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A Survey of an Online Recommender System for Social Networks

Arpita Jain[1], Santosh Vishwakarma[2]

M.Tech Scholar, Dept of Computer Science, Gyan Ganga Institute of Technology & Science, Jabalpur, India[1]

Associate Professor, Dept of Computer Science, Gyan Ganga Institute of Technology & Science, Jabalpur, India[2]

Abstract: The latent growth of internet results the use of social Networks Such as Facebook, Linked In, MySpace or Twitter etc. which produce enormous amount of information .As a result users are faced with the problem of information overload, online Recommender System can be used to address the information overloaded problems by suggesting potentially interesting or useful items to users. Recent studies demonstrate that information from social networks can be dispirited to improve accuracy of recommendation. Online Recommender systems are intelligent tools that help on-line users to cultivated information overloaded. In this paper, we describe overview of online Recommender Systems, different techniques and social factors which influence Online Recommender System.

Keywords: Online Recommender system, Social network, Content based filtering, Collaborative filtering, Hybrid recommender system.

1. INTRODUCTION

Recommender Systems are special type of information filtering system dedicated to generate meaningful suggestions about new items (product and services) for particular users (individuals or businesses).These recommendations will help the users to make decisions in multiple context, such as what music to listen to, what online news to read, or ,in the social network domain, which user to connect to or which users to consider as a trustful adviser. To recommend an item to user a recommender system focuses on the similarity of the user with other users in the system and description of item. An online recommender system is very beneficial for a user who has a lack of knowledge for finding appropriate item on the web.

For example, if one wants to buy a printer, it would be a frustrating experiences for him to read through and compare all online reviews about printers before making the purchase decision. Online Recommender system deal with information overload by automatically suggesting to users item that may fit their interests. Accurate Recommendations enable users to quickly locate desirable items without being overwhelmed by irrelevant information. The information can be acquired explicitly (typically by collecting users' rating) or implicitly (typically by monitoring users' behavior, such as songs heard, applications downloaded, web sites visited and books read).Social information ,like followers, followed, twits and posts, is commonly used in web 2.0.There is a growing tend towards the use of information from Internet of things. In this paper the comprehensive survey of recommendation approaches is provided. The discussion of various approaches and their limitations in a proper manner thereby provides the future research possibilities in online recommendation system.

2. RECOMMENDER SYSTEM TECHNIQUES

There are different types of recommender systems have been introduced. Difference between different types of recommender system is how they predict the best item to the customer. Some recommendation systems are using the properties of items to predict the recommended item where some other recommender systems are using the customer's interaction or past behavior. Over the time recommender systems are getting smarter and smarter.

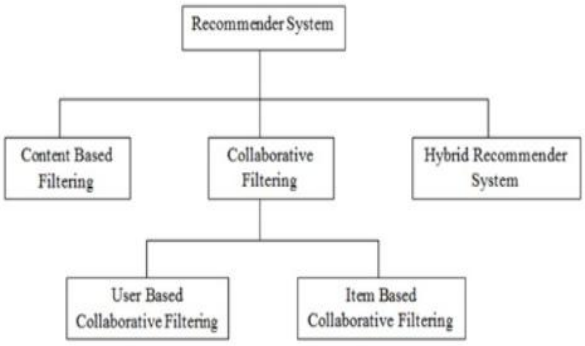

Fig.1 Types of Recommender System

2.1 Content-based recommendation system

Content based recommender system use the user's interests or tastes as input and generate a list of

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recommended items as output. Content based recommendation system is mainly used for recommending text based products such as web pages, news articles, TV programs etc. from which you can find a textual description. All content based recommender systems has few things in common like user profiles, description of items, and techniques to compare profile to item to identify what is the most suitable recommendation for a particular user. In recommendation process attributes of items are compared against the user profile and item that shows maximum similarity or preference with the user profile will be shown on the top of recommended items. The purpose of this comparison is to filter out items that are not relevant to user. Basic architecture of content based recommender system is shown in fig. 2.

