Decision Making

Chair - Prof. Shivaram Kalyanakrishnan

Shivaram Kalyanakrishnan is an Assistant Professor in the Department of Computer Science and Engineering at the Indian Institute of Technology Bombay. His research interests include artificial intelligence and machine learning, spanning topics such as sequential decision making, multi-agent learning, multi-armed bandits, and humanoid robotics. Kalyanakrishnan received a Ph.D. in computer science from the University of Texas at Austin. Subsequently was a Research Scientist at Yahoo Labs Bangalore and an INSPIRE Faculty Fellow at the Indian Institute of Science, Bangalore. His contributions to robot soccer have received two Best Student Paper awards at the annual RoboCup competitions. Kalyanakrishnan was also a member of the first study panel of the One Hundred Year Study on Artificial Intelligence (AI100), which in 2016 released its report titled "Artificial Intelligence and Life in 2030".

Abstract.

In today's world, autonomous agents are being trusted with decisions that have real-life consequences. Examples include self-driving cars that must decide which route to take to a destination, trading agents that much choose whether to buy or sell a particular stock, and on-line ad-exchanges that must select a single ad from a competing pool to display to a given user. This session will present the conceptual foundations of decision making, including the modeling of uncertainty, long-term effects, and the presence of other agents. Illustrations will be drawn from a wide variety of domains.

Prof. Manjesh Kumar Hanawal

Title: Online Decision-Making in Uncertain Environments

Abstract: In many situations, one has to play from a set of actions with an aim to collect as much as reward by playing the best action. However, the environment could be unknown and apriori it may not be clear which action is the best. In such scenarios, the player/learner can figure out which action performs relatively better than the others by observing their rewards as the play progresses. Then it is natural for the player to explore the available actions and exploit the action that is optimistically best as uncertainty over the actions improves. The multi-armed bandit (MAB) framework aims to optimally tradeoff between exploration and exploitations to maximize the total reward collected over a period.

We will discuss the applications of MAB in various fields like e-commerce and recommendations systems.

Dr. Harshad Khadilkar

Harshad Khadilkar holds a BTech from the Department of Aerospace Engineering at IIT Bombay, followed by an MS and PhD from the Department of Aeronautics and Astronautics at the Massachusetts Institute of Technology. He currently leads the Planning & Control team at TCS Research, and is interested in the application of optimization, control, and machine learning algorithms to real-world networked or distributed systems.

Title: "Practical Reinforcement Learning for Managing Industrial Operations"

Abstract:

Machine learning has made several inroads into real-world industrial applications, especially in the areas of forecasting, anomaly detection, and regression. Concurrently, reinforcement learning as a class of control applications has had great success in areas such as online gameplay. However, RL has yet to make a significant impact on control methodologies in industrial operations. In this talk, Harshad will walk through some use cases where RL has proven useful in domains such as transportation scheduling and logistics. The focus will be on motivating the use of RL as opposed to traditional Operations Research algorithms, to solve large scale sequential decision-making problems.