Chapter XVI
Hybrid Recommendation Systems:  
A Case Study on the Movies Domain

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ABSTRACT

Recommendation systems have been used in e-commerce sites to make product recommendations and to provide customers with information that helps them decide which products to buy. They are based on different methods and techniques for suggesting products with the most well known being collaborative and content-based filtering. Recently, several recommendation systems adopted hybrid approaches by combining collaborative and content-based features as well as other techniques in order to avoid their limitations. In this chapter we investigate hybrid recommendations systems and especially the way they support movie e-shops in their attempt to suggest movies to customers. Specifically, we introduce an approach where the knowledge about customers and movies is extracted from usage mining and ontological data in conjunction with customer movie ratings and matching techniques between customers. This integration provides additional knowledge about customers’ preferences and allows the production of successful recommendations. Even in the case of the cold-start problem where no initial behavioral information is available, the approach can provide logical and relevant recommendations to the customers. The provided recommendations are expected to have higher accuracy in matching customers’ preferences and thus higher acceptance by them. Finally, we describe future trends and challenges, and discuss the open issues in the field.
INTRODUCTION

With the evolution of the Web, the overall business environment has undergone significant changes. The ability of companies to transact business with partners and customers anywhere in the world has become not only a reality but also a necessity. In this context, it is becoming evident that the next evolution in business is a global Web economy. However, this networked economy is notably characterized by the impersonal nature of the online environment and the extensive use of information technology (IT), as opposed to face-to-face contact for transactions.

Since Internet technologies and infrastructures to support electronic commerce (e-commerce) are now in place, attention is paid to psychological factors that affect its acceptance by online consumers and their perceptions of online transactions. One such factor is individuality of e-customers, seen to be an important key to the proliferation of e-commerce. The question is how easily Internet users become e-customers and which are the internal “mechanisms” and external factors that participate in an e-purchase. The primary problem arises from the fact that shoppers with varying needs, preferences, and backgrounds navigate through extensive and complex Web structures and are overwhelmed by too many options and too much information that they have to deal with, the majority of which is often irrelevant to their needs and interests. Generally, search engines are used for filtering pages according to explicit users’ queries. However, their results are often poor since the produced lists are long, unmanageable, and contain irrelevant pages (Middleton, De Roure, & Shadbolt, 2004).

Many e-shops consider analyzing customers’ behavior, developing marketing strategies to create new consuming markets, and discovering hidden loyal customers as the key factors of success. Therefore, new techniques to promote electronic business become essential, and Web personalization is one of the most popular techniques. According to Eirinaki and Vazirgiannis (2003):

*Personalization is defined as any action that adapts the information or services provided by a Web site to the knowledge gained from the users’ navigational behavior and individual interests, in combination with the content and the structure of the site.*

In this direction, the recent Web technological advances help online companies to acquire an individual customer’s information in real-time and at low cost. Based on this information, they construct detailed profiles and provide personalized e-services. Thus, e-shops have now the opportunity to improve their performance by addressing the individual’s needs and preferences, increasing satisfaction, promoting loyalty, and establishing one-to-one relationships. Personalization is expected to be one of the means for driving e-commerce and e-business forward.

*Recommendation or recommender systems (RSs)* (Adomavicius & Tuzhilin, 2005) that comprise popular forms of personalization are becoming significant business tools. They emerged in the middle of 1990s and from novelties used by a few Web sites have changed to important tools incorporated into many e-commerce applications (e.g., Amazon.com, eBay.com, CDNow.com, etc.) in order to help customers find products to purchase. Specifically, these systems take advantage of users’ and/or communities’ opinions in order to support individuals to identify the information or products most likely to be interesting to them or relevant to their needs and preferences. For example, an RS can remember the articles that a user has read. The next time he visits the site, the system can recommend new articles to him based on the ones he has read before.

The recommendations may be implemented in many forms (Brusilovsky, 2001):
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