ABSTRACT

Electronic commerce has changed the way businesses interacting with consumers and peers. For both B2B and B2C transactions, it becomes more and more important to make the traditional negotiation price mechanism automated and intelligent [1]. Automated negotiation has become the core of the next generation intelligent e-commerce. The main principle is using software agent technology to make the negotiation process partially or fully automated. The purpose is to improve the efficiency of online negotiations and reduce costs of transactions. In recent years, the research on automated negotiation system has been given high priority by researchers around the globe [2].

Keywords: Automated negotiation system, multi-agent system, service-oriented negotiation, web services.

INTRODUCTION

Traditional research in automated negotiation is focused on theory about negotiation protocol and strategy. However, the application of automated negotiation system has lagged far behind. Negotiation protocol defines the interaction rules between agents. Negotiation strategy defines the sequence of actions taken by agents in the negotiation process based on decision-making models. The research results of protocol and strategy are very rich and represent the major research effort in automated negotiation.

At present, one severe problem for the study of automated negotiation is how to convert the theoretical results into practical applications. Although there are many research achievements about protocols and strategies in the field of automated negotiation nowadays, realization and real application of automated negotiation system still has a long way to go [3, 4]. So far, there is scarcely any automated negotiation system that can be applied in e-commerce [5], which has been a bottleneck for the research of automated negotiation. Many theories, models and algorithms cannot be verified without a practical application platform, thereby constraining the further development of automated negotiation research. In fact, this kind of situation is widespread in the entire e-commerce oriented automated trading applications [6].

PROBLEM STATEMENT

While some systems have been widely cited in literatures, such as the Kasbah, Tete-a-Tete, ADEPT, AuctionBot, eMediator, MAGNET, MATE, etc., however, strictly speaking, they are not automated negotiation system because software agent technology in these systems is primarily used for automated
trading functions, such as product selection, price comparison [7] and so on. Even some applications involved in negotiation are mainly for auction. This situation can be attributed to the following reasons:

First, current research lacks negotiation systems. Scholars pay more attentions to the economic meaning of negotiation in the research of automated negotiation. They are more interested in building a variety of mathematical models to describe the negotiation and designing decision-making process models. These studies are built on the basis of an assumption that there has been a software platform, agent, to support the operation of these mathematical models. However, what on earth is the negotiating agent? How does it follow the negotiation protocol and implement the negotiation strategy? These are critical questions toward the practical application of automated negotiation system. Unfortunately, these questions have not been paid sufficient attentions.

Second, current research needs development methods for automated negotiation system. Automated negotiation system (ANS) is essentially a multi-agent system; therefore its development is inseparable from the software agent technology. Given that software agent technology and multi-agent system development method are not mature, the development of automated negotiation system has no technology roadmap to follow.

Finally, negotiation system research needs a feasible application mode. Most negotiation systems are developed in academic environments such as laboratories in universities. They are usually experimental systems used to verify a particular model or theory and face many technical and security problems. There is a big gap between the experimental systems and the practical commercial applications. At the same time, colleges and universities find it difficult to make the experimental systems meet practical application requirements. Consequently, these systems only stay in the experimental stage. Moreover, many such systems were abandoned later, which is a great waste. Therefore, we need to introduce a new application mode to support the whole process from research to application.

SOFTWARE AGENT TECHNOLOGY FOR AUTOMATED NEGOTIATION SYSTEM

This paper discusses a technology roadmap for the development of automated negotiation system using the software agent technology and proposes a practical application architecture using SOA and web services technology for the automated negotiation system.

A service is a software component that can be accessed via a network to provide functionality to a service requester. The term service-oriented architecture refers to a style of building reliable distributed systems that deliver functionality as services, with the additional emphasis on loose coupling between interacting services. Technically, the term SOA refers to the design of a system, not to its implementation. We regard SOA as an architectural style that emphasizes implementation of components as modular services that can be discovered and used by clients.

The service-oriented architecture is very useful for the application of automated negotiation system. As mentioned above, there are many difficulties, such as security and credit, to make the automated negotiation system to be applicable. In fact, in most cases, the enterprises and individuals do not want a software system, but just a negotiation service. On the other hand, it is more convenient for the developers to just provide a service to the users rather than to deploy software system in the user site, for there will be less work of maintenance, operation and so on. Therefore, we can make the automated negotiation system as a service and deploy it using an enterprise application integration framework.
based on service oriented architecture. To do so, the ANS can take advantage of the infrastructure such as network, security, transaction and so on provided by the whole integration system and benefit from the existing customer resource.

Negotiation Service generally has the following characteristics. 1) It is individually useful, or it can be integrated and composed to provide higher-level services. Among other benefits, this promotes re-use of existing functionality. 2) It communicates with their clients by exchanging messages: they are defined by the messages they can accept and the responses they can give. 3) It can participate in a workflow, where the order in which messages are sent and received affects the outcome of the operations performed by a negotiation. 4) It is completely self-contained, or depends on the availability of other services, or on the existence of a resource such as a database. In the simplest case, a negotiation might be perform without needing to refer to any external resource, or it may have pre-loaded all the data that it needs for its lifetime.

Moreover, the automated negotiation system base on SOA will have the following good cross-platform features: 1) Flexibility: A negotiation service can be located on any server, and relocated as necessary. As long as it maintains its registry entry, prospective clients will be able to find it. 2) Scalability: negotiation services can be added and removed as demand varies. 3) Replacing ability: provided that the original interfaces are preserved, a new or updated implementation of a service can be introduced, and outdated implementations can be retired, without disruption to users. 4) Fault tolerance: If a server, a software component, or a network segment fails, or the negotiation service becomes unavailable for any other reason, clients can query the registry for alternate services that offer the required functionality, and continue to operate without interruption.

REFERENCES


