

## Automatic Genre Classification of Latin Music Using Ensemble of Classifiers

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***Abstract.** This paper presents a novel approach to the task of automatic music genre classification which is based on ensemble learning. Feature vectors are extracted from three 30-second music segments from the beginning, middle and end of each music piece. Individual classifiers are trained to account for each music segment. During classification, the output provided by each classifier is combined with the aim of improving music genre classification accuracy. Experiments carried out on a dataset containing 600 music samples from two Latin genres (Tango and Salsa) have shown that for the task of automatic music genre classification, the features extracted from the middle and end music segments provide better results than using the beginning music segment. Furthermore, the proposed ensemble method provides better accuracy than using single classifiers and any individual segment.*

### 1. Introduction

With the continuous expansion of the Internet, a huge quantity of data from different sources has been become available on-line. An study from the UC Berkeley shows that in 2002 there were about 5 million terabytes of new information produced in films, printed media or magnetic/optic storage media [Lyman and Varian 2003]. In the Web alone, more than 170 terabytes of information is available. However it is very difficult to use in an efficient manner such a huge amount of information. Many important problems such as search for information sources, retrieval/extraction of information, automatic summarization of information, etc. have been the subject of intensive research in the last years. Automatic music genre classification is also the underlying technology to construct digital libraries that intend to preserve a relevant socio-cultural aspect.

In this context, a research area that has been growing in the past few years is the multimedia information retrieval which aims at building tools to effectively organize and manage the huge amount of available multimedia information [Fingerhut 1999] [Pampalk et al. 2002]. The current practice for indexing multimedia data is based on textual meta-data information, which is the case of the ID3 tags in MP3 music files. Although ID3 tags are very useful for indexing, searching, and retrieval, usually, such tags are manually generated and associated with the multimedia data.

One of the most important type of multimedia data distributed over the Web is the digital music in MP3 format. There are many studies and methods related to the analysis of the music audio signal [Aucouturier and Pachet 2003], [Guo and Li 2003], [Li et al. 2003], [Pampalk et al. 2002], [Zhang and Kuo 2001]. One important component for a content-based music information retrieval system is a module for the automatic

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**Colin Johnson, Nereida Rodríguez-  
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## **Automatic Music Genre Classification Using Ensemble Of:**

*Artificial Intelligence in Music, Sound, Art and Design* Colin Johnson, Nereida Rodríguez-Fernández, Sérgio M. Rebelo, 2023-03-31 This book constitutes the refereed proceedings of the 12th European Conference on Artificial Intelligence in Music Sound Art and Design EvoMUSART 2023 held as part of Evo 2023 in April 2023 co located with the Evo 2023 events EvoCOP EvoApplications and EuroGP The 20 full papers and 7 short papers presented in this book were carefully reviewed and selected from 55 submissions They cover a wide range of topics and application areas of artificial intelligence including generative approaches to music and visual art deep learning and architecture *Structural, Syntactic, and Statistical Pattern Recognition* Georgy Gimel'farb, Edwin Hancock, Atsushi Imiya, Arjan Kuijper, Mineichi Kudo, Shinichiro Omachi, Terry Windeatt, Keiji Yamada, 2012-10-22 This volume constitutes the refereed proceedings of the Joint IAPR International Workshops on Structural and Syntactic Pattern Recognition SSPR 2012 and Statistical Techniques in Pattern Recognition SPR 2012 held in Hiroshima Japan in November 2012 as a satellite event of the 21st International Conference on Pattern Recognition ICPR 2012 The 80 revised full papers presented together with 1 invited paper and the Pierre Devijver award lecture were carefully reviewed and selected from more than 120 initial submissions The papers are organized in topical sections on structural syntactical and statistical pattern recognition graph and tree methods randomized methods and image analysis kernel methods in structural and syntactical pattern recognition applications of structural and syntactical pattern recognition clustering learning kernel methods in statistical pattern recognition kernel methods in statistical pattern recognition as well as applications of structural syntactical and statistical methods *Adaptive Multimedia Retrieval: Semantics, Context, and Adaptation* Andreas Nürnberger, Sebastian Stober, Birger Larsen, Marcin Detyniecki, 2014-10-29 This book constitutes the thoroughly refereed post conference proceedings of the 10th International Conference on Adaptive Multimedia Retrieval AMR 2012 held in Copenhagen Denmark in October 2012 The 17 revised full papers presented were carefully reviewed and selected from numerous submissions The papers cover topics of state of the art contributions features and classification location context language and semantics music retrieval and adaption and HCI *Neural Approaches to Dynamics of Signal Exchanges* Anna Esposito, Marcos Faundez-Zanuy, Francesco Carlo Morabito, Eros Pasero, 2019-09-18 The book presents research that contributes to the development of intelligent dialog systems to simplify diverse aspects of everyday life such as medical diagnosis and entertainment Covering major thematic areas machine learning and artificial neural networks algorithms and models and social and biometric data for applications in human computer interfaces it discusses processing of audio visual signals for the detection of user perceived states the latest scientific discoveries in processing verbal lexicon syntax and pragmatics auditory voice intonation vocal expressions and visual signals gestures body language facial expressions as well as algorithms for detecting communication disorders remote health status monitoring sentiment and affect analysis social behaviors and engagement Further it examines neural and machine learning algorithms

