Evaluating Prediction Accuracy, Developmental Challenges, and Issues of Recommender Systems

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ABSTRACT

Modern ways of living have made the people to depend on internet services for everything. The mounting information from various sources like social media, implicit and explicit information, user’s geographical location, and the internet of things had increased the need of a recommender system. From e-governance to e-shopping, a recommender system helps people in finding the needed item or information and also boosts sales in the market of those items. Though many studies elaborate about recommendation systems, challenges in developing the recommendation systems, prevailing issues of recommendation systems and discussions on prediction accuracy are not detailed in any of the earlier works. Therefore, in this article, in order to increase the accuracy of the recommender system, the developmental challenges and issues in constructing recommender systems and for evaluation metrics in prediction accuracy are identified and detailed.

KEYWORDS


1. INTRODUCTION

The evolution of internet era with the advancements in semantic web has garnered an enormous amount of information. Social networking, e-shopping and searching the internet for various queries became as a part of every individuals life. Whenever people are actively involved in a semantic web, they are leaving a large trace of information in the web. The information trace left by the web users and day by day addition of new information to cater the needs of web users has sparked researches to research on recommender systems. A recommender system is an intelligent information filtering mechanism that predicts user interested information by computing the history of available information about the user. Normally information about the user can be classified into explicit information like user behaviour patterns and implicit information like reviews and ratings given to the item by user. This kind of information’s are computed using recommendation algorithms to render recommendations. Currently, a wide range of information from user social networking circles, internet of things and

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demographical information are used in recommending user preferred information (Bobadilla, Ortega, Hernando, & Gutierrez, Recommender systems survey, 2013).

Growing pile of information and need for giving the right information to the right people has increased the use of recommendation system among various web-based application. (Papadimitriou, Symeonidis, & Manolopoulos, 2012). In today’s world, recommender systems are used widely in many fields like television, games, mobile application, movie recommendation, tourism, e-commerce, e-learning, music, books, documents, web searches and web-based application are some among them. The necessity to ascertain the information overload problem and to enhance the user experience various domain specific recommendation algorithms are developed in the recent years. Currently, one can find recommendation system in every web application ranging from small web application to huge e-commerce applications.

The increasing demand in developing new recommendation algorithm, challenges in implementing the recommender system and to study the recommender system accuracy evaluating methodologies motivated us to write this paper. This paper is constructed as follows: sections 2 and 3 details about the literature review on recommendation system and various methodologies. Section 4 elaborates about the evaluating top-n recommender systems prediction accuracy, section 5 details the developmental challenges in developing recommender systems, section 6 discusses about the prevailing issues and sections 7 and 8 give the summaries about the future scope and concludes the paper with the references.

2. LITERATURE REVIEW

The advancement of web made people to comprehend that finding or even distinguishing the items among the huge number of item isn’t a simple errand. In this way, different techniques are started to assist the human in finding the item that they are searching for. This scenario leads to the development of syntactic search engine. This search engine filtered user needed webpage from numerous webpages. This strategy for seeking requested webpage yielded numerous numbers of website pages in which some are applicable and some unessential to the user query. Following this strategy tapestry the first framework with the substance of recommender strategy is invented by Xerox Palo Alto Research Centre in the year 1992 (Goldberg, Nichols, Oki, & Terry, 1992). In this system, the contents of the mail and its metadata information about author and notations are stored. Tapestry was able to query the textual information, metadata and even notation queries and this methodology of filtering information later known as pull-active collaborative filtering (Konstan & Riedl, 2003).

After the establishment of Tapestry, researches started working on the available pile of information within a group or organisations. Pointing the way – an active collaborative (Maltz & Ehrlich, 1995) filtering technique came into existence in the year 1995. In this system, user will push the item to the other user who may have an interest in it. This kind of methodologies was helpful in distributing and filtering the information. Researchers felt that the accuracy of the system will increase to a greater extent if the available semantic information’s are effectively used. Active collaborative filtering algorithm and pull-active collaboration filtering algorithm needs the user input to start the process. To avoid this methodology and to enhance the efficiency of information filtering, automation is needed. At this time, automated collaborative filtering algorithm came into existence. The need for filtering algorithm which is not dependent on syntactic approaches and that does not emphasis totally on any meaning, or word paved the way to invent automated collaborative filtering approach. Automated collaborative filtering algorithm garners information made by the user and process statistically to find the nature of relationship between users in making a recommendation this creates the way to find the similar user information without revealing the user identity.

Three systems that used automotive collaborative filtering algorithm in generating recommendations are Video Recommender (Hill, Stead, Rosenstein, & Furnas, 1995), GroupLens (Resnick, Iacovou, Suchak, Bergstrom, & Riedl, 1994) and Ringo (Shardanan & Maes, 1995). The word recommender system to the information filtering process was first coined at a workshop in
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