

Software Agent Negotiation Development: An Experience Report

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Abstract

Negotiation involves the execution of rules and interaction among the agents toward the agreement, objective or outcomes. It is a complex process and need careful study and design. This paper focuses on experience sharing under the development of negotiation approach in a booking application (e.g. Smart Lecture Theatre). It consists of the conceptual ideal of negotiation as well as the methodology for life cycle development. The development life cycle has been structured into five phases: locution determination, interaction protocol design, autonomy determination, agent binding and agent implementation. A simple negotiation application has been experimented for a simple argumentation negotiation application and an intelligent-based argumentation negotiation application. This paper has demonstrates the importance and capability of this methodology in structuring agent negotiation.

1. Introduction

Agent technology has brought a new dimension to the global computing environment. It is a piece of software that is autonomous, proactive, responsive, adaptive and flexible [1]. Agents can plan, communicate, cooperate, coordinate and negotiate with other agents or users to accomplish task. Agents are used due to the recent problems and limitations of current technology. Its autonomy and interactivity provide an effective solution for the distributed computing environment. Agents have been classified into different types, according to the respective areas of specialization. There are learning agents, filtering agents, interface agents and mobile agents.

This paper focuses on experience sharing under the development of negotiation approach in booking application (e.g. Smart Lecture Theatre). It consists of the conceptual ideal of negotiation as well as the methodology of the development life cycle. We have structured the negotiation development life cycle into locution determination, interaction protocol design, autonomy determination, agent binding and agent implementation. Our methodology is general enough to use in the development of classical negotiation approach and argumentation negotiation approach. Finally, we

believed that this development life cycle can translated into two main component, reasoning and communication component.

The rest of this paper is organized as follows. Section 2 consists of the conceptual understanding in agent negotiation based on our hypothesis. Section 3 discusses the development methodology of agent negotiation. This includes a discussion on locutions determination, interaction protocol design, autonomy determination, binding process and agent implementation. It involves an experience sharing throughout the negotiation implementation under the Smart Lecture Theatre application. Section 4 involves the overall discussion. The paper concludes in Section 5.

2. The Hypothesis

2.1 Getting to Know Negotiation

Negotiation is categorized as types of interaction mechanisms for exchanging information among the entities (e.g. agents) [1, 3]. It involves the execution of rules and interaction among the agents toward the agreement, objective or outcomes. Furthermore, it is the process to resolve conflict(s) that occur among the entities [1, 2]. Negotiation has been divided into different categories - e.g., one to one versus many to many parties, single versus multi issues, closed versus open, and mediator based versus mediator free [3]. Meanwhile, negotiation can be categorized into traditional, heuristic or argumentation negotiation approaches.

We argued that a typical negotiation principle involves two components. There are reasoning and communication components. The reasoning component will act as an intelligent feature for agents to react and pro-act actively during the operation. Other than that, it is a decision making tool for finding an optimized solution towards a problem. For example, decision for choosing a product, scheduling meeting, managing product or service quality and etc. There exist a number of different techniques and algorithms to handle the reasoning component. There are BDI-based models, fuzzy logic, genetic algorithm, decision theory, argumentation and so on. Agents in this case must behave intelligently in order to solve the conflict that occurs during normal operation. The agent must organize its strategy to handle all the influences to