

Chapter 8.18

Towards a Design Process for Integrating Product Recommendation Services in E-Markets

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ABSTRACT

Online recommendation services (widely known as recommender systems) can support potential buyers by providing product recommendations that match their preferences. When integrated into e-markets, recommendation services may offer important added value. They can help online buyers to save time and make informed purchase decisions, as well as e-market operators to respond to buyer product queries in a more efficient manner, thus attracting more potential buyers. On the other hand, the variety of intelligent recommendation techniques that may be used to support such services can often prove complex and costly to implement. Toward this direction, this chapter proposes a design process for deploying

intelligent recommendation services in existing e-markets, in order to reduce the complexity of such kinds of software development. To demonstrate the applicability of this approach, the proposed process is applied for the integration of a wine recommendation service in a Greek e-market with agricultural products.

INTRODUCTION

The rapid adoption of e-commerce practices and technologies has led to the development of numerous e-markets that offer a wide variety of products and services to the online buyers. From the buyers' perspective, this can lead to an often overwhelming amount of product information

related to the purchase process. To facilitate searching, comparing, and selecting products in the context of e-markets, different types of integrated services or systems have been proposed. A particular class of such systems are the recommender systems, which facilitate the decision-making process of online buyers by providing recommendations about products matching their preferences (Schafer, Konstan, & Riedl, 2001). Recommender systems were originally defined as using the opinions of a community of users, to help individuals in that community to identify more effectively the content of interest from a potentially overwhelming set of choices (Resnick & Varian, 1997). Nowadays, the term has acquired a broader connotation, describing any system that produces individualized recommendations as output, or has the effect of guiding the user in a personalized way to interesting or useful items, in a large space of possible options (Burke, 2002).

Recommender systems use different types of techniques in order to provide personalised recommendations. According to Burke (2002), these techniques can be categorised as a content-based recommendation, collaborative recommendation, demographic recommendation, utility-based recommendation, as well as knowledge-based recommendation. Most of these techniques engage artificial intelligence (AI) methods in order to recommend products that best match each individual user's needs. For instance, recommender systems have previously engaged techniques, such as:

- decision tree induction and association rules mining, in order to identify users with similar interests and to extract rules that reflect their buying behavior (Changchien & Lu, 2001; Kim, Lee, Shaw, Chang, & Nelson, 2001; Cho, Kim, & Kim, 2002; Wang, Chuang, Hsu, & Keh, 2004);
- statistical methods, such as the calculation of user-to-user and item-to-item ratings' correlation, in order to create neighbourhoods

of like-minded users (Herlocker, Konstan, & Riedl, 2002; Deshpande & Karypis, 2004; Miller, Konstan, & Riedl, 2004);

- classification methods, such as clustering algorithms and neural networks, to categorise users with similar preferences (Lee, Jun, Lee, & Kim, 2005; Martin-Guerrero et al., 2006; Lihua, Lu, Jing, & Zongyong, 2005); and
- taxonomy- and ontology-based approaches for representing user preferences and product spaces (Middleton, Shadbolt, & Roure, 2004; Hung, 2005).

This has led to a rich variety of AI-based approaches, which can be integrated in recommender systems.

On the other hand, surveys of online e-commerce systems (e.g., Holzmueller & Schluechter, 2002) reveal that most of the existing commercial e-market applications do not include a product recommendation service (i.e., a recommender system for products), or do not engage some intelligent technique to produce their product recommendations. This observation can be partially explained if we consider the inherent complexity of designing intelligent recommendation services, as well as the deployment and evaluation costs of such services. For instance, in the e-commerce domain there are several proposals of product recommendation algorithms (such as the ones proposed by Kim, Cho, Kim, Kim, & Suh, 2002; Cheung, Kwok, Law, & Tsui, 2003; Kim, Yum, Song, & Kim, 2005; Li, Lu, & Xuefeng, 2005) or stand-alone product recommendation systems (such as the approaches of Yen & Kong, 2002; Lee, 2004; Hung, 2005). Nevertheless, these are developed on a case-by-case basis, and include no guidelines related to how an intelligent product recommendation service can be designed, tested, and integrated into an existing e-market. Very few studies in the recommendation literature have addressed such issues (Stolze, 2002; Richard & Tchounikine, 2004). This can be an obstacle

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