

Automatic Music Genre Classification of Audio Signals with Machine Learning Approaches

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Abstract—Musical genre classification is put into context by explaining about the structures in music and how it is analyzed and perceived by humans. The increase of the music databases on the personal collection and the Internet has brought a great demand for music information retrieval, and especially automatic musical genre classification. In this research we focused on combining information from the audio signal than different sources. This paper presents a comprehensive machine learning approach to the problem of automatic musical genre classification using the audio signal. The proposed approach uses two feature vectors, Support vector machine classifier with polynomial kernel function and machine learning algorithms. More specifically, two feature sets for representing frequency domain, temporal domain, cepstral domain and modulation frequency domain audio features are proposed. Using our proposed features SVM act as strong base learner in AdaBoost, so its performance of the SVM classifier cannot improve using boosting method. The final genre classification is obtained from the set of individual results according to a weighting combination late fusion method and it outperformed the trained fusion method. Music genre classification accuracy of 78% and 81% is reported on the GTZAN dataset over the ten musical genres and the ISMIR2004 genre dataset over the six musical genres, respectively. We observed higher classification accuracies with the ensembles, than with the individual classifiers and improvements of the performances on the GTZAN and ISMIR2004 genre datasets are three percent on average. This ensemble approach show that it is possible to improve the classification accuracy by using different types of domain based audio features.

Keywords— *Music genre classification; Features extraction; Machine learning; Ensemble classification; Feature selection*

I. INTRODUCTION

Music can be divided into many categories mainly based on rhythm, styles and cultural background. The styles are what we call the music genres. Musical genres are categorical labels created by human experts and it used for categorizing, describing and even comparing songs, albums, or authors in the vast universe of music [1]. There is a number of top-level or song-level perceptive descriptions, such as instrumentation, genre, mood and artist. Musical

genre is the one of the main top-level descriptors and it encapsulates semantic information of the given music piece. Different genres differ from one another in their pitch content, instrumentation, rhythmic structure and timbre features of the music [2].

Nowadays, a personal music collection may contain thousands of songs, while professional collections typically contain hundreds of thousands. Most of the current music databases are indexed based on the artist's name or the title of the song. When songs are indexed improperly in the database, it can cause unexpected search results. Browsing and searching such large collections of songs are very difficult while associating a genre to a musical piece would be more user friendly, in finding what they are looking for. Most music listeners may only be interested in certain types of music. Therefore, music genre classification system would enable them to search for the music they are interested in.

Traditionally, the music genres are labeled by human musical experts. As the number of manually generated rules increases, it may produce unexpected interactions and side effects. Expert classification process is mostly implemented without following a universal taxonomy and this labeling process to audio indexing is prone to error. Human perception of music is dependent on a variety of personal, cultural and emotional aspects. Therefore its genre classification results may avoid clear definition and the boundaries among genres are fuzzy [3,4]. However, there are no any complete agreement exists in their definition and strict distinguishing boundaries among genres. Automatic music genre classification is the classification of music into genres by a machine and as a research topic, it mostly consists of the selection of best features and development of algorithms to perform this classification. A key problem in music classification is how to efficiently and effectively extract low level audio features for high level classification.

In this paper we present a novel approach for automatically classifying audio signal into a hierarchy of musical genres using ensemble of classifiers and comparative study using different machine learning algorithms. Aim of this project is increase accuracy of genre classification result in more robust way. We proposed frequency domain, temporal domain, cepstral domain and

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areas of protection assurance and trust in information security practice It is a reference for researchers instructors students scientists engineers managers and industry practitioners for advanced work in the area IEEE ASSP Workshop on Applications of Signal Processing to Audio and Acoustics ,2003 Proceedings of the ... Annual International ACM SIGIR Conference on Research and Development in Information Retrieval ,2003 **Proceedings of the ... International Computer Music Conference** ,2005 **Neural Network Music Genre Classification** Nikki Pelchat,2021 Music recommendation systems have become popular in recent years with the increasing variety of music content being produced as well as the sheer size of digital music collections which are available at the touch of a finger Large collections of digital music are commonly organized using genre labels In addition music genres are regularly used by recommendation systems to suggest new music to the listeners The chore of classifying a large amount of music manually can be difficult and time consuming It is for these reasons the automatic classification of music by genre is a crucial task The ability to automatically classify music by genre using machine learning can be quicker and arguably more accurate than doing it manually Using neural networks for generic classification tasks is a well researched area within machine learning In recent years the classification of music by genre has become part of the same problem domain Differences in song libraries machine learning techniques input formats and types of neural networks implemented have all had varying levels of success This thesis implements a convolutional neural network that classifies music by genre through the examination of spectrogram images It concentrates on three specific types of spectrogram inputs Linear Logarithmic and Mel scaled spectrograms as well as several input variables and neural network learning techniques to determine the effect that they have on the overall accuracy of the genre classification network This thesis demonstrates these convolutional neural network techniques for music genre classification and assesses their viability and accuracy **Proceedings of ... ACM/IEEE-CS Joint Conference on Digital Libraries** ,2005 **Handbook of Research on Digital Libraries** Yin-Leng Theng,2009 This book is an in depth collection aimed at developers and scholars of research articles from the expanding field of digital libraries Provided by publisher *ISMIR 2002 Conference Proceedings* Michael Fingerhut,2002 **Computer Music Modeling and Retrieval** ,2004 AES ;,2004 *ISMIR 2007* Simon Dixon,David Bainbridge,Rainer Typke,2007 KDD ... ,2006 **Proceedings of the ... ACM SIGMM International Workshop on Multimedia Information Retrieval** ,2004

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