UNIVERSITÀ DEGLI STUDI DI BERGAMO | Dipartimento di Ingegneria Gestionale, dell'Informazione e della Produzione

Risk Evaluation and Control for Distributed Multi-Agent Systems

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Abstract: We discuss risk evaluation and risk-averse optimization of complex distributed systems with general risk functionals. We postulate a set of axioms for the functionals evaluating the total risk of the system and show the dual representation for the systemic risk measures. Furthermore, we propose two new families of measures constructed by using either collections of linear scalarizations or non-linear risk aggregation. The new framework facilitates risk-averse sequential decision making by distributed methods. The proposed approach is compared theoretically and numerically to some of the systemic risk measurements in the existing literature. We formulate a two-stage stochastic programming decision problem with the new measures of high-dimensional risks and propose a distributed method for its solution. The method is implemented to solve a wireless communication problem associated with the operation of a team of robots that explores an area. The goal is to determine a few reporting points so that the communication is conducted most efficiently while managing the risk of losing information. In this context, we compare the new risk measures to other methods of systemic risk evaluation. We show that the proposed framework is less conservative and results in a substantially better solution of the problem at hand as compared to a linear aggregation of the risk of individual agents as well as other methods.
This is a joint work with Aray Almen, Stevens Institute of Technology.

Thursday, May 30, 2024 - 10:00-11:00
Room C3.02, School of Engineering, Dalmine (BG)

Link MTeams:
https://teams.microsoft.com/l/meetup-join/19%3ameeting_NTM4M2YwYzItYmJhMi00Y2U5LWE4M2QtYzE3NjFiNDU3OWQx%40thread.v2/0?context=%7b%22Tid%22%3a%224f0132f7-dd79-424c-9089-b22764c40ebd%22%2c%22Oid%22%3a%2210bf8574-9e46-413a-81ad-c598bdd6ab7d%22%7d

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