

# MusicBot Recommender System

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## Abstract-

Today, As the digital music increasing significantly in current generation. Every month conduce a lot of song catalogue data and becoming unstructured and making it becomes difficult for users to choose the songs they want to listen. In this project, we are trying to develop a better song recommendation system with chatbot. Chatbot will asking for mood and feeling on the bases of that it will find the songs on the database used and recommend to the user. So, as we know that hearing music more than an average time it is observed that it can cause hearing problem that's not good for our health and can make a person deaf, Usage of electronic device for more than 4-6 hours was observed in 60 members. Among these individuals most of them were using these devices by lying on the bed and some were also using in cervical flexing position. To tackle this problem, we added screen timer to our recommender system which shows time to person who is using it and can use it wisely according to time.

**Keywords:** Music Bot, Music Recommender System, Natural Language Tool Kit, Natural Language Process, Music Database.

## I. INTRODUCTION

Recommender systems are used in a variety of areas, with commonly recognised examples taking the form of generators for video and music services, product recommenders for online stores, or content recommenders for social media platforms and open web content recommenders. These systems can operate using a single input, like music, or multiple inputs within and across platforms like news, books, and search queries. There are also popular recommender systems for specific topics like restaurants and online dating. Recommender systems have also been developed to explore research articles and experts, collaborators, and financial services. Recommender systems usually make use of either or both collaborative filtering and content-based filtering (also known as the personality-based approach), as well as other systems such as knowledge-based systems. Collaborative filtering approaches build a model from a user's past behaviour (items previously purchased or selected and/or numerical ratings given to those items) as well as similar decisions made by other users.

A chatbot is a software or computer program that simulates human conversation or "chatter" through text or voice interactions. Users in both business-to-consumer (B2C) and business-to-business (B2B) environments increasingly use chatbot virtual assistants to handle simple tasks. Adding chatbot assistants reduces overhead costs, uses support staff time better and enables organizations to provide customer service during hours when live agents aren't available. Chatbots have varying levels of complexity, being either stateless or stateful. Stateless chatbots approach each conversation as if interacting with a new user. In contrast, stateful chatbots can review past interactions and frame new responses in context. Adding a chatbot to a service or sales department requires low or no coding. Many chatbot service providers allow developers to build conversational user interfaces for third-party business applications. A critical aspect of chatbot implementation is selecting the right natural language processing (NLP) engine. If the user interacts with the bot through chatting and voice, for example, then the chatbot requires a speech recognition engine. Business owners also must decide whether they want structured or unstructured conversations. Chatbots built for structured conversations are highly scripted, which simplifies programming but restricts what users can ask.

After doing this implementation we have added more functionality and data base and a user interface which makes our Music Bot recommender system more interactive. In this our chatbot greets the user first and chat with the user and using chat it analyse the sentiments of the user and checks the database on the bases of emotions gathered from chat an check which mood the user in and then it goes to database and checks the song related to the zoner user will love to hear the it asks the use to play the song or continue chat and if the user wants to chat rather than hearing songs so it will move further to chat with use without recommending the song and after some interval of time it will again ask to recommend and play song list it gathered from the database.

Now if user wants to hear song it will play the song and create a playlist on the basis of previously heard playlist and ask the user to play the song from that playlist if user wants to hear it will continue to play songs and if not, then the user will continue to chat then it will again analyse chat an recommends

song and the process continues until the user wants to exit the system.

The proposed model has screen timing feature to tackle with the hearing problem of people the peoples who hears music more than 4-6 hours can lead to hearing problems. It was observed that any sound even those who can enjoy music for long time can cause hearing-loss. Repeated exposure to sound 85db or louder for 6 hrs or more can cause premature or permanent hearing loss.

## II. Proposed Methodology

After researching how we might build each of these in Python, we decided to settle on contextual recommenders (with the possibility of expanding using Tokenization and Lemmatization). While we wanted to make something more advanced than a simple recommender (and simple recommenders would not be suitable for use with a chatbot), we did not have the data required to train and build using NLP algorithm. Although we were bristling with ideas of extensions and augmentations for our application during the ideation phase, we decided to define what our minimum viable product should be.

