

The average connected contribution value for graph games

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Abstract

We consider cooperative transferable utility games with a limited communication structure. This structure is defined by a graph and restricts the cooperation of players to only connected coalitions. We define a new solution concept, called the average connected contribution value, that assigns to every player the average of his marginal contributions in all connected coalitions he belongs to. This value has a similar flavor as the restricted Banzhaf value on graph games, and relates to it as the gravity center solution relates to the Myerson value. The average connected contribution value uses only connected coalitions, while the restricted Banzhaf value takes into consideration all possible coalitions. We show that the average connected contribution value, the Myerson value, and the restricted Banzhaf value are members of a larger family of values called power values. We give a general axiomatization for any power value. The axioms are comparable with existing axioms used to characterize other solutions, like the restricted Banzhaf and Myerson values. We also show that in the case when the communication graph is complete, the average connected contribution value coincides with the Banzhaf value. In this way, the average connected contribution value is a generalization of the latter for graph games.

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