Chapter IX

Customised Electronic Commerce with Intelligent Software Agents

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This chapter describes a conceptual framework for designing and developing software agents that will enable customized electronic commerce (CEC) and highlights several important constructs as well as their interrelationships within the framework. In particular, it examines the enabling technologies under two categories, namely, on-line cataloging and recommendation. In order to demonstrate some of the key characteristics of customized electronic commerce, this chapter also presents three prototyped software agents, namely, ETA (Electronic Tour Agent), EPA (Electronic Property Agent), and EAA (Electronic Auction Agent).

INTRODUCTION

Electronic commerce on the Internet is about on-line exchange of information, services, and products. Customers look for products that meet their needs and dealers try to identify potential customers of their products. Matching products with potential customers is a nontrivial process.

The Web provides an affordable and convenient way for information exchange between customers and dealers. Keyword search engines have been available nowadays in many company Web sites for helping visitors (and potential customers) to identify products that they are interested in. However, as the size of the virtual marketplace (i.e., the Web) is tremendously large and is growing at a tremendously fast pace, matching customers and dealers in Internet commerce remains a costly process—customers often experience a hard time in digging up and comparing product information available in the Web, whereas dealers spend a great effort in advertising their products.

With the advent of the software agent technology, the goal of agent-based customized electronic commerce is to alleviate the aforementioned problems by empowering customers in accessing and using electronic commerce services and enabling dealers to gain competi-

tive advantages in finding customers for their products and in providing services without frictional costs. A naive definition of a software agent is a program that can act on behalf of its owner, which is originated from the field of intelligent agents (Russel & Norvig, 1995; Nwana, 1996). A generic model of an intelligent agent is typically defined with at least a goal (e.g., locating products relevant to customer interests), an input interface (e.g., a Web page crawler), a performance element (e.g., identifying matches between the interests and Web pages), an actor (e.g., sending customized messages to the customers automatically), and a learning element (e.g., improving the matching relevancy based on the customer feedback).

Needs for Customized Electronic Commerce

Advances in Internet technology are overwhelming such that connectivity on demand and media on demand have now become a reality. Making the best use of Internet technology is fast emerging to become the norm of daily business and life. Such a norm will present at least four immediate implications for customizing electronic commerce systems with intelligent software agents:

1. **Trading Opportunities.** What we know as steady, constant supply and demand in a traditional marketplace may soon be replaced by electronic selling and buying in a boundary-less Internet marketplace.

   The Web provides a new means of trading commodities. The interests of customers as well as the availability of products from dealers can change dynamically from time to time. These changes may be short-termed or long-termed, making the analysis of the overall market complicated. What usually happens in present day electronic commerce is: (1) a dealer sells his or her items simply because these are the *only* items that he or she has at the moment, or (2) a customer buys a certain item simply because it is the *last* item that he or she can find that partially fits his or her need. In some cases, customers may not even know exactly what they are looking for. Software agent-based customized electronic commerce attempts to change the existing on-line buying and selling into the following new scenarios: (1) a dealer identifies and offers what exactly customers are interested in, and (2) a customer finds and purchases what he or she really loves by comparing the captured customer interest with product information in a just-in-time manner.

2. **Customer Relationship.** What used to be a face-to-face customer-business relationship will soon be replaced by a virtual customer-business relationship. The needs of the customers can be very specific. Simpleminded one-to-one marketing will be too costly to be justified unless there are some (semi-) autonomous ways of achieving that.

   Many existing Web sites are at present constructed based on a set of static projections and fixed assumptions. It would be helpful to develop and deploy on-line intermediaries in the electronic marketplace that can provide or pawn auxiliary services, evaluate the quality of products, and provide recommendations on related or similar products. From the dealers' point of view, each customer is unique in both demographic (e.g., age, gender, occupation, and location) and psychographic (e.g., friendship, trust, like-mindedness, gossip, and opinion) senses. Software agents will be able to detect what customers' buying patterns are forming and how they are structured, and hence effectively manage the on-line commerce. Collaborative recommendation agents can help individual customers aggregate into groups, which can in turn form a dynamic marketplace.

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