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PREDICTION OF SONG MOOD THROUGH LYRICS

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ABSTRACT

Anxiety, worry, job conflicts, and emotional outbursts are just a few of the issues that plague humans. This might be due to a job, family issues, obligations, or peer pressure. During a fight with an emotional crisis, a person urgently seeks solutions to the situation. Music, being one of the most popular forms of entertainment, may be beneficial in such situations. It allows us to express our emotions and improve our mental condition. The mood is the most important aspect of music. Every scenario we face is accompanied by a spirit. Many songs are composed with emotions in mind. Many public venues, such as restaurants, tourist attractions, and cultural events, have a backdrop theme tune. This improves the clients' mood. In this regard, we are performing a mood categorization of songs based solely on words. For the problem, we are using Decision Tree and Random Forest models. The exploratory results from training and testing the model suggest that music associated with joyful and sad states of mind may be predicted with reasonable accuracy based on characteristics derived from song verses.

Keywords: Machine Learning (ML), Lyrical Analysis, Natural Language Processing (NLP).

I. INTRODUCTION

Songs have had a significant effect on human emotions and mood shift throughout the last few decades. As a result, massive trials in the field of music analysis based on lyrics have been done. Text mining was a notion for categorising songs based on their lyrics; however, in the modern period, academics have switched their focus to the subject of machine learning (ML). ML, or machine learning, is a discipline of computer science that studies the creation of algorithms that learn by themselves by training a subset of a dataset (inputs). Concept learning, function learning, or 'predictive modelling,' grouping, and discovering predictive patterns are all important functions.

Online music streaming services have enabled users to create and share unique playlists in recent years, providing Recommender Systems (RS) a critical role in the playlists continuance duty. Modern RSs rarely rely on musical emotions, owing to the subjectivity and difficulty of obtaining this information. Emotion recognition frequently requires the study of human emotions in multimodal formats such as text, audio, or video. We are interested in employing the textual modality in this study because the job is closer to Sentiment Analysis [8], which is the computer treatment of views, feelings, and subjectivity in a natural language text. It may also be used to improve how an RS obtains information about a playlist.

Emotion identification is a difficult problem, and most existing efforts rely on data sources that make this process easier by containing particular phrases and sections of text, such as hash-tags in tweets [7]. Other works employ the pleasure (valence), arousal, and dominance (PAD) descriptors taken from a song's text [5]. This research proposes an innovative method for categorising the major emotion of playlists into four categories: calm, happy, sad, and furious. The forecast is based on aggregating the emotion prediction generated at the song level through analysis of the lyrics linked with the music (we consider English lyrics). Unlike the majority of prior methodologies [4,] our approach significantly depends on Machine Learning and Natural Language Processing.

II. LITERATURE REVIEW

There are various programmes that give facilities and services for music playlist generation or playing a certain song, and all manual effort is included in this process. There are now a variety of strategies and approaches that have been proposed and developed to characterise human emotional states of behaviour. The proposed methodologies, such as Viola and Jones', have only addressed a subset of the basic emotions. Several scientific publications that provide a summary of the concept are:

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[1]According to the authors of this research, music plays a vital function in human existence and inside current technological technology. Typically, the user must actively go through the playlist of music to select one. In this paper, we propose an efficient and accurate approach for generating a playlist based on the user's current mood and behaviour. Existing approaches for automating the playlist building process are computationally sluggish, less precise, and may necessitate the use of extra gear such as EEG or sensors. Speech is that the most ancient and natural way of expressing feelings, emotions and mood and its and its processing requires high computational, time, and cost. This system supported real-time extraction of facial expressions also as extracting audio features from songs to classify into a selected emotion which will generate a playlist automatically such the computation cost is comparatively low.

[2] This study presents an intelligent agent that organises a music collection based on the emotions communicated by each song and then recommends a suitable playlist to the user based on his or her current mood. The user's local music collection is first grouped based on the emotion conveyed by the song, i.e. the mood of the song. This is frequently assessed by taking into account the song's words as well as the music. When the user wants to acquire a mood-based playlist, the user snaps a picture of themselves at the time. This photograph is subjected to face detection and emotion identification methods, which recognise the user's emotion. The music that best suits this feeling is then offered as a playlist to the user.

[3] According to the authors of this article, people are becoming increasingly stressed as a result of the terrible economy, excessive living expenditures, and so on. Taking note of music may be a significant action that aids in stress reduction. However, it will be ineffective if the music does not match the listener's current emotional state. Furthermore, there is no music player that can select songs based on the user's emotions. To address this issue, this study presents an emotion-based music player that may recommend songs depending on the user's emotions: sad, joyful, neutral, and furious. The device gets the user's pulse or a face picture via a sensitive band or mobile camera. It then uses the classification method to spot the user's emotion. This paper presents 2 sorts of the classification method; the guts rate-based and therefore the facial image-based methods. Then, the appliance returns songs which have an equivalent mood because the user's emotion. The experimental results show that the proposed approach is in a position to exactly classify the happy emotion because the guts rate range of this emotion is wide.

