Yunzong Xu, PhD Candidate – Fri., Jan. 13

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| **Operations Management & Statistics****Rotman Recruiting Seminar****FRI., JAN. 13, 2023 | 1:30 PM | ROOM LL 1020** |
| Bridging Online and Offline Learning Towards Improved Data-Driven Decision Making**Yunzong Xu, PhD Candidate,Institute for Data, Systems, and Society at MIT** |

**Abstract |** Machine learning is playing increasingly important roles in decision making, with key applications ranging from dynamic pricing and recommendation systems to personalized medicine and clinical trials. While supervised machine learning traditionally excels at making predictions based on i.i.d. offline data, many modern decision-making tasks require making sequential decisions based on data collected online. Such discrepancy gives rise to important challenges of bridging offline supervised learning and online interactive learning to unlock the full potential of data-driven decision making.

In the main part of this talk, we consider the challenge of reducing difficult online decision-making problems to well-understood offline supervised learning problems. Focusing on contextual bandits, a core class of online decision-making problems, we present the first optimal and efficient reduction from contextual bandits to offline regression. A remarkable consequence of our results is that advances in offline regression immediately translate to contextual bandits, statistically and computationally. We illustrate the advantages of our results through new guarantees in complex operational environments and experiments on real-world datasets, in the context of electronic commerce and healthcare.

After the main part, I will provide an overview of my additional work and broader research agenda on bridging online and offline learning towards improved data-driven decision making. I will highlight the importance of problem structures and discuss the exciting opportunities for the operations management community.

**Bio |** I am a fifth-year Ph.D. student in the Institute for Data, Systems, and Society at MIT. I am affiliated with the Statistics and Data Science Center and the Laboratory for Information and Decision Systems. I am advised by David Simchi-Levi. I am broadly interested in statistical machine learning and operations research. My current research interests include data-driven decision making, online and reinforcement learning, econometrics and causal inference, with applications to revenue management and healthcare. I am interested in both methodological developments and practical implementations. My industrial experience includes a research internship at Microsoft Research NYC on reinforcement learning, as well as an ongoing research collaboration with IBM Research and Boston Scientific on healthcare inventory management. Prior to joining MIT, I received my dual bachelor's degrees in information systems and mathematics from Tsinghua University in 2018.

***Note:*** *OM&S PhD students are reminded to stay in the classroom for the full duration of the seminar.*

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