Music Recommendation System With Advanced Classification

Ramasuri Appalanidu C H
Inforamtion Technology,
Vignan's Institute of Engineering for Women
Visakhapatnam, India.

Athukumsetti Jhansi Rani
Information Technology
Vignan's Institute of Engineering for Women
Visakhapatnam, India.

Ajay Kumar Badhan
Information Technology
Vignan's Institute of Engineering for Women
Visakhapatnam, India.

Achanta Sai Dharani
Information Technology
Vignan's Institute of Engineering for Women
Visakhapatnam, India.

Bhoomireddy Pushpa
Information Technology
Vignan's Institute of Engineering for Women
Visakhapatnam, India.

Mudunuru Venkata Sai Sindhuja
Information Technology
Vignan's Institute of Engineering for Women
Visakhapatnam, India.

***Abstract*—We describe a personalized music recommendation system using KNN and machine learning methods in this study. We present a collaborative filtering and content filtering recommendation algorithm to combine the output of the network with the log files to recommend music to the user in a personalized music recommendation system. The suggested system includes log files that store the previous history of the user's music playlist. The suggested music recommendation system pulls the user's history from the log file and provides music recommendations for each recommendation. Content-based approaches make suggestions based on the audio characteristics.**

Keywords—* *SVM(support vector machine), Nearest neighbourhood, Neural collabarative filtering RS,,K-nearest neighbourhood.

I. INTRODUCTION

With the growth of the internet in recent decades, it has become the primary source for retrieving multimedia material such as video, literature, and music, among other things. People regard music to be a significant part of their lives, and they listen to it on a regular basis. The issue now is how to organise and manage the millions of music titles that society produces. A smart music recommendation system should be able to detect preferences automatically and produce playlists based on them. The suggested technique uses music similarity to detect plagiarism in music. The collaborative filtering algorithm has been confirmed to function well based on user listening behaviour and historical ratings. The Music Information Retrieval Evaluation Exchange (MIREX) has been organised annually since 2005 to aid in the development of MIR algorithms. Similarity between songs is assessed in the content-based method, and songs are recommended based on the similarity score. Plagiarism can also be identified using the content-based method, which uses a similarity score to detect plagiarism. We may quickly propose music to users based on their interests and moods using mood prediction. Many methods exist for predicting mood, including the use of lyrics, face emotion detection, and so on. We employed lyrics-based mood prediction, which calculates the similarity score and suggests songs. Music recommendation systems are a two-edged sword. These are advantageous to both the user and the provider. They keep the user engaged by providing fascinating music in the form of suggestions, minimizing the number of options available to the user. They allow for the investigation and discovery of music that the user might not be aware of. There is never a lack of enjoyment because it is a music recommender.

A music recommender system is one that learns from a user's previous listening experience and suggests tracks that they might enjoy hearing in the future. We've tried a few different algorithms to see what we can come up with. an effective recommender system. We started with a popularity-based paradigm that was straightforward and intuitive. Collaborative filtering algorithms are also implemented, which forecast (filter) a user's liking by collecting preferences and tastes from many other users (collaborating). 2 Literature survey

Existing collaborative filtering algorithms-based recommender systems have had a lot of success. Netflix held a competition for the best collaborative filtering algorithm [3], and the winning algorithm, which used latent factor models, may improve on Netflix's current algorithm by 10.09 percent. Amazon employs user-to-user and item-to-item collaborative filtering [4], which is critical to the company's success. A fresh neural network-based algorithm, neural collaborative filtering (He 2017) [5, has just been proposed. Many academics have proposed several methods employing Machine Learning techniques for content-based algorithms, such as Decision Tree based [6], Support Vector Machine based [7], and even logistic regression [8]. To construct these algorithms, we may fully utilize the knowledge we gained in class. While the music recommendation system resembles existing commercial recommendation systems in certain ways, it concentrates on offering good and individualized

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 10 Issue 07, July-2021

music advise rather than things for users to purchase. The ideal music recommendation system would be able to make individualized music recommendations to human listeners automatically. The length of a piece of music is significantly less than that of a book or a movie, and people usually listen to their favorite songs more than once, which is one of the key challenges we will encounter in this project.

II. EXISTING SYSTEM

Introduced a concept of analysing and predicting songs on the basis of machine learning. The main theme of this system is predicting the songs based on users playlist whether the users like or dislike the song. The song prediction by user's interest from their playlist. Applied machine learning algorithm such as decision tree, random forest and logistic regression. The song prediction is proposed with GUI, where user can enter the details of the attribute and predict the song whether it is like or dislike. The accuracy and error values such as MAE, MSE, RMSE and Rsquarredare arrived for the proposed algorithm. To find the best suitable algorithm for song prediction.

