CS 454

Introduction to Machine Learning and Artificial Neural Networks

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Project Proposal

Music Genre Classification

Team A

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1. Short Description Of The Problem To Be Solved

Genre is one of the most used features to look at in suggesting that specific music track to the user and in music retrieval. The genre of a particular track is determined by various aspects of the music such as rhythmic structure, harmonic content, and instrumentation, is one way to categorize and organize songs. The goal of automating music classification is to make song selection more efficient and less time-consuming. If one must manually classify songs or music, one must first listen to a large number of tracks before deciding on a genre. Not only is this time-consuming, but it's also complicated. Music classification software can make it easier to identify essential information like trends, popular genres, and performers. So, classification of music according to genres is a hot topic and there are many articles and algorithms proposed.

2. Approach To Tackle The Problem

Information will be extracted from tracks available in the GTZAN dataset. Anything that is one of the Magnitude-Based Features (timbral features), Tempo-Based Features, Pitch-Based Features and Chordal Progression Features will be extracted from each of the tracks and a combined feature vector will be created. Principal Component Analysis (PCA) will be used to extract the most useful features that are to be used in classification. Finally, selected features will be provided to each of the three algorithms, namely, K-nearest Neighbors (KNN), Support Vector Machine (SVM) and Convolutional Neural Network (CNN). Classifications will be compared to the ground truth, then, confusion matrices and accuracies will be calculated. Results will be compared to those of the previous work.

3. The Dataset

a. GTZAN (1.000 songs, 100 per genre)

4. The Algorithms Planned To Be Used

a. Support Vector Machines [1][2]
b. Convolutional Neural Networks [3][4]
c. K-Nearest Neighbor [5][6]

5. References To Related Work

[1] Changsheng Xu, N. C. Maddage, Xi Shao, Fang Cao and Qi Tian, "*Musical genre classification using support vector machines,*" 2003 IEEE International Conference on Acoustics, Speech, and Signal Processing, 2003. Proceedings. (ICASSP '03)., 2003, pp. V-429, doi: 10.1109/ICASSP.2003.1199998.

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[3] Y. -H. Cheng, P. -C. Chang and C. -N. Kuo, "*Convolutional Neural Networks Approach for Music Genre Classification,*" 2020 International Symposium on Computer, Consumer and Control (IS3C), 2020, pp. 399-403, doi: 10.1109/IS3C50286.2020.00109.

[4] Bahuleyan, H. (2018). *Music genre classification using machine learning techniques. arXiv preprint arXiv:1804.01149*.

[5] D. R. Ignatius Moses Setiadi et al., "*Comparison of SVM, KNN, and NB Classifier for Genre Music Classification based on Metadata,*" 2020 International Seminar on Application for Technology of Information and Communication (iSemantic), 2020, pp. 12-16, doi: 10.1109/iSemantic50169.2020.9234199.

[6] M. Wu and X. Liu, "*A Double Weighted KNN Algorithm and Its Application in the Music Genre Classification,*" 2019 6th International Conference on Dependable Systems and Their Applications (DSA), 2020, pp. 335-340, doi: 10.1109/DSA.2019.00051.