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 algorithm 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].

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R. K. Nagaria,V. S. Tripathi,Carlos Ruiz Zamarreno,Yogendra Kumar Prajapati

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Mohamad,Mohammad Nazir Ahmad,2023-10-19 This book constitutes the refereed proceedings of the 8th International Conference on Advances in Visual Informatics IVIC 2023 held in Selangor Malaysia in November 2023 The 51 full papers presented were carefully reviewed and selected from 101 submissions The conference focused on 6 tracks Modeling and Simulation Mixed Reality and HCI Systems Integration and IoT Cybersecurity Energy Informatics and Intelligent Data Analytics *VLSI, Communication and Signal Processing* R. K. Nagaria,V. S. Tripathi,Carlos Ruiz Zamarreno,Yogendra Kumar Prajapati,2023-07-01 This book covers a variety of topics in Electronics and Communication Engineering especially in the area of microelectronics and VLSI design communication systems and networks and signal and image processing The content is based on papers presented at the 5th International Conference on VLSI Communication and Signal Processing VCAS 2022 The book also discusses the emerging applications of novel tools and techniques in image video and multimedia signal processing This book is useful to students researchers and professionals working in the electronics and communication domain Proceedings of the Fifth International Conference on Emerging Trends in Mathematical Sciences & Computing (IEMSC-24) Biswadip Basu Mallik,Krishanu Deyasi,Santanu Das,Sharmistha Ghosh,Subrata Jana,2024-10-31 The Proceedings of the Fifth International Conference on Emerging Trends in Mathematical Sciences Computing IEMSC 24 contains papers that present the current scientific as well as technological innovations by leading academicians eminent researchers and experts throughout the globe in the twin domain of Mathematical Sciences as well as Computing The papers focus on the recent advances in the field of Theoretical Computer Science as well as its blending with Mathematical techniques The book aims to disseminate new technical ideas and features that can be incorporated in day to day life for the benefit of the society The research papers exhibit scientific advancements in diversified spectrum that includes Differential as well as Integral Equations with applications Computational Fluid Dynamics Nanofluids Network Theory Optimization Control Theory Machine Learning Artificial Intelligence Big Data Analytics IoT Cryptography Fuzzy Automata Statistics and many more The proceedings primarily focus on the amalgamation of mathematical methods with computing The potential readers will get access to diverse ideas and innovations in the field of computing together with its growing interactions in various fields of mathematics This book serves as a valuable reference resource for researchers in academia and industry **Computer Networks and Inventive Communication Technologies** S. Smys,Robert Bestak,Ram Palanisamy,Ivan Kotuliak,2021-09-13 This book is a collection of peer reviewed best selected research papers presented at 4th International Conference on Computer Networks and Inventive Communication Technologies ICCNCT 2021 The book covers new results in theory methodology and applications of computer networks and data communications It includes original papers on computer networks network protocols and wireless networks data communication technologies and network security The proceedings of this conference are a valuable resource dealing with both the important core and the specialized issues in the areas of next generation wireless network design control and management as well as in the 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   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 the ... Annual International ACMSIGIR Conference on Research and Development in Information Retrieval** ,2003   **Proceedings of the ... International Computer Music Conference** ,2005   **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   **ISMIR 2007** Simon Dixon,David Bainbridge,Rainer Typke,2007   *Computer Music Modeling and Retrieval* ,2004   AES; ,2004   **KDD ...** ,2006   **Proceedings of the ... ACM SIGMM International Workshop on Multimedia Information Retrieval** ,2004

Decoding **Automatic Music Genres Classification Using Machine Learning**: Revealing the Captivating Potential of Verbal Expression

In a time characterized by interconnectedness and an insatiable thirst for knowledge, the captivating potential of verbal expression has emerged as a formidable force. Its ability to evoke sentiments, stimulate introspection, and incite profound transformations is genuinely awe-inspiring. Within the pages of "**Automatic Music Genres Classification Using Machine Learning**," a mesmerizing literary creation penned with a celebrated wordsmith, readers embark on an enlightening odyssey, unraveling the intricate significance of language and its enduring effect on our lives. In this appraisal, we shall explore the book is central themes, evaluate its distinctive writing style, and gauge its pervasive influence on the hearts and minds of its readership.

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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

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