Egyptian Informatics Journal (2015) **16**, 261–273

Cairo University

Egyptian Informatics Journal

www.elsevier.com/locate/eij
www.sciencedirect.com

REVIEW

Recommendation systems: Principles, methods and evaluation

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Received 13 March 2015; revised 8 June 2015; accepted 30 June 2015
Available online 20 August 2015

KEYWORDS

Collaborative filtering;
Content-based filtering;
Hybrid filtering technique;
Recommendation systems;
Evaluation

Abstract On the Internet, where the number of choices is overwhelming, there is need to filter, prioritize and efficiently deliver relevant information in order to alleviate the problem of information overload, which has created a potential problem to many Internet users. Recommender systems solve this problem by searching through large volume of dynamically generated information to provide users with personalized content and services. This paper explores the different characteristics and potentials of different prediction techniques in recommendation systems in order to serve as a compass for research and practice in the field of recommendation systems.

Contents

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Peer review under responsibility of Faculty of Computers and Information, Cairo University.

ELSEVIER Production and hosting by Elsevier

http://dx.doi.org/10.1016/j.eij.2015.06.005

1. Introduction

The explosive growth in the amount of available digital information and the number of visitors to the Internet have created a potential challenge of information overload which hinders timely access to items of interest on the Internet. Information retrieval systems, such as Google, DevilFinder and Altavista have partially solved this problem but prioritization and personalization (where a system maps available content to user's interests and preferences) of information were absent. This has increased the demand for recommender systems more than ever before. Recommender systems are information filtering systems that deal with the problem of information overload [1] by filtering vital information fragment out of large amount of dynamically generated information according to user's preferences, interest, or observed behavior about item [2]. Recommender system has the ability to predict whether a particular user would prefer an item or not based on the user's profile.

Recommender systems are beneficial to both service providers and users [3]. They reduce transaction costs of finding and selecting items in an online shopping environment [4]. Recommendation systems have also proved to improve decision making process and quality [5]. In e-commerce setting, recommender systems enhance revenues, for the fact that they are effective means of selling more products [3]. In scientific libraries, recommender systems support users by allowing them to move beyond catalog searches. Therefore, the need to use efficient and accurate recommendation techniques within a system that will provide relevant and dependable recommendations for users cannot be over-emphasized.

2. Related work

Recommender system is defined as a decision making strategy for users under complex information environments [6]. Also, recommender system was defined from the perspective of E-commerce as a tool that helps users search through records of knowledge which is related to users' interest and preference [7]. Recommender system was defined as a means of assisting and augmenting the social process of using recommendations of others to make choices when there is no sufficient personal knowledge or experience of the alternatives [8]. Recommender systems handle the problem of information overload that users normally encounter by providing them with personalized, exclusive content and service recommendations. Recently, various approaches for building recommendation systems have been developed, which can utilize either collaborative filtering, content-based filtering or hybrid filtering [9–11]. Collaborative filtering technique is the most mature and the most commonly implemented. Collaborative filtering recommends items by identifying other users with similar taste; it uses their opinion to recommend items to the active user. Collaborative recommender systems have been implemented in different application areas. GroupLens is a news-based architecture which employed collaborative methods in assisting users to locate articles from massive news database [12]. Ringo is an online social information filtering system that uses collaborative filtering to build users profile based on their ratings on music albums [10]. Amazon uses topic diversification algorithms to improve its recommendation [13]. The system uses collaborative filtering method to overcome scalability issue by generating a table of similar items offline through the use of item-to-item matrix. The system then recommends other products which are similar online according to the users' purchase history. On the other hand, content-based techniques match content resources to user characteristics. Content-based filtering techniques normally base their predictions on user's information, and they ignore contributions from other users as with the case of collaborative techniques [14,15]. Fab relies heavily on the ratings of different users in order to create a training set and it is an example of content-based recommender system. Some