Collaborative Filtering Recommender System: Overview and Challenges

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This paper is to present an overview of Collaborative Filtering (CF) recommender system and show the major CF challenges. In general, the recommendation systems are the best way to help users to overcome the information overload issue. The CF approach is one of the most widely used and most successful methods in the recommendation system, such as e-commerce. This paper introduced a brief description about recommender's approaches which are: content-Based, collaborative filtering and hybrid approach. Next, defined the main challenges which have clearly impact on the performance and accuracy of CF recommender system. The major finding of this paper is the CF main problems: Data sparsity, Cold-star, and Scalability. By presenting of these challenges the quality of recommendations can be improved by proposing new methods. The paper ends with conclusion summarizes the limitations of the existing methods and recommendations.

Keywords: Recommendation system, Collaborative filtering, Sparsity, Scalability

1. Introduction

In everyday life, the people living in an age of information overload and they face so much information which is problematic. Therefore, they tend to some ways that may help them to alleviate this problem and make their decisions in most cases. For example, the people can ask their friends, read newspapers, advertising, general surveys, and so forth in order to get a knowledge about items to make their decision easy. Nevertheless, the people still suffering from information flood which progressively become a big challenge in their daily life. This encourages more and more researchers to develop new techniques that make users' dealing with this issue more easy and effective. As sequences, the researchers introduced a phenomenon called "Recommendation Systems RS". The basic idea of these systems is that the history activities of users utilized to build a knowledge (user profile) about their preferences. After that, this knowing being used to provide recommendations to the target user through comparing his/her profiles with other users' profiles. Thus, these systems enable the Internet users to find their preferred information/items from the massive data in more quickly and efficiently way. So, the main objective of these techniques is to provide tools that seek to predict 'rating' or 'preference' that a user would give to an item not yet considered such as music, books, movies or a product. This prediction value can help users to get what items they preference. RS uses the content or features of item (content-based approach), feedback information given by users to items (collaborative filtering approach which is a common approach), or combining both approaches (hybrid approach).

The term of Collaborative Filtering (CF) was coined by Goldberg in the recommender system Tapestry. It has become one of the most widely used approaches to providing service recommendation for users in many online webs system such as Fab, amazon, Netflix, Ringo, and Jester. The privilege of CF over existing content-based approaches is that it does not need to know the item’s content or features which are more complex. Typically, the intuition behind collaborative filtering is that if users have similar preferences in the past, they tend to have the same interest in the future. These approaches are classified into user-based CF and item-based CF. Although a lot of work to recommendation system have been done in the past few years the CF still facing some issues and its’ mechanisms still has a room for improvement, thus becoming a rich research area and make the interest in this area still remains high, to deal with growing of information.