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General sum games with joint chance constraints

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Abstract

We consider an n-player non-cooperative game with continuous strategy sets. The strategy set of each player contains a set of stochastic linear constraints. We model the stochastic linear constraints of each player as a joint chance constraint. We assume that the row vectors of a matrix defining the stochastic constraints of each player are independent and each row vector follows a multivariate normal distribution. Under certain conditions, we show the existence of a Nash equilibrium for this game.

Keywords: Chance-constrained game, Multivariate normal distribution, Nash equilibrium.

1. Introduction

The notion of the Nash equilibrium was introduced by John Nash in 1950 [20]. He showed that there exists a mixed strategy Nash equilibrium for an n-player finite strategic game. The games with continuous strategy sets have also been extensively studied in the literature. A Nash equilibrium in this case exists under certain conditions on the players' strategy sets and payoff functions [1]. The games considered in [1, 20] are deterministic in nature, i.e., the payoff function and strategy set of each player are deterministic. However, there could

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