for the implementation of advanced telecommunication systems communication with people with special needs emotion modulation by computer contents advanced sensors for tracking changes in real life and automatic systems as well as the development of advanced human computer interfaces The book does not focus on solving a particular problem but instead describes the results of research that has positive effects in different fields and applications

**Intelligent Human Centered Computing** Siddhartha Bhattacharyya, Jyoti Sekhar Banerjee, Debashis De, Mufti Mahmud, 2023-06-14 This book features high quality research papers presented at the First Doctoral Symposium on Human Centered Computing HUMAN 2023 jointly organized by Computer Society of India Kolkata Chapter and Techno India University West Bengal on February 25 2023 This book discusses the topics of modern human centered computing and its applications The book showcases the fusion of human sciences social and cognitive with computer science human computer interaction signal processing machine learning and ubiquitous computing

**Computational Science - ICCS 2022** Derek Groen, Clélia de Mulatier, Maciej Paszynski, Valeria V. Krzhizhanovskaya, Jack J. Dongarra, Peter M. A. Sloot, 2022-06-21 The four volume set LNCS 13350 13351 13352 and 13353 constitutes the proceedings of the 22nd International Conference on Computational Science ICCS 2022 held in London UK in June 2022 The total of 175 full papers and 78 short papers presented in this book set were carefully reviewed and selected from 474 submissions 169 full and 36 short papers were accepted to the main track 120 full and 42 short papers were accepted to the workshops thematic tracks The conference was held in a hybrid format

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**Emerging Research in Computing, Information, Communication and Applications** N. R. Shetty, L. M. Patnaik, H. C. Nagaraj, Prasad Naik Hamsavath, N. Nalini, 2019-09-10 This book presents selected papers from the International Conference on Emerging Research in Computing Information Communication and Applications ERCICA 2018 The conference provided an interdisciplinary forum for researchers professional engineers and scientists educators and technologists to discuss debate and promote research and technology in the emerging areas of computing information communication and their applications The book discusses these research areas providing a valuable resource for researchers and practicing engineers alike

**Digital Hearing Healthcare** Qinglin Meng, Jing Chen, Changxin Zhang, Dennis L. Barbour, Fan-Gang Zeng, 2022-12-05 We would like to acknowledge VCCA2020 Organizer Jan Willem Wasmann who has acted as coordinator and has contributed to the preparation of the proposal for this Research Topic Dr Qinglin Meng is working on an audio project for Huawei Technologies Co Ltd Dr Jing Chen is working on

