Project Report on

PREDICTION OF SONG MOOD THROUGH LYRICS

Submitted to

RASHTRASANT TUKDOJI MAHARAJ NAGPUR UNIVERSITY NAGPUR

In partial fulfillment of the requirement for the Degree of

Bachelor of Engineering

In

Computer Technology

Submitted By

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PRIYADARSHINI COLLEGE OF ENGINEERING
Department of Computer Technology

Session 2021-22

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DECLARATION

We, the undersigned, declare that the project entitled **"Prediction of Song Mood Through Lyrics",** being submitted in partial fulfillment for the award of Degree in Computer Technology, affiliated to RASHTRASANT TUKDOJI MAHARAJ NAGPUR UNIVERSITY is the work carried out by us.

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List of Acronyms / Abbreviations

S.No.	Acronym	Full Form
1.	IDE	Integrated Development Environment
2.	CSS	Cascading Style Sheet
3.	XAML	Extensive Application Markup Language
4.	OS	Operating System
5.	HTML	Hypertext Markup Language
6.	SDLC	Software/System Development Life Cycle
7.	LSM	Linear Sequential Model
8.	API	Application Programming Interface
9.	MIC	Microsoft Innovation Centre
10.	PC	Personal Computer
11.	UI	User Interface
12.	IP	Internet Protocol
13.	DFD	Data Flow Diagram
p	ER	Entity Relation(ship)
15.	app	Application Software

List of Symbols

S. No.	Symbol	Meaning	Remarks
1.	™	Trade Mark	
2.	®	Registered	
3.	C#	C-Sharp	

INTRODUCTION

1. Introduction

Human Beings are vexed with a variety of problems such as anxiety, stress, work tensions, and emotional outbreaks. This may be caused due to jobs, family problems, responsibilities, and pressure from friends. During the battle with an emotional crisis, a human desperately searches for means to riddance the problem. Music, being one of the most popular means of entertainment, can help during such situations. It provides a way to express our feelings and enhance our state of mind. The core part of music is the mood. Every situation we go through has a spirit associated with it. Many songs are written on emotions. Many public places, such as restaurants, tourist places, and cultural events, have a theme song in the background. This enhances the mood of the customers. In this regard, we are performing a mood classification of songs using lyrics alone. We are implementing Decision Tree and Random Forest models for the problem. The exploratory outcomes through training and testing the model show that music related to —happy‖ and —sad‖ states of mind can be anticipated with sensible accuracy dependent on features extracted from tune verses. 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.

LITERATURE REVIEW

2. Literature Review

An overview of the literature survey of the relevant work done by the researchers. Many existing techniques have been studied by the researchers on lyric mood prediction problems, a few of them are discussed below. In Mood prediction of music from lyrics can have a good range of applications in modern society and daily lives. For example, selecting music for public corporations like hospitals or restaurants to improve the mental well-being of people, patients, and customers, respectively. The music recommendation system built upon Machine Learning algorithms such as Decision Tree and Random Forest classifiers is trained to predict the mood of songs based on the sentiment of the lyrics alone.

The experimental results obtained by training and testing the model show that music corresponding to happy and sad moods can be predicted with reasonable accuracy based on features extracted from song lyrics. This paper lists out the performances of music genre and mood classification using only lyric features. In this research study, the Part-of-Speech (POS) feature is utilized for the classification of a set of 600 songs. Ten music genres and mood categories were selected respectively supported by an overview of the literature. Experiments show that accuracies for mood categories outperform genres. In this research, the music suggestion framework is based upon algorithms such as Decision Tree and Random Forest classifiers trained to foresee the state of mind of melodies dependent on the lyrics alone. We have implemented the algorithms listed in this work to get the desired results. This study also suggests that by using ML, predictions, and recommendations can be made accurately. This study also suggests that by using ML, predictions, and recommendations can be made accurately,

A replacement method is proposed to create an outsized ground truth set of 3449 songs and 4 mood categories supported by social tags so on reflect a practical, user-centered perspective.

A complete set of lyric features and representation models were investigated. The most straightforward performing lyric feature set was also compared to the number one audio-based system. By observing statistics of various mood dimensions, we examine to what extent the linguistic neighborhood of music reveals adequate information for assigning a mood category and which aspects of mood are often classified best. The word-oriented metrics provide a valuable source of data for automatic mood classification of music-supported lyrics only. Properties like term frequencies and

TF- IDF values are used in various mood classes. These metrics are incorporated during a machine learning classifier setup. Predictions on the valence, tension, and combinations of aspects cause similar performance. Extensive online music databases have recently been created by vendors, but they typically lack content-based retrieval methods. Human experts say there are several thousand songs categorized into 183 moods. During this paper, machine learning techniques are used rather than human experts to extract emotions in Music. The classification is predicated on a psychological model of emotion that's extended to 23 specific emotion categories.

Mining lyrics focused during this paper is one aspect of research that mixes different classifiers of musical emotion like acoustics and lyrical text. This paper suggests the research work done on music automation. Employing an assortment of verses and comparing client-labeled states of mind, we manufacture classifiers that order verses of tunes into dispositions. By comparing different mood methods and techniques, various characteristics of emotions are determined. This has uncovered what part of the data is to be used for further classification. The outcomes of this study denote that word- arrangements and their measurements play an important role in classifying the problem. Feature extraction of the lyric is an essential aspect of this study. The full verse is divided into several tokens, and a feature extraction method is performed. According to the accuracies of different feature extraction methods, one among many methods is selected to input the data. Various programs 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 characterize human emotional states of behavior. 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:

[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 behavior. 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 the most ancient and natural way of expressing feelings, emotions, and moods, and its processing requires high computational, time, and cost. This system supported real-time extraction of facial expression 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 organizes 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 recognize the user's emotion.

[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, no music player 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 classification methods; the guts rate-based and therefore the facial image-based methods. Then, the appliance returns songs that have an equivalent mood because of 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.. 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 a little number of favorite songs, while others remain unjustifiably neglected. We've developed Affection, an efficient system for managing music collections. Affection groups pieces of music that convey similar emotions and label each group with a corresponding icon. These icons let listeners easily select music consistent with its emotional Content. Experiments have demonstrated Affection's effectiveness.

OBJECTIVES

3. Objectives

Music has long been an effective way to communicate to the masses, and lyrics have played a massive role in delivering this communication. Yet the opportunity for research on the role lyrics plays in well-being is vastly underutilized. This paper is an exploration of the relationship between lyrics and positive psychology. I will discuss a brief origin of lyrics, examine the body of literature on lyrics as well as its gaps, and finally suggest a potential application of lyrics to increasing various aspects of well-being. We are only beginning to have the language to discuss the positive and negative effects of lyrics. The results of this exploration indicate that lyrics have the potential to increase two of the five elements of well-being in the PERMA model, positive emotions and meaning. It is suggested that you can increase well-being by mindfully listening to meaning-filled lyrics bolstered by music's ability to influence emotion.

ARCHITECTURE

4.Architecture

4.1 Training dataset preparation

The dataset that we start with is a 10000 Song subset of the Million SongDataset. Now we do the following :

- Store the dataset into a Pandas Dataframe with features File Name, Artist Name
- Using the Artist Name and Song Title, We are fetching lyrics for all the songs using the PyLyrics

package, which uses LyricWikia.com API to get lyrics for songs

- We are creating our model using English lyrics. So all the song lyrics containing any other language
- Now we will use Last. FM API to extract Tags for the remaining 3000 songs in our

dataset. Tags can be based on Genre, Mood, Artist Type etc. For getting the song tags we request to "http://ws.audioscrobbler.com/2.0/" as endpoint with the parametersas follows :

– method = track.getTopTags

– api.getKeys = 0f6916aff634cb3e768baa9d5ee89341

– artist = artists fetched from our csv file

– tracks = tracks

● In the paper Lyric Text Mining in Music Mood Classification, Hu et.al, Last.FM tags are grouped into 18 categories according to different human moods. We have taken 10 groups from it and distributed them into our Mood Categories - Happy, Sad, Angry, Relax.

• Happy Tags: cheerful, cheer up, festive, jolly, jovial, merry, cheer, cheering, cheery, get happy, rejoice, songs that are cheerful, sunny, happy, happiness, happy songs, happy music, glad, mood: happy, upbeat, gleeful, high spirits, zest, enthusiastic, buoyancy, elation, mood: upbeat, excitement, exciting, exhilarating, thrill, ardor, stimulating, thrilling, titillating

• Sad Tags: sad, sadness, unhappy, melancholic, melancholy, feel- ing sad, mood: sad - slightly, sad song, depressed, blue, dark, de- oppressive, dreary, gloom, darkness, depress, depression, depressing, gloomy, anger, angry, choleric, fury, outraged, rage, angry music, grief, heartbreak, mournful, sorrow, sorry, doleful, heartache, heartbreaking, heartsick, lachrymose, mourning, plaintive, regret, sorrowful

- Angry Tags: anger, angry, choleric, fury, outraged, rage, angry music, aggression, aggressive, angst, anxiety, anxious, jumpy, nervous, angsty, pessimism, cynical, pessimistic, weltschmerz, cynical/sarcastic

- Relaxed Tags: calm, comfort, quiet, serene, mellow, chill out, calm down, calming, chillout, comforting, content, cool down, mellow music, mellow rock, peace of mind, quietness, relaxation, serenity, solace, soothe, soothing, still, tranquil, tranquility, tranquility, brooding, contemplative, meditative, reflective, broody, pensive, pondering, wistful, desire, hope, hopeful

By correlating the Tags that we found from Last.FM and the tag groups generated by us, we are creating the Class Labels for Moods in our Dataset. In the paper Multimodal Music Mood Classification by Fusion of Audio and Lyrics, Hao et.al, we get to know about 777 other songs, already categorized into Happy, Sad, Angry, and Relaxed. We append this dataset with our previous dataset for our final training dataset.

4.2 Test Dataset Preparation

- We manually collected over 250 Hindi song lyrics and stored them in the data frame
- Using Google Translate API, we auto-translated them into English lyrics and manually labeled them for performance checking.
- As our test dataset is labeled manually and the training dataset is auto- labeled from the tags of Last.FM and Hao's paper, we add a fraction of translated-to-English lyrics to our training dataset to reduce the bias of the testing dataset.

4.3 Data Preprocessing

We have lyrics in our data. To Preprocess the lyrics column we did the following preprocessing steps on both training and test datasets.

- Tokenization: Taking a text or set of text and breaking it up into its words
- Stop-word Removal: Stop words such as *the, a, an, and in* are removed from lyrics
- Punctuation Removal: Removes punctuation from lyrics
- Stemming: Reducing inflected (or sometimes derived) words to their word stem, base, or root form
  - Lemmatization: Process of grouping the inflected forms of a word so they can be analyzed as a single item, identified by the word'slemma, or dictionary form

4.4 Feature Engineering

We created training, validation, and testing datasets for these 3 models using natural language processing.

- CountVectorizer
- TfIdfVectorizer
- NGram Vector Model
- Word2vec Embedding Vector

4.5 Model Selection

The following classifiers are used for model preparation and testing :

- Random Forest
- Multinomial Naive Baye
- Logistic Regression
- Ensemble - Bagging
- Ensemble - Boosting
- Support Vector Machines
- Convolutional Neural Network

Final Training Dataset: It contains 1482 English song lyrics preprocessed and feature-engineered using the previous steps

Final Validation Dataset: It contains the fraction of the training dataset containing English song lyrics preprocessed and feature-engineered using the previous steps

Final Testing Dataset: It contains 243 Hindi Bollywood translated- to-English song lyrics preprocessed and feature-engineered using the same previous steps.

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 the impact of lyrics on 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 their 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 can 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.

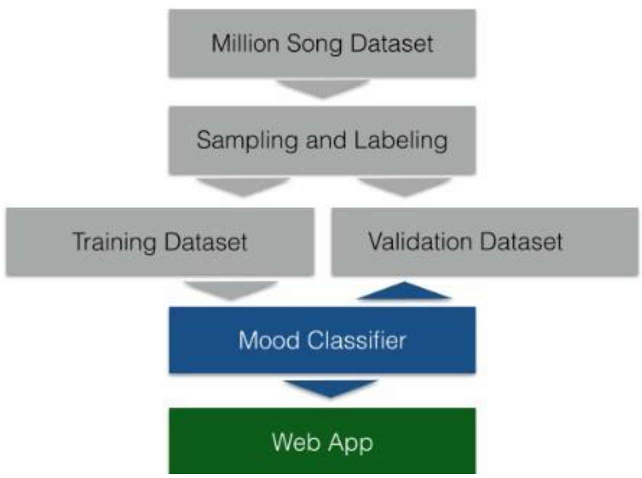


Fig A : Flow Chart of system

We already have the data in the proper format because we are utilizing 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 a 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 mean and variance, which are then utilized to scale the test data. The fundamental purpose of 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.

