FINDING MUSIC GENRE

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Abstract

The main aim of this work is to design a tool to automatically classify the different music genres. Usually, people carry their favourite songs on mobile. There are many genres of music, and these genres are different from each other, resulting in people having different preferences of music. With the help of machine learning techniques, we can provide a classified list of songs to the smartphone user. As we know, many music streaming platforms have different types of music genres which are separated based on the song. We can create a similar one on our own, which can classify audio files into various genres.

Classification is done using low-level features related to frequency and time within the wav file. The features are extracted, and predictions are made using the nearest neighbours. Acoustic features generated from these networks have been used for music genre classification on a data set.

KEYWORDS: Music Genre, Acoustic Features, Low-level features, Nearest Neighbours.

I. INTRODUCTION

Music plays an integral role in people's lives. Music brings like-minded people closer, and it helps to bring the communities together. Communities can be identified by the type of songs that they compose, or even listen to. Different kinds of music are listened by different communities and groups. Genre of the music separates one kind of music from another.

In this project, we are classifying the songs to its genres using Mel-frequency cepstral coefficients (MFCCs). Due to the high dimensionality that results from using MFCCs, our focus was to find appropriate methods that could best classify data with such a high dimensionality and minimize this high dimensionality and still retain the significant components of the data. We use supervised algorithm (KNN) to cluster songs by genre and predict the genre of a given song, respectively.

II. LITERATURE SURVEY

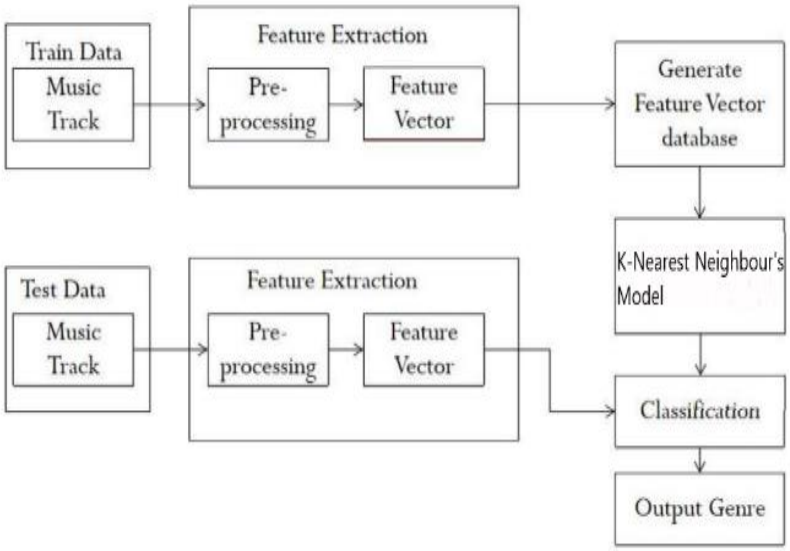
A literature survey is that section which shows the various analyses and research made in the field of your interest and the reports already published, considering the different parameters and the extent of the project. It helps you set a goal for your analysis of the project thus giving you your problem statement.

There are two approaches given by Rouat and Ezzaidi. They divided the musical components into frames and then got MFCCs from averaged spectral energies. Finally, for comparison purposes, they used Gaussian Mixture Models (GMMs), obtaining a maximum of 99% recognition. Another classic work by Tzanetakis and Cook is, they framed three different sets of features to represent timbral texture, rhythmic and pitch content. Short time Fourier Transform (STFT), Mel-frequency Cepstral Coefficients (MFCCs), Wavelet Transform (WT), and some additional parameters were used to obtain features as a vector form. With these vectors, they are able to train statistical pattern recognition classifiers such as simple Gaussian, Gaussian Mixture Model, and k-Nearest Neighbour, by using real world audio collections. It resulted them with correct classifications of 61% for 10 musical genres.

III. PROPOSED METHOD

The purpose of this work is to design a tool to automatically classify the different music genres, with the help of low-level features related to time and frequency within the wav file. In recent years, machine learning and deep learning technologies are advancing. The K-Nearest Neighbour's (KNN) are applied to all kinds of fields and various KNN-based fusion and combination methods are also appeared one after another. As the streaming media is growing rapidly, therefore the music genre classification is important in the multimedia world. In order to raise the user's efficiency when searching for different styles of music. while music genre classification allows users to have better visibility when selecting their favourite music, and more accurately retrieve and classify different types of music, helping people to reduce search time.

A. PROPOSED ARCHITECTURE



B. IMPLEMENTATION

1. The dataset is divided into two parts training data and test data. Data Set: We used the Marsyas 1000 song data set an openly distributed and widely used data set for song analysis. It consists of ten genres with 100 songs in each of 30 seconds in length. The frequency of each song is a 22050 Hz Mono 16-bit audio file.

