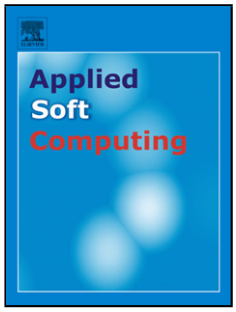

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A Multi-Demand Negotiation Model Based on Fuzzy Rules Elicited via Psychological Experiments

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Abstract

This paper proposes a multi-demand negotiation model that takes the effect of human users' psychological characteristics into consideration. Specifically, in our model each negotiating agent's preference over its demands can be changed, according to human users' attitudes to risk, patience and regret, during the course of a negotiation. And the change of preference structures is determined by fuzzy logic rules, which are elicited through our psychological experiments. The applicability of our model is illustrated by using our model to solve a problem of political negotiation between two countries. Moreover, we do lots of theoretical and empirical analyses to reveal some insights into our model. In addition, to compare our model with existing ones, we make a survey on fuzzy logic based negotiation, and discuss the similarities and differences between our negotiation model and various consensus models.

Keywords: automated negotiation, fuzzy logic, bargaining game, preference, agent

1. Introduction

A negotiation problem is a communication process among a number of agents about how to allocate profit, goods, resources and so on among them [1, 2, 3]. It is one of the most common phenomena in our daily life [4]. Therefore, since Nash built the first mathematical model of negotiation [5], various models have been proposed in various areas, such as economics [6, 7, 8, 9], political science [10, 11, 12], management science [13, 14, 15], sociology [16, 17, 18], and especially artificial intelligence [1, 19, 20, 21, 22, 23]. In the area of artificial intelligence, most of the studies about negotiation focus on handling one demand with one or multiple attributes in continuous domains. There are many examples of this kind, such as how to divide a pie [24], negotiation in an accommodation renting scenario [2], wage negotiation between employers and employees [25], negotiation of multiple dependent issues based on hypergraph utility [26], using BLGAN strategy and its extension for dealing with consecutively-conceding opponents [27] or multifarious opponents [28] in one-shot negotiation, finding agents' optimal strategies in bilateral negotiation with uncertain information about

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