

Aligning Individual and Societal Interests in Broadcast Games Via Subsidies

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In game theory, we are often interested in understanding the extent to which the interests of individual players are aligned with the interests of society as a whole. In this talk, I will present some recent results in which we investigate how a central authority can improve this alignment of interests by subsidising some of the cost.

Our investigation is set in the context of broadcast games. It is a cost sharing network design game in which players are vertices in a graph that need a path to a designated root node. The cost of each edge is shared equally by players who use it. Each player will choose a path that is cheapest for himself or herself. However, such selfish behaviour of players may not lead to a good social cost, which is the sum of costs incurred by all players.

We ask the question: can a central authority subsidize the cost of edges in the graph (within a budget) such that selfish behavior may lead to a reasonably lower social cost? We answer in the affirmative when the central authority has the freedom to subsidize edges fractionally. However, suppose the central authority must, for each edge e , choose to either fully subsidize e or completely leave it unsubsidized. Then, we use a non-trivial reduction to show that this problem is hard to even approximate.

This is joint work with Ioannis Caragiannis, Angelo Fanelli, and Christos Kalaitzis.