A Collaborative Filtering Recommendation Based on User Profile and User Behavior in Online Social Networks

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Abstract—*This paper aims to present and discuss the similarity among users in a social network based on CF (Collaborative Filtering) algorithm and SimRank (Similarity Based on Random Walk) algorithm. The CF algorithm used to predict the relationship between users based on the user rating on items (movies and books) and the user's profile. The SimRank algorithm calculates the similarity among users through finding the nearest neighbors for each user in the social network. At last, the combination of these two algorithms will be used to get "people may interest each other" from users' database. In the experimental analysis, a data set "DouBan" (a data set is collected from a Chinese website) will be used and demonstrates the performance of the improved technique with a website. And the website will be developed to show the recommended processing of the proposed algorithm. Finally, the recommendation accuracy of the proposed method is evaluated by comparing with the existing recommendation algorithms.*

Keywords—*Collaborative Filtering; SimRank; social network; similarity*

I. INTRODUCTION

Nowadays, Online Social Networks have an important role in the life. More and more people make friends, watch movies and buy books on the website. As a new user for a social website, the system must better recommend some person or interesting things to them. And making them enjoy your website. For the old users, the website must maintain their enthusiasm.

Collaborative Filtering (CF) is the most successful technology in personalized recommendation systems. However, it is based on the assumption that users are independent and identically distributed, and ignore the relationships among users. Based on this intuition, the author attempts to identify the reasons of connectivity by measuring how three features influence people when deciding to connect with someone or any items and topic. The three features are a) Popularity, b) User profile, c) Activity. In this research, the user profile and user behavior will be collected and used to calculate the similarities among users and items. A social website will be constructed and used as a simulator.

II. RELATED WORK

In previous literatures, several available papers about recommender systems are reviewed, including Traditional Collaborative Filtering algorithm [1,2], Content-Based Filtering algorithm [3], Social recommender system algorithm [4,5,6] and mobile recommender system [7]. For paper [1], only three user's information (age, gender and occupation) would be used, and the similarity is based on this information is same or not. This method of judging is not good enough because people from different ages might like the same type of movies. Even if users have alike been rating value on movies, it doesn't mean they have similar behaviors. A good way with user profile is described in [8]. The Content-Based Filtering algorithm can calculate the similarity through user's behaviors. However, user's content is a huge data set, the information about "follower and following" just be used in paper [3]. It focuses on the relationship but ignores the other user's behaviors. For Social recommender systems, several articles and papers [4,5,6] discuss hybrid methods are used in the social networks. In the field of hybrid methods, neighborhood-based approaches and model-based approaches are two widely used methods [5]. A mobile recommender system is introduced in paper [7]. It is an application with a hybrid recommendation method in real-world use. Some information such as content descriptions, sensor inputs, and user profiles are used in this system.

From these papers, the problem definition of this study is identified and it is different from traditional recommender systems. Therefore, this research cannot just consider the user-item matrix, and the user's social network information is used to improve recommender systems.

III. SYSTERM OVERVIEW

This section will present the design of a social website and introduce some techniques used on the Internet to recommend "friends in the future".

The system framework consists of a social network website which provides an exciting and powerful new communication mode for users. Fig.1 illustrates the structure of the social website and reveals how the recommending algorithm works.