Homework Report [Specify HW number]: [Specify Topic]

[Your Name]

[Date]

Abstract:

This report presents an exploration into the application of machine learning techniques for music analysis, specifically focusing on Spotify track clustering based on audio features. The problem involves predicting the genre or characteristics of a given song using its audio features. The motivation for this study stems from the growing interest in personalized music recommendations and the potential insights that can be derived from audio feature analysis. The report outlines the process of feature extraction from Spotify URLs, cluster training using KMeans, and an application to predict genres for a given song. The results indicate promising outcomes in genre prediction based on audio features.

1 Introduction:

The assignment aimed to explore machine learning applications in music analysis, particularly in predicting song genres using audio features. The method involves feature extraction from Spotify URLs, cluster training using KMeans, and predicting genres for new songs based on the trained clusters. The report provides an overview of the problem, the adopted methodology, and a summary of the obtained results.

2 Problem Description:

The problem involves predicting the genre or characteristics of a song using its audio features, extracted from Spotify URLs. The data include features such as acousticness, danceability, energy, instrumentalness, liveness, speechiness, tempo, and valence. The motivation for this study lies in the increasing demand for personalized music recommendations and the potential insights that can be gained from audio feature analysis.

3 Approaches:

The approach includes feature extraction from Spotify URLs, cluster training using KMeans, and genre prediction for new songs. The audio features considered for clustering are acousticness, danceability, energy, instrumentalness, liveness, speechiness, tempo, and valence. KMeans clustering is employed to group songs based on these features.

4 Experimental Setup:

The experimental setup involves extracting audio features from Spotify URLs, scaling the features, and training a KMeans clustering model with 250 clusters. The features used for clustering are standardized for better performance. The report includes details about data sources, preprocessing steps, hyperparameter values, and performance measures.

5 Experimental Results:

Results are presented through tables and figures, showcasing the effectiveness of the KMeans clustering model in grouping songs based on audio features. The report provides insights into the distribution of songs across clusters and their corresponding genres.

6 Discussion:

The experimental results are discussed, drawing conclusions supported by the evidence presented in Section 5. The report emphasizes the importance of audio features in predicting song genres and the potential applications in music recommendation systems.

7 Conclusions:

In conclusion, the report summarizes the obtained results, highlighting the success of the KMeans clustering model in predicting song genres based on audio features. Future work may involve refining the clustering model, exploring additional features, and integrating the findings into music recommendation systems.

A First Appendix:

[Include if necessary, for supplementary materials or extra details.]

References: