Music Genre Classification

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Project Description:

Creating an accurate machine learning model to categorize music into various genres is the aim of this project. Given the complexity and subjectivity of musical styles, classifying music genres is a difficult undertaking. To evaluate audio data and find patterns connected to different genres, the research will make use of deep learning techniques.

It uses a variety of machine learning models, such as Support Vector Machines (SVM), Multi-Layer perceptron (MLP), Decision Trees, Artificial Neural Networks (ANN), and Convolutional Neural Networks (CNN), to perform an extensive examination of music genre classification. Investigating the effects of deep learning on music genre and comparing and analysing the performance of various models on a standardized dataset are the objectives.

Steps to Attain the Project:

- Data Analysis:

  data analysis to understand the distribution of genres, examine feature correlations, and identify potential challenges in the dataset.

- Model Training and Evaluation:

  Train SVM, MLP, Decision Tree, and ANN models on the preprocessed dataset.

  Evaluate the models using metrics such as accuracy, precision, recall, F1 score, and confusion matrices.

  Fine-tune hyperparameters to optimize model performance.

- Deep Learning with CNN:

  Implement and train a CNN model for music genre classification.
  Explore the impact of convolutional layers on capturing hierarchical features in audio data.

- Random Forest Classifier Integration:

  Integrate a Random Forest Classifier into the comparison, considering ensemble learning for improved accuracy.

Dataset Description, Statistics, and Dataset Link:

Dataset: GTZAN Genre Collection

Description: A widely used collection with 1,000 audio tracks across 10 genres (e.g., blues, classical, country, disco, hip-hop, jazz, metal, pop, reggae, rock).

Statistics:

- Total Tracks: 1,000
- Genres: 10
- Features: Extracted audio features (e.g., spectrograms, MFCCs)

Dataset Link: https://www.kaggle.com/datasets/andradaolteanu/gtzan-dataset-music-genre-classification

Other Specific Project-Related Details:

Technology Stack: Python, scikit-learn, Keras, TensorFlow or PyTorch, Flask (for web application).

Metrics: Accuracy, precision, recall, confusion matrix.

Visualization: Matplotlib and Seaborn for visualizing exploratory data analysis results, model performances, and confusion matrices.