Engineering online matching markets

Instructors: Yash Kanoria and Jay Sethuraman

Fridays 1 pm to 4 pm in 329 Uris. Spring 2017.

Class Dates: 1/27, 02/03, 10, 17, 24, 03/03, 24, 31, 04/07, 14, 21, 28.

This class will explore the intersection of operations, engineering and economics relevant to modern internet marketplaces, with a focus on matching markets. Matching markets allow compatible agents to match with each other for mutual benefit, including those for dating, labor, accommodation and rides. The topics covered will emphasize recent developments and research, technical tools that may help advance the frontier in this space, and open directions. We will *not* cover the important and heavily studied topics of stable marriage and auctions.

Some of the major topics the class will touch on:

- **Intro to two-sided platforms**. Thinking about the platform operator and platform participants.
  Rochet and Tirole (2003), Platform competition in two-sided markets
  Rochet and Tirole (2006), Two-sided markets: A progress report
  Armstrong (2006), Competition in two-sided markets
  Horton and Zeckhauser (2016), "Owning, Using and Renting: Some Simple Economics of the "Sharing Economy""
- **Search frictions in matching markets**
  Rogerson, Shimer & Wright (2005), "Search-theoretic models of the labor market: A survey".
  Hoppe, Moldovanu & Sela (2009), "The Theory of Assortative Matching Based on Costly Signals".
  Horton (2015), "Supply Constraints as a Market Friction: Evidence from an Online Labor Market".
- **Design of the "search environment"** on platforms within which participants search for partners.
  Halaburda, Piskorski & Yildirim (2015),
  Competing by restricting choice: the case of search platforms
  Kanoria and Saban (2016),
  Facilitating the search for partners on matching platforms: Restricting agent actions.
  Romanyuk (2016),
  Ignorance is Strength: Improving the Performance of Matching Markets by Limiting Information
- **The theory of optimal transport**: a powerful tool for matching supply and demand?
  A. Galichon (2016), Optimal Transport Methods in Economics (Princeton University Press).
  Also, tools from switch scheduling that appear promising in the context of dynamic matching:
  Maguluri & Srikant (2016), "Heavy traffic queue length behavior in a switch under the MaxWeight algorithm".
  Eryilmaz & Srikant (2012). "Asymptotically tight steady-state queue length bounds implied by drift conditions".

- **Balancing supply and demand in a spatio-temporal environment**
  Braverman, Dai, Liu & Ying (2016), "Empty-car Routing in Ridesharing Systems".
  Work by Cornell IEOR folk (Henderson, Shmoys and others) on Citibike.
  Kanoria & Qian (2016), "Using dispatch to balance supply and demand via virtual flows".
- **Pricing issues**
  Banerjee, Freund & Lykouris (2016), Multi-objective pricing for shared vehicle systems
  Bimpikis, Candogan & Saban (2016), Spatial Pricing in Ride-Sharing Networks
  Gomes & Pavan (2014), Many-to-many matching and price discrimination
- **Reputation systems**
  Nosko, Tadelis (2015), "The limits of reputation in platform markets: An empirical analysis and field experiment".
  Resnick, Kuwabara, Zeckhauser & Friedman (2000), Reputation Systems.
- **Project presentations by students**

Class evaluation will be based on **class participation (40%)** and **projects (60%).**