Chapter 3.15
Comparison-Shopping Agents and Online Small Business

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BACKGROUND OF SMALL BUSINESS

Since the commercialization of the Internet in the 1990s, online retailing has increased steadily. According to the most recent Department of Commerce Census Bureau report,[1] retail e-commerce sales in the first quarter of 2004 were $15.5 billion, up 28.1% from the first quarter of 2003. E-commerce sales in the first quarter of 2004 accounted for 1.9% of total sales, compared with 1.6% of total sales for the first quarter of 2003.

An important trend in this growth in B2C (business-to-consumer) e-commerce is the participation of small business on the Web. Considering that in the United States small business comprises more than 99% of employer firms,[2] this trend is significant.

Though the Web offers huge potential to these small businesses for growth and prosperity, and also offers them a very low entry cost, Web visibility becomes the major barrier for them. Small businesses often have difficulty putting up enough funding to compete with brand-name businesses in promotion. So small businesses are desperately in need of a less costly channel for increasing their Web visibility.

In the past 4 years and especially since the economic slowdown in 2000, comparison shopping has become more and more popular among online shoppers. Because of the low cost of being listed on comparison-shopping Web sites and the relatively high conversion rate for online shoppers who use comparison shopping, many small businesses found this an ideal channel to increase their Web visibility. As a result, many early participating small businesses gained a customer base in the competition by displaying their products and service prices on comparison-shopping Web sites.

Now, it is more and more clear that comparison shopping provides a unique opportunity for small businesses to reach a large customer population with relatively little cost. To help readers better understand this phenomenon, we give a comprehensive introduction to comparison-shopping agents and summarize recent research on their impact in e-commerce.

DESCRIPTION OF COMPARISON-SHOPPING AGENTS

Definition

Comparison-shopping agents, also called shopbots, are those Web-based intelligent agents that can collect product and service information, especially price-related information, from multiple online vendors, aggregate them, and then provide value-added service to online shoppers to assist their online shopping.

Comparison-shopping agents are information intermediaries. They play the role of information brokers in the information supply chain that connects online vendors to consumers on the Web (Etzioni, 1997; Haubl & Trifts, 2000). Comparison-shopping agents are intelligent software applications (Wooldridge & Jennings, 1995; Wooldridge, Müller, & Tambe, 1996). There is a general three-tier design for these agents (Kushmerick, Weld, & Doorenbos, 1997). Based on the information they provide, comparison-shopping agents can be classified into three categories: differentiation agents, evaluation agents, and preference-identification agents (Wan, Menon, & Ramaprasad, 2003).

Technical Review

The efficiency and effectiveness of comparison-shopping agents are mainly determined by their technical rationality, which is manifested through two aspects: their ability to extract and aggregate information from heterogeneous data sources (online vendors), and their ability to provide appropriate information and information-processing support to consumers. These two aspects are implemented in their three-tier design as described below.

Data-Retrieval Tier

The data-retrieval tier is responsible for collecting data from external heterogeneous data sources on the Web or proprietary partner network.[3] Because the data format of the information the comparison-shopping agents retrieve is HTML (hypertext markup language), which is a semistructured language, we have to employ a "wrapper" technology (also called "screen scraping" in the popular press) to retrieve data and transform it from an incompatible data format into a format that can be understood by the agent (Adelberg, 1998; Ashish & Knoblock, 1997; Firat, Madnick, & Siegel, 2000; Kushmerick et al., 1997; Madnick, 1999). XML (extensible markup language) and other more structured solutions may transform the design of this tier in the near future (Rosenthal, Seligman, & Costello, 1999).

Information-Processing Tier

The information-processing tier, the heart of the agent, performs three major tasks: filtering the data retrieved, categorizing them, and indexing them.

This tier is needed to make the data format consistent. For example, to compare price information for the same book from two vendors in two countries, we have to convert one country's currency into the other's by using the current exchange rate (Zhu, Siegel, & Madnick, 2001). Sometimes, certain products may be queried repeatedly, so a cache database could be utilized to store the most frequently requested information for fast retrieval. The categorization of information is important because it is also an indexing process and makes the retrieval of records more efficient.

Information-Presentation Tier

The information-presentation tier is the interface between consumers and the agent. It provides the