An Agent-Based Multi-Issue Negotiation System in E-Commerce

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ABSTRACT
Due to the growth of the Internet and computing power of PCs, activities in the real world have been changed with the help of computers. Internet commerce became an interesting research area along with the change of this new computing environment. In a traditional commerce environment, negotiation was an interesting topic in the past. In the new Internet commerce environment, computer-supported negotiation becomes interesting in academics. In this paper, we propose a computer-supported negotiation agent system on the Internet that helps buyers make decisions. We believe that a negotiation mechanism is based on a multi-attribute utility theory and the negotiation strategy focuses on the weighting adjustment on multiple issues. Therefore, our negotiation mechanism is based on a multi-attribute utility theory and the negotiation strategy focuses on the weighting adjustment on multiple issues. On the other hand, software agents are a useful technology in this new computing environment and the technology has several advantages in solving different computing problems. In a negotiation process, the user cannot handle the complex process individually. Also, the process is a time consuming task. Thus, we use the advantage of agent technology as the major system developed approach. With the help of the technology, the system can be more efficient in many Internet commerce applications.

Keywords: Internet commerce, negotiation, software agent, multi-attribute utility theory

INTRODUCTION
With the growth of the Internet, online transactions grow rapidly with services or goods sold on the Internet. Electronic commerce activities are increasing continuously. In the commerce activities of the real world, several merchants could apply the same product or service with different values of product attributes. In general, a buyer does not care about only one issue of a product or service. They consider several issues, set different parameters within these issues and obtain the best choice. In this paper, a negotiation mechanism and system is proposed as a negotiation mediator between one user and multiple sellers. The negotiation process...
is a multi-issues negotiation problem. Therefore, a mechanism based on the multi-attribute utility theory is proposed and developed. On the other hand, negotiation is a time consuming task for users. Fortunately, agent technology has several advantages that include automatic intelligence, proactive and reactive, etc., and it is suitable for designing a computer supported negotiation system. Therefore, an agent-based negotiation system is proposed.

**Negotiation**

Negotiation (Caglayan and Harrison, 1997; Faratin et al., 1999; Guttman and Maes, 1998A, 1998B; Hammer et al., 2000; Iizuka et al., 1999; Kang and Lee, 1998; Lomuscio et al., 2000; Russell and Norvig, 1995; Sandholm and Lesser, 1997; Wu and Soo, 1999) is a popular topic in the electronic commerce of academic research. In the negotiation process, all parties involved want to obtain a better benefit with respect to their own preference. According to the number of the participants, the negotiation type can be modeled as a one-to-one negotiation, a one-to-many negotiation, a many-to-many negotiation, and a many-to-one negotiation (Tung et al., 2001). One-to-one negotiation is a bargaining process between two parties. One-to-many negotiation is the auction process that several buyers compete with each other to win the goal. Many-to-one negotiation is a reverse auction process that includes one buyer and several sellers. Many-to-many negotiation is the broker that mediates transactions for several buyers and sellers. The summarization of the negotiation types is showed in the Table 1 according to the number of buyer and seller participants.

In Lomuscio et al. (2000), Jennings (2000) proposed several research challenges and directions about the automatic negotiation research. They reveal the basic components of the negotiation process that includes negotiation protocol, negotiation domain and the agent utility function. Faratin (1999) proposed a negotiation approach based on the multi-issues negotiation in Faratin et al. (1999). They defined each role’s task in the process and how the interaction of these parties helps them to reach their goals. Their approach is based on the negotiation rules to achieve the negotiation agreement. Guttman (1998) proposed a negotiation system

<table>
<thead>
<tr>
<th>Seller Participants</th>
<th>Buyer Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>One</td>
</tr>
<tr>
<td></td>
<td>One</td>
</tr>
<tr>
<td>One</td>
<td>bargaining</td>
</tr>
<tr>
<td>Many reverse auction</td>
<td>Many</td>
</tr>
</tbody>
</table>

**Table 1: Types of Negotiation**

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