III. METHODOLOGIES AND ARCHITECTURE

One of the strategies used to construct a prediction system is collaborative filtering. The most essential component of this algorithm is product rating, which is gathered from the majority of consumers who expressly submit an appraisal of the item. In essence, the system delivers a return to the user by processing these data and allowing a statistical calculation to be performed, the results of which reflect which products the user has given a high rating. Collaborative filtering relies on a user-supplied database. Users and objects are the two key components in this data that can be used to build predictions for the recommender system. There are numerous algorithms for collaborative filtering, and more are being developed all the time.

Collaborative filtering is a recommendation system that collects "a vast quantity of information about the user's behavior, activities, or preferences and predicts what users would like based on their commonalities with other users." The item itself, or its features, that are recommended are not analyzed; rather, this approach assumes that previous information in the user's history is about how they agree with other users (for example, User A likes Film A and User B likes Film A, so they will have the same interests) and will be a prediction in determining whether they will purchase it.

The goal of this method is to develop a function that can predict whether or not a user would profit from an item — in this case, whether or not the user will listen to a music. This can be accomplished through the use of ratings. User ratings can be collected in two ways: explicitly and implicitly. K-Nearest Neighbors was utilized.

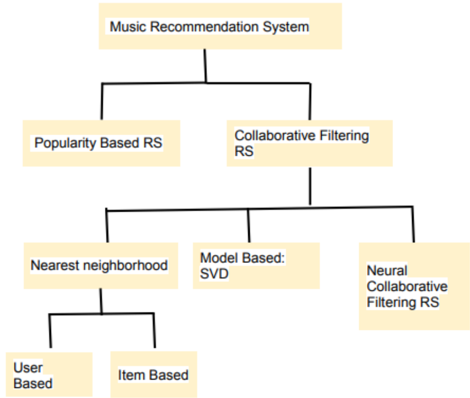

Fig 1Proposed Model

IV. 5.ALGORITHMS

5.1 SVM:

SVM (Support Vector Machine) is a supervised machine learning technique that can be used to solve classification and regression problems. It is, however, mostly employed to solve categorization difficulties. Each data item is plotted as a point in n-dimensional space (where n is the number of features you have), with the value of each feature being the value of a certain coordinate in the SVM algorithm.

The Support Vector Machine, or SVM, is a linear model that can be used to solve classification and regression issues. It can solve both linear and nonlinear problems and is useful for a wide range of applications. SVM is a basic concept: The method divides the data into classes by drawing a line or hyper plane. During the training phase, it divides the words into different categories depending on the training dataset, such as happy, sad, and so on, and predicts the mood of the input song based on the words and the similarity score. sorted in the increasing order the mood for the top similarity songs are predicted using svm and then the same mood songs are recommended.

```
Define number of features+1 as F and SVs+1 as SV
FOR each SV
        FOR each feature of the SV
          Read streamed data
          Convert it to float
          Store into array_SVs [SV][F]
        END FOR
END FOR
Read streamed data
Convert it to float
Store into array_αy [0] (b value)
FOR each SV
        Read streamed data
        Convert it to float
        Store into array_αy [SV]
END FOR
FOR each feature
        Read streamed data
        Convert it to float
        Store into array_test [F]
END FOR
FOR each feature
        Clear array_AC [F]
END FOR
FOR each SV
        FOR each feature of the SV
          array_AC [F] += array_αy [SV] * array_SVs [SV][F]
        END FOR
END FOR
FOR each feature
        Distance_value += array_AC [F] * array_test [F]
END FOR
Distance_value -= b
IF (Distance_value ≥ th) THEN
        RETURN 1
ELSE
   RETURN -1
END IF
```

Fig 2 pseudo code of SVM algorithm

4.2 KNN

Unlike user-based algorithms that look for neighbors between individuals, the K-Nearest Neighbor (K-NN) model for recommendations is an item-based approach that looks for neighbors between objects. K-Nearest Neighbor is the ideal model for implementing item-based collaborative filtering and is also a fantastic starting point for creating a recommendation

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 10 Issue 07, July-2021

system. The K-NN approach is a non-parametric learning technique. To make conclusions for new samples, this method uses a database where data points are divided into categories. K-NN relies solely on the similarity of item attributes and makes no assumptions about the distribution of the underlying data. When K-NN comes to a conclusion about an item, it calculates the "distance" between the target item and every other item in the database, ranks the distance, and recommends the top K nearest neighbors as the most comparable item.

