

Lab 3: Music Genre Classification

1 Files included

GenreTrain.arff – arff training set file with song Essentia descriptors

GenreTest.arff – arff training set file with song Essentia descriptors

https://drive.google.com/drive/folders/1ijzsLkkSZHW2JDaoH2fAm6f9IwMg8dk?usp=drive_link

- features_30_sec.csv – csv file with global song descriptors
- features_3_sec.csv - csv file with 3sec-window song descriptors
- Original songs in wav format
- Songs spectrograms

2 Background

Automatic genre classification using machine learning techniques is pivotal in managing and enriching large-scale text and music collections. In textual data, assigning genre labels—such as promotional or legal—enhances information retrieval by enabling users to filter documents based on their specific needs, thereby improving search relevance and efficiency. This automated labeling also aids in the curation of web corpora, ensuring a diverse and representative dataset for training language models, which is essential for advancing natural language processing applications. In the realm of music, genre classification facilitates the organization of extensive audio libraries, supporting personalized recommendation systems and efficient content-based music retrieval. By analyzing audio features, machine learning models can accurately categorize tracks into genres like classical, jazz, or hip-hop, enhancing user experience in music streaming services. Overall, the integration of automatic genre classification streamlines the management of vast information repositories, making them more accessible and user-centric.

3 Tasks

Implement the following tasks using a google colab notebook.

Task 1. Using the training set file with song Essentia descriptors (GenreTrain) your aim is to train a model with the highest accuracy as possible. Explore several machine learning algorithms (i.e. ANN, SVM, Logistic regression, k-NN, decision trees, and ensemble methods as discussed in class). Optimise the models by performing feature selection and tuning the algorithm's parameters using cross validation. Once you have decided on the best algorithm, parameters, and feature set, evaluate your model with the test set provided (GenreTest).

Task 2. Same as Task 1 but this time using the features provided in the csv files: features_30_sec.csv and features_3_sec.csv. Shuffle the data and perform an 80%-20% split for training data and test data.

Task 3. Use the spectrogram data provided to train a convolutional neural network with the same objective as Task 2. With the provided spectrogram data, you may build a CNN from scratch or refine a pretrained deep convolutional neural network (for instance, musicnn or VGGish).

Submitting your answer

The Lab can be solved in teams of two people (1 submission per team) or individually. Submission is through the Aula Global. Submissions should contain the link to your google

colab notebook. The notebook should include your name(s), your code and a text cell at the end with a summary of your results and a very brief discussion of them. Deadline is specified in the Aula Global.