EPSTEIN INSTITUTE SEMINAR ▪ ISE 651

Optimization in the Presence of Model Ambiguity in Markov Decision Processes

ABSTRACT - Optimizing sequential decision-making under uncertainty is essential in many contexts, including inventory control, finance, healthcare, and many others. One of the most common model formulations is the Markov decision process (MDP). However, ambiguity in the MDP model parameters can introduce challenges because recommendations from MDPs depend on the underlying model, and there are often multiple plausible models. To address this problem, we present a framework in which a decision-maker considers multiple models of the MDP's ambiguous parameters and seeks to find a policy that maximizes an aggregate measure of performance with respect to each of these models of the MDP, such as weighted rewards, regret, or worst-case performance. I will discuss connections to other models in the stochastic optimization literature, complexity results, and solution methods for solving these problems. I'll illustrate the approach with two examples, one in the context of preventative treatment for cardiovascular disease and the other in the context of machine maintenance. Finally, I'll conclude with a summary of the most important takeaway messages from the study.

Dr. Brian Denton
Stephen M. Pollock Professor
and Dept. Chair
Dept. of Industrial & Operations
Engineering
University of Michigan

SPEAKER BIO – Brian Denton is the Stephen M. Pollock Professor of Industrial and Operations Engineering and the Chair of the Department of Industrial and Operations Engineering at the University of Michigan. His research interests are data-driven decision-making and optimization under uncertainty with applications to healthcare delivery, supply chain management, and other topics related to allocating scarce resources. Before joining the University of Michigan, he worked at IBM, Mayo Clinic, and North Carolina State University. His honors and awards include the National Science Foundation Career Award, the INFORMS Daniel H. Wagner Prize, the Institute of Industrial Engineers Outstanding Publication Award, and the Canadian Operations Research Society Best Student Paper Award. He has served on several editorial boards including Manufacturing & Service Operations Management, Medical Decision Making, Operations Research, and Production and Operations Management. He has co-authored over 100 journal articles, conference proceedings, book chapters, and patents. He is an elected Fellow of INFORMS and IISE and a past President of INFORMS.

USC Viterbi
School of Engineering
Daniel J. Epstein Department of
Industrial and Systems Engineering

TUESDAY, MARCH 21, 2023
3:30 PM – 4:50 PM
USC ANDRUS GERONTOLOGY CENTER (GER), ROOM 206