Industrial & Systems Engineering

Seminar Announcement

Robust Medical Treatment Decisions—an Application to Type 2 Diabetes

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Abstract: Medical treatment decisions, such as glycemic control for patients with type 2 diabetes, involve complex tradeoffs between the risks and the benefits of treatment. The diversity of treatment options that patients can choose over time and the uncertainty in future health outcomes result in a difficult sequential decision making problem that plays out over the course of a patient's lifetime. In this seminar, I will first discuss a new Markov chain-based glycemic control model for comparing the effectiveness and cost of different treatment regimens for individuals newly diagnosed with type 2 diabetes. Next, I will discuss an approach to evaluate the sensitivity of model outcomes with respect to uncertainty in transition probabilities of the underlying Markov chain. Finally, I will present a robust Markov decision process model (RMDP) that is applicable in many contexts where the goal is to optimize medical treatment decisions. I will discuss computationally efficient methods for solving this model, illustrate the application of this model to optimize treatment decisions for glycemic control, and show that robust optimal policies could potentially provide guidance for clinicians and policy makers to make treatment decisions that tradeoff the nominal and worst case performance of treatment policies.

Bio: *Brian Denton* is a Professor in the Department of Industrial and Operations Engineering at University of Michigan, in Ann Arbor, MI. He also holds an appointment in the Department of Urology at University of Michigan. Previously he has been an Associate Professor in the Department of Industrial & Systems Engineering at NC State University, a Senior Associate Consultant at Mayo Clinic, and a Senior Engineer at IBM. He is past president of the INFORMS Health Applications Section and he serves as Secretary on the INFORMS Board of Directors. He is currently President-Elect of INFORMS. His primary research interests are in optimization under uncertainty with applications to health care delivery and medical decision making in the context of chronic diseases. He completed his Ph.D. in Management Science at McMaster University, his M.Sc. in Physics at York University, and his B.Sc. in Chemistry and Physics at McMaster University in Hamilton, Ontario, Canada.

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