

When BDI meets Argumentation: The Conceptual Ideal

Cheah Wai Shiang, Narayanan Kulathuramaiyer, Lai Suk Fui
Faculty of Computer Science and Information Technology, Universiti Malaysia Sarawak
wscheah@fit.unimas.my, nara@fit.unimas.my

Abstract

Argument-based negotiation consists of a meaningful expression, able to provide better reasoning features and flexibility. Agents in this case, become aware of the information surrounding them in an attempt to analyze, influence and understand its counterparts or opponents. The agents behave intelligently to facilitate the argumentation process, which consists of argument interpretation, argument evaluation, argument generation and argument selection. The Belief, Desire, Intention (BDI) mode, on the other hand, is a widely adopted for modeling intelligence. Hence, we explore the relationship between these two models. We argue that a typical intelligent model involves two component, which are the reasoning and communication components. The integration between these components, however, is still unclear. This paper proposes the integration among the reasoning aspect (BDI in particular) and communication aspect (argumentation specifically) in an open multi-agent society. The capability of argument-based negotiation enables the BDI agent in intention reconsideration, to enhance its reasoning powers.

1. Introduction

An intelligent agent model consists of two components. There are reasoning and communication components. However, the integration between these components is still unclear in agent development. Hence, we explore the relationship between these components from the aspect of BDI model in particular and argumentation-based negotiation specifically. We explore the capability of argument-based negotiation to help the BDI agent for intention reconsideration, which then becomes a potential research topic.

The BDI architecture models rational agents that have particular mental attitudes of belief, desire and intention [1,2]. Belief represents the information state

of the agent, which includes internal information (what the agent knows about itself) and external information (the world information). Argument-based negotiation (ABN) consists of a meaningful expression, with more reasoning feature and flexibility. Agents in this case become aware of the information surrounding them in attempt to analyze, influence and understand its counterparts or opponents.

The rest of this paper is organized as follows. Section 2 discusses the integration in by integrating the ABN components into plan library. It includes the design model and algorithm of the integration. Section 3 involves the implementation based on the integration framework. It includes the practice towards intention reconsideration as well as observation. Section 4 involves the finding after the integration. The paper concludes in Section 5.

2. When BDI meets ABN

By giving the agent initial beliefs and desires (goals to achieve), a goal with highest priority is chosen as Intention (current goal). Based on the current committed intention, a set of plans are selected and executed. Events happening internally or externally will update the belief and desire of the agent. After the execution of plans is completed, the goal may or may not achieved depending on the plan selected. Alternate plan may be selected for execution to replace the failed plan to achieve an intention. The achieved intention or desire will be dropped and the next intention will be processed until all desires are achieved. Here, we have introduced the ABN framework to be a part of plans. The following sections discuss how the argumentation components can be a part of the plan library in the BDI architecture.

2.1. Plugging into Plan Library

Different strategies or mechanisms are plugged to the plan library as plans. For example, mobile plan is required when a BDI agent needs to move to another