Egalitarian tree solutions for graph games

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Abstract

To generalize the equal surplus division for n-person TU games into n-person graph games, this article introduces a recursive negotiation process to establish cooperation between all players. This procedure can be regarded as a generalization of the negotiation process introduced by Ju, Borm and Ruys (2007) from orderings of the player to rooted spanning trees of a communication graph (Demange, 2004). The associated payo vector can be characterized by component efciency and component fairness for subordinates. The latter axiom says that if a player deletes all his links, then the changes in payo for this player and the resulting components among his subordinates should be the same. Then, for each nonempty set of rooted spanning trees, we dene the egalitarian tree solutions as the average over this set of the associated payo vectors. For the class of forest graph games, we provide two axiomatic characterizations of the egalitarian tree solution. A further extension to arbitrary graph games is studied in which rooted spanning trees are constructed by classical algorithm DFS and BFS. When the graph is complete, we show that the associated egalitarian tree solutions coincide with the consensus value (Ju, Borm and Ruys, 2007) and the equal surplus division respectively. As such, the egalitarian tree solution can be seen as a generalization of the consensus value for graph games.

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