[4] According to the authors, digital audio is simple to record, play, process, and maintain. Because of its pervasiveness, gadgets for handling it are inexpensive, allowing more individuals to record and play music and voice. Furthermore, the web has made it easier to access recorded audio. As a result, the amount of recorded music that people own has rapidly expanded. The majority of today's audio players compress audio files and store them in internal memory. Because storage prices have constantly reduced, the amount of music that will be stored has expanded significantly. If each song is saved in compressed format and contains 5 Mbytes, a player with 16 Gbytes of memory may carry around 3,200 songs. Effectively organizing such large volumes of music is difficult. People often listen repeatedly to alittle number of favorite songs, while others remain un justifiably neglected. We've developed Affection, an efficient system for managing music collections. Affection groups pieces of music that convey similar emotions and labels each group with a corresponding icon. These icons let listeners easily select music consistent with its emotional Content. Experiments have demonstrated Affection' effectiveness.

III. PROBLEM STATEMENT

With the rapid expansion of digital music libraries, as well as advancements in innovation, music characterisation and suggestion has grown in popularity in the music industry and among audience members. Many applications include AI approaches into their models. They are used to categorise music based on the following criteria: artist, genre, instruments utilised, title, and year of release, artist similitude, and type. According to recent research, humans utilise music to relieve their worries and stress. Because the Web platform is a sea of musical information, it is difficult for users to categorise it based on their needs. As a result, utilising MLalgorithms, this may be automated and completed swiftly.

Few people may want to differentiate their playlist based on the sentiment of the songs. In this section, we investigate the possibility of assigning such data without the involvement of the customer. Previously, it was a manual procedure that required the listener to manually shuffle the playlist, which took a long time. Our article

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covers not just speed, but also efficiency and user interaction. As a result, enormous trials in the field of music study based on verses and emotion have been conducted. While data mining produced some promising outcomes, it was inconsistent. As a result, we ML devised a method to do this.

IV. METHODOLOGY

Music has historically been an efficient means of communicating with the public, and lyrics have played a significant role in this communication. However, the possibility for study on the impact of lyrics in happiness is largely neglected. This research investigates the connection between lyrics and positive psychology. I will provide a brief history of lyrics, evaluate the corpus of research on lyrics and its deficiencies, and lastly suggest prospective applications of lyrics to improve various elements of well-being. We are only now developing the vocabulary to discuss the good and negative consequences of songs. According to the findings of this study, lyrics have the capacity to boost two of the five dimensions of well-being in the PERMA model: good emotions and meaning. It is stated that you can improve your well-being by deliberately listening to lyrics with meaning, which is aided by music's power to alter emotion.

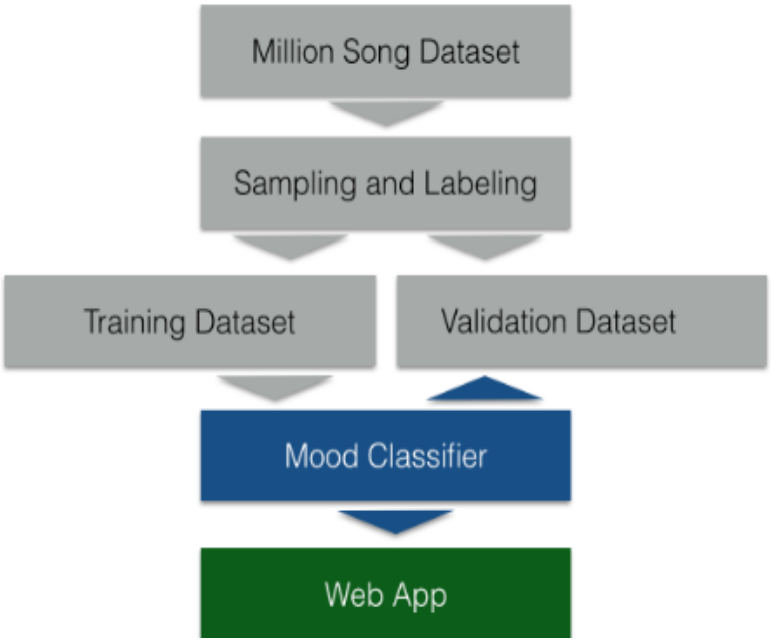

Fig 1: Flow Chart Of The System

Data cleaning: It is a process of removing noise and inconsistent data.

