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MUSIC GENRE CLASSIFICATION USING MACHINE LEARNING

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ABSTRACT

Music genre classification utilizing neural networks (NNs) has achieved some limited success in recent years. Differences in song libraries, machine learning techniques, input formats, and types of NNs implemented have all had varying levels of success. This article reviews some of the machine learning techniques utilized in this area. It also presents research work on music genre classification. The research uses images of spectrograms generated from timeslices of songs as the input into an NN to classify the songs into their respective musical genres.

I. Introduction

The overview of performing Music Genre Classification is used to recognize which genre of music, by giving its input of the music we can predict the music genre. The project is done by a pre-trained model in which datasets are trained by a Convolution Neural Network (CNN). Proposed system provides a solution to overcome the limitations faced by existing system. In our work we use deep convolutional neural network (CNN) for Music to get classified. Convolution Neural Network helps the pre-trained model to learn in a consistent way to acquire the knowledge from the datasets

II LITERATURE REVIEW

[1] In Hareesh Bahuleyan, (2018). Music Genre Classification using Machine Learning techniques

The work conducted gives an approach to classify music automatically by providing tags to the songs present in the user's library. It explores both Neural Network and traditional method of using Machine Learning algorithms and to achieve their goal. The first approach uses Convolutional Neural Network which is trained end to end using the features of Spectrograms (images) of the audio signal. The second approach uses various Machine Learning algorithms like Logistic Regression, Random forest etc, where it uses hand-crafted features from time domain and frequency domain of the audio signal. The manually extracted features like Mel-Frequency Cepstral Coefficients (MFCC), Chroma Features, Spectral Centroid etc are used to classify the music into its genres using ML algorithms like Logistic Regression, Random Forest, Gradient Boosting (XGB), Support Vector Machines (SVM). By comparing the two approaches separately they came to a conclusion that VGG-16 CNN model gave highest accuracy. By constructing ensemble classifier of VGG-16 CNN and XGB the optimised model with 0.894 accuracy was achieved.

[2] In Tzanetakis G. et al., (2002). Musical genre classification of audio signals

They have mainly explored about how the automatic classification of audio signals into a hierarchy of musical genres is to be done. They believe that these music genres are categorical labels that are created by humans just to categorise pieces of music. They are categorised by some of the common characteristics. These characteristics are typically related to the instruments that are used, the rhythmic structures, and mostly the harmonic music content. Genre hierarchies are usually used to structure the very large music collections which is available on web. They have proposed three feature sets: timbral texture, the rhythmic content and the pitch content. The investigation of proposed features in order to analyse the performance and the relative importance was done by training the statistical pattern recognition classifiers by making use of some real-world audio collections. Here, in this paper, both whole file and the real time frame-based classification schemes are described. Using the proposed feature sets, this model can classify almost 61% of ten music genre correctly.

[3] n Lu L. et al., (2002). Content analysis for audio classification and segmentation

They have presented their study of segmentation and classification of audio content analysis. Here an audio stream is segmented according to audio type or speaker identity. Their approach is to build a robust model which is capable of classifying and segmenting the given audio signal into speech, music, environment sound and silence. This classification is processed in two major steps, which has made it suitable for various other applications as well. The first step is speech and non-speech discrimination. In here, a novel algorithm which is based on KNN (K-nearest- neighbour) and linear spectral pairs-vector quantization (LSP-VQ) is been developed. The second step is to divide the non-speech class into music, environmental sounds, and silence with a rule- based classification method. Here they have made use of few rare and new features such as noise frame ratio, band periodicity which are not just introduced, but discussed in detail. They have also included and developed a speaker segmentation algorithm. This is unsupervised. It uses a novel scheme based on quasi - GMM and LSP correlation analysis. Without any prior knowledge of anything, the model can support the open-set speaker, online speaker modelling and also the real time segmentation.

[4] Automatic Music Genre Classification using Convolution Neural Network

This work shows provides a Convolution Neural Network based automatic music genre classification

system. The feature vectors are calculated using Mel Spectrum and MLCC. The python based librosa package helps in extracting the features and thus helps in providing good parameters for the network training. The learning accuracies are shown to be 76% and 47% for Mel Spec and MFCC feature vectors respectively. Thus this methodology is promising for classification of huge database of songs into the respective genre. The future work will focus on developing the system further to classify the songs based on mood. This will be helpful in finding out which kind of music can reduce stress in a person while listening to it. This be helpful in music therapy which can be used for playing a particular music depending on the person's stress level. This work needs to be further extended for such a system.

