

Influence Structures, ε -Approximations, and Nash Equilibria

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Abstract

We introduce the structure of influence among players, called I-structure, of a game. An I-structure describes that for each player, who influence his payoff. In terms of I-structure, we give a necessary and sufficient condition for the existence of pure strategic Nash equilibrium (NE). Then, we relax the requirement in I-structure and introduce ε -I-structure, where for each player only those having salient influence on him are considered. Based on ε -I-structure, we define an ε -approximation of the original game. We show that each NE of an ε -approximation is an approximated NE of the original game. Based on it, we connect the I-structure of an ε -approximation with the existence of some approximated NE in the original game. Our results can be interpreted from the viewpoint of players' bounded cognitive abilities.

Keywords: influence structure, existence of Nash equilibrium, ε -approximation, ε -Nash equilibrium.