

# Collaborative Filtering and Genre Classification for Music Recommendation

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## Abstract

This short paper briefly describes the proposed music recommendation method that provides suitable music pieces to a listener depending on both listeners' ratings and content of music pieces. The proposed method consists of two methods. First, listeners' ratings prediction method is a combination the traditional user-based and item-based collaborative filtering methods. Second, genre classification method is a combination of feature extraction and classification procedures. The feature extraction step obtains audio signal information and stores it in data structure, while the second one classifies the music pieces into various genres using decision tree algorithm.

## 1. Introduction

A rapid development of Internet together with the growth of the bandwidth availability have resulted in the widespread of a large amounts of digital multimedia contents [1]. This has motivated researchers to develop music information retrieval (MIR) methods that would be useful for Internet music search engines, musicologist and listeners to find a music from numerous options. Among these methods, music recommendation is the procedure of providing a listener a list of music pieces that he/she is likely to enjoy listening to [2]. However, a large amounts of digital music causes the difficulty in the effective and accurate selection of music pieces, and thus, raises the requirements of more sophisticated music recommendation methods.

This short paper briefly describes the proposed music recommendation method that provides suitable music pieces to a listener depending on both listeners' ratings and content of music pieces. By careful integration of the collaborative filtering and content based recommendation methods, the proposed method is able to make better recommendations in terms of novelty and accuracy. High recommendation accuracy is obtained by identifying similar listeners based on ratings of music pieces given by listeners, while high recommendation novelty is achieved by classifying

music pieces into various genres. In addition, the proposed method essentially combines aspects of a number of the established algorithms and thus, is lightweight and robust.

More precisely, we describe the following contributions in this short paper:

- First, we propose listeners' ratings prediction method by combining the traditional user-based and item-based collaborative filtering methods. The proposed method provides suitable music pieces to a listener by analyzing ratings from similar listeners.
- Second, in order to recognize the music piece, we propose a genre classification method that has two steps: feature extraction and classification. The first step extracts music features and stores the extracted feature in data structure, while the second one classifies the music pieces into various genres using decision tree algorithm.

The rest of the paper is organized as follows: We first go over related work in Section 2. Section 3 describes the proposed method. Section 4 presents performance evaluation. Section 5 highlights the conclusion.

## 2. Music Recommendation Methods

Various music recommendation methods have been developed that can be divided into two

groups: collaborative and content based filtering.

Collaborative filtering methods recommend music pieces to a listener by considering similar listeners' ratings of those music pieces. Two types of collaborative filtering methods are widely developed: memory based and model based. Memory based recommenders [3] discover an active user's nearest neighbors using a large amount of explicit user ratings. Then they combine the discovered neighbors' ratings to forecast the active user's ratings of related items. Model based recommenders [4] utilize machine learning methods to model user preferences by a set of rating scores and to model user preferences by a set of rating scores and to build a special prediction model. In addition to these collaborative filtering methods, there are also hybrid recommenders, which merge different collaborative algorithms to generate a better recommendations. However, with collaborative filtering methods music pieces that have not been rated cannot be recommended. Because, in order to make a correct music recommendation to a listener, these methods should recognize the music piece by analyzing the acoustic features of a music piece, such as genre, mood and rhythm. Content based methods recommend music pieces that are similar to listeners' preferences based on music content such as genre, moods and rhythms.

Content based methods recommend music pieces that are similar to listeners' preferences based on music content such as genre, moods and rhythms. In [5], the authors proposed an audio recommendation system based on audio signature in MPEG-7 Audio. In the proposed system, listener first provides each music piece a rating value in his/her collected music pieces, and the system extracts the audio signature as the music features from audio data. The system then uses Linde-Buzo-Gray (LBG) Vector Quantization method to rate a new music piece. In [6], the authors design collaborative music recommender system based on audio features of the multimedia content. In the proposed method, the authors provide recommendation service where a clustering method is used to integrate the audio features of music into the collaborative filtering framework. However, these methods can generate unrated recommendations of a large amounts of artists and music pieces are not similar to listeners' preference. In order to overcome this, listeners' preferences

should be related with the music content by using a practical database where most listeners tend to rate few music pieces as favorites [7].

### 3. Conclusion

This short paper have briefly described the proposed a music recommendation method that provides suitable music pieces to a listener depending on both listeners' ratings and content of music pieces. Due to the page limitations, we will describe the proposed method in future work.

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