Minimum viable products, or MVPs, are, in short, the simplest version of a finished product that would satisfy the basic requirements for a solution. They exist in contrast to a very over-the-top prototype, i.e., a first product that tries to be as excellent as possible right off the bat. We are using .json for storing Data and to create database then using recommendation methods using a code snippet then we connect it to the Spotify database for recommendation of songs.

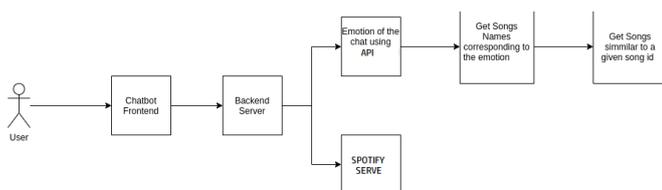


Figure: Proposed Methodology

In the above figure we can see the user is connecting with the chatbot for which we will use many techniques and python modules initially we used tokenization which will help us to process sensitive data elements from the chat and taken out a logical meaning from that in this everything I referred to as a token, which maps the back the sensitive data which was extracted from chat of user with chatbot.

After using tokenization, we will be using Lemmatization which taken out words from chat and separates it using vocabulary and morphological analysis of words then it creates a meaningful sentence of that words by removing inflectional ending in between then it will return the base of words according to the English dictionary according to our research on these processes.

For the other processes we will use stemming to check and

remove inflections and .json file for creating our own database then comes to graphical user interface (GUI) we used tkinter for that.

Then we will try to add part of speech from the technique called POS tagging that converts into sentences and assigning it to the corresponding with a particular part of speech depending upon the chat and the words used in it and analyze it accordingly.

For converting it to the emotions on the basis of the chat, we use Natural Language Process (NLP), this will analyze whole process and scales the language and mood of the user accordingly it will help the chatbot to read text, interpret it, analyze sentiments and the mood of user.

### 2.1 Techniques Involved in Proposed Model

#### 2.1.1 Lemmatization

Lemmatization is the process of converting a word to its base form. The difference between stemming and lemmatization is, lemmatization considers the context and converts the word to its meaningful base form, whereas stemming just removes the last few characters, often leading to incorrect meanings and spelling errors.

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It uses comprehensive retrieval systems like search engine which makes it easy for us to analyse words quickly from the chat and categorise them accordingly.

It groups the different inflected form of a word in its simple terms together which reduce the processing time by analysing only single item by inking them together, it does not analyse word morphologically and pre-process them and takes out the mood and emotions of the user.

