AER Model: An Integrated Artificial Society Modeling Method for Cloud Manufacturing Service Economic System

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Abstract : With the increasing collaboration among various services and the growing complexity of user demands, there are more and more factors affecting the stable development of the cloud manufacturing service economic system (CMSE). This poses new challenges to the evolution analysis of the CMSE. Many researchers have modeled and analyzed the evolution process of CMSE from the perspectives of individual learning and internal factors influencing the system, but without considering other important characteristics of the system's individuals (such as heterogeneity, bounded rationality, etc.) and the impact of external environmental factors. Therefore, this paper proposes an integrated artificial social model for the cloud manufacturing service economic system, which considers both the characteristics of the system's individuals and the internal and external influencing factors of the system. The model consists of three parts: the Agent model, environment model, and rules model (Agent-Environment-Rules, AER): (1) the Agent model considers important features of the individuals, such as heterogeneity and bounded rationality, based on the adaptive behavior mechanisms of perception, action, and decision-making; (2) the environment model describes the activity space of the individuals (real or virtual environment); (3) the rules model, as the driving force of system evolution, describes the mechanism of the entire system's operation and evolution. Finally, this paper verifies the effectiveness of the AER model through computational and experimental results.

Keywords : cloud manufacturing service economic system (CMSE), AER model, artificial social modeling, integrated framework, computing experiment, agent-based modeling, social networks

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