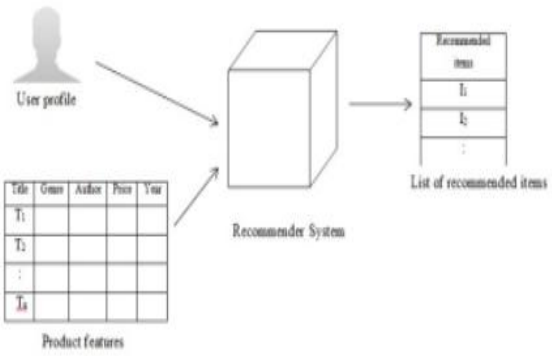

Fig.2 Architecture of content based recommender system

In content based recommendation system, algorithm extracts the textual description from the unstructured web pages, news etc. the extraction of feature is very difficult task because algorithm searches for words or strings in text, if exact word or string matched ,it will pick the word, but it will not figure out synonyms. Semantic analysis and its integration in personalization models used to solve this problem.

2.2 Collaborative Based Recommender System

Collaborative Filtering (CF) based Recommender Systems are most basic techniques of recommending items to the users. Compared with the content-based filtering system, collaborative filtering system could automatically filter the information that the system could not analyze and represent, and recommend up-to-date information. Collaborative filtering methods are based on collecting and analyzing a large amount of information on users' behavior, activity or preferences and predicting what users will like based on their similarity to other users. One of the most common types of Collaborative Filtering is item-to-item collaborative filtering (people who buy x also buy y), an algorithm popularized by Amazon.com recommender system. User-based collaborative filtering attempts to model the social process of asking a friend for a recommendation. A particular type of collaborative filtering algorithms uses matrix factorization, a low-rank matrix approximation technique. The greatest strength of collaborative techniques is that they are completely independent of any machine-readable representation of the objects being recommended, and work well for complex objects such as music and movies where variations in taste are responsible for much of the variation in preferences.

A) User-based approach:

Recommendations are given to user based on evaluation of items by other users form the same group, with whom he/she shares common preferences. If the item was positively rated by the community, it will be recommended to the user. Thus in the user-based approach the items that were already rated by the user before play an important role in searching a group that shares appreciations with him.

B) Item-based approach:

Referring to the fact that the taste of users remains constant or change very slightly similar items build neighborhoods based on appreciations of users. Afterwards the system generates recommendations with items in the neighborhood that a user would prefer.

2.3 Hybrid Recommender System

The Hybrid Recommender Systems are based on the combination of the above mentioned techniques. A hybrid system combining techniques A and B tries to use the advantages of A to fix the disadvantages of B. For instance, Collaborative Filtering methods suffer from new-item problems, i.e., they cannot recommend items that have no ratings. This does not limit content-based approaches since the prediction for new items is based on their description (features) that are typically easily available. Given two (or more) basic RSs techniques, several ways have been proposed for combining them to create a new hybrid system.

2.4 Knowledge –Based Recommender System

Knowledge-based systems recommend items based on specific domain knowledge about how certain item features meet users' needs and preferences and, ultimately, how the item is useful for the user. Notable knowledge based recommender systems are case-based.

In Knowledge-Based Recommender systems a similarity function estimates how much the user requirements match the recommendations. In such systems, the similarity score can be directly used as the utility of the recommendation for the user. Knowledge-based systems tend to work better than others at the beginning of their deployment but if they are not equipped with learning components they may be surpassed by other shallow methods that can exploit the logs of the human/computer interaction.

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3. CHALLENGES AND ISSUES TO ONLINE RECOMMENDER SYSTEM

A) Cold-start: It's difficult to give recommendations to new users as his profile is almost empty and he hasn't rated any items yet so his taste is unknown to the system. This is called the cold start problem. In some recommender systems this problem is solved with survey when creating a profile. Items can also have a cold-start when they are new in the system and haven't been rated before. Both of these problems can be also solved with hybrid approaches.

B) Trust: The voices of people with a short history may not be that relevant as the voices of those who have rich history in their profiles. The issue of trust arises towards evaluations of a certain customer. The problem could be solved by distribution of priorities to the users.

