Implementability of Correlated Equilibria in Games with Incomplete Information

Igal Milchtaich

Bar-Ilan University, Ramat Gan 52900, Israel
milchti@mail.biu.ac.il
http://faculty.biu.ac.il/~milchti

October 2008

Abstract

In a correlated strategy, the players' choice of actions is affected by signals, or cues, that they get from an extrinsic source, or correlation device. A mixed strategy may be viewed as a special case, in which the cues are statistically independent. In an incomplete information game, the different types of players may conceivably differ in their ability to perceive or interpret the cues, in which case the cues are affectively type specific. The cues may also convey information about the types of the other players, e.g., because they reflect external events that affect the types. Thus, correlation devices in incomplete information games can be classified by the connections between the players' types and the cues they get, the dependence or independence of different players' cues, and whether or not randomization is involved. These properties define 27 distinct classes of devices.

The significance of this classification is that (as in the complete information case) the properties of the device affect the achievable equilibrium payoffs. In fact, preliminary results show that there are precisely 14 or 15 classes of payoff vectors in incomplete information games. Each class is defined by the kinds of devices that can and cannot implement the payoffs in some correlated equilibrium. This is analogous to implementability of social choice functions, which is studied in mechanism-design theory. An identical classification applies to the correlated equilibrium distributions, i.e., the joint distributions of players' types and actions. Most of these classes have not been described before.