The algorithm of the K-Nearest Neighbors method is as follows: (Han, et al, 2012)

a. Determine the parameter k (number of nearest neighbours).
b. Calculate the distance between the data to be evaluated and all training data.
c. Sort the distance formed (in ascending order) and determine the closest distance to the k-order.
d. Attach the appropriate class (c).
e. Find the number of classes from the nearest neighbour, and specify the class as the data classbeing evaluated.

k-Nearest Neighbor
Classify $(\mathbf{X}, \mathbf{Y}, x)$ // $\mathbf{X}$: training data, $\mathbf{Y}$: class labels of $\mathbf{X}$, x: unknown sample
for $i = 1$ **to** m **do**
  Compute distance $d(\mathbf{X}_i, x)$
end for
Compute set I containing indices for the k smallest distances $d(\mathbf{X}_i, x)$.
return majority label for $\{\mathbf{Y}_i \text{ where } i \in I\}$

Fig 3 :- pseudo code of knn

V. 5 RESULTS

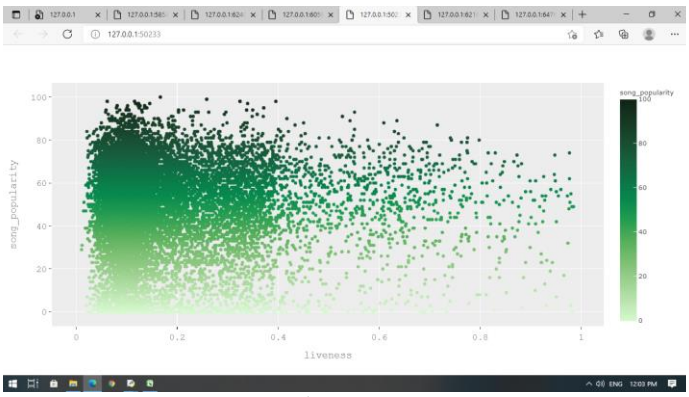

Fig 4 Livens features scatter plot

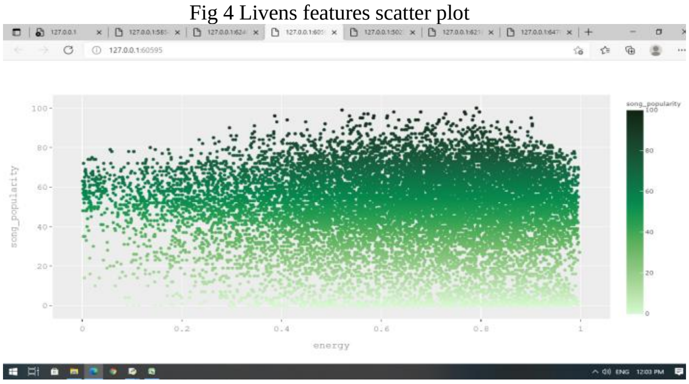