C) Scalability: With the growth of numbers of users and items, the system needs more resources for processing information and forming recommendations. Majority of resources is consumed with the purpose of determining users with similar tastes, and goods with similar descriptions. This problem is also solved by the combination of various types of filters and physical improvement of systems. Parts of numerous computations may also be implemented offline in order to accelerate issuance of recommendations online.

D) Sparsity: In online shops that have a huge amount of users and items there are almost always users that have rated just a few items. Using collaborative and other approaches recommender systems generally create neighborhoods of users using their profiles. If a user has evaluated just few items then its pretty difficult to determine his taste and he/she could be related to the wrong neighborhood. Sparsity is the problem of lack of information.

E) Privacy: Privacy has been the most important problem. In order to receive the most accurate and correct recommendation, the system must acquire the most amount of information possible about the user, including demographic data, and data about the location of a particular user. Naturally, the question of reliability, security and confidentiality of the given information arises. Many online shops offer effective protection of privacy of the users by utilizing specialized algorithms and programs.

4. SOCIAL NETWORK ANALYSIS IN RECOMMENDER SYSTEM

Social network analysis has been used in recommender systems as a result of the dramatic growth of social networking tools in Web -based systems in recent years. To help improve user experience, recommender systems increasingly provide users with the ability to engage in social interaction with other users, such as online friending, making social comments, social tags etc.

Nowadays, the wide use of Internet around the world allows a lot of people to connect. This explosion of the Web 2.0 (blogs, wikis, content sharing sites, social networks, etc.) gives rise to a growing need for Online Recommender Systems based on social and information network mining methods. Finding relevant and interesting content at the right time and in the right context is challenging for existing recommender approaches. Actually , the social platforms is to encourage interaction between users. Each interaction can be extracted and used as an input for the RS, as it helps to better understand the user interests and information needs. Also, the structure of the underlying social network in a social platform can contribute to generate recommendations that are more trusted by users (e.g., by considering the social distance in the recommendation process, as generally we trust more recommendations from closer connections). Therefore, we can conclude that the social web provides a huge opportunity for improving RSs (Fig. 3).

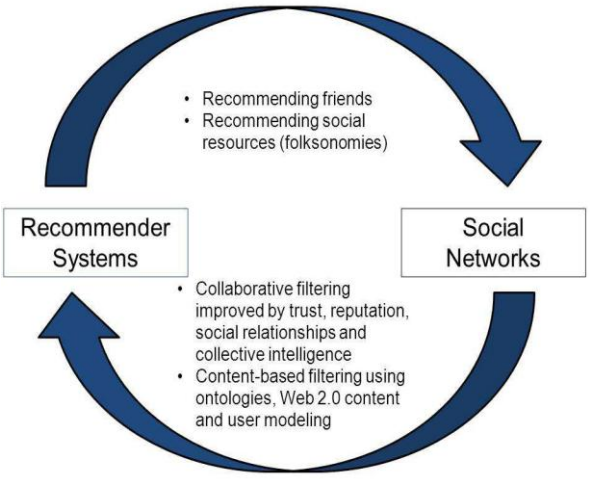

Fig.3 Recommender systems to social networks

The field of social network analysis is a complex and rapidly changing area. To understand the mutual contributions of social networks in recommender systems (and vice versa), it is necessary to clarify the basic principles of these systems. The efficiency of an RS is measured in terms of relevance of the recommendations and forecast accuracy, in particular seeking to narrow the difference between the predicted ratings made by the system and the real ratings made by the users. Moreover, the system has to be a good filtering system and not present to users uninteresting items, while not missing interesting items (e.g., in the case of commercial RS, for

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increasing the number of items sold). It is important to propose to the users items that might be hard to find without a precise recommendation. Many systems suffers from novelty discovery, i.e. they fail to find serendipitous items. All these properties will increase the user satisfaction and the fidelity to the use of the system.

5. CONCLUSION

In this paper, we first gave a short overview of the online recommender systems. We then presented different techniques that are used to construct online recommender system. The challenges and issues of these techniques have been highlighted. We then presented how social network information can be adopted by recommender systems as additional input for improved accuracy. The increasing popularity of online social networks, new recommendation algorithms will be needed to mine .It is required to explorer and provides new methods that can reduce the challenges and provide recommendation in a wide range of application in social network.

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