

Automatic Music Genres Classification using Machine Learning

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Abstract—Classification of music genre has been an inspiring job in the area of music information retrieval (MIR). Classification of genre can be valuable to explain some actual interesting problems such as creating song references, finding related songs, finding societies who will like that specific song. The purpose of our research is to find best machine learning algorithms that predict the genre of songs using k-nearest neighbor (k-NN) and Support Vector Machine (SVM). This paper also presents comparative analysis between k-nearest neighbor (k-NN) and Support Vector Machine (SVM) with dimensionality return and then without dimensionality reduction via principal component analysis (PCA). The Mel Frequency Cepstral Coefficients (MFCC) is used to extract information for the data set. In addition, the MFCC features are used for individual tracks. From results we found that without the dimensionality reduction both k-nearest neighbor and Support Vector Machine (SVM) gave more accurate results compare to the results with dimensionality reduction. Overall the Support Vector Machine (SVM) is much more effective classifier for classification of music genre. It gave an overall accuracy of 77%.

Keywords—*K-nearest neighbor (k-NN); Support Vector Machine (SVM); music; genre; classification; features; Mel Frequency Cepstral Coefficients (MFCC); principal component analysis (PCA)*

I. INTRODUCTION

Nowadays, a personal music collection may contain hundreds of songs, while the professional collection usually contains tens of thousands of music files. Most of the music files are indexed by the song title or the artist name [1], which may cause difficulty in searching for a song associated with a particular genre.

Advanced music databases are continuously achieving reputation in relations to specialized archives and private sound collections. Due to improvements in internet services and network bandwidth there is also an increase in number of people involving with the audio libraries. But with large music database the warehouses require an exhausting and time consuming work, particularly when categorizing audio genre manually. Music has also been divided into Genres and sub genres not only on the basis on music but also on the lyrics as well [2]. This makes classification harder. To make things more complicate the definition of music genre may have very well changed over time [3]. For instance, rock songs that were made fifty years ago are different from the rock songs we have today. Luckily, the progress in music data and music recovery has considerable growth in past years.

According to Aucouturier and Pachet, 2003 [4] genre of music is possibly the best general information for the music content clarification. Music engineering encourages the practice of categories and family based operators like to organize their sound accumulations by this clarification, so the requirement of involuntary organization of audio files into categories improved extensively. In addition, the latest improvements in category organization here are still an issue to accurately describe a type, or whether mostly relay on a consumer understands and flavor.

In order to establish and explore increasing composition groups we implemented an automatic technique that can be used for data mining for valuable data about audio composition direct from the audio file. Such data could incorporate rhythm, tempo, energy distribution, pitch, timbre, or other features. Most of the classifications depend on spectral statistical features timbre. Content collections relating to further musicological contents such as pitch and rhythm are too suggested, however their execution time is very less and furthermore they are closed by tiny info collections pointing at different audio arrangements. The inadequateness of audio descriptors will positively have a limitation on music categorization methods.

In this paper, we use machine learning algorithms, including k-nearest neighbor (k-NN) [5] and Support Vector Machine (SVM) [6] to classify the following 10 genres: blues, classical, rock, jazz, reggae, metal, country, pop, disco and hip-hop. In addition, we perform a comparative analysis between k-nearest neighbor (k-NN) [5] and Support Vector Machine (SVM) [6] with and without dimensionality reduction via principal component analysis (PCA) [7]. The k-nearest neighbor is automatically non-linear, and it can sense linear or non-linear spread information. It inclines to do very well with a lot of data points. Support Vector Machine can be used in linear or non-linear methods, once we have a partial set of points in many dimensions the Support Vector Machine inclines to be very good because it easily discovers the linear separation that should exist. Support Vector Machine is good with outliers as it will only use the most related points to find a linear separation (support vectors).

In our research we used Mel Frequency Cepstral Coefficients (MFCC) [8] to extract information from our data as prescribed by past work in this field [9].

Automatic Music Genres Classification Using Machine Learning

Roman Wölfel



Automatic Music Genres Classification Using Machine Learning:

The book delves into Automatic Music Genres Classification Using Machine Learning. Automatic Music Genres Classification Using Machine Learning is a vital topic that needs to be grasped by everyone, ranging from students and scholars to the general public. This book will furnish comprehensive and in-depth insights into Automatic Music Genres Classification Using Machine Learning, encompassing both the fundamentals and more intricate discussions.

1. This book is structured into several chapters, namely:
 - Chapter 1: Introduction to Automatic Music Genres Classification Using Machine Learning
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 - Chapter 4: Automatic Music Genres Classification Using Machine Learning in Specific Contexts
 - Chapter 5: Conclusion
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5. In chapter 4, the author will scrutinize the relevance of Automatic Music Genres Classification Using Machine Learning in specific contexts. This chapter will explore how Automatic Music Genres Classification Using Machine Learning is applied in specialized fields, such as education, business, and technology.
6. In chapter 5, this book will draw a conclusion about Automatic Music Genres Classification Using Machine Learning. This chapter will summarize the key points that have been discussed throughout the book.

The book is crafted in an easy-to-understand language and is complemented by engaging illustrations. This book is highly recommended for anyone seeking to gain a comprehensive understanding of Automatic Music Genres Classification Using Machine Learning.

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Table of Contents Automatic Music Genres Classification Using Machine Learning

1. Understanding the eBook Automatic Music Genres Classification Using Machine Learning
 - The Rise of Digital Reading Automatic Music Genres Classification Using Machine Learning
 - Advantages of eBooks Over Traditional Books
2. Identifying Automatic Music Genres Classification Using Machine Learning
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Automatic Music Genres Classification Using Machine Learning
 - User-Friendly Interface
4. Exploring eBook Recommendations from Automatic Music Genres Classification Using Machine Learning
 - Personalized Recommendations
 - Automatic Music Genres Classification Using Machine Learning User Reviews and Ratings
 - Automatic Music Genres Classification Using Machine Learning and Bestseller Lists
5. Accessing Automatic Music Genres Classification Using Machine Learning Free and Paid eBooks
 - Automatic Music Genres Classification Using Machine Learning Public Domain eBooks
 - Automatic Music Genres Classification Using Machine Learning eBook Subscription Services
 - Automatic Music Genres Classification Using Machine Learning Budget-Friendly Options
6. Navigating Automatic Music Genres Classification Using Machine Learning eBook Formats
 - ePub, PDF, MOBI, and More
 - Automatic Music Genres Classification Using Machine Learning Compatibility with Devices
 - Automatic Music Genres Classification Using Machine Learning Enhanced eBook Features

7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Automatic Music Genres Classification Using Machine Learning
 - Highlighting and Note-Taking Automatic Music Genres Classification Using Machine Learning
 - Interactive Elements Automatic Music Genres Classification Using Machine Learning
8. Staying Engaged with Automatic Music Genres Classification Using Machine Learning
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Automatic Music Genres Classification Using Machine Learning
9. Balancing eBooks and Physical Books Automatic Music Genres Classification Using Machine Learning
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Automatic Music Genres Classification Using Machine Learning
10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
11. Cultivating a Reading Routine Automatic Music Genres Classification Using Machine Learning
 - Setting Reading Goals Automatic Music Genres Classification Using Machine Learning
 - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Automatic Music Genres Classification Using Machine Learning
 - Fact-Checking eBook Content of Automatic Music Genres Classification Using Machine Learning
 - Distinguishing Credible Sources
13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development
 - Exploring Educational eBooks
14. Embracing eBook Trends
 - Integration of Multimedia Elements
 - Interactive and Gamified eBooks

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