Cross Domain Framework for Implementing Recommendation Systems Based on Context Based Implicit Negative Feedback

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ABSTRACT

The last decade met a remarkable proliferation of P2P networks, PDMS, semantic web, communitarian websites, electronic stores, etc. resulting in an overload of available information. One of the solutions to this information overload problem is using efficient tools such as the recommender system which is a personalization system that helps users to find items of interest based on their preferences. Several such recommendation engines do exist under different domains. However, these recommendation systems are not very effective due to several issues like lack of data, changing data, changing user preferences, and unpredictable items. This paper proposes a novel model of Recommendation systems in e-commerce domain which will address issues of cold start problem and change in user preference problem. This model is based on studying implicit negative feedback from users in cross domain collaborative environment to identify user preferences effectively. The authors have also identified a list of parameters for this study.

Keywords: Change in User Preference Problem, Cold Start Problem, Cross Domain Environment, Implicit Negative Feedback, Recommendation Systems

INTRODUCTION

With the proliferation of an electric commerce and knowledge economy environment both organizations and individuals generate and consume a large amount of online information typically available as textual documents and web pages. The last decade met a remarkable proliferation of P2P networks, PDMS, semantic web, communitarian websites, electronic stores, etc. resulting in an overload of available information. Current information systems deal with a huge amount of content, and deliver in consequence a high number of results in response to user queries. Thus, users are not able to distinguish relevant contents from secondary

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ones. Information retrieval systems can be used to search for relevant items. However, typical IR systems return the same results for all users, since they are not aware of users' preferences. One of the solutions is to create recommendation systems. A recommender system is a personalization system that helps users to find items of interest based on their preferences. Recommender systems are efficient tools that overcome the information overload problem by providing users with the most relevant contents (Breese et al., 1998). The users can get recommendations on movies, songs, consumer items, travel packages, hotel packages, images, restaurants, jokes and many others. A recruiter can get personalized information about the job seekers according to his requirements and preferences. A scientist studying Mars planet can get only those images which are of his interest and preferences. While a substantial amount of research in recommendation systems focus on recommending the most relevant item to the user, a very few focus on additional contextual information such as time, location, weather, companion etc. The importance of contextual information has been recognized by researchers and practitioners in many disciplines including E-commerce, personalized IR, ubiquitous and mobile computing, data mining, marketing and management. In addition to incorporating contextual information many times recommendation systems are also faced with issues like lack of data, changing data, changing user preferences and unpredictable items. Our work is focused on these issues and we propose a novel approach to provide best possible solutions to these issues.

**Recommendation Systems**

The advances in information and entertainment technologies have accelerated the availability of various alternative items in each and every domain, e.g., availability of hundreds of movies, television and music channels, books, restaurants, etc. In addition to this, the emergence of World Wide Web has opened up new possibilities for the users/customers to know the details/specifications of items seamlessly without visiting shops or outlets. It is an easy task for an individual to choose from limited number of available alternatives. When the collection becomes large, it is a tedious and time consuming task for any individual to really evaluate the features of items/products while purchasing quality, economic, and useful items. In such circumstances, people seek suggestions or recommendation from friends, relatives and experts who have knowledge about the items/products. The main purpose of the recommender systems is to provide tools to leverage the information hunting and gathering activities and interests of other people or groups of people. Recommender systems are generally defined as systems that assist users in selecting items of their interest or need from a big set of items, helping users to overcome the overwhelming feeling when facing a vast information source, such as the web, an organizational repository or the like (Burke, 2002; Montaner et al., 2003; Van Setten, 2005). Recommendation systems have been an important application area and the focus of considerable recent academic and commercial interest. Generally, recommender systems are used online to suggest items that customers find interesting, thereby, benefiting both the customer and merchant. They benefit the customer by making him suggestions on items that he is likely to purchase and the business by increase of sales. Types of recommendations: - personalized recommendation based on prior behavior of the user, social recommendation based on prior behavior of the similar users, item recommendation based on the item itself and a combination of all the three.

**Importance of Context in Recommendation System**

Recommender Systems are powerful tools helping on-line users to tame information overload by providing personalized recommendation on various types of products and services. Recommendation is computed by exploiting historical data of the users’ online behavior (Adomavicius et al., 2005), assuming that the
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