Title: Defining & Optimizing Multi-agent Systems

Abstract: Multi-agent system (MAS) is a system composed of multiple interacting intelligent agents, that aim to solve problems. Application of MAS covers a variety of domains, including aircraft maintenance, military, supply-chain management, financial portfolio management and more. In this tutorial, we will talk about the theory and practice of multiagent systems, how to define and optimize dynamic systems. We will also cover the main concepts and practical applications of multi-agent reinforcement learning that studying the behavior of multiple learning agents that coexist in a shared environment.

Agenda:

Section 1: Fundamentals of multi-agent systems (MAS) [60 mins + 10 mins break]
- Introduction and core elements of MAS
- Agents' communication and coordination
- Cooperative and non-cooperative game theory

Section 2: Multi-agent reinforcement learning and practical applications [80 mins]
- Fundamentals of Multi-agent Reinforcement Learning (MARL)
- Solving MARL under various scenarios
- Coding examples

Expected audience: We expect two types of audience. First type is attendees who have backgrounds in computer science, engineering, and other mathematically oriented disciplines. Second type is interested behavioral and social scientists, who will benefit by understanding the main multi-agent systems concepts. We will go over some code examples, so laptop is recommended, but not required. The tutorial will be based on the graduate-level course "Multi-agent systems" taught by Dr. Alina Vereshchaka.

Speakers' bio:
Nitin Kulkarni is a Ph.D. student of Computer Science and Engineering at the State University of New York at Buffalo, USA. Nitin's research focuses on using reinforcement learning to solve real-world problems. His recent work was on developing epidemiological models for COVID-19 and using reinforcement learning to assist policymakers in finding an efficient mitigation strategy. His ongoing work is on trustworthiness in multi-agent systems for connected and autonomous vehicles to improve efficiency and safety. Email address is nitinvis@buffalo.edu

Dr. Alina Vereshchaka is an Assistant Professor of Teaching of Computer Science and Engineering at the State University of New York at Buffalo, USA. Her current research interests include deep reinforcement learning, optimization and multi-agent modeling in stochastic environments. Email address is avereshc@buffalo.edu