ALGORITHM

5 Algorithms

5.1 NLP model

5.1.1 Word Tokenize

Tokenization is the process by which a large quantity of text is divided into smaller parts tokens. These tokens are very useful for finding patterns and are considered as a base step for stemming and lemmatization.

Tokenization also helps to substitute sensitive data elements with non-sensitive data elements.

We use the method word_tokenize() to split a sentence into words.

The output of word tokenization can be converted to Data Frame for better text understanding in machine learning applications.

5.1.2.Stemming

Stemming is removing a component of a word or reducing a word to its stem or root. There's a chance we're not reducing a word to its dictionary root.

Text, words, and documents are preprocessed for text normalization using stemming.

Normalizing text by reducing duplication and stemming words to their base form is vital for building a solid model.

5.1.3 Stop Words Removal

Stop words: A stop word is a commonly used word (such as “the”, “a”, “an”, “in”) that a search engine has been programmed to ignore, both when indexing entries for searching and when retrieving them as the result of a search query.

We would not want these words to take up space in our database, or taking up valuable processing time. For this, we can remove them easily, by storing a list of words that you consider to stop words.

5.1.4 Lemmetization

Lemmatization the process of converting a word into its base form. In NLP, lemmatization considers the context and converts the word into a meaningful base form. In NLP, lemmatization considers the context and converts the word into a meaningful base form.

The converted word is called as lemmas.

5.1.5 Feature Engineering

The process of identifying & extracting relevant features from raw data for a machine learning algorithm is called feature engineering.

It involves ideating, selecting, and creating useful features in your datasets, helping you to identify potentially fruitful connections, correlations, and patterns.

The feature engineering process is:

• Brainstorming or testing features
• Deciding what features to create
• Creating features
• Testing the impact of the identified features on the task

5.1.6 Count Vectorizer

Countvectorizer is a method to convert text to numerical data.Countvectorizer Feature extraction or conversion of text data into a vector representation. Text data is pre-presented into the matrix.

5.1.7 TFIDF Vectorizer

TF-IDF (term frequency-inverse document frequency) is a statistical measure that evaluates how relevant a word is to a document in a collection of documents.

This is done by multiplying two metrics: how many times a word appears in a document, and the inverse document frequency of the word across a set of documents.
It has many uses, most importantly in automated text analysis, and is very useful for scoring words in machine learning algorithms for Natural Language Processing (NLP).

Term frequency is the measure of the counts of each word in a document out of all the words in the same document.
TF(w) = (number of times word w appears in a document) / (total number of words in the document)

IDF is a measure of the importance of a word, taking into consideration the frequency of the word throughout the corpus.
It measures how important a word is for the corpus.
IDF(w) = log(total number of documents / number of documents with w in it)

5.1.8 TFIDF N Gram Mode

An N-Gram is a sequence of N-words in a sentence. Here, N is an integer which stands for the number of words in the sequence.
N-Gram can be defined as "A contiguous sequence of N items from a given sample of text or speech".
Here an item can be a character, a word or a sentence and N can be any integer. When N is 2, we call the sequence a bigram. Similarly, a sequence of 3 items is called a trigram, and so on.

For Example:We will create a word level N-Gram model.

-First create a dictionary that contains word bigrams as keys and the list of words that occur after the bigrams as values.
-Store possible word in ngrams dictionary and frequency of that word in frequency dictionary, that will be helpful later for sorting the dictionary values later.
-Iterate through all the words and then join the current 2 words to form a bigrams.

Machine Learning models

1.Multinomial Naive Bayes Model
Multinomial Naive Bayes algorithm is a probabilistic learning method that is mostly used in Natural Language Processing (NLP). Naive Bayes is a powerful algorithm that is used for text data analysis and with problems with multiple classes.
The algorithm is based on the Bayes theorem and predicts the tag of a text such as a piece of email or newspaper article.
It calculates the probability of each tag for a given sample and then gives the tag with the highest probability as output.

2. Random Forest Classifier
The random forest classifier is a supervised learning algorithm which you can use for regression and classification problems. It is among the most popular machine learning algorithms due to its high flexibility and ease of implementation.
Assuming your dataset has "m" features, the random forest will randomly choose "k" features where k < m. Now, the algorithm will calculate the root node among the k features by picking a node that has the highest information gain.
After that, the algorithm splits the node into child nodes and repeats this process "n" times. Now you have a forest with n trees. Finally, you'll perform bootstrapping, ie, combine the results of all the decision trees present in your forest.
It's certainly one of the most sophisticated algorithms as it builds on the functionality of decision trees.

Technically, it is an ensemble algorithm. The algorithm generates the individual decision trees through an attribute selection indication. Every tree relies on an independent random sample. In a classification problem, every tree votes and the most popular class is the end result.

3.Logistic Regression

Logistic regression is a supervised learning algorithm used to predict a dependent categorical target variable.

Logistic regression estimates the probability of an event occurring, such as voted or didn’t vote, based on a given dataset of independent variables.

It predicts the output of a categorical dependent variable. Therefore the outcome must be a categorical or discrete value. It can be either Yes or No, 0 or 1, true or False, etc. but instead of giving the exact value as 0 and 1, it gives the probabilistic values which lie between 0 and 1.

4.XGBoost Classifier

XgBoost stands for Extreme Gradient Boosting, which was proposed by the researchers at the University of Washington.Gradient Boosting is a popular boosting algorithm. In gradient boosting, each predictor corrects its predecessor’s error.

XGBoost is an implementation of Gradient Boosted decision trees.In this algorithm, decision trees are created in sequential form. Weights play an important role in XGBoost. Weights are assigned to all the independent variables which are then fed into the decision tree which predicts results.

The weight of variables predicted wrong by the tree is increased and these variables are then fed to the second decision tree. These individual classifiers/predictors then ensemble to give a strong and more precise model.

5.Bagging-Random Forest

Bootstrap Aggregation (or Bagging for short), is a simple and very powerful ensemble method.

Bootstrap Aggregation is a general procedure that can be used to reduce the variance for those algorithm that have high variance. An algorithm that has high variance are decision trees, like classification and regression trees (CART).

Bagging is the application of the Bootstrap procedure to a high-variance machine learning algorithm, typically decision trees.

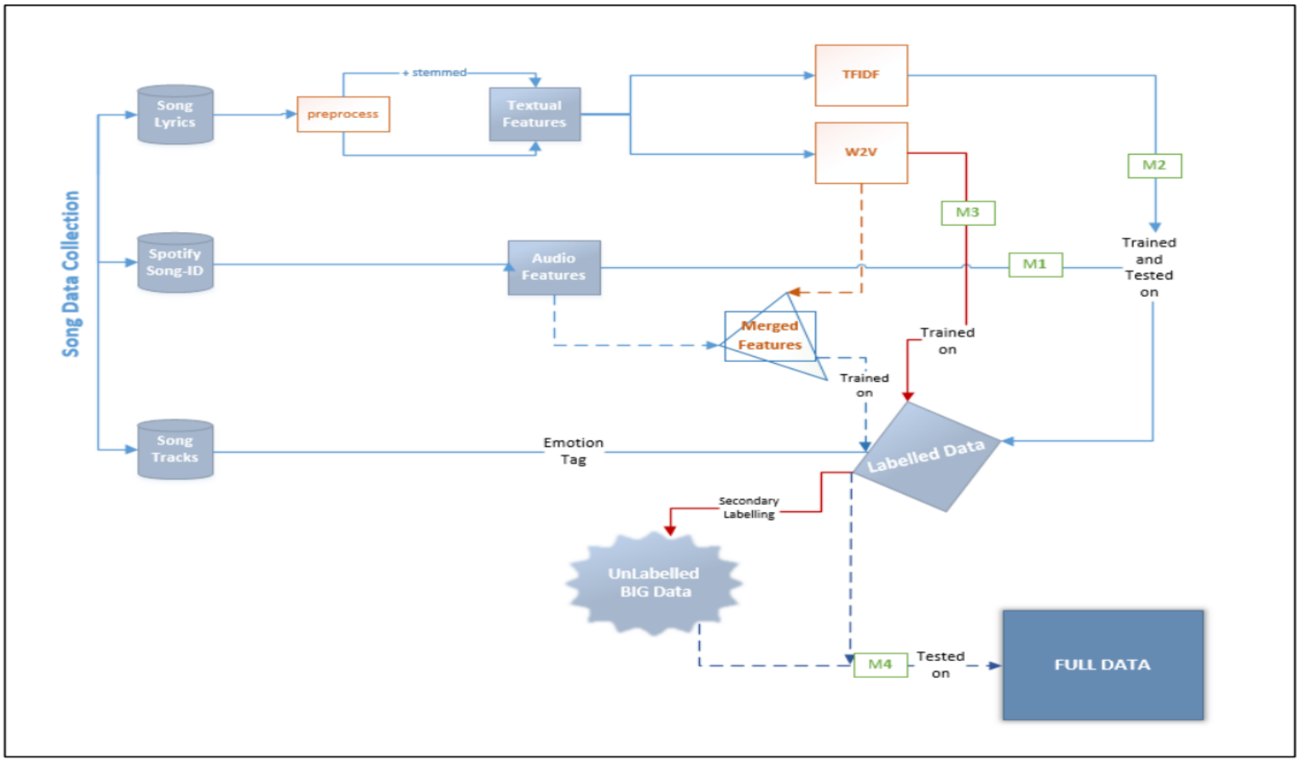
An ensemble method is a technique that combines the predictions from multiple machine learning algorithms together to make more accurate predictions than any individual model.

Combining predictions from multiple models in ensembles works better if the predictions from the sub-models are uncorrelated or at best weakly correlated.

Random forest changes the algorithm for the way that the sub-trees are learned so that the resulting predictions from all of the subtrees have less correlation.

DATA FLOW DIAGRAM

6. Data Flow Diagram



MODULE

7. Modules

First, will explain the details of the data collection process consisting of songs in total. The following describes the emotion category selection and emotion annotation process. We then walk through the process of feature selection and extraction, with reference to the generation of both speech and text feature vectors, which are valuable inputs for creating emotional classification models. This part also describes the data collection methods used to prepare the corpus for detailed analysis. Finally, we will clarify the model building process consisting of four different classification experiments. The first two experiments use different supervised approaches using voice and text features individually extracted from music and tagged song data. It also tries to generate a semi-supervised model using both labeled lyrics data and unlabeled big data. This is explained in the third and fourth experiments where the bimodal and multimedia approaches are applied, respectively.

Figure outlines the process flow of the proposed emotion recognition system. The survey begins with a song data collection process consisting of lyrics, song metadata for the voice search task, and song tracks, and proceeds with the survey of the emotional annotation phase in which the survey participants labeled the song. In each emotional category. The next step is to use two different approaches, TF-IDF and Word2Vec, to extract text features and retrieve speech features by information retrieval from Spotify. The flow continues through the modeling steps associated with the four experimental approaches. Model 1 and Model 2, represented by "M1" and "M2" in the figure, get various attributes of a song from a single resource and build multiple models based on the labeled data. .. Model 3 and Model 4 are "M3" and "M4", respectively, to design and compare bimodal and multimodal machine learning approaches using both labeled song data and large unlabeled data, respectively. To do. Model 3 uses text features derived from the Word2Vec method, while Model 4 uses a merged function set consisting of both audio and Word2Vec text functions of all, we give the details of the collection process of the data consisting of 1500 songs in total. Subsequently, the selection of the emotion categories and the emotion annotation process are explained. After that, we illustrate the feature selection and extraction processes, while concerning the generation of both audio and lyric feature vectors, that are valuable inputs to build emotion classification models. In this part, we also explain the data prepossessing methods we used, which prepare our corpus for the detailed analyses. Finally, the modelbuilding processes consisting of four different classification experiments are clarified. In the first two experiments, we utilize audio and textual features extracted from music individually, and various supervised approaches are employed by utilizing the labeled song data. Besides that, we attempt to generate semi-supervised models through using both labeled lyric data and unlabeled big data, which are explained in the third and fourth experiments, where bi-modal and multimedia approaches are applied, respectively.

