

An Overview of Data Mining Techniques in Recommender Systems

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Abstract

Nowadays, recommender systems support the online customers in their decision making and buying process. Whereas, the information in the web is increasing through continuous growing of the number of websites, recommender systems have to recommend the items with maximal matching to the users' preference. Recommender systems are an active research topic in the data mining and machine learning fields. Data mining techniques have played an important role in the design and implementation of recommender systems. In this paper, an overview of the main data mining techniques used in the design and implementation of recommender systems is given. The relevant papers which have used the data mining techniques in the context of recommender systems are reviewed. We hope that this research helps researchers who are interested in developing recommender systems with an insight into its state-of-the-art methods.

Keywords: Recommender systems, Data mining techniques, Classification methods, Clustering methods, Prediction methods

1. Introduction

During the last decade the amount of information available online increased exponentially and information overload problem has become one of the major challenges faced by information retrieval and information filtering systems. The solutions to overload information problems can be found in the field of information retrieval and information filtering, where search engines like Google and various text-retrieval applications have been developed to deal with the problem. Recommender systems are one of the solutions to the information overload problem (Nilashi et al., 2014a, Nilashi et al., 2014b). They address the problem of filtering information that is likely of interest to individual users. In addition, providing recommendations to users by reflecting their personal taste and convincing the users to trust and explore the given recommendations are the main objectives of a recommender. Successful application have been used on the Internet by electronic commerce (e-commerce) Websites like Amazon.com, that offer millions of products to its customers, and by communities in the entertainment domain like MovieLens, a research project that runs a Website where people can become members and receive recommendations for movies.

Recommender systems have become an important and interesting research area since the coming out of the first research paper on Collaborative Filtering (CF) in the mid-

1990s (Resnick et al., 1994; Shardanand and Maes, 1995). Several studies show that using a recommender system can lead to increased sales volumes in the short and long term or help to increase sales diversity by directing customers to other parts of the available product catalog (Senecal and Nantel, 2004; Zanker et al., 2006; Fleder and Hosanagar, 2007; Dias et al., 2008; Vahid et al., 2016). Although recently many different approaches and techniques to recommender systems have been developed, the interest in this area still remains high. This is because of growing demand for their practical applications, which are capable of dealing with information overload and to generate personalized recommendation to the users.

1.1. Classification of Recommender Systems

Recommendation systems predict items for users tailored to their preferences based on user-item interaction using either implicit or explicit information (Adomavicius and Tuzhilin, 2005). For an unseen item, reducing the time required to predict what rating a user would give is one of the main goals of the recommendation task. In addition, this can be to find a list of items that the user is most likely to enjoy. Explicit information is specific information provided by the user such as ratings or ranking. One of the most successful algorithms with this type of information in recommending items is CF (Nilashi et al., 2013; Bagherifard et al., 2013; Farokhi et al., 2016) which has