[5] Music Genre Classification using Machine Learning Techniques

In this work, the task of music genre classification is studied using the Audioset data. We propose two different approaches to solving this problem. The first involves generating a spectrogram of the audio signal and treating it as an image. An CNN based image classifier, namely VGG-16 is trained on these images to predict the music genre solely based on this spectrogram. The second approach consists of extracting time domain and frequency domain features from the audio signals, followed by training traditional machine learning classifiers based on these features. XGBoost was determined to be the best feature-based classifier; the most important features were also reported. The CNN based deep learning models were shown to outperform the feature-engineered models. We also show that ensembling the CNN and XGBoost model proved to be beneficial. It is to be noted that the dataset used in this study was audio clips from YouTube videos, which are in general very noisy. Futures studies can identify ways to pre-process this noisy data before feeding it into a machine learning model, in order to achieve better performance.

III IMPLEMENTATION

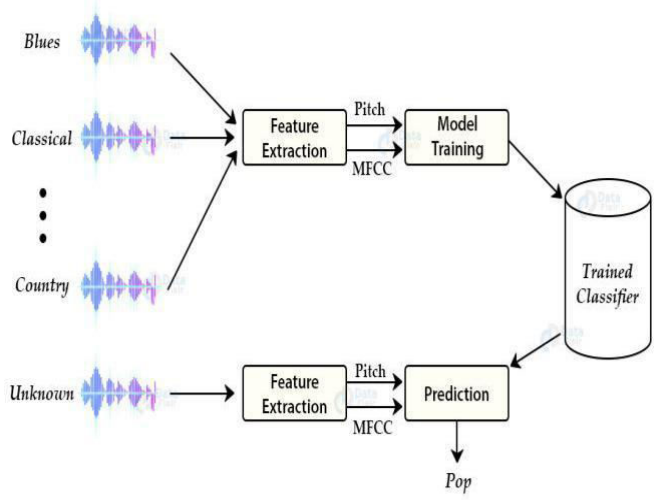


Fig.1 Architecture Diagram

Our proposed system uses a very easy method for knowing and identifying the music genre classification from the given sample music. The sample input will be passed to the segmentation part where we would segment the music and later on we will do the extraction for extracting the input music which again will be proceeded by testing and training of the sample under the machine learning algorithm to know or to predict the genre

SYSTEM MODULES

Our proposed system is made up of these following modules.

Module 1: Choosing any audio type of music as an input

Module 2: Pre Processing of the music is done from the input

Module 3: After preprocessing ,segmentation is done from the preprocessed audio

Module 4: Feature Extraction is done from the segmentation process

Module 5: The output is predicted from which genre it comes under

IV. REQUIREMENT ANALYSIS

FUNCTIONAL REQUIREMENTS

1. To build a machine learning model which classifies music into its respective genre.

2. To compare the accuracies of this machine learning and pre-existing model

3. To develop a machine learning model that classifies music into genres shows that there exists a solution which automatically classifies music into its genres based on various different features, instead of manually entering the genre.

4 .To reach a good accuracy so that the model classifies new music into its genre correctly.

