

Music Genre Classification

Kaushik Patil (001056490)

Introduction

A Music Genre is a standard category that distinguishes many music pieces. In several different ways, music can be categorized into genres. Music's artistic existence means that the categories are flexible, and some genres can overlap with each other. There are several common genres of music: hip-hop, rock, country, etc.

It is important to group music into one genre because each person is different, as different taste in music. We will allow users to listen to the music they want by grouping.

Problem Statement

It is very difficult to bring music into one music category because it could have elements belonging to another music category (genres). Differences exist between music genres, such as hip-hop & heavy metal. Heavy metal music typically uses musical instruments with more bass and high-pitched sounds, whereas hip hop relies mostly on voices.

The problem is to create an ML program that can categorize a song into various genres.

Dataset

The dataset used is GTZAN dataset. The dataset can be downloaded directly from this link – <https://www.kaggle.com/andradaolteanu/gtzan-dataset-music-genre-classification>

The dataset contains 10 classes/genres of music, these are:

- Metal.
- Disco.
- Classical.
- Hip-hop.
- Jazz.
- Country.
- Pop.
- Blues.
- Reggae.
- Rock.






genres original - A collection of 10 genres with 100 audio files each, all having a length of 30 seconds (the famous GTZAN dataset, the MNIST of sounds)

images original - A visual representation for each audio file. One way to classify data is through neural networks. Because NNs (like CNN, what we will be using today) usually take in some sort of image representation, the audio files were converted to Mel Spectrograms to make this possible.









2 CSV files - Containing features of the audio files. One file has for each song (30 seconds long) a mean and variance computed over multiple features that can be extracted from an audio file. The other file has the same structure, but the songs were split before into 3 seconds audio files (this way increasing 10 times the amount of data we fuel into our classification models). With data, more is always better.

Screenshots

1.31 GB

- ▼  Data
 - ▶  genres_original
 - ▶  images_original
 -  features_30_sec.csv
 -  features_3_sec.csv

Summary

▼  2001 files	
 .wav	1000
 .png	999
 .csv	2
▼  120 columns	
 Decimal	114
 String	4
 Integer	2

Problem Solution

The audio files obtained can not be used directly with the technique of Machine Learning, we will have to convert them first. FFT (Fast Fourier Transformations) and MFCC (Mel-Frequency Cepstral Coefficients) are the methods used to transform. We will have to one hot encode the target labels after each song is converted using the above methods.

As our benchmark model, we will take the best model obtained from FFT Features training. We will use the featurization techniques that researchers have developed for audio data-MFCC to enhance performance. The outcomes of this featurization will be contrasted with the FFT outcomes.

Project Design

1. **Preprocessing of data:** The data collected from the dataset takes the form of a dataset. We can convert the .au file to a .wav file using "ffmpeg" program used to convert it to a .wav file. Convert the formatted audio file to a different format. The program is easy to use and accessible for download from

<http://ffmpeg.org/download.html.org/download.html>

2. **Data Visualization:** For audio data we will plot the spectrogram and power density for each of the classes/genres available.
3. **Model Training and Evaluation:** We will train 3 different Machine Learning Models on FFT Featurization and on MFCC featurization. The results will then be put up in table for comparison.

References

How to apply machine learning and deep learning methods to audio analysis

<https://towardsdatascience.com/how-to-apply-machine-learning-and-deep-learning-methods-to-audio-analysis-615e286fcbbc>

Exploring different approaches for music genre classification

<https://www.sciencedirect.com/science/article/pii/S1110866512000151>

Music Genre Classification and Recommendation by Using Machine Learning Techniques

<https://ieeexplore.ieee.org/document/8554016>

Thank You!