

# **MUSIC GENRE CLASSIFICATION**

**NAME** : KARTHEESWARI K  
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**CLASS** : MCA-R  
**GUIDE** : MS.R.L.JASMINE

## **ABSTRACT:**

A music genre is a conventional category that identifies some pieces of music as belonging to a shared tradition or set of conventions. It is to be distinguished from musical form and musical style. Music can be divided into different genres in many different ways. The popular music genres are Pop, Hip-Hop, Rock, Jazz, Blues, Country and Metal. Music Genre Recognition is an important field of research in Music Information Retrieval (MIR). Most of the current music genre classification techniques use machine learning techniques. Machine Learning techniques have proved to be quite successful in extracting trends and patterns from the large pool of data.

## **INTRODUCTION:**

In today's world, an individual's music collection generally contains hundreds of songs, while the professional collection normally contains tens of thousands of music files. Music databases are incessantly gaining reputation in relations to specialized archives and private sound collections. With improvements in internet services and increase in network bandwidth there is also an increase in number of people accessing the music database. Dealing with extremely large music databases is exhausting and time consuming. Most of the music files are stored according to the song title or the artist name. This may cause trouble in searching for a song related to a specific genre. Music has also been divided into Genres and sub genres not only on the basis on music but also on the lyrics as well. This makes music genre classification difficult. Also the definition of music genre has changed over time. For instance, pop songs that were made fifty years ago are different from the pop songs we have today. Fortunately, the progress in music data and its storage has improved considerably over the past few years. Since manually classifying each track of a large music database according to their genre is a tedious task, Machine Learning Techniques to perform Automatic Music Genre Classification are used.

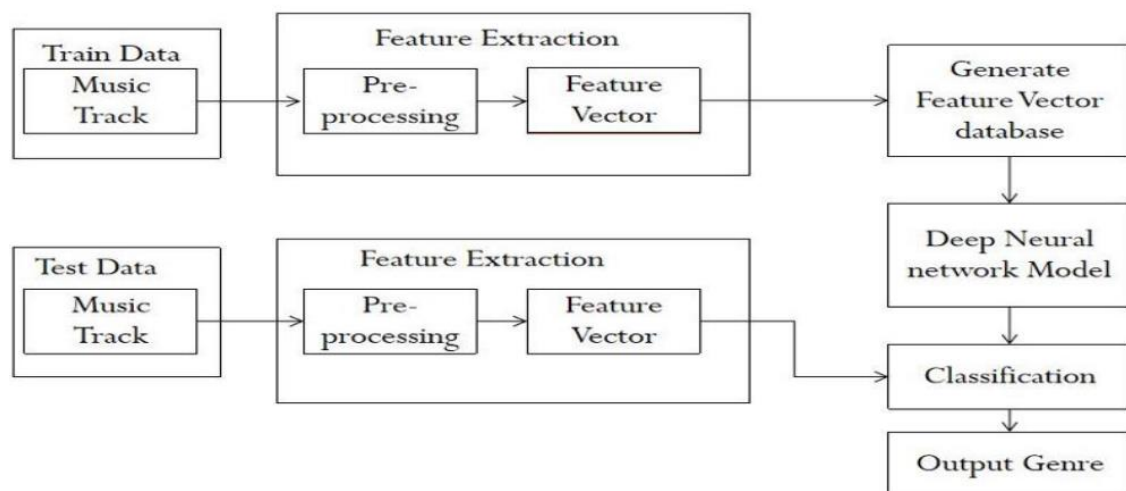
## **PROBLEM STATEMENT:**

Music Genre Classification is an area which has attracted the interest of many researchers. Vishnupriya S and K Meenakshi have proposed a Neural Network Model to perform the classification. Tzanetakis and Cook pioneered their work on music genre classification using machine learning algorithm. Changsheng Xu et al have shown how to use support vector machines (SVM) for this task. Matthew Crème have used 4 different methods to perform the classification. They have used Support Vector Machines, Neural Networks, Decision Trees and K-Nearest Neighbours methods to perform classification. Tao shows the use of restricted Boltzmann machines and arrives to better results than a generic multilayer neural network by generating more data out of the initial dataset, GTZAN. After carrying out the above mentioned, Convolutional Neural Network is used to perform classification.

## **OBJECTIVE:**

The goal of this project is to build a proof-of-concept music genre classifier using a deep learning approach that can correctly predict the genre.

## **ARCHITECTURE DIAGRAM :**



## **ARCHITECTURE EXPLANATION:**

1. The dataset is split into two parts, Training data and Test data.
2. Each track from the train dataset is pre-processed and a feature vector is extracted for the same. A Feature Vector Database is generated from the extracted feature vectors.
3. The Neural Network 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 for the same.
5. The trained Neural Network model operates on the feature vector obtained at the end of step 4 to perform classification on test data.
6. Finally, output is genre of the music track.

## **LIST OF MODULES:**

1. Data Pre-processing
2. Training the model
3. Implementing the model
4. Classify the music genre

## **BRIEF DESCRIPTION OF MODULES :**

GTZAN Genre Collection dataset was used to perform the classification. The dataset has been taken from the popular software framework MARSYAS. Marsyas (Music Analysis, Retrieval and Synthesis for Audio Signals) is an open source software framework for audio processing with specific emphasis on Music Information Retrieval applications.

### ***Data Pre-processing***

1. Database of the complete collection was created and stored in a .csv file.
2. Feature Vector Extraction is done using the libROSA package in python which is for music and audio analysis which provides the building blocks necessary to create music information retrieval systems.
3. Each audio file is taken and from that, its feature vector is extracted. The extracted feature vector is called MFCC (Mel-Frequency Cepstral Coefficients).
4. Fourier Transforms are applied on the music signal. A Frequency Spectrum is thus obtained. Mel Scale Filtering is applied on the frequency spectrum to obtain a Mel Frequency Spectrum. A  $\log()$  function is applied on this Mel Frequency Spectrum which is transformed into Cepstral Coefficients on applying discrete cosine transforms. Finally, the Feature Vector is obtained by finding out the derivatives of the Cepstral Coefficients.

### ***Training the model***

CNN is a Deep Learning algorithm which can take an input image as input, assign importance (learnable weights and biases) to various aspects/objects in the image and be able to differentiate one from the other. A CNN has various layers such as Convolutional layers, ReLU layers, Pooling layers and a fully connected layer. CNN is widely used for image classification because it does automatic feature extraction using convolution.

To train the Convolutional Neural Network, an 80% - 20% splitting strategy was used for training and testing respectively.

### ***Implementing the model***

The application uses a Convolutional Neural Network model to perform the classification. A Mel Spectrum of each track from the GTZAN dataset is obtained. This is done by using the libROSA package of python. A piece of software is implemented which performs classification of huge database of songs into their respective genres.

### ***Classify the music genre***

For the GTZAN dataset, the model used achieved a comparatively highest training accuracy and validation accuracy. Extract the Characteristics using librosa.load. It converts one data frame and display structured form. Further it compares loaded model and it displays the output from the audio file what sort of music genre that audio file has.

### **REFERENCES:**

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