HARDWARE REQUIREMENTS

SYSTEM : LAPTOP /ANACONDA INSTALLED

RAM :8 GB RAM

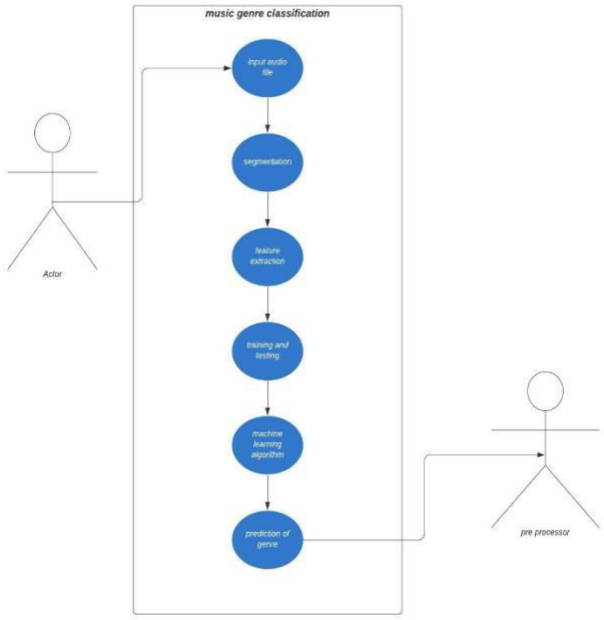
SOFTWARE REQUIREMENTS

Operating System: windows 10

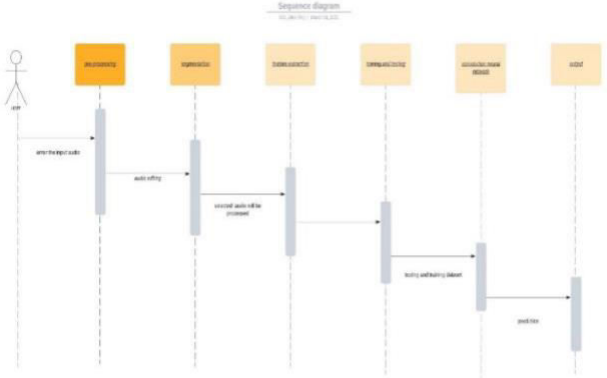
IDE: ANACONDA NAVIGATOR

Coding language: PYTHON

USE CASE DIAGRAM



SEQUENCE DIAGRAM



V. SYSTEM ANALYSIS

EXISITING SYSTEM

Most of the music genre classification techniques uses machine learning techniques. Here convolution neural network is used for training and classification. Feature Extraction is the most crucial task for audio analysis. Mel Frequency Cepstral Coefficient (MFCC) is used as a feature vector for sound sample. Downloading and purchasing music from online music collections has become a part of the daily life of probably a large number of people in the world. The users often formulate their preferences in terms of genre, such as hip hop or pop or disco. However, most of the tracks now available are not automatically classified to a genre. Given a huge size of existing collections, automatic genre classification is important for organization, search, retrieval, and recommendation of music. Music classification is considered as a very challenging task due to selection and extraction of appropriate audio features. While unlabeled data is readily available music tracks with appropriate genre tags is very less. Music genre classification is composed of two basic steps: feature extraction and classification. In the first stage, various features are extracted from the waveform. In the second stage, a classifier is built using the features extracted from the training data. There has been many approaches that are used for the classification of music into different genre. With huge amount of music available in the internet it is needed for an automatic music genre classification. Each implementation uses various types of feature extraction. Some can take the timber, rhythm etc. as the classifying parameter, while some others take pitch, timber, beat etc. The types of features extracted varies from person to person. The Deep Neural Network (DNN) is a most widely used in classification problems and it is helpful in training huge database. We propose a novel approach for the automatic music genre classification using Convolution Neural Networks (CNN). The features from the music are extracted. They are called as Mel Frequency Cepstral Coefficients (MFCC) for each song. They are obtained by taking the Fourier transforms of the signal, then taking the logarithmic of the power values and then taking the cosine transforms. The detailed explanation will be done in the forthcoming sessions. These extracted features then acts as the inputs to the neuros for training. For our work, we analyze music from ten various genres. The whole implementation is done in python programming language. The average accuracy obtained by using the MFCC feature vectors is 76%.

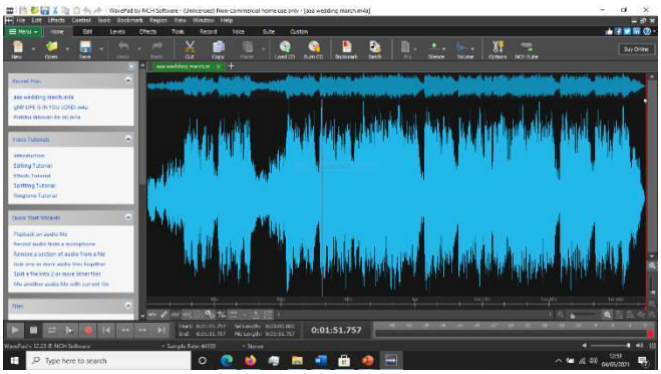
PROPOSED SYSTEM

In this project Music Genre Classification we are going to develop a deep learning project to automatically classify different musical genres from audio files. We will classify these audio files using their low-level features of frequency and time domain we need a dataset of audio tracks having similar size and similar frequency range. GTZAN genre classification dataset is the most

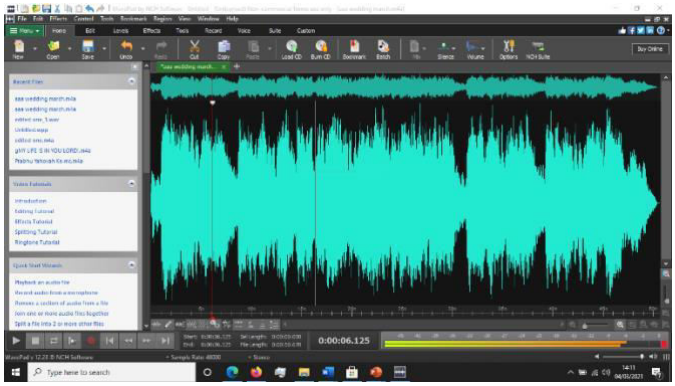
recommended dataset for the music genre classification project and it was collected for this task only.

PREPROCESSING METHOD

The sample input before preprocessing will be in this below format



The sample input after preprocessing will be in this below format



VI. CONCLUSIONS

This work shows provides a Convolution Neural Network based automatic music genre classification system. The feature vectors are calculated using Mel Spectrum and MLCC. The python based librosa package helps in extracting the features and thus helps in providing good parameters for the network training. The learning accuracies are shown to be 76% and 47% for Mel Spec and MFCC feature vectors respectively. Thus this methodology is promising for classification of huge database of songs into the respective genre. The future work will focus on developing the system further to classify the songs based on mood. This will be helpful in finding out which kind of music can reduce stress in a person while listening to it. This be helpful in music therapy which can be used for playing a particular music depending on the person's stress level. This work needs to be further extended for such a system.

VII. REFERENCES

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