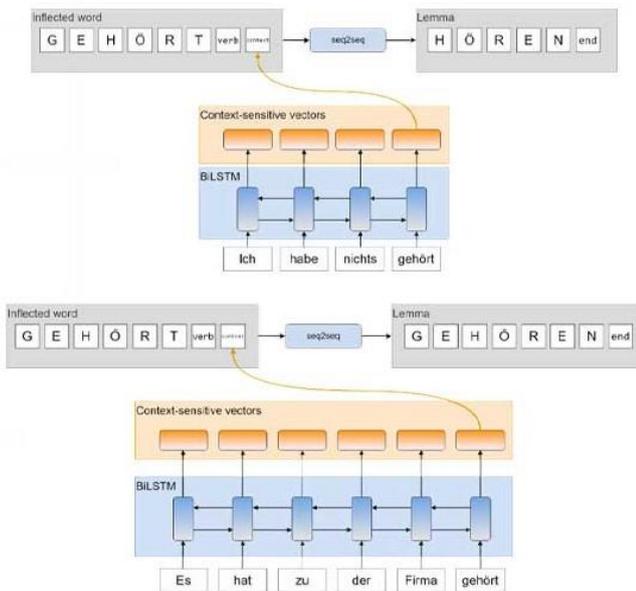


Figure: -Lemmatization Process

### 2.1.2 Stemming

Stemming is a natural language processing technique that lowers inflection in words to their root forms, hence aiding in the pre-processing of text, words, and documents for text normalization. According to Wikipedia, inflection is the process through which a word is modified to communicate many grammatical categories, including tense, case, voice, aspect, person, number, gender, and mood. Thus, although a word may exist in several inflected forms, having multiple inflected forms inside the same text adds redundancy to the NLP process. As a result, we employ stemming to reduce words to their basic form or stem, which may or may not be a legitimate word in the language. For instance, the stem of these three words, connections, connected, connects, is “connect”. On the other hand, the root of trouble, troubled, and troubles is “trouble” which is not a recognized word.

Stemming is most important technique of NLP it reduces the word into its root word of we can say it converts it into its stem that affixes to suffix and prefix or to the root word called lemma. So, using stemming helped us to separate same type of words their plurals and other grammatically similar words which save our time pre process word and let us take out emotions from them in less time. It lowers the inflections in words to their root form.

Both lemmatization and stemming are used in chatbot to analyse and understand the meaning of the word. Stemming uses stem word to understand the meaning while lemmatization uses the context of the word in which it is used.

Mostly Lemmatization preferred over the use of Stemming as it uses Morphological analysis of the word.

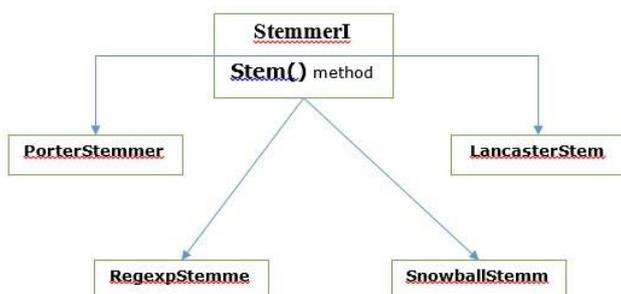
Stemming has two errors in it Over Stemming and Under Stemming. When two words are stemmed to same roots which have different stems then it comes under the overstemming error and when two words are stemmed to same roots which do not have different stems then it come under understemming error.

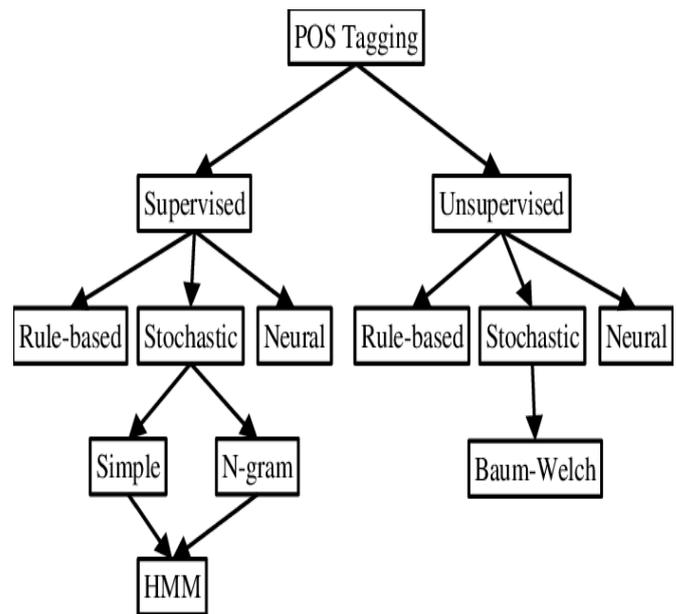
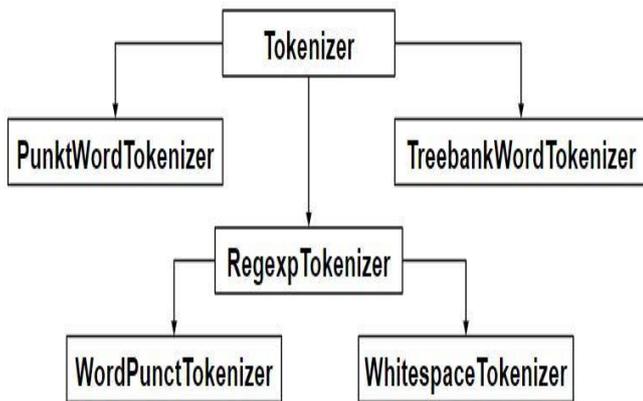
### C. Tokenization

