Chapter III

Customizing Digital Storefronts Using the Knowledge-Based Approach

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ABSTRACT

The concept of personalization has long been advocated to be one of the edges to improve the stickiness of on-line stores. By enabling an on-line store with adequate knowledge about the preference characteristics of different customers, it is possible to provide customized services to further raise the customer satisfaction level. In this paper, we describe in detail how to implement a knowledge-based recommender system for supporting such an adaptive store. Our proposed conceptual framework is characterized by a user profiling and product characterization module, a matching engine, an intelligent gift finder, and a backend subsystem for content management. A prototype of an on-line furnishing company has been built for idea illustration. Limitations and future extensions of the proposed system are also discussed.
INTRODUCTION

The development of Web technologies has brought a lot of advantages to merchants for moving their business on-line. Within the past few years, a large variety of on-line stores have been started in the cyberspace. However, the survival rate is just around 50%, where some recognized dot-coms like Boo.com, Kozmo.com, and MVP.com are included (Helft, 2001). We believe that one important factor determining the success of on-line stores is whether the on-line shopping experience can be enhanced to such an extent that some customers choose to and continue to shop on-line. Along this direction, the concept of personalization has long been advocated as one of the edges to improve the stickiness of on-line stores. A survey, recently conducted by Cyber Dialogue, reveals that customers are more likely to purchase from a site that allows personalization, and register at a site that allows personalization or content customization (Rosenbaum, 2001). To achieve that, an on-line store needs to be enabled with adequate knowledge about customers’ preference characteristics and use it effectively to provide personalized services with high precision. A typical example of personalized services is the use of recommender systems.

Recommender systems have been adopted by many big Web retailers, such as Amazon.com and CDNow.com for enhancing the on-line shopping experience of their on-line customers. Typically, they use an intelligent engine to collect and mine the customer’s rating records and then create predictive user models for product recommendation. Software products of recommender systems are now available from various companies like NetPerception, Andromedia, and Manna, etc. Based on the underlying technology, recommender systems can be broadly categorized as:

- **Knowledge-based** (Towle & Quinn, 2000) where user models are created explicitly via a knowledge acquisition process (e.g., expert knowledge tells you that young customers consider product appearance more than durability).
- **Content-based** (Mooney & Roy, 1999) where user models are created implicitly by applying machine learning or information retrieval techniques to analyze user preference ratings and corresponding product features (e.g., the products that a customer rated high so far have the common attributes of being less colorful, easy to clean, and safe).
- **Collaborative** (Resnick et al., 1994) where user models are created solely by utilizing overlap of user preference ratings (e.g., customers with their “tastes” (ratings patterns) similar to yours like this set of products).

In the literature, there exist a lot of works on content-based and collaborative recommender systems. One of their common characteristics is that a substantial
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