Brij Disa Centre for Data Science and Artificial Intelligence

IIMA
INDIAN INSTITUTE of MANAGEMENT AHMEDABAD
विद्याविनियोगाद्विकास:

WORKSHOP ON

ADVANCES IN DATA-DRIVEN OPTIMIZATION

April 23-25, 2025

Introduction

The objective of the workshop is to empower faculty members and PhD students who are already familiar with technologies related to prescriptive-AI by providing them a basic knowledge about two problems of interest.

1. Distributionally Robust Optimization
2. Online Resource Allocation (ORA)

These are both specific problems where decisions have to be made under uncertainty, and have a fast-growing body of literature along with interesting practical applications.

Distributionally Robust Optimization modeling: Many decision problems in engineering and sciences are affected by uncertain quantities whose distribution is observable only via limited training samples. Given limited data about the uncertain quantities, how can we arrive at data-driven prescriptive decisions that can be certified to perform well even if the deployment environment drifts and differs from the training environment (or) produces scenarios unseen in training? In the recent years, Distributionally Robust Optimization (DRO) models have emerged as a prominent modeling paradigm towards this goal. In the series of talks under this topic, we aim to introduce some commonly used DRO model formulations and key methodological enablers, together with discussions of application contexts in Operations Research and Machine Learning.

Online resource allocation: Models and Algorithms: Online resource-constrained reward collection problems form a highly useful abstraction for various real-world applications where the decision-maker has to sequentially interact with a system to learn the characteristics of resource constraints and make reward-maximizing decisions. Prominent models which come under this topic include the well-known multi-secretary problem, Online Linear Programming, network revenue management, online bidding for ad allocation, etc. In the series of talks under this topic, we aim to introduce two effective principles, namely (i) certainty equivalent heuristic, and (ii) optimism in the face of uncertainty, which govern the design of effective online algorithms which exhibit low regret.

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The workshop is designed for faculty members and advanced PhD students in Operations Research. Participants are expected to have a basic understanding of: Linear programming duality and Basic Probability theory, including expectations and conditional distributions.

Duration and Mode

The workshop will be for three days. There will be four sessions of 75 minutes each conducted on each day of the workshop, with two sessions planned before lunch and two sessions after lunch. Out of the 12 sessions, 6 sessions will be reserved for DRO and 6 sessions will be reserved for ORA. The workshop will involve lectures and a detailed analysis of standard results in these areas.

Speaker

Prof. Karthyek Murthy

Faculty member in Singapore University of Technology & Design (SUTD)

Scan the QR Code or click here to know more about Prof. Karthyek Murthy

Karthyek Murthy serves as an Assistant Professor in the Singapore University of Technology and Design. His research interests revolve around data-driven operations research, focussing on models and methods for translating data into large-scale planning and operational decisions that are robustly effective and reliable in the face of uncertainty. His research has been recognized with the Outstanding publication award (2024) from the INFORMS Simulation Society, Best publication award (2023) from the INFORMS Applied Probability Society, Winter Simulation Conference best paper award (2019), and the INFORMS Junior Faculty JFIG paper competition Third Prize (2021). He earned his PhD from the Tata Institute of Fundamental Research in 2015 and worked as a postdoctoral researcher in Columbia University's Industrial Engineering & Operations Research department from 2015 to 2017. He presently serves on the editorial boards of the journals Operations Research, Stochastic Systems, Operations Research Letters and as an elected council member in the INFORMS Simulation Society.

The registration deadline is March 31, 2025. As registrations are limited, we encourage you to secure your spot at the earliest. For any additional questions, please feel free to contact Mr. Jaydeep Gohel (Centre Secretary-CDSA) at cdsa-secretary@iima.ac.in.

To know more and register, scan the QR code or click on the link here:

Link to the webpage of the workshop on Advanced Optimization Theory

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