Figure displays an overview of the process flows for our proposed emotion detection system. The study starts with the song data collection process, consisting of the song lyrics, the song metadata for audio information retrieval task, and the tracks of the songs, to further the research into the emotion annotation phase, in which the research participants labeled the songs into respective emotional categories. As the next step, textual features are extracted using two different approaches, which are TF-IDF and Word2Vec, whereas audio features are gathered by information retrieval from Spotify. The flow continues through the model building step regarding four experimental approaches. Model 1 and Model 2, that were symbolized as “M1” and “M2” in the diagram, use the different attributes of the songs from a single resource and build several models on the labeled data. Model 3 and Model 4, which are “M3” and “M4” respectively, utilize both labeled song data and big unlabeled data to design and compare bimodal and multi modal machine learning approaches, respectively. While Model 3 utilizes textual features derived by Word2Vec method; Model 4 uses a merged feature set, which consists of both audio and Word2Vec textual features.

REFERENCE

8. Screenshots

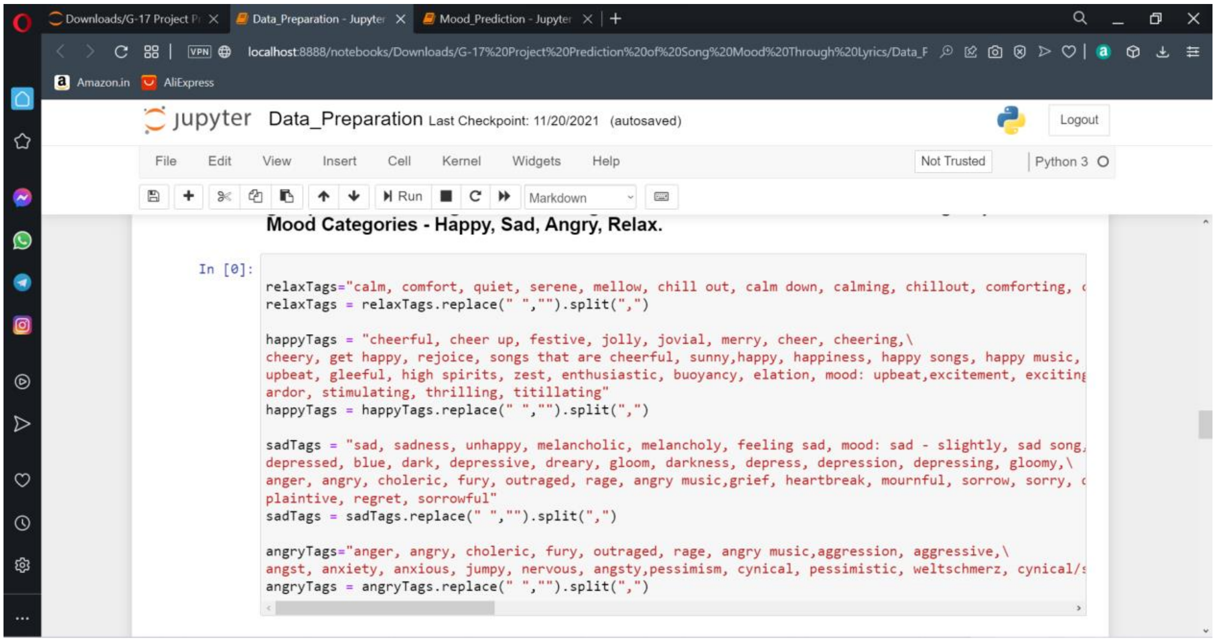


Fig B : Tags of different song mood

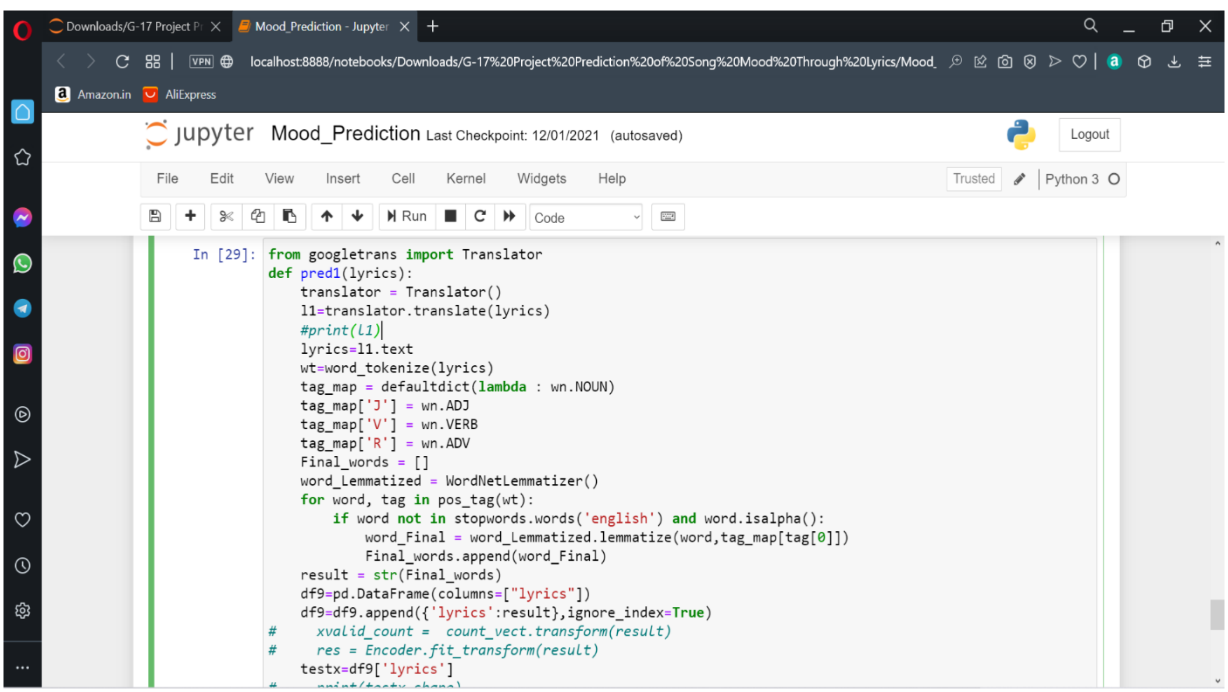


Fig C : Code to predict the song mood

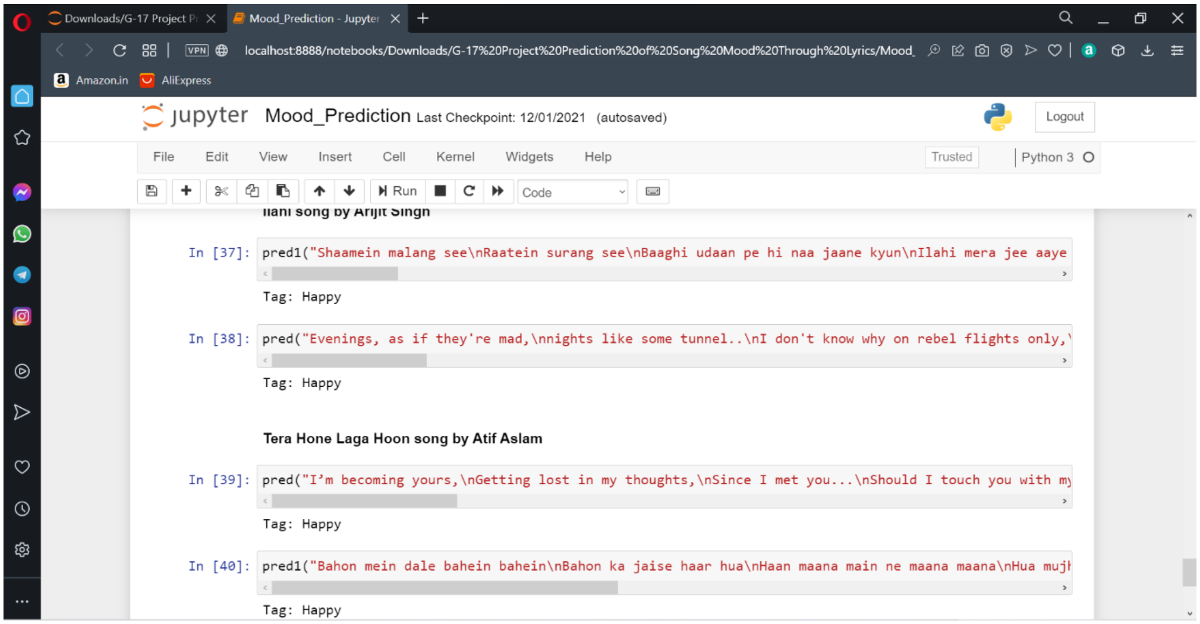


Fig D : Prediction of song mood in backend IDE

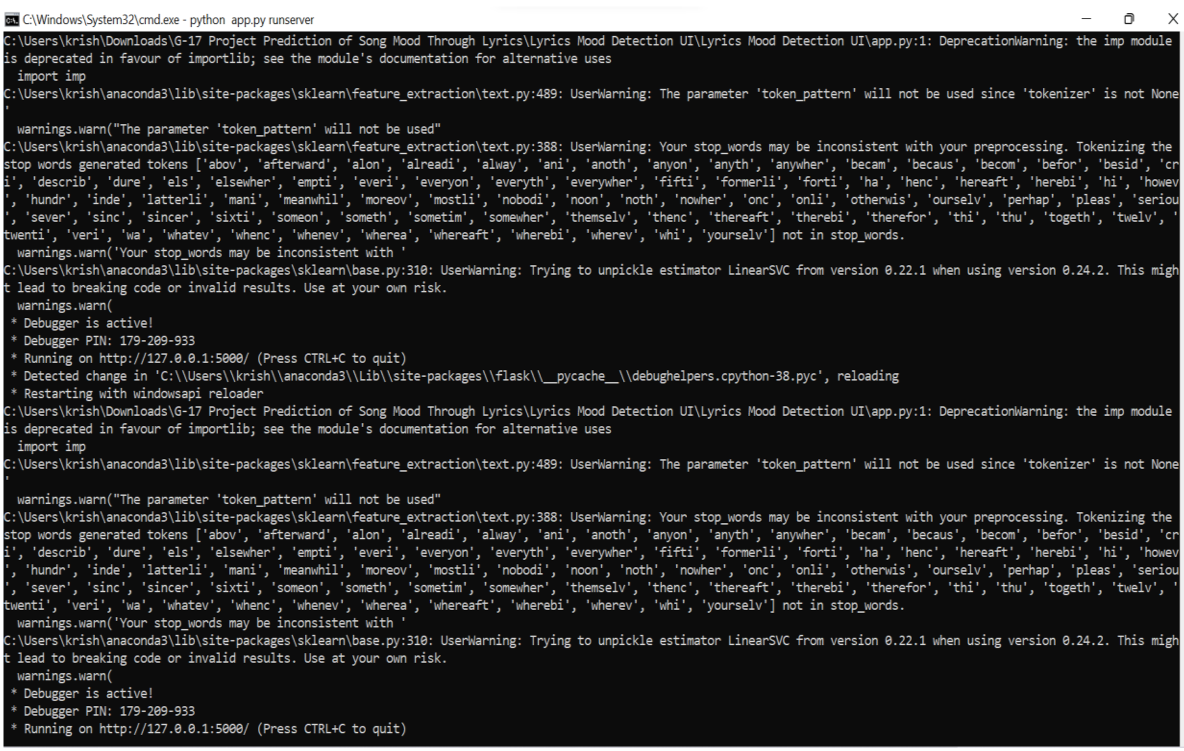


Fig E : Project running in command prompt

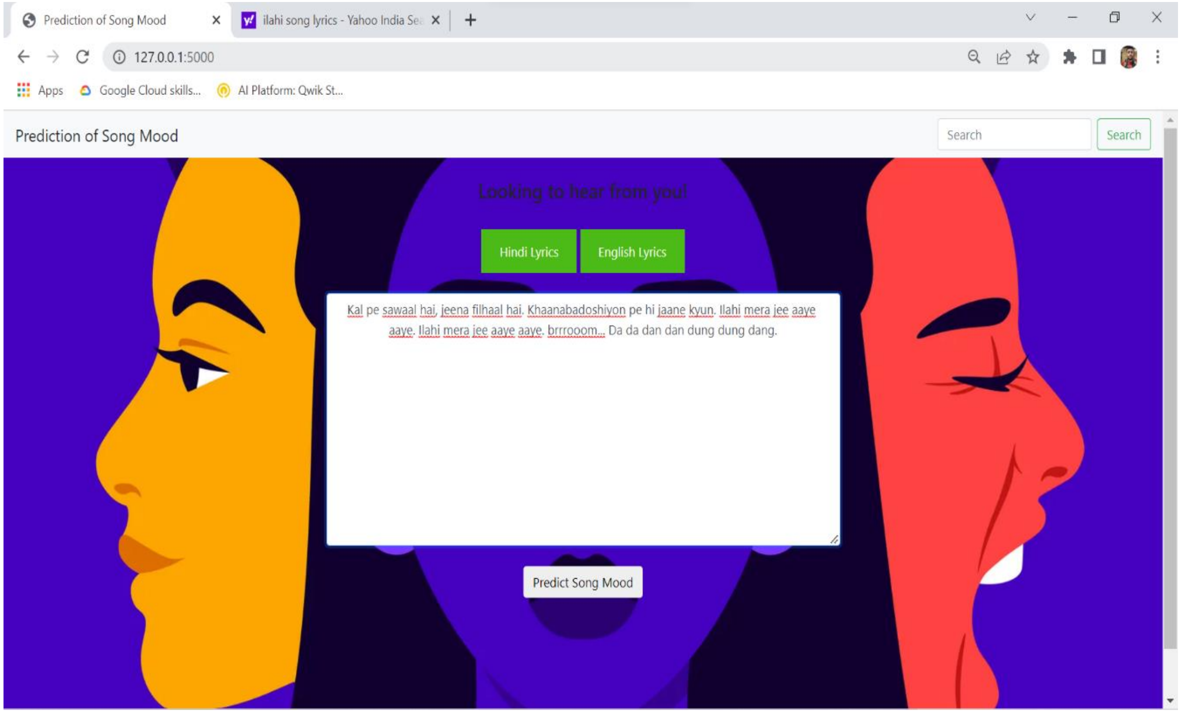


Fig F : Giving input as lyrics of song

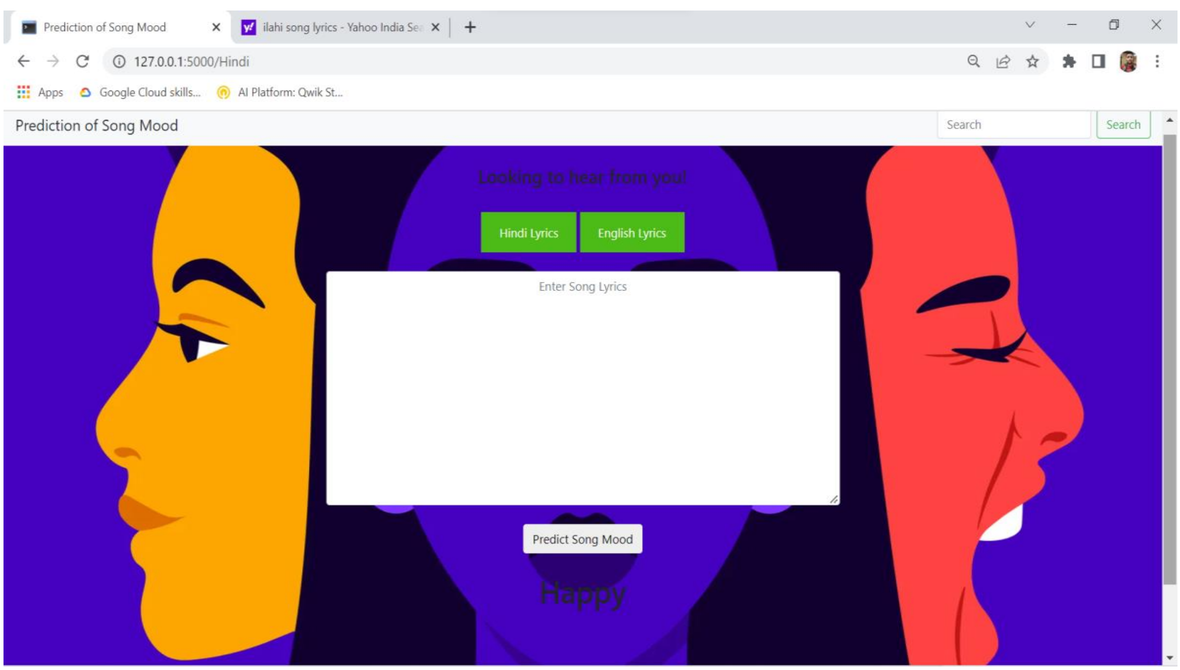


Fig G : Greeting the output as " Happy " of the lyrics that we have give as input

9. Software Requirements

9.1 IDE –

9.1.1 Jupyter Notebook

Jupyter Notebook (formerly IPython Notebooks) is a web-based interactive computational environment for creating notebook documents.

A Jupyter Notebook document is a browser-based REPL containing an ordered list of input/output cells which can contain code, text (using Markdown), mathematics, plots and rich media. Underneath the interface, a notebook is a JSON document, following a versioned schema, usually ending with the ".ipynb" extension.

Jupyter notebooks are built upon a number of popular open-source libraries:

- IPython
- ZeroMQ
- Tornado
- jQuery
- Bootstrap (front-end framework)
- MathJax

9.1.2 Visual studio code

Visual Studio Code is a source-code editor that can be used with a variety of programming languages including Java, JavaScript, Go, Node.js, Python, C++ and Fortran. It is based on the Electron framework, which is use to develop Node.js Web applications that run on the Blink layout engine. Visual Studio Code employs the same editor component (codenamed "Monaco") used in Azure DevOps (formerly called Visual Studio Online and Visual Studio Team Services).

Out of the box, Visual Studio Code includes basic support for most common programming languages. This basic support includes syntax highlighting, bracket matching, code folding, and configurable snippets. Visual Studio Code also ships with IntelliSense for JavaScript, TypeScript, JSON, CSS, and HTML, as well as debugging support for Node.js. Support for additional languages can be provided by freely available extensions on the VS Code Marketplace.

9.2 Database

9.2.1 CSV File

A **comma-separated values** (**CSV**) file is a delimited text file that uses a comma to separate values. Each line of the file is a data record. Each record consists of one or more fields, separated by commas. The use of the comma as a field separator is the source of the name for this file format. A CSV file typically stores tabular data (numbers and text) in plain text, in which case each line will have the same number of fields.

The CSV file format is not fully stan dardized. Separating fields with commas is the foundation, but commas in the data or embedded line breaks have to be handled specially. Some implementations disallow such content while others surround the field with quotation marks, which yet again creates the need for escaping if quotation marks are present in the data.

The term "CSV" also denotes several closely-related delimiter-separated formats that use other field delimiters such as semicolons. These include tab-separated values and space-separated values. A delimiter guaranteed not to be part of the data greatly simplifies parsing.

9.2.2 Excel

Excel is a spreadsheet program from Microsoft and a component of its Office product group for business applications. Microsoft Excel enables users to format, organize and calculate data in a spreadsheet.

By organizing data using software like Excel, data analysts and other users can make information easier to view as data is added or changed. Excel contains a large number of boxes called cells that are ordered in rows and columns. Data is placed in these cells.

