

The University of Chicago Booth School of Business

Operations Management/Management Science Workshop

Tuesday, April 4, 2017

Brendan Lucier, Microsoft Research

Title: Online Resource Management with Posted Prices and Combinatorial Prophet Inequalities

Abstract:

In a combinatorial market with many goods, such as virtual machines in the cloud or bandwidth in a data network, a typical challenge is to serve multi-dimensional requests that arrive online. This is a stochastic decision-making problem, where the goal is to allocate the pool of resources efficiently. In this talk we will focus on posted-price policies, where the designer sets prices and customers sequentially choose their preferred bundles. This pricing problem is related to the prophet inequality, which describes the power of threshold rules in online stochastic optimization.

I will present a framework for deriving new prophet inequalities for combinatorial allocation problems. Our approach reduces the problem to a simpler deterministic setting, using economic insights from auction theory. This framework is robust to errors and generalizes to a variety of combinatorial markets. I will also discuss an empirical study on a market for data transfers in a wide-area network, where price-based admission is combined with traffic optimization to improve overall efficiency.

Paper links:

“Posted Prices, Smoothness, and Combinatorial Prophet Inequalities”

<https://arxiv.org/abs/1612.03161>

Joint with Paul Dütting, Michal Feldman, and Thomas Kesselheim

“Dynamic Pricing and Traffic Engineering for Timely Inter-Datacenter Transfers”

<https://www.microsoft.com/en-us/research/publication/dynamic-pricing-traffic-engineering-timely-inter-datacenter-transfers-2/>

Joint with Ivan Bliznets, Virajith Jalaparti, Srikanth Kandula, and Ishai Menache

Short Bio:

Brendan Lucier is a Researcher at Microsoft Research, New England. Prior to joining Microsoft, he received a Ph.D. in Computer Science from the University of Toronto. His research interests lie in the intersection of theoretical Computer Science and Economics, and include algorithmic market design, algorithmic pricing, and social processes on networks. He is especially interested in the tradeoffs between simplicity, robustness, and optimality in markets for complex goods and services.