It refers to splitting up a larger body of text into smaller lines, words or even creating words for a non-English language. The various tokenization functions in-built into the NLTK module itself and can be used in programs.

The token value can be used in various applications as a substitute for the real data. If the real data needs to be retrieved. for example, in the case of processing a recurring credit card payment – the token is submitted to the vault and the index is used to fetch the real value for use in the authorization process.

To the end user, this operation is performed seamlessly by the browser application nearly instantaneously. They're likely not even aware that the data is stored in the cloud in a different format.





The advantage of tokens is that there is no mathematical relationship to the real data they represent. If they are breached, they have no meaning. No key can reverse them back to the real data values. Consideration can also be given to the design of a token to make it more useful. For example, the last four digits of a payment card number can be preserved in the token so that the tokenized number (or a portion of it) can be printed on the customer’s receipt so she can see a reference to her actual credit card number. The printed characters might be all asterisks plus those last four digits. In this case, the merchant only has a token, not a real card number, for security purposes.

Tokenization is used to remove all sensitive data and unique identity of the symbols or word which retain all essential information from the data without compromising the security of the it is working on.

For this security purposes it used widely in the security sensitive places like Banks, Police Rooms, to securely place criminal record files in database, In financial records, To keep records in medical industries which are sensitive for patients, in keeping save the information of voters identities during elections, and many more fields.

#### D. POS Tagging

POS tagging: POS tagging, or part-of-speech tagging may be defined as the process of assigning a part of speech to the given word. To tag, something means you classify it as something.

One of the more powerful aspects of the NLTK module is the Part of Speech tagging that it can do for you. This means labelling words in a sentence as nouns, adjectives, verbs...etc. Even more impressive, it also labels by tense, and more. POS tagging is used to assign grammatical information of each word of the sentence.

POS refers to parts of speech which it converts sentence into the list of words, list of tuples (word, tag) the tag then identifies the grammar in the words which signifies whether it is noun, pronoun, adjective, and many more. It is useful in creating parse trees, which are useful to make NERs. Most importantly for our recommender system it helps to extract out the relationship between the words use during the chat between user an the chatbot which then converted into sentences and then using NLP modules the emotions and the mood of the use analysed and then creating a playlist for the user based on this analysis.

In NLP the Part of speech i.e. (POS) Tagging is the text processing technique used to understand the meaning of the text. It is the process of assigning the correct POS maker (noun, pronoun, adjective, etc) to each word in the input.

POS tagging is a supervised learning solution from NLP which features the previous work, next word, is first word capitalized etc. NLTK can call a function to get pos tags it works after the Tokenization process. The most popular tag which tag set from POS tagging used is Penn Treebank target.

#### E. NLP (NATURAL LANGUAGE PROCESS)

NLP is used to convert user input into features using python nltk module. This is called as data preprocessing.

Natural Language process helps the computer to communicate with humans in their own language and scales the tasks related to the other languages NLP make it easier for computer to read text, hear speech and interpret it, helpful in measuring sentiments and determines the important features and parts in

it.