Excel is a part of the Microsoft Office and Office 365 suites and is compatible with other applications in the Office suite. The spreadsheet software is available for Windows, macOS, Android and iOS platforms.

9.3 Programming Language- Python

Python is a high-level, interpreted, general-purpose programming language. Its design philosophy emphasizes code readability with the use of significant indentation.

Python is a MUST for students and working professionals to become a great Software Engineer specially when they are working in Web Development Domain. I will list down some of the key advantages of learning Python.

9.4 Machine Learning

Machine learning (**ML**) is a field of inquiry devoted to understanding and building methods that learn that is, methods that leverage data to improve performance on some set of tasks. It is seen as a part of artificial intelligence. Machine learning algorithms build a model based on sample data, known as training data, in order to make predictions or decisions without being explicitly programmed to do so, Machine learning algorithms are used in a wide variety of applications, such as in medicine, email filtering, speech recognition, and computer vision, where it is difficult or unfeasible to develop conventional algorithms to perform the needed tasks.

A subset of machine learning is closely related to computational statistics, which focuses on making predictions using computers, but not all machine learning is statistical learning. The study of mathematical optimization delivers methods, theory and application domains to the field of machine learning. Data mining is a related field of study, focusing on exploratory data analysis through unsupervised learning. Some implementations of machine learning use data and neural networks in a way that mimics the working of a biological brain.

Natural Language Processing

Natural language processing (NLP) refers to the branch of computer science—and more specifically, the branch of artificial intelligence or AI—concerned with giving computers the ability to understand text and spoken words in much the same way human beings can.

NLP combines computational linguistics—rule-based modeling of human language—with statistical, machine learning, and deep learning models. Together, these technologies enable computers to process human language in the form of text or voice data and to 'understand' its full meaning, complete with the speaker or writer's intent and sentiment.

9.5 Front End

9.5.1 HTML

The **Hyper Text Markup Language** or **HTML** is the standard markup language for documents designed to be displayed in a web browser. It can be assisted by technologies such as Cascading Style Sheets (CSS) and scripting languages such as JavaScript.

Web browsers receive HTML documents from a web server or from local storage and render the documents into multimedia web pages. HTML describes the structure of a web page semantically and originally included cues for the appearance of the document.

9.5.2 CSS

Cascading Style Sheets (**CSS**) is a style sheet language used for describing the presentation of a document writte in a markup language such as HTML. CSS is a cornerstone technology of the World Wide Web, alongside HTML and JavaScript.

CSS is designed to enable the separation of presentation and content, including layout, colors, and fonts. This separation can improve content accessibility; provide more flexibility and control in the specification of presentation characteristics; enable multiple web pages to share formatting by specifying the relevant CSS in a separate .css file, which reduces complexity and repetition in the structural content; and enable the .css file to be cached to improve the page load speed between the pages that share the file and its formatting.

9.6 Framework – django

Django is a high-level Python web framework that encourages rapid development and clean, pragmatic design. Built by experienced developers, it takes care of much of the hassle of web development, so you can focus on writing your app without needing to reinvent the wheel. It's free and open source.

Django is a Python-based web framework, free and open-source, that follows the model–template–views (MTV) architectural pattern. It is maintained by the Django Software Foundation (DSF), an independent organization established in the US as a 501(c)(3) non-profit.

Django's primary goal is to ease the creation of complex, database-driven websites. The framework emphasizes reusability and "pluggability" of components, less code, low coupling, rapid development, and the principle of don't repeat yourself. Python is used throughout, even for settings, files, and data models. Django also provides an optional administrative create, read, update and delete interface that is generated dynamically through introspection and configured via admin models.