Fig 5 Energy features scatter plot

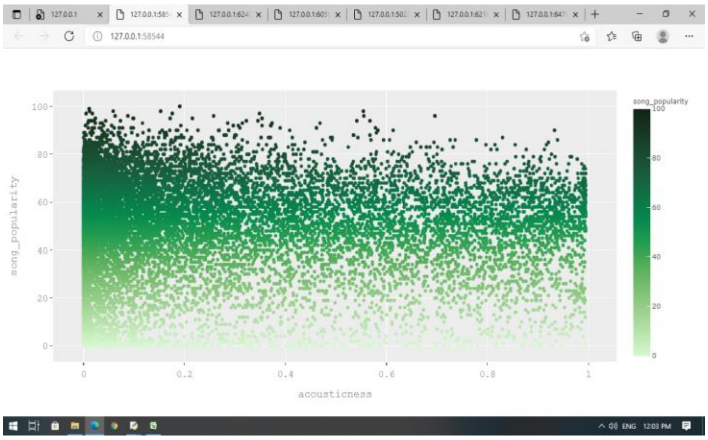

Fig 6 Acuteness features scatter plot

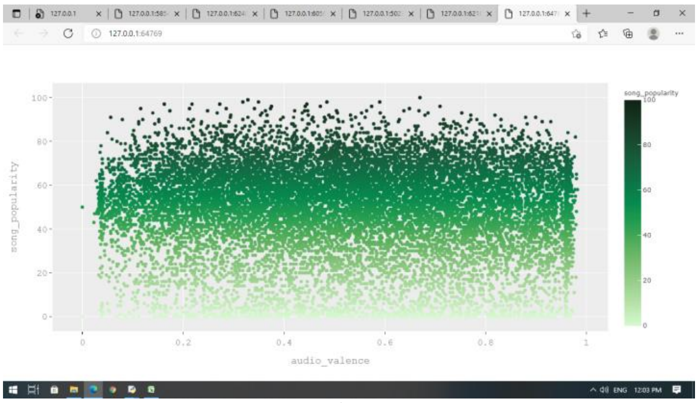

Fig 7 Audio valence features scatter plot

Fig8:- frequency graph for audio-violence

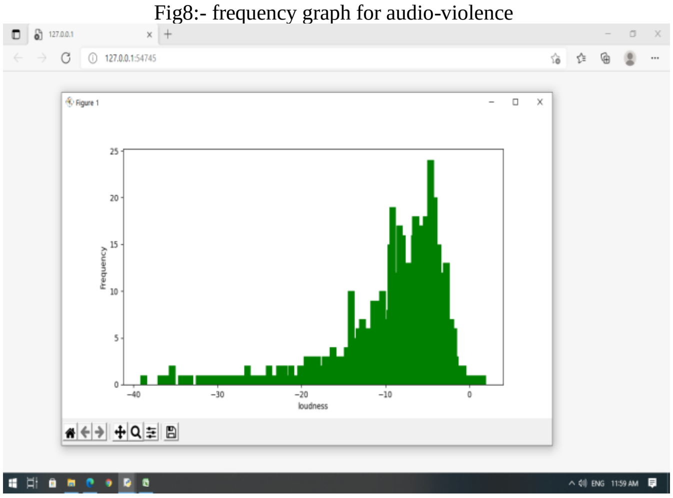

Fig9:- frequency graph for loudness

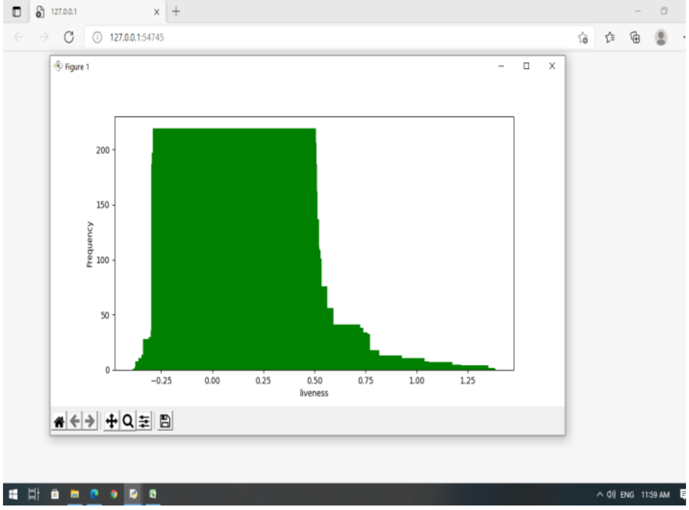

Fig10:- frequency graph for liveness

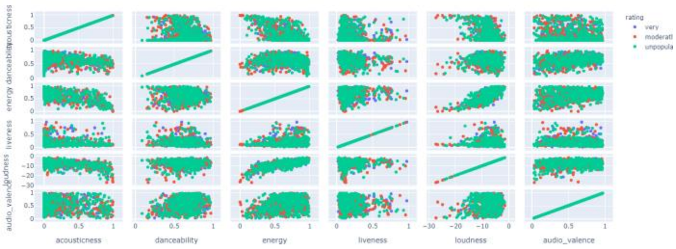

Fig11:- classification based rating as modrate, verygod, unpopular

```
k-nearest neighbors
        Prediction accuracy on the training data:  99.32%
        Prediction accuracy on the test data:  57.44%

Decision Tree
        Prediction accuracy on the training data:  99.32%
        Prediction accuracy on the test data:  57.32%
```

Fig 12 Accuracy report between the KNN and decision tree

algorithm	Test Accuracy	Train Accuracy
SVM	**40.92%**	**42.96%**
KNN	**57.44%**	**99.32%**
DECSION TREE	**57.32%**	**99.32%**

Table 1 Accuracy report between the KNN and decision tree and svm for train and test data

