Overview

The purpose of the course is to provide an introduction to social and economic networks. A key focus is on understanding concepts and methods used for, and derived from, analyzing such networks. Most of these methods are central to the operations of companies like Facebook, Google, Twitter and Amazon. Among these are methods for identifying segments (communities) in networks; methods that are used by Google to rank search results, by Amazon to recommend products, and by Twitter to recommend customized stories and other individuals for a user to follow; auctions used for selling products as varied as flowers, tuna, art and search keywords; methods used by Facebook for placing advertising in a user’s newsfeed; and mechanisms used for matching students to schools, cars to passengers (e.g., Uber, Lyft), and kidneys to patients.

Class sessions will combine lectures and discussions of assigned articles. All students are expected to actively contribute to class discussions and think critically about the concepts and issues discussed in the course. In each class, one group of 3-4 students will present a paper (marked by a * in the list below).

Grading

30% homework; 40% final exam; 30% class participation.

Readings

A pdf copy of the Easley and Kleinberg book *Networks, Crowds, and Markets: Reasoning About a Highly Connected World* is available on Jon Kleinberg’s website: https://www.cs.cornell.edu/home/kleinber/networks-book/ Links to all other readings will be provided on Canvas.
Session 1. Introduction to social networks. Strong and weak ties. Community detection.

Required readings
(1) Graphs, Chapter 2 in Easley, D. and J. Kleinberg.
(2) Strong and Weak Ties, Chapter 3 in Easley and Kleinberg.

Optional reading


Required readings
(1) Link Analysis and Web Search, Chapter 14 in Easley and Kleinberg.

Optional readings


Required readings
(1) Networks in Their Surrounding Contexts, Chapter 4 in Easley and Kleinberg.
Optional readings


Session 4. Information cascades and coordinated action.

Required readings


(3) Information Cascades, Chapter 16 in Easley and Kleinberg.

(4) Cascading Behavior in Networks, Chapter 19 in Easley and Kleinberg.

Optional readings


Session 5. Auctions, Sponsored Search, VCG and GSP.

Required readings

(1) Auctions, Chapter 9 in Easley and Kleinberg.
(2) Sponsored Search Markets, Chapter 15 in Easley and Kleinberg.
https://www.wired.com/2015/09/facebook-doesn-t-make-much-money-could-on-purpose/

Optional readings


Required readings

https://sloanreview.mit.edu/article/dating-disruption-how-tinder-gamified-an-industry/
(3) The Small Worlds Phenomenon, Chapter 20 in Easley and Kleinberg.

Optional readings