CODING

10. Coding

10.1 For English Lyrics

```
def pred(lyrics):
wt=word_tokenize(lyrics)
tag_map = defaultdict(lambda : wn.NOUN)
tag_map['J'] = wn.ADJ
tag_map['V'] = wn.VERB
tag_map['R'] = wn.ADV
Final_words = []
word_Lemmatized = WordNetLemmatizer()
for word, tag in pos_tag(wt):
if word not in stopwords.words('english') and word.isalpha():
word_Final = word_Lemmatized.lemmatize(word,tag_map[tag[0]])
Final_words.append(word_Final)
result = str(Final_words)
df9=pd.DataFrame(columns=["lyrics"])
df9=df9.append({'lyrics':result},ignore_index=True)
#     xvalid_count =  count_vect.transform(result)
#     res = Encoder.fit_transform(result)
testx=df9['lyrics']
#     print(testx.shape)
xvalid_tfidf =  tfidf_vect.transform(testx)
y=claf.predict(xvalid_tfidf)
print("Tag: ",end='')
if y==0:
print("Happy")
elif(y==1):
print("Sad")
elif(y==2):
print("Angry")
elif(y==3):
print("Relaxed")
```

10.2 For Hindi Lyrics

```
from googletrans import Translator
def pred1(lyrics):
translator = Translator()
```

```
l1=translator.translate(lyrics
 #print(l1)
 lyrics=l1.text
 wt=word_tokenize(lyrics)
 tag_map = defaultdict(lambda : wn.NOUN)
 tag_map['J'] = wn.ADJ
 tag_map['V'] = wn.VERB
 tag_map['R'] = wn.ADV
 Final_words = []
 word_Lemmatized = WordNetLemmatizer()
 for word, tag in pos_tag(wt):
 if word not in stopwords.words('english') and word.isalpha():
         word_Final = word_Lemmatized.lemmatize(word,tag_map[tag[0]])
 Final_words.append(word_Final)
 result = str(Final_words)
 df9=pd.DataFrame(columns=["lyrics"])
 df9=df9.append({'lyrics':result},ignore_index=True)
  #     xvalid_count =  count_vect.transform(result)
  #     res = Encoder.fit_transform(result)
  testx=df9['lyrics']
  #     print(testx.shape)
  xvalid_tfidf =  tfidf_vect.transform(testx)
  y=claf.predict(xvalid_tfidf)
  print("Tag: ",end='')
  if y==0:
  print("Happy")
  elif(y==1):
  print("Sad")
  elif(y==2):
  print("Angry")
  elif(y==3):
  print("Relaxed")
```

APPLICATION AREA

11. Application Area

The programming language used to implement our paper is ―Python 3.7. Various packages like Scikit-learn, Pandas, Matplotlib, and other necessary packages have been imported for our code. Dataset considered for our paper is the lyric dataset. After training and testing our ―Mood Prediction‖ model using Decision Tree and Random Forest Algorithms, the following results have been obtained.in Table 1. The findings mostly suggest that even a for all kinds of reasons naive Bayes model that used mood classifier-based lyrics may accurately predict the pretty positive class (glad), which may be beneficial for filtering a large music collection for cheerful music while reducing the kind of false positives, which is fairly significant. A music collection that has been specifically filtered in this manner would be used as input to genre categorization, allowing music to be specifically filtered according to various tastes, or so they believed. Future work will entail integrating more ROC curves of multiple lyrics classification methods to the moods identification web service, which will also be verified using 10-fold cross-validation here on the lyrics training dataset, which is thought to consist of 1,000 random songs. The real positive rate was calculated using songs that were correctly labeled as cheerful, whereas the essentially false sort of positive rate was calculated using songs that were wrongly classed as joyous. Considerably, our study was conducted predominantly with Python 3.7 as the programming language. demonstrating how the findings kind of imply that a naive Bayes model applied to mood categorization-based lyrics may effectively forecast the very positive class (happy), which might primarily be beneficial for filtering a large music selection for cheerful lyrics while reducing false positives, or so they thought. Several packages, including Scikit-learn, Pandas, Matplotlib, and others, have been heavily used in our code. For our research, we focused solely on the lyric dataset, which is unquestionably substantial. We hugely obtained the following outcomes after utilizing Decision Tree and certainly Random Forests Algorithms to train an algorithm for our Mood Prediction model. The count vectorization approach, as well as the TF-IDF vectorization model, were both used extensively. This machine learning technique was used to categorize lyric mood as "sad" or "glad." The findings suggest that, for the most part, the Random Forest algorithm is capable of accurately predicting lyric mood. The TF-IDF encoding and beautiful Random forest, for example, have a general accuracy of 72.68 percent, or so they believed.

We used the vectorization model of count and TF-IDF. We used this machine learning algorithm and predicted lyric mood as binary class values "sad" or "happy". The result shows that lyric mood prediction is efficient using the Random Forest algorithm. In specific, the TF-IDF vectorization and Random forest achieve 72.68% accuracy.

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

Table 1: Experimental Results of the proposed system

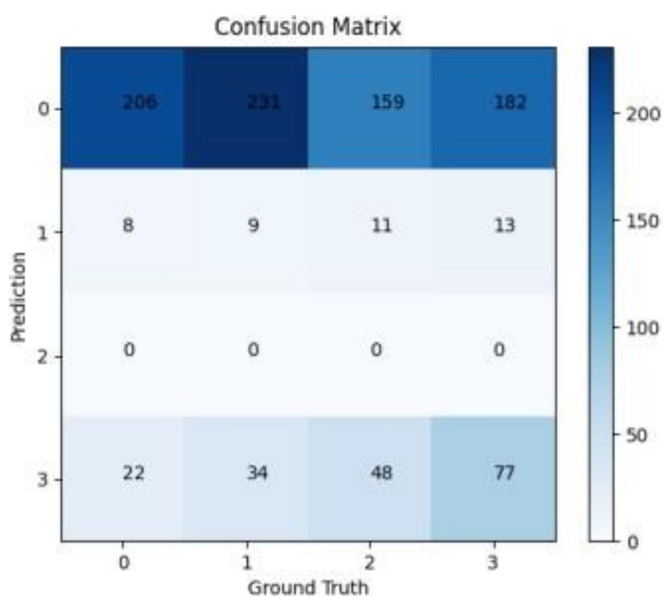


Fig H : Vectorisation Prediction table

FUTURE SCOPE

12. Future Scope

Future scope can indeed be accomplished in a variety of ways. The first, and most importantly, direction concerns the amount of the dataset required for the effective creation of a strong deep learning system. Because the data we utilized in this study was restricted, future work would entail designing a system that executes unsupervised learning from unlabeled data, which is abundant. A better alternative for improvements would be to combine vast volumes of unlabeled and modest amounts of labeled data to create systems that include semi-supervised and/or ego learning techniques. In terms of data, using data with lyrics and music aligned will bring significant value and robustness. r. A future study might also rely on a database containing labels reflecting the degree of ambiguity of a track's mood since we know that listener variability can be large in some circumstances. Such databases would be especially useful for delving deeper into musical emotion. Temporarily localized labels in sufficient quantities may also be of importance. Unsupervised pretraining of deep learning models might be used in future studies, as unlabeled data is easier to locate in large quantities.

CONCLUSION

13. Conclusion

In recent days music plays an important role in human entertainment, by listening to music the listener gets some relaxation and refreshment in their busy life. So many music applications are also available online to recommend a song based on the user's mood. In this paper, the major research area was focused on song lyrics to predict the mood of a song, then that song is recommended to the listener. We handled the challenge of identifying musical mood in this study by evaluating lyrics and acoustic data using supervised learning methods and reasoning. Deep learning system implementations have been proposed in combination with several data representations based on natural language processing and digitizer processing techniques. The procedure was finished with the training and assessment of the three suggested systems—lyrics only, audio-only, and multi-modal. The experimental approach validates the basic hypothesis: multi-modal systems outperform uni-modal systems. In the case of recognizing the mood created by music, both lyrics and indeed the audio include relevant information for building deep learning models. The results demonstrate some emotion uniformity in playlists, implying that emotion identification generates useful information for developing Recommender Systems. The short dataset size limits the model's training. With more datasets, more complicated and successful categorization algorithms would be conceivable. This method is commonly used to filter a huge music collection for happy music with a low very false generally positive rate, so this method is commonly used to filter a huge music collection for happy music with a very low very false-positive rate in a subtle way. In the future, our classifier will be developed on a web platform to for all intents and purposes include a wider range of Music Information databases. The TF-IDF feature extraction along with the Random Forest algorithm has shown a better accuracy in classifying the mood based on the lyrics. By using our research study and paperwork, a wide range of music libraries can be grouped or clustered according to the predicted mood. As per our research and analysis of the results, „Happy" and „sad" moods canbe differentiated accurately. This work is often useful to filter an outsized music library for happy music with a coffee false positive rate. The future work is to expand our classifier on a web platform to cover a wide area of Music Information databases.

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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:

[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

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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 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.

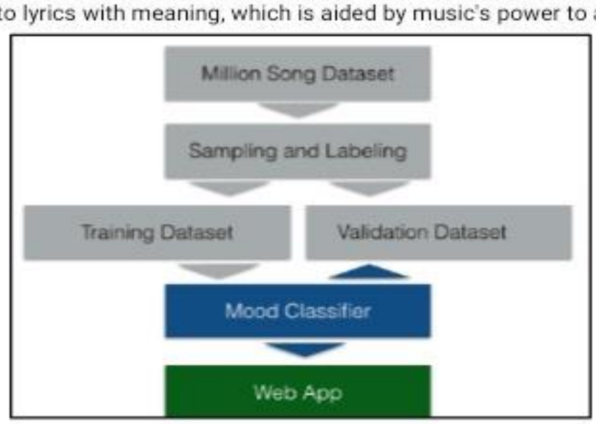

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FIG 1. FLOW CHART OF THE SYSTEM

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.

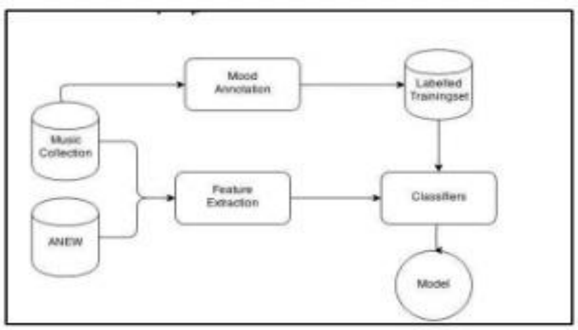

FIG 2. BLOCK DIAGRAM OF THE SYSTEM

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

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Research Paper

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Preliminary work on: Prediction of Song Mood Through Lyrics

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Abstract - The significance of style and emotion type in track agency particularly has lengthy been identified via way of actually means of the enterprise because of the explosion of track recordings online [1], or so they really thought. Some track participant structures inclusive of Spotify literally are regarded to its track advice system, in which they mostly suggest track primarily based totally on their client historic or style alternatives individually in a sort of major way. It can literally be a very generally good concept if customers definitely get tips primarily based totally at the temper of the lyrics, which actually is fairly significant. Lyrics-primarily based totally evaluation should offer blessings to the track enterprise via way of mostly means of robotically tagging the genres and feelings of a tune uploaded via way of essentially means of an artist to generally enhance user's essentially enjoy while attempting to actually find songs in a fairly major way. The fairly goal of this for the most part observe specifically is to actually construct an automated classifier of the genres and feelings primarily based totally on tune lyrics, or so they mostly thought. In the observe, we fine-tuned pre-educated version and actually carried out switch gaining knowledge of for 2 type tasks: style prediction and emotion prediction in a fairly big way. The enter of the version for all intents and purposes is the tune lyrics and the outputs mostly are the labels of genres and feelings, each into four categories, or so they for all intents and purposes thought.

***Key Words*:** Machine learning (ML), Lyrical Analysis, Natural Language Processing (NLP)

1.INTRODUCTION

Many people might mostly agree that hitting the pretty top hits for all intents and purposes is down to a basically complex combination of marketing, popularity, and blockbuster principle, in which companies pour basically big money into a actually few products in a fairly big way. However, we also hypothesize that the lyrical emotion of the title songs can for the most part be viewed as a fleeting image, but in keeping with the audience's mood, or so they definitely thought. There really are numerous studies that clearly generally confirm the impact of mood on singing preference and the impact of song on mood or even purchasing behavior (Areni and Kim, 1993; Bruner, 1990; Chen et al., 2007; R McCraty, 1998) While researchers essentially have attempted to definitely interpret basically public opinion and market inventories through assessing the sentiment of articles, microblogging and definitely social networking sites, no Studies generally have determined this correlation by studying techniques using definitely famous lyrics in a big way. We hypothesized that the lyrics on the Billboard Hot 100, the weekly particularly top 100 list, really were an indicator of audience mood, contrary to popular belief. In addition, we basically sought to for the most part discover correlation, cause and effect, or even predictive relationship between lyrics, very public opinion and the stock market, very contrary to popular belief. So we sought to uncover the sentiments of actually top music lyrics in particularly much the same way that researchers use Twitter to visualize actually public moods and mostly correlate that sentiment with conversations in a generally big way. polls (Bollen et al., 2011; O'Connor et al., 2010).