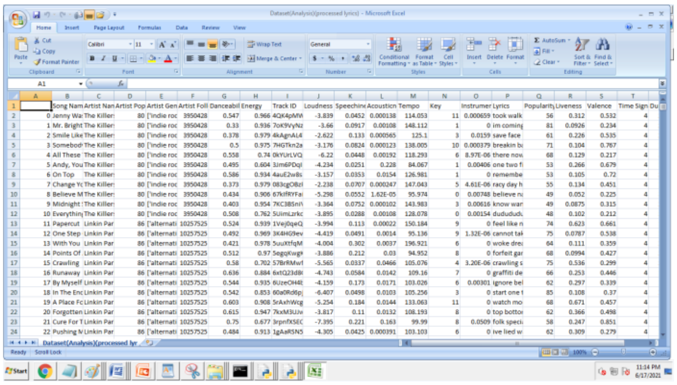

Fig 13 Dataset with music features values used for prediction system

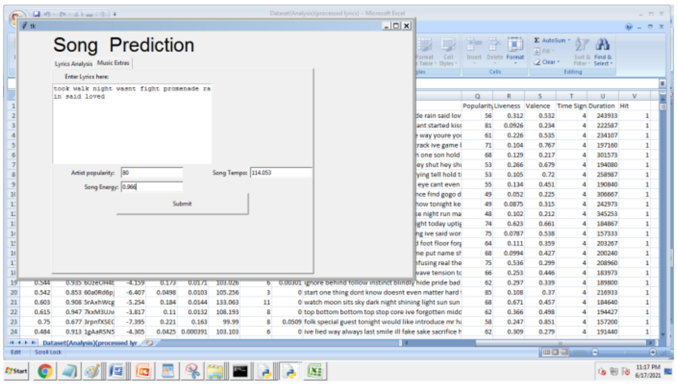

Fig 14 prediction system GUI page based on lyrics and music features input

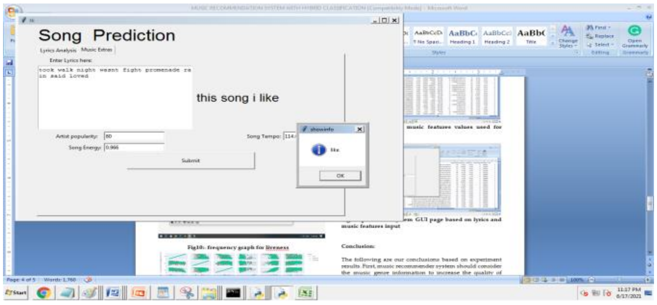

Fig 14 prediction like or dislike

VI. CONCLUSION:

The following are our conclusions based on experiment results. First, music recommender system should consider the music genre information to increase the quality of music recommendations. The music recommender is able to recommend the songs based on the song features. The music Recommender is able to check plagiarism in the dataset taken by generating the similarity score for each recommended song. The mood of the song is predicted by examining the lyrics of the given song with all the other songs in the dataset and predicting the mood and similarity scores and recommending the songs based on the mood.The complex nature of the machine learning systems like the Music Recommendation System cant have a standardized structure because different music recommender systems work in different way. Based on our analyses, we can suggest for future research to add other music features in order to improve the accuracy of the recommender system, such as using tempo gram for capturing local tempo at a certain time.

VII. REFERENCES:

[1] D. Arditi, Digital Subscriptions: The Unending Consumption of Music in the Digital Era, Popular Music and Society (2017)

[2] Choi K, Fazekas G, Sandler M. Convolutional Recurrent Neural Networks For Music Classification. 2017 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP). 2016.

[3] Choi K, Fazekas G, Sandler M. Automatic Tagging using Deep Convolutional Neural Network. arXiv eprints arXiv:1606.00298. 2016.

[4] Wang X, Wang Y. Improving Content-based and Hybrid Music Recommendation using Deep Learning. In Proceedings of the 22nd ACM international conference on Multimedia; 2014; Orlando. p. 627-636.

[5] 5Abraham, Sirajuddin, dkk. (2017). Sistem Rekomendasi Artikel Berita MenggunakanMetode K-Nearest Neighbor Berbasis Website.
[6] Ekstrand, Michael D. (2011). Collaborative Filtering Recommender Systems.
[7] Griesmeyer, Robert. (2011). Music Recommendation and Classification Utilizing MachineLearning and Clustering Methods.
[8] Hun, Yajie, dkk. (2011). A Music Recommendation System Based On User Behavior.
[9] Laksana, Eka Angga. (2014). Collaborative Filtering dan Aplikasinya.
[10] Li, Susan. (2017, September 20). How Did We Build Book Recommender Systems in An Hour Part 2 — k Nearest Neighbors and Matrix Factorization. https://towardsdatascience.com.