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Generalized Shapley function for games with fuzzy payoffs. (Chinese. English summary)
Zbl 1424.91011

Summary: Generalized Shapley function for cooperative games with fuzzy payoffs is studied based on generalized Hukuhara difference. Firstly, reasonable assumption for generalized Hukuhara difference is made, and on this basis the definition and an axiomatization of generalized interval Shapley value for interval-valued cooperative games are given. Then, according to the relationship between fuzzy number and its cut sets, the generalized Shapley function for cooperative games with fuzzy payoffs is constructed on the basis of generalized interval Shapley value for its $\alpha$-cut games. This generalized Shapley function can be characterized by the axioms of generalized efficiency, generalized dummy player, generalized symmetry, and generalized additivity. Meanwhile, the condition of the existence of generalized Shapley function is given, and the existence and uniqueness of generalized Shapley function are proved. Interestingly, it is found that generalized interval Shapley for interval-valued cooperative game always exists, and generalized Shapley function for cooperative game with the center triangle fuzzy number payoffs also always exists. In addition, we point out that generalized Shapley function for the cooperative games with fuzzy payoffs cannot be directly constructed by using generalized interval Shapley value of its $\alpha$-cut games.

MSC:
91A12 Cooperative games
03E72 Theory of fuzzy sets, etc.

Keywords:
cooperative games; fuzzy number; Shapley value; generalized Hukuhara difference; generalized Shapley function