Towards The Deterministic Communication Complexity of Approximate Nash Equilibrium

Abstract:

We study the two-party communication complexity of the geometric problem of finding an approximate Brouwer fixed-point of a composition of two Lipschitz functions $g \circ f$, where Alice knows $f$ and Bob knows $g$. We prove an essentially tight communication lower bound on this problem, using a novel adaptation of the Raz-McKenzie simulation theorem into geometric settings. We show that a slightly stronger version of this communication problem would imply an (essentially) tight communication lower bounds on the problem of finding an approximate Nash equilibrium in 2-player (and n-player) games, where each player initially knows only his own payoff matrix.

Joint work with Tim Roughgarden.