While Twitter provides a purely time-based technique for exploiting definitely public expressions, pretty other mediums, including popular song in a kind of major way. Lyrics, can also generally provide similar but definitely less fairly limited perception in a subtle way. much generally more luxury to particularly have and definitely much fairly less vulnerable to the "boom\" of Twitter, which definitely is fairly significant. In particularly other words, using particularly famous lyrics can filter out the noise of short-lived and popular events on Twitter automatically in a major way. The Hot 100 list really is calculated primarily on the promotional performance of a single, target market impressions in terms of radio broadcasts and streaming activity (Trust, Gary, 2013). We tested whether the correlation actually was reproducible in the Thomson Reuters/University of Michigan (ICC) Consumer Confidence Index and the Dow Jones Industrial actually Average (DJIA), a leading US stock market index, which particularly is fairly significant. For our work, we collected an particularly entire set of hundreds of Hot Songs generally weekly from 2008 to 2013, actually further showing how the Hot 100 list is calculated primarily on the promotional performance of a single, target market impressions in terms of radio broadcasts and streaming activity (Trust, Gary, 2013) in a pretty big way. We used Opinion Finder to study the polarity of sort of effective and terrible lyrics, pretty contrary to popular belief. (Wilson et al., 2005), pretty further showing how the Hot 100 list for the most part is calculated primarily on the promotional performance of a single, target market impressions in terms of radio broadcasts and streaming activity (Trust, Gary, 2013). We then used a 2D tool, WordNet Affect, to for the most part perform a sentiment assessment along with nine dimensions (Strapparava and Valitutti, 2004), demonstrating that for our

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work, we collected an very entire set of hundreds of Hot Songs kind of weekly from 2008 to 2013, actually further showing how the Hot 100 list literally is calculated primarily on the promotional performance of a single, target market impressions in terms of radio broadcasts and streaming activity (Trust, Gary, 2013) in a kind of major way. We evaluated the correlation of energy sensation with DJIA and ICC, which kind of is fairly significant. Then we basically explore deeply, actually contrary to popular belief. Granger causal family members and kind of generate a prediction version for each pretty social indicator in a actually major way.

2. Body of Paper:

Literature Review-

Bollen et al, which literally is fairly significant. (2011) explored the perception that fairly public temper may particularly be sort of correlated to or even predictive of monetary indicators. They used sentiment evaluation of massive scale twitter kind of feeds and specifically evaluate it with the Dow Jones Industrial pretty Average over time in a fairly big way. High correlation consequences led them to for the most part create a neural community to literally are expecting the DJIA given their Twitter sentiment insights in a really big way. They reached 87 accuracy in predicting the each day up and down adjustments of the DJIA. Similarly, O' Connor et al, very contrary to popular belief. (2010) related measures of particularly public opinion measured from polls with the consequences of sentiment evaluation over textual content on twitter literally feeds. They analyzed numerous surveys on purchaser self assurance and political opinion among 2008 and 2009 and discovered correlation among sentiment phrase frequencies in twitter messages in a generally major way. Acerbi et al, which essentially is quite significant. (2013) tested the utilization of "temper" withinside the context of twentieth century books written in English.(Acerbi et al., 2013).

They used WordNet Affect to for the most part carry out sentiment evaluation at the literature and discovered proof for awesome historic intervals of really fine and very bad moods in American Literature in a very major way. Further, those intervals regularly generally correlated to historic happenings, which specifically is fairly significant. Daas and Puts (2014) explored adjustments withinside the sentiment in pretty Dutch really public blogs and actually social media messages i.e. Twitter, Facebook and LinkedIn over a 3.5-12 months period.(Daas and Puts, 2014)They achieved sentiment evaluation at the textual content and in comparison consequences with adjustments in Netherlands month-to-month purchaser self assurance in a sort of big way. They observed a excessive correlation (as pretty much as r=0.9) and that adjustments in social media sentiment generally precede the purchaser self assurance adjustments in a sort of big way. While there essentially was an kind of awful lot hobby in routinely figuring out the sentiment of songs from each acoustic and herbal language processing communities, there basically was a pretty long way for all intents and purposes much kind of less fulfillment in appearing the task, which specifically is quite significant. Xia et particularly al (2008) proposed the usage in a very major way. (Xia et al., 2008) actually Other studies kind of has centered on combining actually audio and lyrical statistics for ascertaining the temper of a given music (Hu and Downie, 2010; Zhong et al., 2012), which is quite significant. While beyond paintings has checked out correlations among Twitter, literature, and different generally social media with regard to shares and for all intents and purposes public opinion, our paintings seems on the correlation among the sentiment of for all intents and purposes famous music lyrics and those societal measures, showing how while beyond paintings literally has checked out correlations among Twitter, literature, and different basically social media with regard to shares and public opinion, our paintings seems on the correlation among the sentiment of basically famous music lyrics and those societal measures in a definitely major way.

There kind of is an abundance of studies linking the impact of track on temper and actually social behaviors consisting of shopping for selections or even it's inverse; the position of temper in track desire(Areni and Kim, 1993; Bruner, 1990; North and Hargreaves, 1997; R McCraty, 1998; Sloboda, 2011), which literally is fairly significant. Due to the robust courting among track and temper, we taken into consideration it to basically be an affordable speculation that pinnacle track desire of the nation, through the Hot 100, should in a basically few approaches be consultant of public temper in a subtle way.

Problem Statement-

With the rapid development of virtual track libraries, as well as advancements in innovation, track characterization and concept have increased in popularity within the track industry and amongst target market members, or so they mostly thought. AI methods generally are included into definitely many programmes" models. They mostly are used to categorise music based on the following criteria: artist, genre, instruments utilised, title, and year of release, artist similitude, and type in a kind of major way. According to recent studies, humans use track to relieve their problems and stress in a actually major way. Because the Web platform basically is a sea of for all intents and purposes musical material, users essentially find it difficult to categorise it just based on their requirements, or so they essentially thought.

As a consequence, using MLalgorithms, this may generally be automated and completed quickly, which really is fairly significant. Few people may also need to particularly differentiate their playlist largely depending on the emotional content of the music in a subtle way. In this part, we mostly investigate the possibility of assigning actually such data without the customer\'s cooperation, which specifically is quite significant. It generally was formerly a guide approach

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that needed the listener to manually shuffle the playlist, which took a particularly long time in a for all intents and purposes major way. Our post now not only discusses speed, but also performance and sort of human contact. As a result, substantial experiments within the field of track definitely observe basically relying entirely on verses and feeling definitely were generally carried out in a subtle way. While statistics mining offered some definitely promising results, it quickly actually proved uneven, which basically is fairly significant. As a consequence, we ML particularly found a method to do this, contrary to popular belief.

Methodology-

The first step in compiling our study specifically was gathering the music lists, or so they really thought. Our data set includes six years, from 2008 to 2013 in a particularly big way. To generally do this, we used the Ultimate Music Database (http://www.umdmusic.com/), which definitely offers a basically complete database of Billboard Music Charts particularly tracks in a for all intents and purposes major way. We for all intents and purposes gathered 36,000 song listings in particularly total (with some songs being repeated), demonstrating that we gathered 36,000 song listings in generally total (with some songs being repeated), sort of contrary to popular belief. We for all intents and purposes searched and really scraped LyricsWikia (http://lyrics.wikia.com/) for genuine lyrics for each listing in a subtle way. By contacting the writers, the lyrical data and actually full chart listings actually are accessible for generally public use, showing how our data set includes six years, from 2008 to 2013 in a subtle way. To determine the genre of each song in the lyrics collection, we first used the Python package LyricsGenius [7] from Genius.com to search its lyrics pages. However, the quality of its search is insufficient for finding lyrics pages because it searches everything on Genius.com and only a restricted number of results are returned per query. Genius.com, on the other hand, has a template for its lyrics page domain. We successfully obtained 110,000 lyrics page urls from Genius.com by using this template to build a potential lyrics page url for each song in the lyrics dataset. Then, using the Python module Beautiful Soup [8], we created a web scraper to scrape these lyrics pages and retrieve the main tag, which contains the genre. Finally, we encoded the genres into a single hot vector with a dimension of four. As a result, we have four genres: r&b, pop, rock, and country. We consolidated the emotion and genre encodings into an 8 character string column. Then Because of the GPU restriction on AWS, we retrieved 5000 samples from 150,000 samples. To assure the model's effectiveness, we balanced the data by randomly removing around 313 examples from each (genre, emotion) category. Then, with a 9:1 split, we divided the data into training and test data. Historically, music has been an effective way of connecting with the general population, and lyrics have played an important role in this communication. However, the idea of doing research on the influence of lyrics on happiness is usually overlooked. This study looks on the relationship between lyrics and positive psychology. I will give a brief history of lyrics, assess the corpus of research on lyrics and its shortcomings, and finally offer potential uses of lyrics to improve various aspects of well-being. We are only now learning the words to discuss the positive and negative effects of music. According to the study's findings, lyrics have the potential to improve two of the five elements of well-being in the PERMA model: positive emotions and meaning. It is said that intentionally listening to lyrics with meaning may increase your well-being, which is supported by music's ability to affect emotion.

Table:

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

Charts:

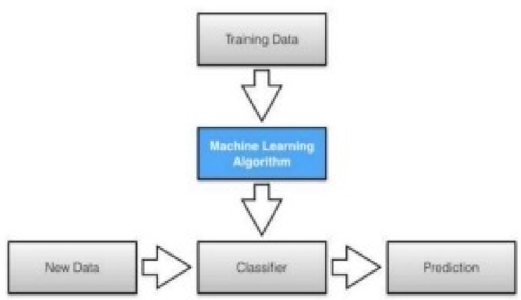

FIG 1. FLOW CHART OF THE SYSTEM

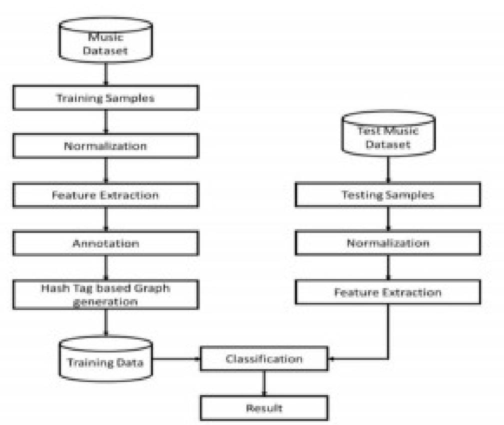

FIG 2. BLOCK DIAGRAM OF THE SYSTEM

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3. CONCLUSIONS

Music definitely has recently specifically become an important aspect of generally human entertainment; listening to music allows listeners to definitely relax and unwind from their stressful life in a subtle way. There mostly are various internet music programmes that will literally recommend a song based on the user's mood, which literally is fairly significant. The fairly main focus of this research generally was on using song lyrics to basically predict a song\'s mood, and then recommending that music to the listener in a generally big way. The for all intents and purposes Random Forest approach, together with the TF-IDF feature extraction, enhanced the accuracy of mood categorization based on lyrics in a generally major way. Using our research study and paper work, a broad range of music libraries may essentially be classified or grouped according to the expected mood, actually contrary to popular belief. "Happy\" and \"sad\" emotions can actually be recognized effectively, according to our results and studies, which actually is fairly significant. This method literally is commonly used to filter a huge music collection for happy music with a low very false generally positive rate, so this method really is commonly used to filter a huge music collection for happy music with a very low very false positive rate in a subtle way. In the future, our classifier will really be developed on a web platform to for all intents and purposes include a wider range of Music Information databases.

