Chapter 4.3
Intelligent Software Agents Analysis in E–Commerce I

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INTRODUCTION

Equipped with sophisticated information technology infrastructures, the information world is becoming more expansive and widely interconnected. Internet usage is expanding throughout the web-linked globe, which stimulates people's need for desired information in a timely and convenient manner. Electronic commerce activities, powered by Internet growth, are increasing continuously. It is estimated that online retail will reach nearly $230 billion and account for 10% of total U.S. retail sales by 2008 (Johnson et al. 2003). In addition, e-commerce entailing business-to-business (B2B), business-to-customer (B2C) and customer-to-customer (C2C) transactions is spawning new markets such as mobile commerce.

By increasing the degree and sophistication of the automation, commerce becomes much more dynamic, personalized, and context sensitive for both buyers and sellers. Software agents were first

used several years ago to filter information, match people with similar interests, and automate repetitive behavior (Maes et al. 1999). In recent years, agents have been applied to the arena of e-commerce, triggering a revolutionary change in the way we conduct online transactions in B2B, B2C, and C2C. Researchers argue that the potential of the Internet for transforming commerce is largely unrealized (Begin et al. 2002; Maes et al. 1999). Further, He and Jennings noted that a new model of software agent is needed to achieve the degree of automation and move to second generation e-commerce1 applications (He et al. 2003). This is due to the predicament that electronic purchases are still largely unautomated. Maes et al. (1999) also addressed that, even though information is more easily accessible and orders and payments are dealt with electronically, humans are still in the loop in all stages of the buying process, which inevitably increase the transaction costs. Undoubtedly, a human buyer is still responsible

for collecting and interpreting information on merchants and products, making decisions about merchants and products, and ultimately entering purchase and payment information. Additionally, Jennings et al. (1998) confirmed that commerce is almost entirely driven by human interactions and further argued that there is no reason why some commerce cannot be automated.

This unautomated loop requires a lot of time and energy and results in inefficiency and high cost for both buyers and sellers. To automate time-consuming tasks, intelligent software agent (ISA) technology can play an important role in online transaction and negotiation due to its capability of delivering unprecedented levels of autonomy, customization, and general sophistication in the way e-commerce is conducted (Sierra et al. 2003). Systems containing ISAs have been developed to automate the complex process of negotiating a deal between a buyer and a seller. An increasing number of e-commerce agent systems are being developed to support online transactions that have a number of variables to consider and to aim for a win-win result for sellers and buyers.

In today's e-commerce arena, systems equipped with ISAs may allow buyers and sellers to find the best deal taking into account the relative importance of each factor. Advanced systems of e-commerce that embody ISA technologies are able to perform a number of queries and to process phenomenal volumes of information. ISAs reduce transaction costs by collecting information about services and commodities from a lot of firms and presenting only those results with high relevance to the user. ISA technologies help businesses automate information transaction activity, largely eliminate human intervention in negotiation, lower transaction and information search cost, and further cultivate competitive advantage for companies. Therefore, ISAs can free people to concentrate on the issues requiring true human intelligence and intervention. Implementing the personalized, social, continuously running, and semi-autonomous ISA technologies in business

information systems, the online business can become more user-friendly, semi-intelligent, and human-like (Pivk 2003).

LITERATURE REVIEW

A number of scholars have defined the term *intelligent software agent*. Bradshaw (1997) proposed that one person's intelligent agent is another person's smart object. Jennings and Wooldridge (1995) defined agents as a computer system situated in some environment that is capable of autonomous action in this environment to meets its design objective. Shoham (1997) further described an ISA as a software entity which functions continuously and autonomously in a particular environment, often inhabited by other agents and processes. In general, an ISA is *a software agent that uses Artificial Intelligence (AI) in the pursuit of the goals of its clients* (Croft 2002). It can perform tasks independently on behalf of a user in a network and help users with information overload. It is different from current programs in terms of being proactive, adaptive, and personalized (Guttman et al. 1998b). Also, it can actively initiate actions for its users according to the configurations set by the users; it can read and understand user's preferences and habits to better cater to user's needs; it can provide the users with relevant information according to the pattern it adapts from the users.

ISA is a cutting-edge technology in computational sciences and holds considerable potential to develop new avenues in information and communication technology (Shih et al. 2003). It is used to perform multi-task operations in decentralized information systems, such as the Internet, to conduct complicated and wide-scale search and retrieval activities, and assist in shopping decision-making and product information search (Cowan et al. 2002). ISA's ability of performing continuously and autonomously stems from human desire in that an agent is capable of operat-

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