ID de Contribution: **101** Type: **Contributed talk**

Continuous and Monotone Bayesian Nash Equilibrium with Incomplete Information about Player's Risk Preferences

mardi 29 juillet 2025 15:30 (30 minutes)

In this paper, we consider a non-collaborative game where each player faces two types of uncertainties: aleatoric uncertainty arising from inherent randomness of underlying data in its own decision-making problem and epistemic uncertainty arising from lack of knowledge and statistical information on the rivals' risk preferences. By assuming that players are risk-averse against aleatoric uncertainty and risk-neutral on the epistemic uncertainty, we propose a Bayesian risk minimization model to describe players' interactions. We investigate existence and uniqueness of a continuous monotone equilibrium arising from the game, termed CMBNRE, where "R" is used to emphasize the game is concerned with risk minimization as opposed to utility maximization in the existing BNE models. We derive sufficient and/or necessary conditions for ensuring existence of CMBNRE from two perspectives: monotonicity of a continuous BNRE and continuity of a monotone BNRE. Continuous BNE emphasizes continuity of each player's response function with respect to variation of the type parameter whereas monotone BNE focuses on monotonicity of the player's response function and/or rival's response functions. The former is derived by virtue of Schauder's fixed point theorem and the latter is established by other fixed point theorems based on single-crossing and quasi-supermodularity, the proposed CMBNRE model synthesizes the two modeling frameworks. We discuss numerical methods for computing an approximate CMBNRE from stochastic optimization perspective and apply the proposed model and computational schemes to a reinsurance competition problem. The test results provide some insights about how indemnity parameter may affect reinsurer's behaviour, market share and profitability.

Authors: XU, Huifu (The Chinese University of Hong Kong (CUHK) - Department of Systems Engineering & Engineering Management); M. SU, Ziheng (The Chinese University of Hong Kong (CUHK) - Department of Systems Engineering & Engineering Management)

Orateur: M. SU, Ziheng (The Chinese University of Hong Kong (CUHK) - Department of Systems Engineering & Engineering Management)

Classification de Session: Game theory and equilibrium

Classification de thématique: Game theory and equilibrium