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Talk Title: Learning Nash Equilibria in Convex Games

Abstract: Multi-agent decision making arises in engineering applications ranging from electricity markets to telecommunication and transportation networks. Game theory provides a powerful framework for analyzing and optimizing decisions in such systems. We consider a multi-agent decision making scenario, in which each agent optimizes its convex cost function subject to convex local and global constraints. Motivated by practical applications in which the agents may not know the functional form of the objectives or constraints, we consider a payoff-based information structure. Hence, we assume each player can only observe the values of its cost function and the constraints for a played strategy. We propose an algorithm for computing the Nash equilibria using ideas from stochastic optimization. We prove convergence of the proposed algorithm and analyze its convergence rate. We will illustrate the applicability of the approach with numerical case studies.