IV. Flow Diagram for Proposed Model ‘MusicBot’

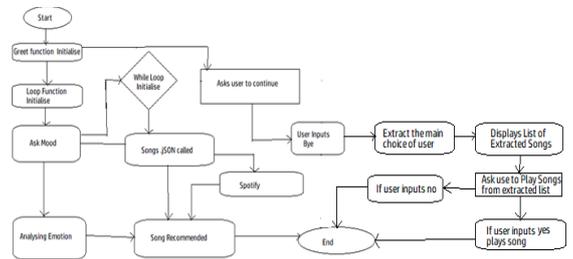
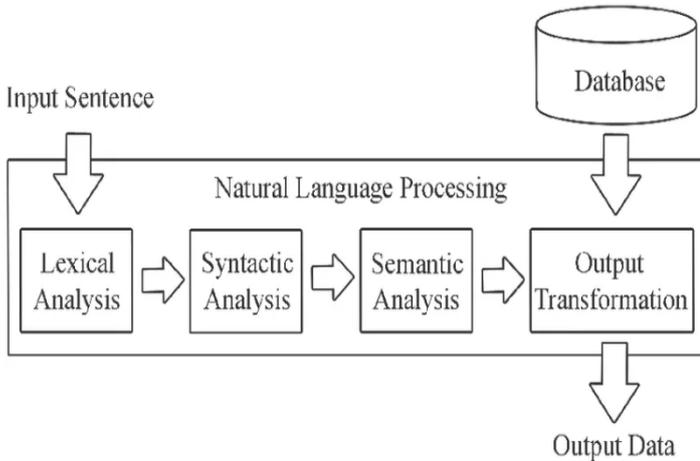


FIGURE: Flow diagram for proposed model.

NLP combine computational linguistic-rule-based modelling of human language-with statistical, machine learning, and deep learning models. Together this enables a computer to process and understand human language very easily in the form of text or voice data and to understand its full meaning, with complete feelings and sentiments using NLP. It drives the programs in computer that translates one language to another and also can responds to spoken commands and can be able to summarize large amount of text rapidly even if it is on real time.

First phase of NLP is Lexical analysis the phase analyses the source code as a stream of characters it gets as input from the user and converts it into the meaningful lexemes. Then comes Syntactic analysis is used to check grammar in the words which arranged accordingly and show the relationship between among them.

NLP provides with the large number of modules in it they are Scikit-learn, NLTK, Patterns, TextBlob, Quepy, SpaCy, Gensim.etc.

It also helps in translation, automatic, summarization, Named Entity Recognition (NER), speech recognition, relationship extraction an topic segmentation. This can also manipulates the analysed human language.

When the chatbot starts it will initialise the greet function we have used in it then after greeting it initialise the loop functions which has many inputs in it to responds on the basis of the then user chats with chatbot and the NLP and other techniques which we have use in it comes under play and starts analysing the chat as soon as it taken out the emotions and mood of the user it asks user to play the song to improve its mood if user says no then it will continue the chat with the use and after some interval of time it will again ask to play the song then it takes to the .json file which contains our database and as user wants to hear the songs it will take him/her to the Spotify server to play the song after hearing song the chatbot extracts some songs on the basis of the users genre and ask him/her to play music from that extracted list and we set a parameter to exit this if user says ‘by’ then user gets exit from this.

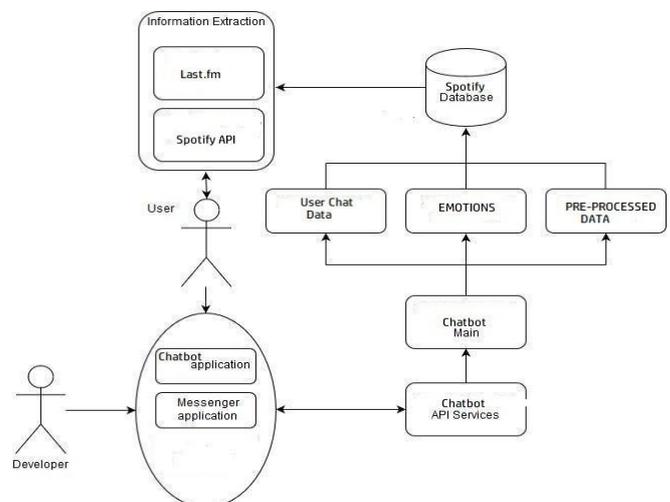


FIGURE: Use Case Diagram for Music Bot

So, as we can see in the above diagram the user is connecting to chatbot for chatting which connected to all other parts of this recommender system which analysis the emotions and mood and to improve the mood it will recommend songs to the user through Spotify server and the .json file which contains all our database.

