatbot interface that enables users to interact with the system easily. Ensure that the chatbot can carry on a meaningful conversation and adapt its recommendations based on user feedback.

Personalization and Adaptation

Implement mechanisms for the chatbot to continuously learn and adapt to user preferences over time. Explore methods such as collaborative filtering and content-based filtering to enhance personalization.

Evaluation and User Feedback

Conduct user testing and gather feedback to assess the performance and user satisfaction of the chatbot. Use metrics like user engagement, click-through rates, and user ratings to evaluate the system's effectiveness.

Scalability and Robustness

Ensure that the chatbot system can handle a growing user base and maintain robust performance under varying loads. Implement error handling and graceful degradation strategies.

Ethical Considerations

Address ethical concerns related to user data privacy, bias in recommendations, and responsible AI usage. Implement safeguards to protect user information and ensure fairness in recommendations.

Comparative Analysis

Compare the performance of the developed chatbot recommendation system with existing music recommendation services and state-of-the-art chatbots to benchmark its capabilities.

Documentation and Reporting

Document the entire development process, algorithms, and findings. Prepare a comprehensive report summarizing the research, methodology, results, and recommendations for future improvements.

By achieving these research objectives, the project aims to contribute to the advancement of chatbot technology for personalized music recommendations, enhancing user experiences in the realm of music discovery and engagement.

RESEARCH METHODOLOGY

The application in our project is a webapp called “RIYA’S CHATBOT”. The application primarily is a chatbot application which incorporates the emotion detection module. The emotion detection module is used for identifying the emotion expressed by the user while chatting with the chatbot and songs are suggested according to the user’s emotions. The application consists of three modules: Chatbot, Emotion detection, Music Recommendations.

CHATBOT MODULE

A chatbot is an intelligent software that is capable of communicating and performing actions similar to human. There are two basic types of chatbot models based on how they are built namely Retrieval based and Generative based models. We have built a simple retrievalbased chatbot which uses predefined input patterns and responses. The chatbot will be trained on the dataset which contains categories ,patterns and responses. It then uses an heuristic approach to select the appropriate response. We have used a special recurrent neural network named Long Short-Term Memory (LSTM) to classify which category the user’s message belongs to and then we will give a random response from the list of responses. The data set used is a JSON file which has predefined patterns and responses. As the data is in json format we use the json package to parse the JSON file into Python. With the help of Keras sequential API we build a deep neural network containing 3 layers. We then train the model for 200 epochs. After the model has been successfully trained, it is saved using the 'model.save' function. . The advantage of preserving the model is that you don't have to fit the model every time you execute the code, which would take a long time. The load function can be used to load the model.

Emotion Detection Module

The Emotions Detection model is built to classify the emotions of a chats. The model is implemented by using four supervised machine learning algorithms namely Support Vector Machine (SVM), Linear SVM, Random Forest and Decision Tree. The proposed model will detect 5 basic emotions as „happy“, „sad“, „anger“, „surprise“, „fear“. The dataset for emotion detection model is downloaded from Kaggle which is a dataset containing different sentences with emotions. The dataset contains 7480 instances. The emotion column consists of a key (0-4) that represents the emotion being expressed. The emotions are classified as: 0=Surprise, 1=Happy, 2=Fear, 3=Sad, 4=Angry. We train our data using four machine learning models and then choose the model that works best on the training and testing sets. The Classifiers used for prediction are Support Vector Classifier, Linear Support Vector Classifier, Random Forest Classifier and Decision Tree Classifier.

Music Recommendation Module

Once the emotion has been detected and classified into one of the five categories it is sent to our third module which suggests songs based on the emotion being detected. When the user clicks on the Suggest songs button song playlist is displayed on the user's screen with the options. The user can select a song among the list displayed and play songs. The songs will play one after the other, until the user asks the chatbot to detect the mood again. Only the songs appropriate for the mood are listed on site. Each song listed on the website provides the user with the song poster and some basic details of the song such as the artist, genre, rating of the song in case the user is interested and wants to know more about the song.

PROJECT OUTCOME

The project outcome for a chatbot song recommendation system would typically include:

FUNCTIONAL CHATBOT

A fully functional chatbot that users can interact with to request song recommendations.

User Interface

If applicable, a user-friendly interface for the chatbot, such as a web or mobile app.

Database

A database or dataset of songs with relevant metadata, such as genre, artist, release year, and user preferences.

Recommendation Algorithm

The core recommendation algorithm that suggests songs to users based on their preferences, previous interactions, or input.

Natural Language Processing (NLP)

Integration of NLP techniques for understanding and responding to user input in a conversational manner.

User Profile Management

A system for managing user profiles and collecting data on user preferences over time.

Feedback Mechanism

A mechanism for users to provide feedback on recommended songs, helping to improve future recommendations.

Performance Metrics

Metrics to evaluate the chatbot's performance, such as recommendation accuracy, user engagement, and response time.

Privacy and Security

Measures to protect user data and ensure the privacy and security of user interactions.

Documentation

Comprehensive documentation on how to use and maintain the chatbot system, including installation and setup instructions.

Testing and Evaluation

Results from testing and evaluation of the chatbot's performance, including any user feedback or improvements made based on it.

Future Enhancements

Ideas and plans for future enhancements or features to further improve the chatbot's functionality.

PROPOSED TIME DURATION

Task	Subtask	Start Date	End Date	Duration
Project Planning	Define scope and objectives	10/09/2023	15/09/2023	5 days
	Create project plan and timeline	16/09/2023	20/09/2023	5 days
Chatbot Design	Choose chatbot platform and tools	21/09/2023	25/09/2023	5 days
	Define chatbot persona and tone	25/09/2023	30/09/2023	6 days
	Design chatbot dialog and flow	31/10/2023	10/10/2023	11 days
Chatbot Development	Implement chatbot logic and functionality	11/10/2023	25/10/2023	16 days
	Integrate chatbot with music recommendation API	26/10/2023	08/11/2023	13 days
	Test chatbot performance and usability	10/11/2023	30/11/2023	20 days
Project Closure	Evaluate project outcomes and lessons learned	01/12/2023	05/12/2023	5 days

Task	Subtask	Start Date	End Date	Duration
	Deliver project report and documentation	06/12/2023	10/12/2023	5 days

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