The ten genres are: Blues, Classical, Country, Disco, Hip hop, Jazz, Metal, Pop, Reggae, Rock

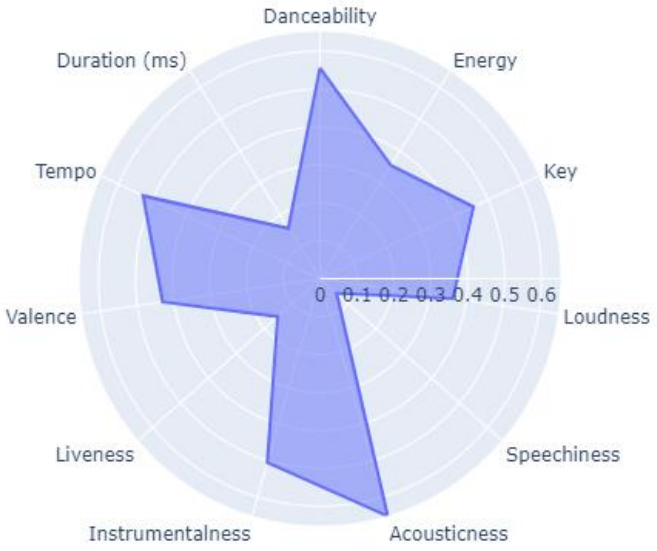


Fig. Jazz attributes radar chart

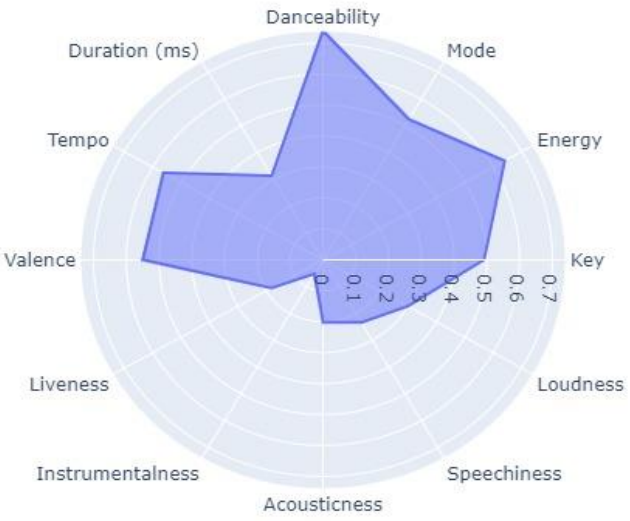


Fig. Hip-Hop attributes radar chart

2. Each track from the training dataset is pre-processed and a feature vector is produced. A database of feature vector is generated from the extracted feature vectors. Our features consisted of the MFCCs, which are basically used in music analysis. The human ear's response is generally linear below 1kHz and logarithmic above 1kHz. Thus, the Mel scale provides a useful metric to discern the human ear's response to the Hz scale.
3. The k Nearest Neighbour's model is trained using the obtained feature vector database.
4. Each track from the test dataset is also pre-processed and a feature vector is extracted.
5. The trained k Nearest Neighbour's operates on the feature vector obtained at the end of step 4 to perform classification on test data.
6. Finally, result is genre of the music track.

IV. RESULTS

Accuracy for this algorithm (KNN) was seen to increase with k until about k = 9 and then decrease subsequently. This agrees well with expectation, as polling too few neighbours would not give a proper picture of environments surrounding the test point. In short, K-nearest Neighbours is a supervised machine learning technique that takes a data point and calculates the distance between k number of labelled data points, classifying the point as which class it belongs to based on the number of votes that it obtains from the k-nearest data points. The supervised says that we already know what genre the song is before we test it, hence the labels. For example, if k=3 and the three nearest Neighbours are classified as 1. country, 2. country and 3. rock, this results in 2 vs 1 votes for country, and the new data point would be classified as country. Distance is calculated using the Euclidean distance.

Result using KNN:

Genre	Nearest Neighbours			
	Precision	**Recall**	**F1-Score**	**Support**
Blues	0.70	0.64	0.67	11
Classical	0.70	0.78	0.74	9
Country	0.90	0.53	0.67	17
Disco	0.50	0.56	0.53	9
Jazz	0.40	1.00	0.57	4
Metal	0.80	0.62	0.70	13
Pop	1.00	0.91	0.95	11
Reggae	0.40	0.50	0.44	8
Rock	0.40	0.50	0.44	8
Avg/Total	**0.70**	**0.64**	**0.66**	**90**

Test Cases and Results:

Sno:	Test Cases	Expected Results	Actual Results	Result
1	test1	Classical	Classical	Success
2	test2	Jazz	Classical	Failed
3	test3	Blues	Blues	Success
4	test4	Blues	Country	Failed
5	test5	Hip hop	Hip hop	Success
6	test6	Pop	Pop	Success
7	test7	Metal	Pop	Failed
8	test8	Reggae	Rock	Failed
9	test9	Disco	Metal	Failed
10	test10	Country	Country	Success

V. CONCLUSION

Music genre classification plays an important role in music industry as manually mapping data is an arduous task. And also recommendations for similar music genres will also be easy. KNN is a good technique to use for music genre classification. The classification of music genres using different Machine Learning algorithms is a complex yet suitable process that helps software applications to assort millions of songs using schemas formulated by pre-data sets.

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