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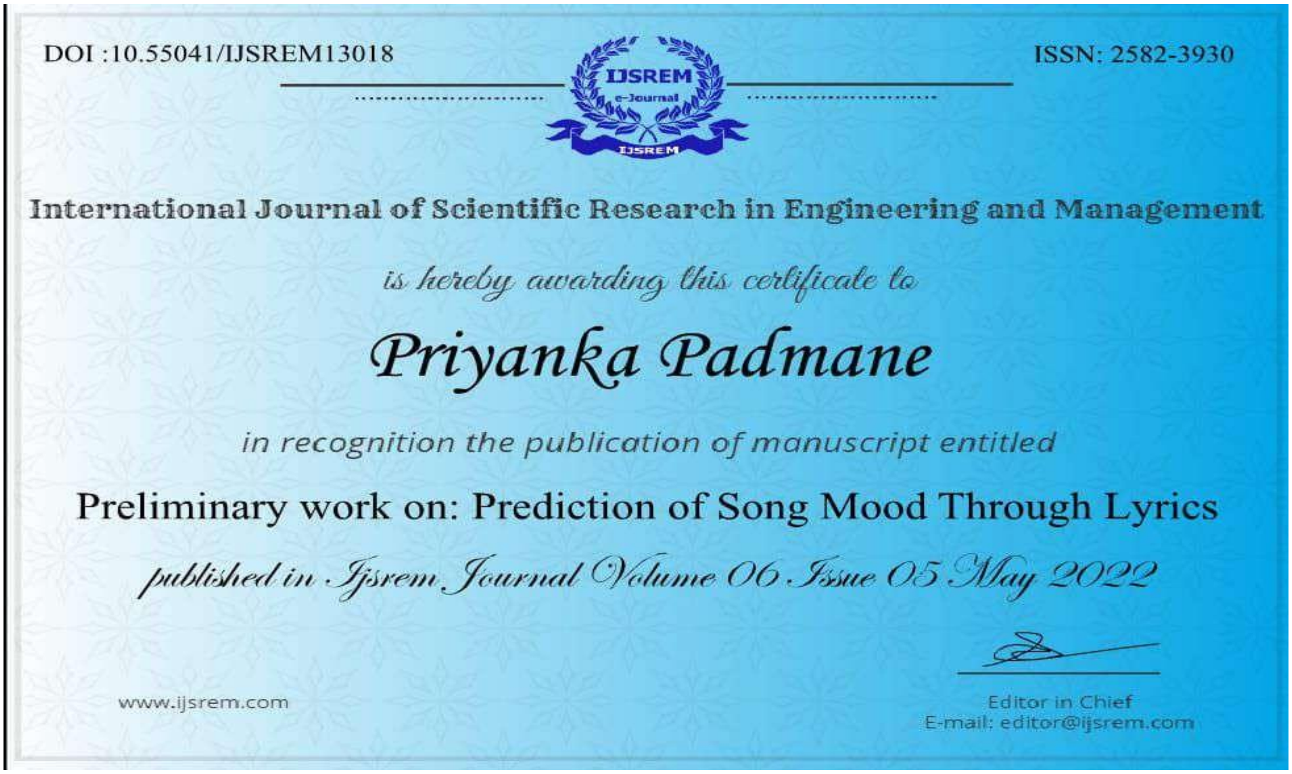

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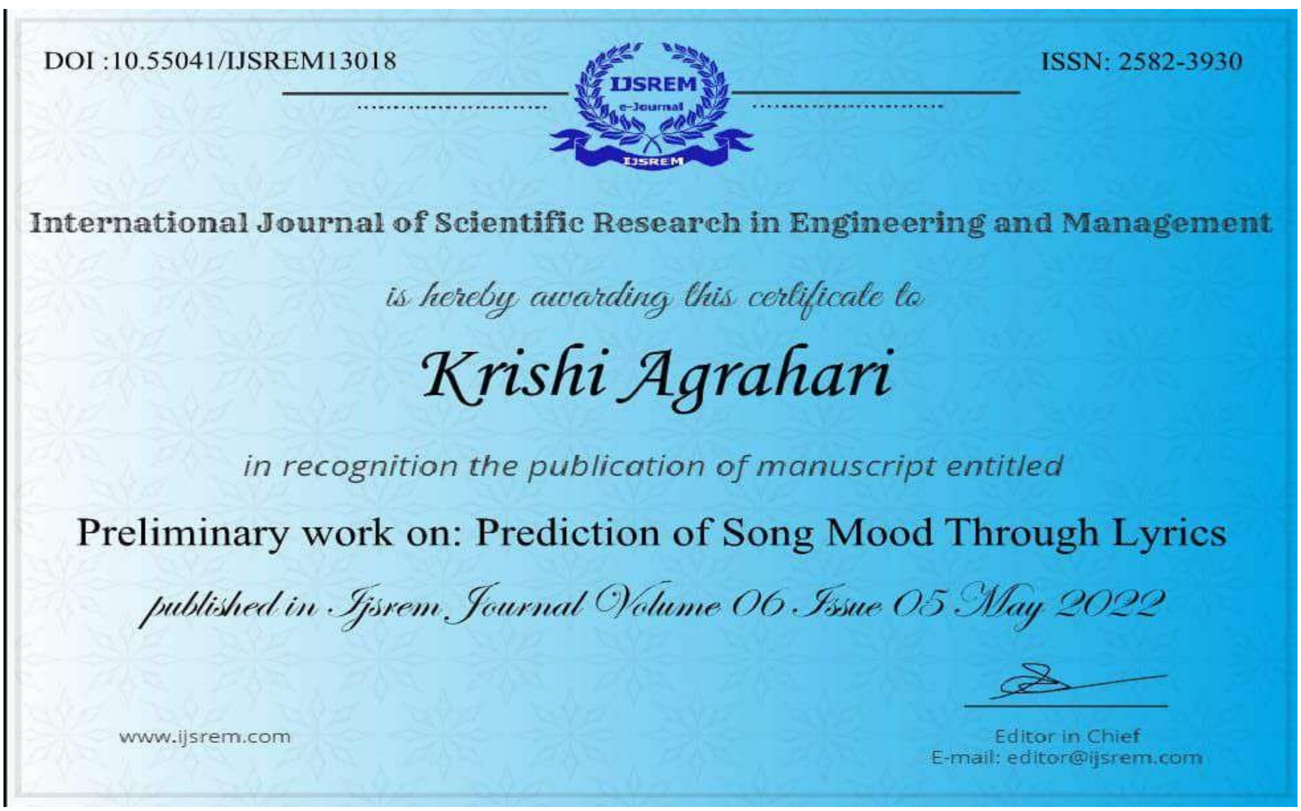

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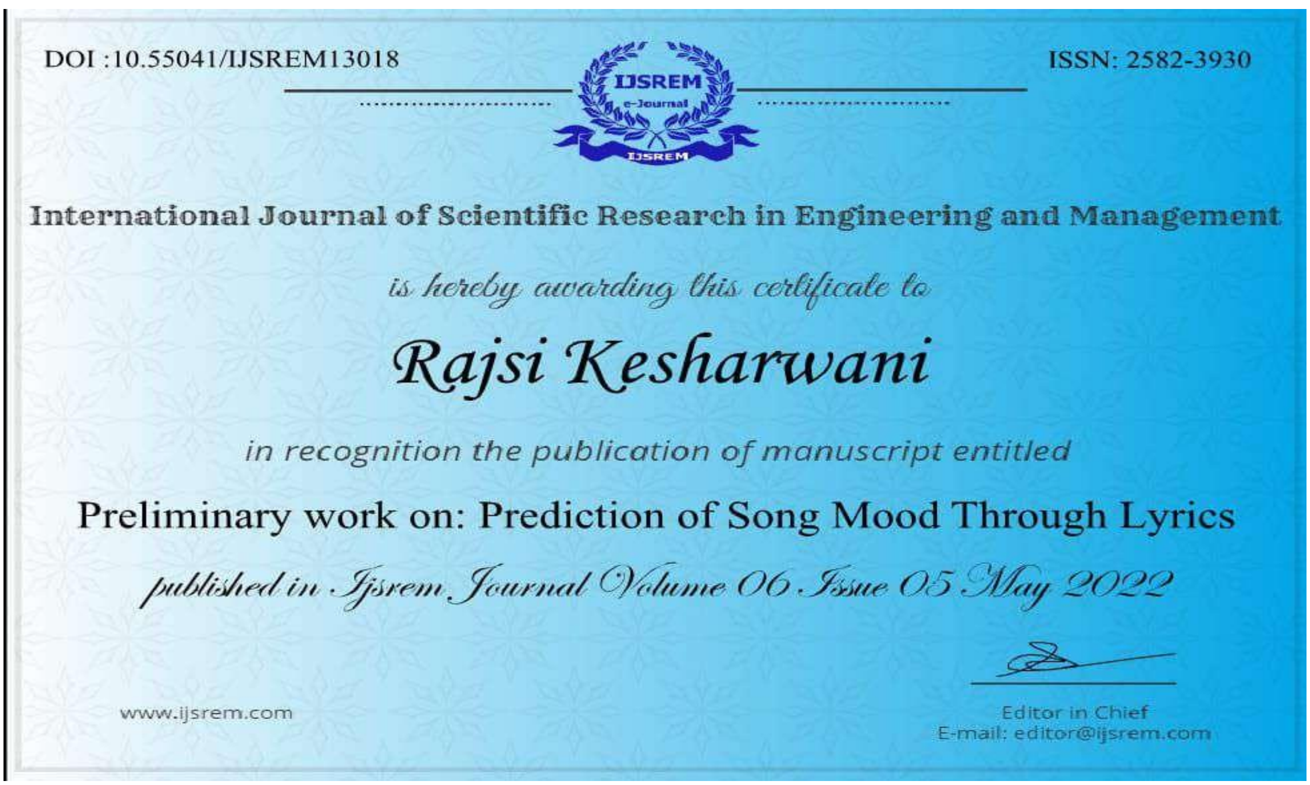

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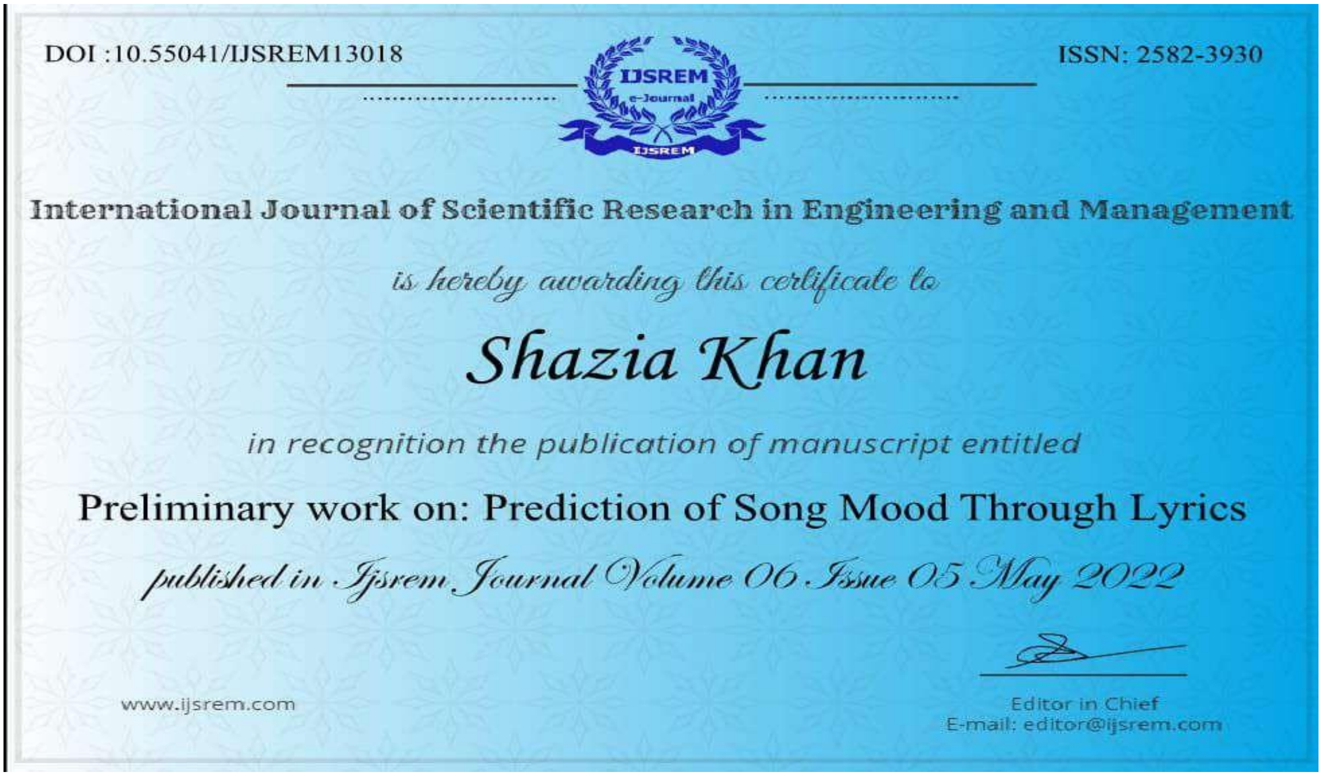

