Music Genre and Mood Classification

This repository contains the code for my dissertation project, which applies machine learning techniques to classify music tracks based on their genres and moods. The project leverages audio features from Spotify data, employs advanced clustering and classification methods, and provides insightful visualizations of the results.

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Overview

The aim of this project is to analyze music tracks and classify them into various genres and moods using techniques such as:

Data preprocessing and feature extraction
Clustering using spectral methods
Mood mapping via K-Means
Model training for genre and mood prediction

Dataset

The dataset used in this project includes audio features obtained from Spotify. Key audio features include danceability, energy, loudness, valence, and tempo. Additional metadata such as track genre is used for supervised learning.

Installation

To run this project, you need Python 3.x and the following libraries:

pandas
numpy
scikit-learn
librosa
matplotlib
seaborn
plotly
umap-learn

Install the required packages with:

bash
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```
pip install -r requirements.txt
```

Features

Data Preprocessing: Handles missing values, removes outliers, and standardizes features.

Clustering: Implements multiple clustering methods like K-Means, Spectral Clustering, and Diffusion Maps.
Visualization: Provides heatmaps, 3D scatter plots, and t-SNE projections for data insights.
Model Training: Trains classifiers (Random Forest, Gradient Boosting) for genre and mood prediction.
Usage
Clone the repository:
bash
Copy code
git clone https://github.com/ShreyaKrishnarth
Navigate to the project directory:
bash
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cd music-genre-classifier
Run the script:
bash
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python FINAL_CODE_DISSERTATION_COMP702.py
Results
The project achieved promising results with the best clustering method identified as Normalized Spectral Clustering (RBF) based on evaluation metrics such as Silhouette Score, Calinski-Harabasz Score, and Davies-Bouldin Score. The trained classifiers performed well in predicting both genres and moods.

Future Work
Expand the dataset to include more diverse music genres and moods.
Experiment with deep learning models for improved accuracy.
Build an interactive web app for real-time music classification.