Music Genre Classification

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BIG DATA ANALYTICS

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Introduction to Project

Genre classification is an important task with many real world applications. As the quantity of music being released on a daily basis the need for accurate meta-data required for database management and search/storage purposes climbs in proportion.

Being able to instantly classify songs in any given playlist or library by genre is an important functionality for any music streaming and the capacity for statistical analysis that correct and complete labeling of music genre.

The application is very important and requires automation to reduce the manual error and time So to automate the process we use Machine learning and deep learning algorithms and this is what I will implement in this project.

Problem Formulation

Music plays a very important role in people's lives. Music bring like-minded people together and is the glue that holds communities together. Communities can be recognized by the type of songs that they compose, or even listen to. Different communities and groups listen to different kinds of music. One main feature that separates one kind of music from another is the genre of the music.

The aim of this project is:

1. To build a machine learning model which classifies music into its respective genre.
2. To compare the accuracies of this machine learning model and the pre-existing models, and draw the necessary conclusions.

Objectives of the Work

1. Developing 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.
2. Another objective is to reach a good accuracy so that the model classifies new music into its genre correctly
3. This model should be better than at least a few pre-existing models.

Methodology used

- Dataset

For this project, the dataset that I will be working with is GTZEN. Genre Classification dataset which consists of 1000 audio tracks, each 30 seconds long. It contains 10 genres, each represented by 100 tracks.

- The 10 genres are as follows:

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

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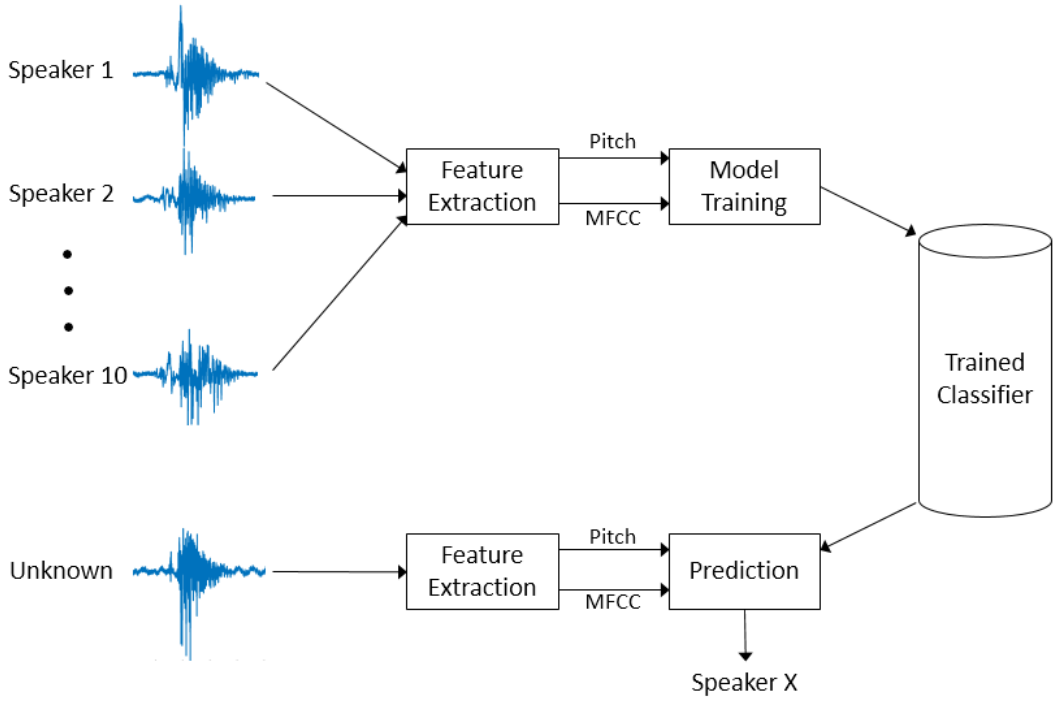

- Audio Libraries Used

1. LIBROSA

2. Python.display.Audio

3. TensorFlow & Keras - It is a library for multiple machine learning tasks, while Keras is a high-level neural network library

MFCC - Mel-frequency cepstral coefficients

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- Building the Model

Now comes the last part 0of the music classification genre project. The features have been extracted from the raw data and now we have to train the model. There are many ways through which we can train our model. Some of these approaches are:

- Support Vector Machines
- K-Nearest Neighbors
- Convolutional Neural Networks

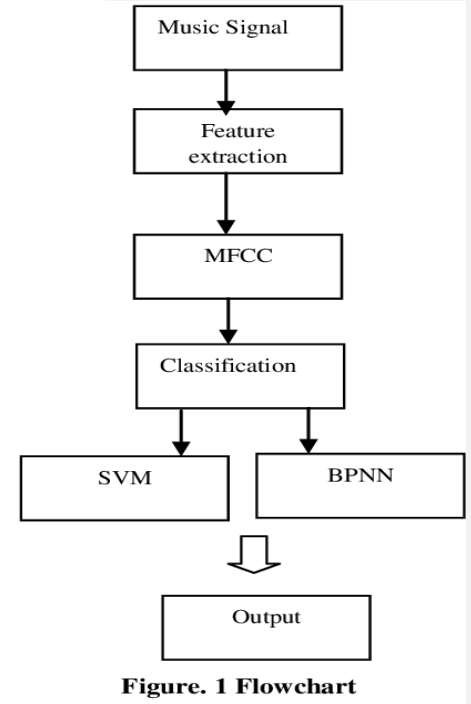

Figure. 1 Flowchart

Results and Outputs

In the end our result & outputs are look like comparison of accuracies of two or more models, which I apply in coding part

Our Model Accuracies

	Model	Accuracy
1	SVM	84%
2	KNN	88%
3	CNN	93.46%

TABLE VI: Compare with previous purposed models

Method	Model Used	Accuracy
Chang et. al [10]	Compressed sensing	92.7%
A. Ghildiyal et. al [13]	Convolution Neural Network	91%
Gessle et. al [22]	Convolution Neural Network	90%
Chillara et. al [20]	Convolution Neural Network	88.5%
A. Ghildiyal et. al [13]	Support Vector Machine	68.9%
Islam et. al [6]	XGBoost	90.2%
Proposed Model	Convolution Neural Network	93.46%

Conclusion

In summary, the music genre classification project, with its integration of SVM, KNN, and CNN models, has provided valuable insights into the nuanced task of categorizing diverse musical genres. While SVM and KNN demonstrated respectable performances, it is the CNN model that stands out with an impressive accuracy of 93.46%. This success emphasizes the significance of leveraging deep learning architectures specifically designed to extract hierarchical features from complex audio data.

The project not only contributes to the understanding of the unique characteristics of music genre classification but also showcases the adaptability and robustness of convolutional neural networks in handling intricate patterns within audio signals. As the project transitions to potential deployment, the high accuracy achieved by the CNN model positions it as a promising choice for real-world applications, affirming the project's efficacy in automated music genre classification

Future Scope

The success of the music genre classification project opens up promising avenues for future exploration and enhancements. One significant area of future scope involves the incorporation of more advanced deep learning architectures and techniques. Further experimentation with state-of-the-art neural network structures, such as recurrent neural networks (RNNs) or attention mechanisms, could potentially capture even more intricate temporal dependencies and nuanced features present in music data.

Additionally, expanding the dataset to include a wider variety of music genres and cultural influences could enhance the model's generalization capabilities. Introducing a continuous learning framework would enable the model to adapt and evolve with newly emerging music genres over time.

Music genre classification can be used to compare the accuracy of different & more advanced machine learning models.

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Thank You