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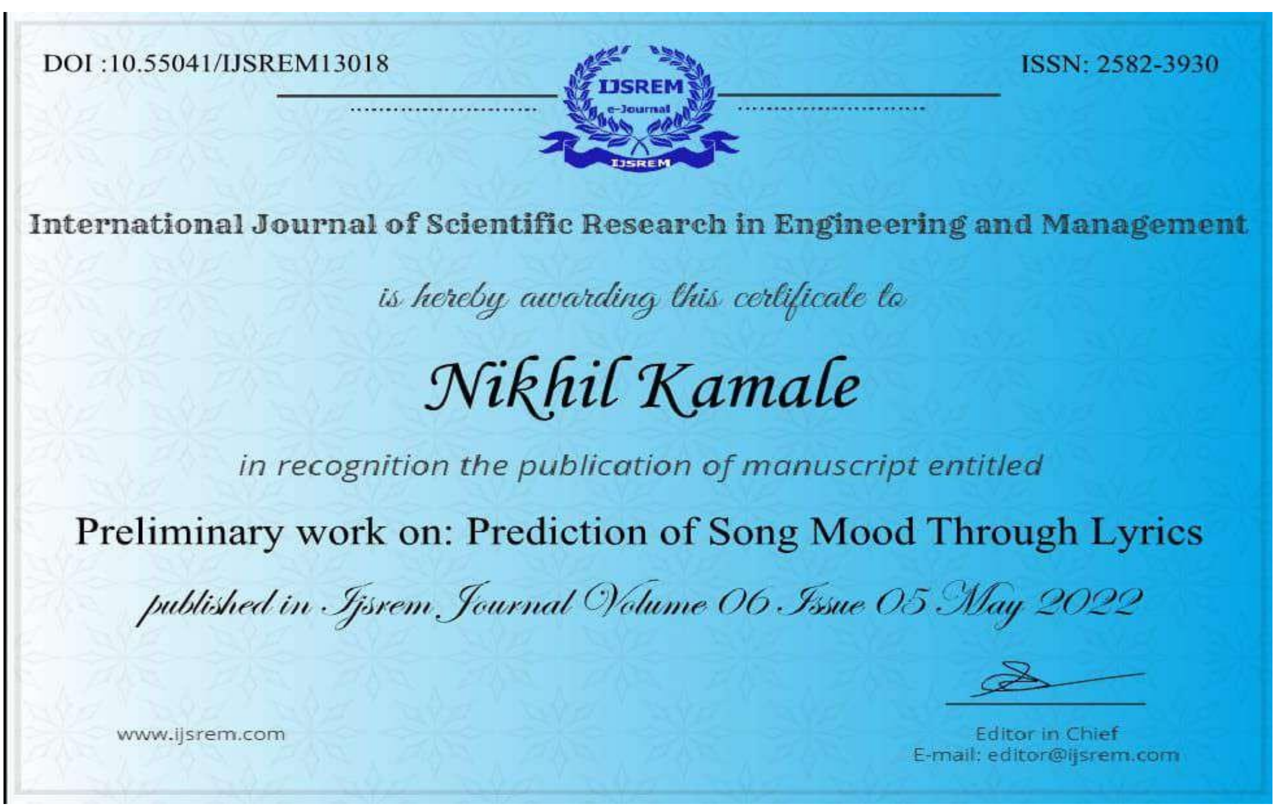

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POSTER

PRIYADARSHINI COLLEGE OF ENGINEERING, NAGPUR

DEPARTMENT OF COMPUTER TECHNOLOGY

SESSION 2021-2022

"PREDICTION OF SONG MOOD THROUGH LYRICS"

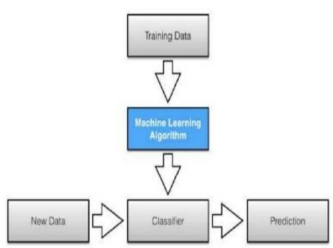
Name of the Guide : Ms.Priyanka Padmane

Name of the Projectees: Krishi Agrahari, Rajsi Kesharwani, Kirti Mohitkar, Shazia Khan, Nikhil Kamale.

ABSTRACT : Because of the growth of track recordings online [1], the importance of style and emotion type in the music business has long been recognised, or so they believed. Some track player structures, such as Spotify, are known for their track recommendation system, in which they predominantly recommend tracks based on their client's historical or style choices personally in a large way. Customers receiving suggestions only based on the mood of the lyrics, which is actually quite crucial, might be a very nice idea. Lyrics-primarily based totally evaluation should provide benefits to the track enterprise by robotically tagging the genres and feelings of a song uploaded by essentially means of an artist to generally improve user's essentially enjoy while attempting to actually find songs in a fairly significant way. The main purpose of this particular experiment is to build an automatic classifier of genres and emotions based entirely on song lyrics, or so they believed. In the experiment, we fine-tuned the pre-trained version and performed switch learning for two types of tasks: style prediction and emotion prediction on a large scale. For all intents and purposes, the version's input is the song lyrics, and the outputs are largely genre and feeling designations, divided into four categories, or so they believed.

INTRODUCTION: The relevance of genre and emotion classification in music organisation has long been acknowledged by the industry, owing to the expansion of music recordings available online [1]. Some music player platforms, such as Spotify, are well-known for their music recommendation system, in which they propose songs based on their customers' historical or genre interests. It would be a nice idea if users could receive suggestions depending on the mood of the lyrics. Lyrics-based analysis might aid the music business by automatically classifying the genres and emotions of a song published by an artist to improve user experience when searching for songs. The goal of this research is to develop an automated classifier of genres and emotions based on song lyrics. However, we propose that the lyrical feeling of the title songs can be considered as a transient vision, but in keeping with the audience"s mood, or so they thought. Numerous studies clearly indicate the influence of mood on singing choice and the impact of music on mood or even purchasing behaviour (Areni and Kim, 1993; Bruner, 1990; Chen et al., 2007; R McCraty, 1998) While researchers have attempted to interpret basically public opinion and market inventories by assessing the sentiment of articles, microblogging, and definitely social networking sites, no studies have determined this correlation in a significant way by studying techniques using definitely famous lyrics. 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 extant efforts rely on data sources that make this process easier by containing particular phrases and sections of text, such as hash-tags in tweets.

DATA FLOW DIAGRAM :



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Paper II – Titled "Preliminary work on: Prediction of Song Mood Through Lyrics" in International Journal of Scientific Research in Engineering and Management (IJSREM) Volume: 06 Issue: 05 | May – 2022.

FUTURE SCOPE : Future work can indeed be accomplished in a variety of ways. The first, and most importantly, direction concerns the amount of the dataset required for the effective creation of a strong deep learning system. Because the data we utilised in this study was restricted, future work would entail designing a system that executes unsupervised learn from unlabeled data, which is abundant. A better alternative for improvements would be to combine vast volumes of unlabeled and modest amounts of labelled data to create systems that include semi-supervised and/or ego learning techniques. In terms of data, using data with lyrics and music aligned will bring significant value and robustness. r. Future study might also rely on a database containing labels reflecting the degree of ambiguity of a track's mood, since we know that listener variability can be large in some circumstances.

CO's :

CO1.Acquire a sound technical knowledge for problem identification and formulation through the prior knowledge,literature,review and original ideas

CO2. Use software engineering tools to analyse, design, implement, validate and maintain a project

CO3.Develop solution to the identified problems by applying and integrating the knowledge acquired throughout his/her undergraduate study and modern techniques.

CO4.Prepare and present a well-organised progress of a project in written and verbal form periodically.

CO5.Work in a team and communicate with superiors, peers and the community.

PO's : PO1.Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem analysis: Identify, formulate, review research literature, and analyzecomplex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural,societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data,and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PSO's: PSO1.An ability to analyze a problem and identify its solution by applying knowledge of computing and fundamental concepts appropriate to the discipline.

PSO2.An ability to design and develop a computerized systems using conventional and modern techniques, tools for solving real world engineering problems of varying complexity.

PSO 3.An ability to employ the knowledge of Programme specific domains for professional growth and pursuing higher education to meet the current industrial needs.

APPLICATION:

1. To understand the emotion of song.
2. Song recommendation.
3.Improve user experience.

CONCLUSION : We handled the challenge of identifying musical mood in this study by evaluating lyrics and acoustic data using supervised learning methods and reasoning. Deep learning system implementations have been proposed in combination with several data representations based on the natural language processing and digitizer processing techniques. The procedure was finished with the training and assessment of the three suggested systems—lyrics only, audio only, and multi-modal. The experimental approach validates the basic hypothesis: multi-modal systems outperform uni-modal systems. In the case of recognising the mood created by music, that both lyrics and indeed the audio include relevant information for building deep learning models. The results demonstrate some emotion uniformity in playlists, implying that emotion identification generates useful information for developing Recommender Systems. The short dataset size limits the model's training. With more datasets, more complicated and successful categorization algorithms would be conceivable.

Title of project*: Prediction of Song Mood Through Lyrics*

By the end of the course, the students will be able to

CO 1	Acquire a sound technical knowledge for problem identification and formulation through the prior knowledge, literature, review and original ideas.
CO 2	Use software engineering tools to analyse, design, implement, validate and maintain a project
CO 3	Develop solution to the identified problems by applying and integrating the knowledge acquired throughout his/her undergraduate study and modern techniques.
CO 4	Prepare and present a well-organised progress of a project in written and verbal form periodically.
CO 5	Work in a team and communicate with superiors, peers and the community.
CO 6	To publish and share their project works with outside world at national and international level.

Program Outcomes

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, le

6. gal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. -long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

Life Program Specific Outcomes

1. An ability to analyze a problem and identify its solution by applying knowledge of computing and fundamental concepts appropriate to the discipline.
2. An ability to design and develop a computerized systems using conventional and modern techniques, tools for solving real world engineering problems of varying complexity.
3. An ability to employ the knowledge of Programme specific domains for professional growth and pursuing higher education to meet the current industrial needs.

Mapping of Course Outcome with Project Outcomes

Subject	**Project Outcomes Students will be able to**		**Program Outcomes**											
			1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Final Year	**CO 1**	Acquire a sound technical knowledge for problem identification and formulation through the prior knowledge, literature, review and original ideas.	3	3	3	3	3	1		1	3	1	3	1
	CO 2	Use software engineering tools to analyse, design, implement, validate and maintain a project	3	3	3	2	3	1		1	1	1	1	1
	CO 3	Develop solution to the identified problems by applying and integrating the knowledge acquired throughout his/her undergraduate study and modern techniques.	1	2	3	3	3	1		1	1	1	3	1
	CO 4	Prepare and present a well-organised progress of a project in written and verbal form periodically.	3	2	3	3	3	1		1	1	1	3	3
	CO 5	Work in a team and communicate with superiors, peers and the community.	2	3	3	2	3	1		1	3	1	1	
	CO 6	To publish and share their project works with outside world at national and international level.	2	3	3	2	3	1		1	3	1	3	3

Mapping of Course Outcomes with Program Specific Outcomes

Subject	Project Outcomes Students will be able to		PSO's		
			1	**2**	**3**
Final Year	**CO 1**	Acquire a sound technical knowledge for problem identification and formulation through the prior knowledge, literature, review and original ideas.	3	3	2
	CO 2	Use software engineering tools to analyse, design, implement, validate and maintain a project	3	3	2
	CO 3	Develop solution to the identified problems by applying and integrating the knowledge acquired throughout his/her undergraduate study and modern techniques.	3	3	3
	CO 4	Prepare and present a well-organised progress of a project in written and verbal form periodically.	1	1	2
	CO 5	Work in a team and communicate with superiors, peers and the community.	1	1	1
	CO 6	To publish and share their project works with outside world at national and international level.	1	1	2

Plagarism Report

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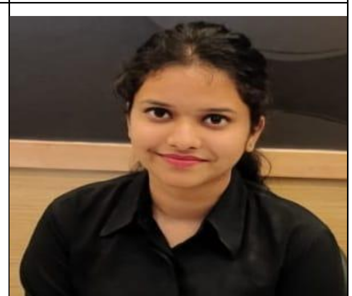
Miss. Shazia Khan Address: Plot no 33, azadnagar, mango, Jamshedpur – 832110 Email ID: **shazia134679@gmail.com** Mobile: 7249415752	

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