COLLABORATIVE RECOMMENDER SYSTEMS WITH USER PREFERENCE MINING APPROACHES

ABSTRACT

The unexpected expansion of WWW and online environments has made information search and selection an unavoidable concern. Information access has reached the level at which the amount of information available is enormous and so people find it difficult to sift through. Recommender system provides a rational way of managing information explosion and it has been established as a meaningful strategy for online users to take decisions.

Recommender system has the primary goal of providing reasonable, personal and efficient recommendations. It employs the opinions of a community of users to help individuals in that community more effectively to identify the content of interest from the catalogue of items. It has prevalent applications in both industry and academia. Therefore the attention given to recommender systems has been constantly increasing from its launch.

Recommender system has become an essential business tool to re-shape the world of electronic commerce. Many online business systems such as Amazon.com™ (www.amazon.com), CDNOW™ (www.cdnow.com), eBay.com™ (www.ebay.com), Levi Straus™ (www.levis.com), Match Maker (www.moviefinder.com) and Netflix (www.netflix.com) are using recommender systems to provide personalized suggestions.

Recommendation algorithms can be classified based on the information they use for making predictions as content based algorithms, collaborative filtering

algorithms and combination of both the approaches called hybrid techniques. Content based methods make recommendations based on comparison of user profile and content of items to be suggested. An alternative to content based approaches is collaborative filtering which relies only on past user behaviour in the form of previous transactions or product ratings. The task of a CF based recommender system is to predict how much a user likes an item which is currently unrated.

Recommendation algorithms often operate in a challenging environment, especially for large online shopping companies. Recommender systems which provide accurate, interesting, novel, non-monotonic and fast recommendations will improve user's satisfaction and bring benefits to companies. The success of any collaborative filtering based recommender systems lies predominantly on user contributed data. A large-scale involvement of user-contribution has brought advantages of recommendation efficiency, accuracy, and personalization. As this feature has enabled many interesting applications in social networking services, it becomes mandatory to understand user's intention and behavior from his preferences.

User's preferences available in the form of ratings would reflect intrinsic behaviour of the user. Thus it is crucial for any user adaptive system to understand the behaviour of a user from his profile or preferences. Therefore the proposed work tries to analyze user behaviour from his preferences to check whether he has rendered reliable ratings, consistent ratings, aware of popular items of the domain, has novel/innovative thinking and has preferred diversified list of items etc.

The relevance of a collaborative filtering system depends on how it addresses issues like data sparsity, noise, attacks, grey sheep, serendipity, novelty and diversity etc. Three issues namely natural noise, accuracy diversity trade-off and data sparsity are addressed in this work.

Noise is a general term which refers to an unreliable user or unreliable rating provided by any user. Two kinds of noise may result from user preferences, namely natural noise and malicious noise. Malicious noise is created in the system by an

intruder with a motive of gaining an objective, but natural noise is created due to user's un-interest in giving preferences. Quality of recommendations is affected by the presence of both the kinds of noise.

From user's perspective, they would not be interested when they are facing monotonous recommendations even if they are accurate. Novelty and Diversity have been identified as key dimensions of recommendation utility. Novel and diverse recommendations enrich the user experience over time and expand user's horizon. It has been made clear that greater accuracy leads to lower diversity which results in accuracy diversity trade off in personalized recommender system.

Data Sparsity is one of the major issues of recommender systems. In real situations, many commercial recommender systems handle very large product sets. Any user of the dataset cannot give preferences for many products and so the user-item rating matrix will be extremely sparse. Prediction algorithms are based on similarity between item vectors or user profiles. However similarity computations become less efficient if the system does not contain enough ratings. The system may not be able to provide correct predictions when it runs on sparse data sets.