Entropy methods for coordination and communication in games.

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Abstract

We review several applications of information theory to game theory, and present some open problems.

In the first application, a repeated game is played between nature, and a team consisting of a forecaster and a follower. The sequence of moves of nature is known in advance to the forecaster, but not to the follower. After each stage of the repeated game, the moves of all three players are revealed. We develop optimal strategies for the team against both an i.i.d. sequence of moves or nature, or an adversary nature.

In the second application, team I of players faces team II. At each stage, a signal is observed by the members of team I, but not team II, stochastically depending on the actions chosen by both teams. We analyze how these endogenous signals can be used as a coordination device by team I, allowing for more efficient strategies. We express the trade-off for team I between the generation of signals for future coordination, and the use of these signals to derive efficient payoffs.

In both cases, the maximum payoff the team can guarantee can be computed as the solution of a maximization problem under entropy constraint.