

ICAC3'15

An Approach on Multilateral Automated Negotiation

Madhur Patrikar^a, Sheetal Vij^a, Debajyoti Mukhopadhyay^b

^aDepartment of Computer Engineering, Maharashtra Institute of Technology, Pune 411038, India

^bDepartment of Information Technology, Maharashtra Institute of Technology, Pune 411038, India

Abstract

In E-commerce, numbers of transactions are increasing day by day in B2B and B2C trade. Online negotiation is possible because of automated negotiation. In this paper, we propose linear programming and pattern matching based multilateral automated negotiation system and study some multilateral system with several methods. We have studied fuzzy inference logic based system, multithreading based automated negotiation system, linear programming based system and genetic algorithm based system and we have compared some methods of automated negotiation. Multilateral negotiation system gives better result to participant than bilateral automated negotiation. Technique of pattern matching based automated negotiation gives fast result and reduces overhead of calculation.

© 2015 The Authors. Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Peer-review under responsibility of organizing committee of the 4th International Conference on Advances in Computing, Communication and Control (ICAC3'15)

Keywords: Multilateral automated negotiation; fuzzy logic; multithreading; linear programming based system.

1. Introduction

Automated negotiations have allowed people for online negotiations. An automated negotiation can be done in two ways: bilateral automated negotiation and multilateral automated negotiation. In bilateral negotiations, two agents negotiate on single or multiple issues on behalf of people. When more than two agents come together to negotiate, with different constraints and preferences, then the process becomes complicated. The complicated process of automated negotiation is referred as multilateral automated negotiation. Many people do not like traditional negotiation process because they view it as time consuming and complex process as people participation is required till the process is complete. This problem is solved by automated negotiations. Negotiations are conducted using bidding, bargaining or auctions. It is difficult when the behavior of opponents is unknown.

Prediction methods are used to identify the behavior of opponents. A prediction method of utility function gives good result to identify the behavior of opponents [5].

2. Related Work

As per Ricardo Buttner, automated negotiation is classified mainly as structure, theoretic foundation and restriction. We are going to focus on the protocol for the structure. The Protocols can be classified into bilateral, one-sided and double-sided protocols. One-sided and double-sided negotiations are also called as multilateral automated negotiation [10]. In bilateral automated negotiation, maximum utility for a single agent can become minimum utility for opponent agent, and therefore the chance of agreement is low. Considering Figure 1, agent A and agent B have limited space to take their decision[14]. This problem is avoided by multilateral automated negotiation. A major challenge in the negotiation using the bilateral protocol is that the agents hide their preferences. So agent does not know which preferences the opponent will prefer. Susanne Klaus, Karl Kurbel and Iouri Loutchko, in 2001, gave an overview of game theory based negotiation, multi-attribute utility theory based negotiation and auction based negotiation. As per their paper, there is scoring function problem and user dependent problem in many-to-many multilateral negotiation. For linear scoring function, optimal solution can be found but for non-linear scoring function, the mathematical analysis is very difficult. How to construct the negotiation strategy is not cleared in this paper. As per this paper, multilateral negotiation using game theory is very difficult to use. Utility theory can give better results than the game theory [19]. Sanghyun Park and Sung-Bong Yang have proposed a negotiation agent system based on the incremental learning in order to increase the efficiency of bilateral negotiations and to improve the applicability towards multilateral negotiations. For the system, they also have introduced a framework for multilateral negotiations in an e-marketplace in which the components can dynamically join and disjoin. They proposed an automated negotiation system that can efficiently carry out multilateral negotiations with multi-attributes in pervasive computing environments[17]. Also they developed linear programming based automated negotiation system. They used concept of mediator agent and two bilateral automated negotiation schemes based on linear programming. The experimental results show that the proposed system produces higher joint profits and is faster in reaching agreements on an average under the condition of agreement for reciprocity than a negotiation system based on the trade-off mechanism. [15].

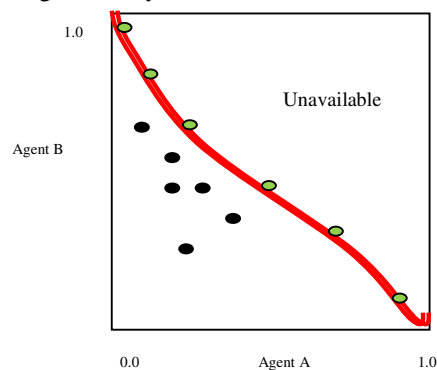


Fig 1. A point indicates the utility for both agents of a bid. The red line is the Pareto optimal frontier .

The multi issue negotiation model with distributed problem solving was presented by P Faratin, C Sierra, N R Jennings and P Buckle. In this, they developed fully autonomous agent who coordinates both agents' interaction and handles individual agent also [21].

Monotonic Concession Protocol for Multilateral Negotiation has been described by Ulle Endriss. It is a deadlock free protocol in which they restricted on the utility function. It is not applicable for all the cases of negotiation [17]. When the participant does not share his preference in the negotiation, the agent needs to analyze the behaviour of the opponent. Performance of negotiation can be measured in two ways: using agent's performance as a benchmark for the model's quality and directly evaluating its accuracy by using similarity measures. As per Tim, there is an almost linear correspondence between accuracy and performance of the system. They measure accuracy of system over timing but do not consider system based on resource dependent [9]. Dong proposed multi-attribute negotiation model based on internal factors argumentation, the system can achieve Pareto

Download English Version:

<https://daneshyari.com/en/article/486136>

Download Persian Version:

<https://daneshyari.com/article/486136>

[Daneshyari.com](https://daneshyari.com)