Chapter V
An Associative Classification–Based Recommendation System for Personalization in B2C E–Commerce Applications

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ABSTRACT
This chapter presents an associative classification–based recommendation system to support online customer decision-making when facing a huge amount of choices. Recommendation systems have been recently introduced to e-commerce sites in order to solve the information overload and mass confusion problem. This chapter applies knowledge discovery techniques to overcome the drawback of conventional approaches to recommendation systems. The framework of the associative classification-based recommendation system has been addressed in this chapter. The system analysis, design, and implementation issues in an Internet programming environment are also presented. Taking the advantage of accumulative knowledge from historical data, the efficiency and effectiveness of B2C e-commerce applications are improved.

INTRODUCTION
With the advent of customer-driven marketing, it has been envisioned that e-commerce will emerge as a primary style of manufacturing in the coming decade and beyond. The capabilities of e-commerce enable the customer's involvement in design, manufacturing, and service, thus to make it possible for product/service providers to interact directly with their custom-
An Associative Classification-Based Recommendation System for Personalization

ers and capture the customer requirements. A number of online product customization systems have been launched recently (for example, Dell.com, Idtown.com, and Cannondale.com). These systems support providers to respond to a high variety of requirements and orders by customizing the offerings and anticipating the customer requirements.

However, the online customization systems encounter the difficulties when dealing with the support for customers’ finding the valuable products that match their heterogeneous needs, namely, the personalization problem. It is not uncommon that searching for information or buying complex products (e.g., digital products) via the Internet are always frustrated (Francisco, Rafael, & Rodrigo, 2005). As in the World Wide Web, the available products and the corresponding electronic information lead to the problem of information overload. Online customers have to access all the information contents in order to find what they mostly prefer. Without the face-to-face advice, customers always have difficulties in making trade-offs among numerous competing products on the Internet. For example, as in real purchase decisions, buyers cannot get all the best features at the lowest prices. In some cases, for specific products, especially for digital products, professional knowledge is always required for evaluation. It is difficult for non-experts to compare products’ performances. For example, online customers may be frustrated by the information of digital camera products because they do not know how each feature or its parameters can influence the picture quality.

Recommendation systems are traditionally used in e-commerce sites to solve the personalization problem by guiding customers to find the products they would like to purchase (Yong, Yum, Song, & Su, 2005). A number of recommendation systems have been proposed for different businesses (for example, Group-Lens recommendation system and Ringo). Most of them are either homogeneous (i.e., content-based filtering) or heterogeneous (i.e., collaborative filtering) product recommendation systems (Yuan & Cheng, 2004). However, both of the two paradigms yielded few promising results. The content-based filtering (CBF) approach recommends products to target customers according to the preferences of their neighbors (Hill, Stead, Rosenstein, & Furnas, 1995). However, it is often inhibitive to estimate the preference similarities between various customers. For example, similar preferences may be defined as the preferences of customers who have similar ratings of items (Yoon & Jae, 2004). It is difficult to obtain the accurate customer ratings of products, especially when special knowledge is needed for rating. The collaborative filtering (CF) approach, on the other hand, recommends products to target customers based on their past preferences (Basu, Hirsh, & Cohen, 1998). When facing new customers, this type of recommendation system cannot recommend any product as no historical preference records are available (Avery & Zeckhauser, 1997). Nevertheless, both approaches require the customers to express their requirements according to system predefined formats (e.g., product ratings or customer profiles), and thus real customer requirement information may be distorted.

Due to the drawbacks of traditional approaches, a new paradigm is preferred to advise proper products by capturing accurate individual requirement information (Cheung, Lee, Wang, Chu, & To, 2003). As individual customer requirements are heterogeneous, an open environment is required to allow customers to express their diverse requirements completely to their manner. On the other hand, to avoid the difficulties involved in preference estimation, it is preferred to establish such models that allow the prediction of product labels according to customer requirements directly. As a result, the main difficulties involved in establishing recommendation systems for personalization in B2C e-commerce applications can be summarized as two categories. First, customers always use their