## VI. RESULTS

This music bot helps people to listen their favourite music and automatically create the list of songs on the basis of chat with our chatbot Roya, very useful for people to improve their mood by listening this music.

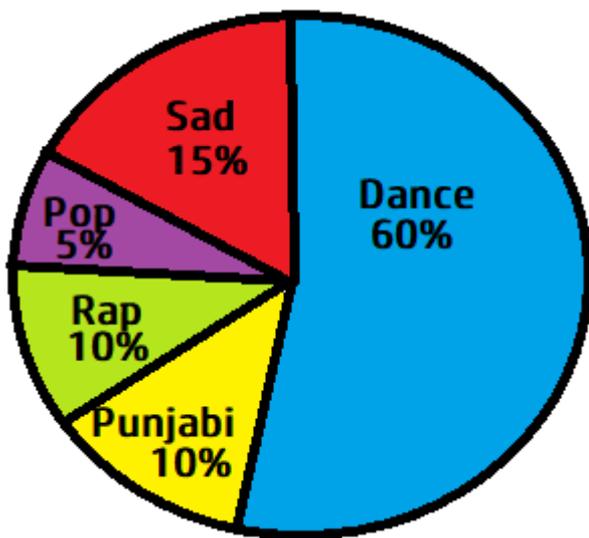


Figure: - Diagram of taste of music of peoples

According to the data analysed by us, In above figure you can find that the people lokes to listen dancing songs very much and rarely listens to the pop song. Peoples also likes to hear and enjoy Punjabi, Sad, and Rap songs too. Our recommender system will help people to extract out music for their genre.

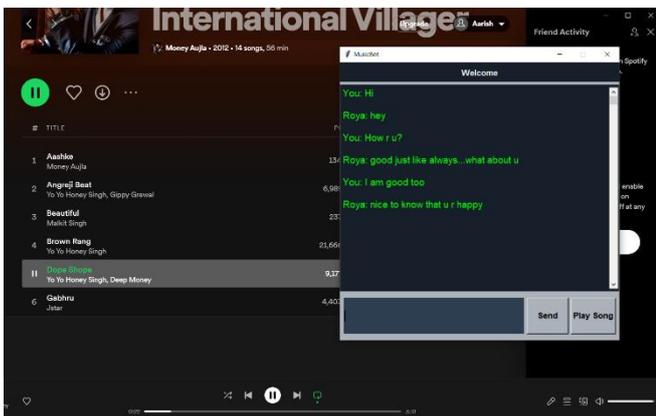


Figure: - Results of MusicBot.

The Music Bot offers the user to chat and listen to music simultaneously. Moreover, the songs recommended to user are based on the user’s mood. It is a fun software application and is meant to be used by anyone in their idle time.

## VII. CONCLUSION

The user gets better experience of using advanced Chatbot Recommender. When the user is not able to find a song according to he’s/her mood , or dont want to waste time for searching and hearing music one by one to improve his mood so we have use NLP algorithms to create a chatbot which work for the user to reduce the time and hactate of finding music we have used NLTK methods to monitor and to chat with users requirements and recommendation system the functionality of the Recommender system such as using Spotify server to as a dataset. The main investigation of this paper was exploring a system that was able to recognize mood of the USER with a user-friendly recommending songs on the bases of users taste and defined a list for the same use it helps user to not search music one by one and remembering it hence user can see the list of songs extracted from database and play then in the loop .This chatbot recommender system be very useful for improving mood of the user by recommending songs according to mood of the user.

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