

Special Issue on ‘Human Factors and Computational Models in Negotiation’

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Negotiation is a complex emotional decision-making process aiming to reach an agreement to exchange goods or services. Although a daily activity, few people are effective negotiators. Existing support systems make a significant improvement if the negotiation space is well-understood, because computers can better cope with the computational complexity. However, the negotiation space can only be properly developed if the human parties jointly explore their interests. The inherent semantic problem and the emotional issues involved make that negotiation cannot be handled by artificial intelligence alone, and a human-machine collaborative system is required. Everyone is an experienced negotiator and everyone has an opinion about their negotiation skills. However, even professional negotiators can still improve their skills considerably by using automated support for negotiation.

Negotiation is a prime example of a task for which the human mind is but partially equipped, and for which artificial intelligence can only provide partial assistance. Computational power, data storage, search techniques, computational heuristics to tackle exponential problem spaces, are among the good products of AI. However, AI has not solved the problem of the huge amount of knowledge necessary to cope with, and understand arbitrary conversations and problems. The complexity and the variability of the problems humans wish to address are just too much to handle. It thus becomes important to both study the human factors as well as computational models that contribute to reaching negotiated agreements between parties.

This special issue is a selection of papers that were presented at the First International Conference on Human Factors and Computational Models in Negotiation. These papers present various research goals, ideas, challenges and approaches towards creating the next generation of negotiation support systems.

The first paper ‘A Secure and Fair Protocol for Multiple Interdependent Issues Negotiation’ focuses on negotiation with multiple interdependent issues in which

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agent utility functions are non-linear. The paper proposes a new multi-party protocol called Secure and Fair Mediator Protocol to obtain fair outcomes in complex negotiation domains based on non-linear utility functions. The goal is to obtain outcomes that are Pareto-optimal and maximizes social welfare.

The second paper ‘Approximating the Qualitative Vickrey Auction by a Negotiation Protocol’ compares auctions and negotiation. It addresses the question whether an efficient outcome determined by an auction mechanism can be reasonably approximated by multi-bilateral closed negotiation between a buyer and multiple sellers. The focus of the paper is on the Qualitative Vickrey Auction. A multi-issue multi-bilateral negotiation protocol is introduced and it is experimentally shown that this protocol enables agents that can learn preferences to obtain agreements that approximate the efficient outcome defined by the auction mechanism.

The third paper ‘Cultural Differentiation of Negotiating Agents’ studies the modelling of agents in multicultural negotiations where agents show culturally differentiated behaviour. This paper presents an agent-based simulation model that tackles these challenges. Hofstede’s model of national cultures is used where the five dimensions of this model provide the basis for a modification of the weight factors in the utility function and negotiation strategy parameters. The goal is to explain the behaviour of actors in international trade networks.

The fourth paper ‘Incorporating Fairness into Development of an Integrated Multi-agent Online Dispute Resolution Environment’ describes the development of an integrated multi-agent online dispute resolution environment called IMODRE. Key issues that are addressed are the representation of domain knowledge using Bayesian Belief Networks, in this case knowledge about Australian Family Law. The goal of the work is to achieve greater fairness to Family property law negotiations. The approach is agent-based and uses heuristics and game theory to equitably distribute marital property assets and facilitate further trade-offs.

Finally, the fifth paper ‘Argumentation-Based Qualitative Preference Modelling with Incomplete and Uncertain Information’ presents an argumentation-based framework for the modelling of, and automated reasoning about multi-attribute preferences of a qualitative nature. The goal of the paper is to provide a qualitative framework for representing preferences of negotiating parties. To address the fact that often only incomplete or uncertain information is available, the framework is able to handle such lack of information while still being able to derive reasonable (safe and decisive as the authors call it) preferences. The paper uses an argumentation-based framework for modelling preferences.

We would like to express our gratitude to everyone who participated in making the Human Factors and Computational Models in Negotiation event a success and those who helped in completing this special issue. First, we would like to thank all authors for extending and extensively revising papers they presented at the conference to ensure high quality of the material included in this issue. Second, we would like to thank the reviewers who put the time and effort into reviewing the papers, which also greatly contributed to the quality of the papers presented here. Finally, we want to thank Mel Shakun for being supportive and making it possible to dedicate a special issue to our event and for providing the necessary support to get this special issue completed.