research projects with Sonova AG Dr Fan Gang Zeng owns stock in Axonics Nurotron Syntiant Velox and Xsense Dr Dennis Barbour founded and owns equity in Bonauria All other Topic Editor declare no conflicts of interest *Proceedings of ... ACM/IEEE-CS Joint Conference on Digital Libraries* ,2005 *Proceedings of the ... ACM SIGMM International Workshop on Multimedia Information Retrieval* ,2004 *Proceedings of the ... International Computer Music Conference* ,2005 *ISMIR 2007* Simon Dixon,David Bainbridge,Rainer Typke,2007 **MIR '04** Michael S. Lew,Nicu Sebe,Chabane Djeraba,2004 **AES** ;,2003 *Proceedings of the ... International Conference on Information and Knowledge Management* ,2004 *CIKM 2004* David A. Evans,2004 *The Journal of the Acoustical Society of America* Acoustical Society of America,2005 **Automatic Music Genre Classification** Ritesh Ajoodha,2014 *Characterizing and Classifying Music Genres and Subgenres Via Association Analysis* Adam T. Lefaiivre,2019 In this thesis we investigate the problem of automatic music genre classification in the field of Music Information Retrieval MIR MIR seeks to apply convenient automated solutions to many music related tasks that are too tedious to perform by hand These tasks often deal with vast quantities of music data An effective automatic music genre classification approach may be useful for other tasks in MIR as well Association analysis is a technique used to explore the inherent relationships among data objects in a problem domain We present two novel approaches which capture genre characteristics through the use of association analysis on large music datasets The first approach extracts the characteristic features of genres and uses these features to perform classification The second approach attempts to improve on the first one by utilizing a pairwise dichotomy like strategy We then consider applying the second approach to the problem of automatic subgenre classification

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**the new innovative medical education system in ethiopia background** - Sep 20 2022

results the objectives rationale as well as the approach and methodology used to develop the curriculum are outlined the processes involved in the implementation and the initial appraisal of the developed curriculum was also discussed [medical education in difficult circumstances analysis of the](#) - Apr 27 2023

may 31 2018 the new innovative medical curriculum nimc is a four year programme designed by the ethiopian federal ministries of health and education which has been in place in aksum since 2012 there have been 4 years of clinical students on the course with the first cohort of students graduating in 2016

**the rapid scale up of medical education in ethiopia medical** - Nov 22 2022

sep 5 2019 the rapid scale up of medical education in ethiopia medical student experiences and the role of e learning at addis ababa university pmc journal list plos one pmc6728036 as a library nlm provides access to scientific literature

**new medical education initiative ministry of health ethiopia** - Oct 02 2023

content has given emphasis to essential clinical and professional skills emergency live saving surgical and obstetrics skills and has introduced ethiopian health problems mainly infectious diseases rural health the main intent of this new approach to medical education has been twofold first to ensure relevance to the task of medical

**students perceptions towards self directed bmc medical education** - May 29 2023

jan 8 2020 students perceptions towards self directed learning in ethiopian medical schools with new innovative curriculum a mixed method study bmc medical education full text research article open access published 08 january 2020

[medical education in difficult circumstances analysis of the](#) - Jul 19 2022

may 31 2018 pmcid pmc5984342 doi 10 1186 s12909 018 1199 x abstract background this included aksum school of medicine situated in aksum a rural town in northern ethiopia the new innovative medical curriculum nimc is a four year programme designed by the ethiopian federal ministries of health and education

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a review of the background and process of developing a new innovative medical curriculum in ethiopia and the possible impact of the nimei on the human resources for health development as well as for the overall health system of the country background a new innovative medical education initiative nimei had been launched in ethiopia in february 2012 and the

training

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jul 19 2023 are ethiopian schools of medicine producing competent medical graduates for providing quality health care in the era of covid 19 pandemic july 2023 bmc medical education 23 1 doi

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a azaje abstract background a new innovative medical education initiative nimei had been launched in ethiopia in february 2012 and the training of medical doctors using a new approach and curriculum initiated

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abstract background a new innovative medical education initiative nimei had been launched in ethiopia in february 2012 and the training of medical doctors using a new approach and curriculum initiated

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assessing predictors of academic performance for nmei hindawi - Aug 20 2022

aug 15 2020 in ethiopia since 2012 the ethiopian federal ministry of health and education implemented a new medical education initiative in 13 institutions currently as a nation very little is known about the predictors of academic performance for new medical education curriculum based students

*the rapid scale up of medical education in ethiopia medical* - Feb 23 2023

sep 5 2019 results 673 99 6 of 676 students approached completed the survey representing 39 5 of all 1705 medical students enrolled at aau in 2014 most students felt the flooding policy had a negative impact on their medical education and 90 felt there was not adequate infrastructure to support the increased student body

*announcement for eligible candidates interested to join nimei* - Sep 01 2023

oct 13 2022 selection of applicants to the new innovative medical education initiative nimei program includes the following criteria the total grade break down is indicated below a written examination 60