Data integration: In this step data from multiple sources are combined. Data selection: In this step data relevant for mining task is selected.

Data transformation: In this step data will be transformed into form that is appropriate for mining.

Data mining: In this step some intelligent methods are applied for extracting data patterns.

Pattern evaluation: In this step we concentrate upon important patterns representing knowledge based on some measure are identified.

Knowledge presentation: In this step visualization and knowledge representation techniques are used to present the mined knowledge to the user.

Data Mining Techniques Data mining Algorithms is categorized into different which is given below:

Classification: Classification is the frequently (most commonly) applied data mining mechanism, which explains a set of preclassified examples to develop a (procedure) model that can (identifies or categories) classify the population (Dataset) of records at large.

Clustering: Clustering can be said as to find out of similar classes of objects. By using clustering mechanism, we can further find out dense and sparse (n Dimensional Space) regions in object space and can discover overall distribution trends (pattern) and relation among many coordinate points (correlations) among data attributes.

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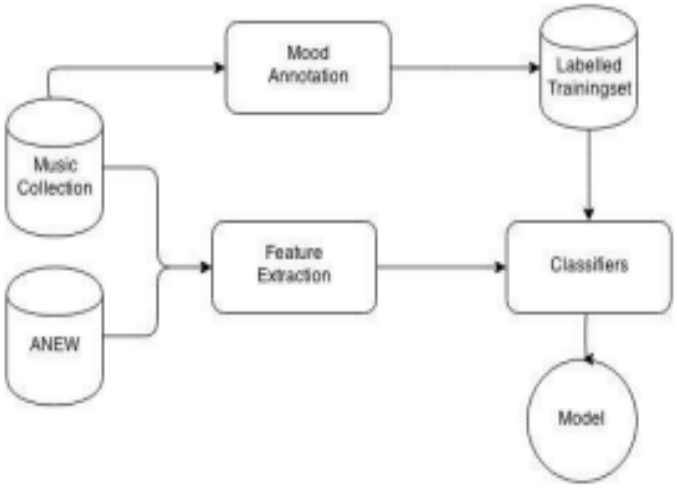

Fig 2: Block Diagram Of The System

We already have the data in the proper format because we are utilising a csv file. Feature engineering, also known as feature selection, assists the model in achieving the required performance. When developing a machine learning model, it is critical to pick a strong collection of characteristics that will assist us in more accurately predicting the proper conclusion. Filter methods, wrapper methods, embedding methods, and hybrid methods are the four types of feature selection strategies used in machine learning. We employed Random Forest Importance, which is a strategy in the embedded approach. We found the top 20 characteristics with the greatest influence on the output label using random forest significance. We also trained another set of classifiers with all of the data save the name and length of the audio and compared the results. We next divide the dataset in an 80:20 ratio, with 80 percent going to the training set and the remaining 20 percent going to the test set. The data is then scaled. We scale the test and training data independently because we want our test data to be entirely new to the model and free of bias. Scaling the training data yields scaling parameters like as mean and variance, which are then utilised to scale the test data. The fundamental purpose for scaling the data is to avoid biassing the model to a certain aspect of the dataset. This data is now being used to train our classifiers.

V. RESULTS AND DISCUSSION

Python 3.7 was the programming language utilised to implement our study. Several packages, including Scikit-learn, Pandas, Matplotlib, and others, have been imported for our code. The lyric dataset was considered for our work. The following findings were acquired after training and testing our Mood Prediction model with Decision Tree and Random Forest Algorithms. 1st Table We employed the count vectorization model and the TF-IDF vectorization model. We utilised this machine learning method to identify lyric mood as either "sad" or "happy." The results suggest that the Random Forest algorithm is effective for predicting lyric mood. The TF-IDF vectorization and Random forest, in particular, achieve 72.68 percent accuracy.

Table 1: Experimental Results of proposed system

Vectorization	Algorithm	Accuracy (%)
Count	Decision Tree	68.04
	Random Forest	69.07
TF-IDF	Decision Tree	67.52
	Random Forest	72.68

VI. CONCLUSION

Music has recently played an essential part in human amusement; by listening to music, the listener can get some rest and refreshment in their hectic lives. There are several music programmes accessible online that will propose a song based on the user's mood. The key study field in this work was focused on song lyrics to forecast the mood of a song, and then that music is recommended to the listener. The TF-IDF feature extraction,

along with the Random Forest algorithm, improved the accuracy of mood classification based on lyrics. A wide range of music libraries can be sorted or clustered according to the projected mood utilising our research study and paper work. According to our findings and analyses, "happy" and "sad" emotions may be distinguished properly. This technique is frequently effective for filtering a large music library for joyful music with a low false positive rate. Our classifier will be expanded on a web platform to encompass a wide range of Music Information databases in the future.

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