MAX-FLOW MIN-CUT CONFIDENCE REGIONS IN DISCRETE GAMES

Alfred Galichon (École polytechnique, Paris)
Marc HENRY (Université de Montréal, CIREQ, CIRANO)
Maurice Queyranne (Sauder School of Business, UBC)

Abstract

We derive very efficient combinatorial optimization solutions to the problem of computing the identified set for structural parameters of discrete games and a simple bootstrap procedure to construct confidence regions for these structural parameters. We formulate the problem of compatibility of a parameter value with the data as a maximum flow problem through a network containing as nodes the observed equilibrium values and the predicted multiple equilibria combinations for different values taken by unobserved heterogeneity. The capacities that constrain the flow are the true frequencies of each equilibrium. Since those are unknown, they are replaced by suitably augmented empirical frequencies in order to construct confidence regions for the identified set of structural parameters. When exogenous observable variables are included in the model, we apply the maxflow mincut theorem of combinatorial optimization in order to give a tractable optimization formulation of the confidence region. Finally, we show that the complexity of the latter optimization problem can be dramatically reduced by an appeal to results on monotone comparative statics in supermodular games.