Harmonic Clusters:

Mood-based playlist generation and multinomial genre classification of Spotify tracks

Introduction

The Liked Songs playlist on Spotify can often become useless for users because it is easy to accumulate a group of tracks intended for different occasions and moods. This problem worsens if the person in question is fond of many different genres ranging from industrial techno to Brazilian jazz. To resolve this issue, our project aims to address the challenge of organizing these tracks into coherent playlists based on mood and to classify tracks into their respective genres further using multinomial classification.

Problem Statement

1. Mood-based song clustering: Users' liked songs on Spotify often include a variety of moods and vibes, making the listening experience disjointed. This project aims to cluster tracks based on their mood, utilizing audio features to create playlists that offer a more cohesive listening experience.

2. Multinomial genre classification: Given the indirect nature of genre information at the track level on Spotify, this project also aims to classify tracks into genres based on their audio features. This task addresses the challenge of aggregating artist-level genre data to tracks, providing insights into the predominant genres of a user's liked songs, and a deeper understanding of the relationship between certain genres and audio features.

Objectives

1. Curate and pre-process a dataset of tracks given our own Spotify accounts (integration with Spotify API). There exists a complication of enrichment by genre. The feature is only available at the artist level and an artist can produce music in multiple genres.

2. Perform data cleaning and exploratory data analysis to have a good understanding of the data and prepare for modelling

3. Develop different clustering models (k-means, dbscan) and provide a subjective evaluation.

4. Develop different multinomial classification models (SVM, Random Forest, Logistic Regression) for genre classification and provide quantitative evaluation.

Data Features

Given that the data will be curated from the API, the exact number of rows is still unknown, but we will be working with at least 300, possibly extending the solution to more than 1000 tracks. Audio features such as danceability, energy, key, loudness, mode, speechiness, acousticness, instrumentalness, liveness, valence, tempo (numerical), and aggregated genre information (categorical, with potentially hundreds of levels due to the diversity of music genres) will be used for modelling.

Prior works

1. In Spotify Genre Classification Algorithm on Towards Data Science, the author explores a method to classify songs into genres using Spotify's audio features, demonstrating the potential of machine learning models to navigate and predict music categories effectively.

2. The article Classifying Song Genre using Spotify's Built-in Features vs. Extracting My Own compares the efficacy of Spotify's built-in audio features versus manually extracted features for song genre classification, giving insights into the pros and cons of Spotify's data for predictive modelling.

3. Discovering Musical Diversity: K-Means Clustering Analysis and Song Recommendations from Spotify Dataset on RPubs by Rusdi Permana showcases a practical application of the K-Means clustering algorithm to group Spotify tracks into distinct clusters, providing a foundation for understanding how unsupervised learning can be used to organise music based on its inherent characteristics.

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