

Article

Context-Aware Music Recommender Systems for Groups: A Comparative Study

Adrián Valera , Álvaro Lozano Murciego  and María N. Moreno-García * 

Department of Computer Science and Automation, Science Faculty, University of Salamanca, Plaza de los Caballos s/n, 37008 Salamanca, Spain; adriamval@com.usal@usal.es (A.V.); loz@usal.es (Á.L.M.)
* Correspondence: mung@usal.es

Abstract: Nowadays, recommender systems are present in multiple application domains, such as e-commerce, digital libraries, music streaming services, etc. In the music domain, these systems are especially useful, since users often like to listen to new songs and discover new bands. At the same time, group music consumption has proliferated in this domain, not just physically, as in the past, but virtually in rooms or messaging groups created for specific purposes, such as studying, training, or meeting friends. Single-user recommender systems are no longer valid in this situation, and group recommender systems are needed to recommend music to groups of users, taking into account their individual preferences and the context of the group (when listening to music). In this paper, a group recommender system in the music domain is proposed, and an extensive comparative study is conducted, involving different collaborative filtering algorithms and aggregation methods.

Keywords: group recommender systems; music recommendation; context-aware recommender systems; collaborative filtering



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1. Introduction

Recommender systems (RS) are present today in multiple application domains, such as e-commerce, tourism, television, etc. [1]. Music and audiovisual content, in general, are domains where there is a high demand for these systems, due to the popularization of portable devices and streaming services [1].

Each application area has its own particularities, and the music area is characterized, among other things, by the rapid consumption of items. Consequently, it is difficult to know the ratings explicitly, since users do not stop listening to express them. For this reason, ratings are generally inferred from user behavior. Moreover, the sparsity problem is more important than in other domains, due to the scarcity of ratings and large availability of items in music catalogs.

In this domain, recommender systems for groups acquire great relevance, since music is often listened in company, either by gathering friends for that purpose or while doing another activity, such as training in a gym or working in a library. In contrast, recommendations to groups are not feasible in many other areas where products are used or consumed individually. In addition to music, the main application domains for group recommender systems (GRS) are movies, television, and travel [2]. However, there are differences between these items and music [3]. For example, a song is usually played many times by the same user, while a movie is generally watched only once. Another difference is the number of items consumed in a particular time frame, which is higher for music than for movies and tourist attractions, among other items. These facts influence both the way implicit feedback is obtained from the user and the number and diversity of recommendations.

Moreover, in the music domain, the context of the user also has a great importance on user preferences [4]. Many environment-related contextual factors, such as time, weather, or place, as well as user-related contextual factors, such as, activity or mood, influence

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security and trust behavior change and persuasion Impact of Context-aware Recommender Systems on Habitual Listening Patterns Anonym,2017-12-12 Seminar paper from the year 2017 in the subject Musicology grade 1 0 language English abstract With the ubiquitous availability and rapid travelling of information networked media environments confront consumers with an abundance of information which they can not handle by themselves As consequence of that digital media platforms such as Spotify make use of recommender systems that suggest items based on anticipated user preferences Thereby algorithms assist users to navigate huge databases of items Recommender systems turn out to be one of the most powerful tools to cope with information overload On the other hand digital music platforms afford user with new opportunities to add share comment or rank items and thus facilitate the formation of participatory music communities However very little is known about the socio cultural consequences of computer mediated decision making processes A *Geographically-aware Context-based Music Recommendation System* René A. Enguehard,2009 *Personalized and context-aware music retrieval and recommendation* Zhiyong Cheng,2016 Rapid advances in mobile devices and cloud based music services have brought about a fundamental change in the way people consume music Cloud based music streaming platforms like Pandora and Last fm host an increasing huge volume of music contents Meanwhile the ubiquity of wireless infrastructure and advanced mobile devices enable users to access such abundant music content anytime and anywhere Consequently there has been an increasing demand for the development of intelligent techniques to facilitate personalized and context aware music retrieval and recommendation Most of existing music retrieval systems have not considered users music preferences and traditional music recommender systems have not considered the influence of local contexts As a result search and recommendation results may not best suit users music preference influenced by the dynamically changed contexts when users listen to music using mobile devices on the move Current mobile devices are equipped with various sensors and typically for personal use Thus rich user information e g age gender listening logs and various types of contexts e g time location can be obtained and detected with the mobile devices which provide an opportunity to develop personalized and context aware music retrieval and recommender systems Author s abstract **A Historical Survey of Music Recommendation Systems** Ying Qin,2013 The development of the Internet and the emergence of audio compression technologies have contributed to the realization of making millions of music titles accessible to millions of users Due to the extensive distribution of music consumers are being presented with a problem of information overload while the music industry is being faced with the challenge of personalized promotion and distribution Music recommendation systems aim to ease the task of finding the music items that might interest the users by generating meaningful recommendations The recommendation for music is different from those for books and movies due to its low cost per item short consumption time high per item reuse highly contextual usage and numerous item types Understanding the patterns of music listening and consumption is important to create accurate and satisfying music recommendations This thesis reviews state of the art music

recommendation and discovery methods with the goal of presenting the historical developments in this area Traditional music recommendation systems can be classied as one of two major kinds collaborative filtering and content based filtering Recently the research community has broadened its attention to include other aspects such as hybrid approaches context awareness social tagging music networks visualization playlist generation and group recommendation For the evaluation of music recommendation systems researchers or developers need to take into account properties such as accuracy coverage confidence novelty diversity and privacy These properties can be measured in an offline simulation a user study or an online evaluation Suggestions for future work in both the design and the evaluation of music recommendation systems are given

A Music Recommendation System Using Automatic Emotion Recognition and Context Determination for Mobile Devices, 2017 **MIRages** Perfecto Herrera Boyer, 2018 This thesis reports on research carried out and published during the last twenty years on different problems of Music Information Retrieval MIR We organize the text as a personal account and critical reflection along four hypothesized ages that have shaped the evolution of MIR In the age of feature extractors we present work on features to describe sounds and music especially timbre and tonal aspects In the age of semantic descriptors work on describing music with high level concepts such as mood instruments similarities cover versions or genres usually inferred with machine learning from annotated collections is reported In the age of context aware systems we report on user models for recommendation and for avatar generation in addition to factors that influence music listening decisions We finally discuss the possibility of a more recent age of creative systems where MIR features classifiers models and evaluation methodologies aid to enhance or expand music creation

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