An Improved Content-Based Music Recommending Method with Weighted Tags

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Abstract. Content-based filtering is widely used in music recommendation field. However, the performance of existing content-based methods is dissatisfactory, because those methods simply divided the listened songs into like or unlike set, and ignored user's preference degree. In this paper, an enhanced content-based music recommending method was proposed by quantifying the user preference degree to songs with weighted tags. Firstly, each listened song was classified into like or unlike set according to user's playing behaviors, such as skipping and repeating. Secondly, the songs' social tags were collected from LastFm website and weighted according to their frequency in the collected tags.Finally, the user's preference degree for each song was quantified with the weighted tags, and the candidate songs with high preference degrees would be recommended to him. On the LastFm dataset, the experimental results demonstrate that the proposed method outperforms those traditional content-based methods in both rating and ranking prediction.

Keywords: Recommend Systems, Social Tagging, Content Filtering.

1 Introduction

Along with the development of World Wide Web, millions of free online music makes it hard for people to find out what they like manually. The recommender systems provide a widely adopted solution to the information overload problem, and can automatically help people to decide what to listen.

The current music recommendation technologies mainly fall into two categories: content-based filtering [1] and collaborative filtering [2]. Content-based filtering technology analyzes the similarity between users or items by the metadata, such as user profiles and music acoustic features. In contrast, collaborative filtering technology analyzes the similarity between users or items by users' past behaviors, no requiring domain knowledge. The Latent factor models like matrix factorization (MF) and the neighborhood model are typical approaches in collaborative filtering. They found the relationships between users and items by analyzing users' listening histories. Besides, there are other new techniques, such as LDA methods [3] and graph-based models [4].

Though the traditional recommenders can effectively predict which song a user likes, they can hardly make an understandable explanation why they do

these recommends, and difficultly answer the question of what kind music a user likes or unlike

In this paper, a personalized tag model was proposed for music recommendation. The music's metadata was replaced with the social tags to represent songs. Here, the social tags are keywords generated by internet users on a platform and they are used to describe and categorize an object, concept or idea. As they are originally created by users' own way, they contain meaningful concepts to users. Furthermore, a song's top tags are the most popular ones which are attached by the users on this platform, so that they can stand for the social opinion to songs. Comparing with the audio features, such as pitch and tempo, social tags can better classify and label resource, besides they can make the recommender more understandable. Moreover, the tags were weighted on the perspective of statistic analysis of each user's implicit feedbacks to build each user's personalized tag model. On the LastFm dataset, experiments demonstrate that the proposed method can outperform the traditional content-based method in both rating and ranking prediction.

The remainder of this paper is organized as follows. Section 2 introduces prior work related to this paper. Then the details of the proposed method are presented in Section 3. In Section 4, experiments are discussed, followed by conclusion and future work in Section 5.

2   Related Work

In this section, some of research works related to tag-based music recommender systems are presented.

The methods which recent research papers apply in tag-based music recommendation can be classified into two categories. One way is to use tag data as content information to compute users or items similarity. For examples, Bosteels et al. [5] used social top tags to calculate similarity values between listened songs and candidate songs, and then used those values as the fuzzy relationship degrees to compare performance of some different heuristics. It can reduce the predicting failure rate comparing with the method in [6], which used the audio-based similarity. The main difference between the proposed method and [5] is that the tags' weights were equal in [5] but in the proposed method tags were assigned with different weights according to their frequency in the collected tags. Kim [7] assigned weight to tags according to the intensity of tag's emotion which was judged by the SentiWordNet [8], after then, user profiles using the weighted tags were generated and a user-based collaborative filtering algorithm was executed. The main barrier in [7] is the sparsity problem as the tags each user assigned to a song are very poor.

The other way is to make use of the tag data to build recommend models. For example, Zhang et al. [9] proposed a random walk model, which was based on Page Rank liked random walks among the user-item, user-tag and item-tag bipartite graphs. Besides, it also made use of the tag information to build item graphs and user graphs based on a probabilistic method. As it applied random