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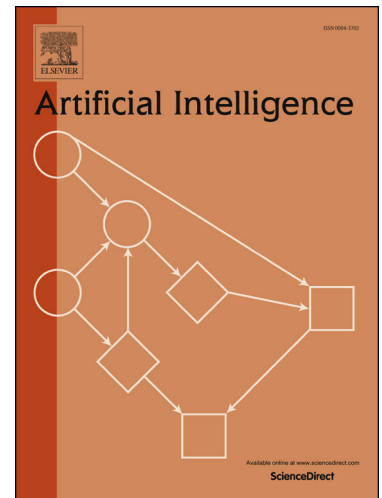
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Human-Computer Negotiation in a Three Player Market Setting

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Abstract

This paper proposes a novel agent-design for a three-player game involving human players and computer agents. The game is analogous to settings in which participants repeatedly negotiate over contracts, such as cell-phones and credit card plans. The game comprises three players, two service providers who compete to sign contracts with a single customer player. The service providers compete to make repeated contract offers to the customer consisting of resource exchanges in the game. Customers can join and leave contracts at will. We computed sub-game perfect equilibrium strategies for all players that were based on making contracts involving commitments between the customer player and one of the service provider players. We conducted extensive empirical studies (spanning over 500 participants) comparing the performance of computer agents using different types of equilibrium strategies with that of people in three different countries, the U.S., Israel and China, that are characterized by cultural differences in how people make contracts in the game. Two human participants played a single computer agent in various role configurations in the game. For the customer role, agents using equilibrium strategies were able to obtain a higher score than people playing the same role in three countries. For the service provider role, agents using equilibrium strategies that reasoned about possibly irrational behavior were able to obtain higher scores than people (as well as agents that did not reason about irrational behavior). This work shows that for particular market settings involving competition between service providers, equilibrium strategies can be a successful design paradigm for computer agents without relying on data driven approaches.

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