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Synthesis of agent-based decision-making systems with multiple coalitions

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Abstract

This paper presents a synthesis method of decision-making systems based on Agents forming multiple coalitions. The condition for coalition formation is defined by a mathematical model that solves the problem of global optimization of the objective function. The problem of synthesizing the agent-based system was formulated, and the mathematical model for negotiating the coalition formation process was developed. The process of initiation, dialogue and coalition formation is presented based on the sequence diagram. For structural modeling, Membrane Computation (P-Systems) models are used that highlight the parallelism and topology of the Multi-Agent system. The Agent structure is defined as a collection of knowledge (data and processing methods) and input/output ports. The functional validation of the Agent and the Multi-Agent system was performed based on the Timed Petri Nets.

Keywords: *coalition, collaborative system, decision-making, genetic algorithms, multi-agent, negotiation, P-systems, strategy*

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