University of Haifa
Information and Knowledge Management
Social Networks: Structure and Analysis
(13:00 – 16:00)
Course number: 218.5212
Instructor: Ossi Mokryn
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Course Overview and Objectives

"Over the past decade there has been a growing public fascination with the complex "connectedness" of modern society. This connectedness is found in many incarnations: in the rapid growth of the Internet and the Web, in the ease with which global communication now takes place, and in the ability of news and information as well as epidemics and financial crises to spread around the world with surprising speed and intensity. These are phenomena that involve networks, incentives, and the aggregate behavior of groups of people; they are based on the links that connect us and the ways in which each of our decisions can have subtle consequences for the outcomes of everyone else." [1]

In this course we will study the structure of these networks and links, and understand the mechanisms that govern social and complex interactions and networks.

Perquisite: Python, Statictics

Methodology

Lectures are given in Hebrew, using slides that are in English. The purpose is twofold: familiarize the students with the technical terminology, and with the style in the textbooks and literature.

Lectures are supplemented by in-class discussions.

Text Books

[1] Easley, David, and Jon Kleinberg. *Networks, Crowds, and Markets: Reasoning about a Highly Connected World*. New York, NY: Cambridge University Press, 2010. ISBN: 9780521195331.
A site dedicated to the book: Networks, Crowds, and Markets: Reasoning About a Highly Connected World

[2] Network Science, ALBERT-LÁSZLÓ BARABÁSI. A site dedicated to the book: Network Science

Grades

Class participation: 10%, based on 5 reading assignments
3 Home works, 30% each: 90%
Attendance policy is defined by the program's requirements

Homework

Submission is allowed and even encouraged *in pairs*, to promote collaboration between the students. Please do not split the work but rather work on it together. The final exam is given under the assumption you have thought yourself on each and every exercise given in the homeworks.

Submitting Homeworks:
All homeworks must be submitted via the Moodle system.

Schedule:

Date	Topic	Assignment
9/5/17	Introduction and Motivation	Reading assignment 1: Chapter 2 of text book [1]
17/5/17	Networks concepts 1/2	Reading assignment 2: Additional reading [1,4,5] Problem assignment 1;
23/5/17	Degree distributions	Reading assignment 3: http://barabasi.com/f/622.pdf (excluding 5.7)
6/5/17	From random networks to scale free Networks	Problem assignment 1 due; Assignment 2;
13/6/17	Network Concepts 2/2	Reading assignment 4: Chapter 3 of textbook [1] including the advanced material, Additional material [6]
20/6/17	Guest Lecture: Twitter and event detection (Mr. Samer Aamar)	Reading assignment 5: Chapter 14 of text book [1]

27/6/17	Social networks 1: Weak and strong ties Presentations of assignment 2: 15 minutes each group	Assignment 2 due; Final assignment
4/7/17	Social Networks 2,3: Communities; Trust in online social networks and e-commerce	Final assignment due July 5th

Additional Reading Material

Lada Adamic. Zipf, power-laws, and Pareto: A ranking tutorial, 2000. On-line at http://www.hpl.hp.com/research/idl/papers/ranking/ranking.html.   .1

R ́eka Albert and Albert-L ́aszl ́o Barab ́asi. Statistical mechanics of complex networks. Reviews of Modern Physics, 74:47–97, 2002.   .2

Chris Anderson. The long tail. Wired, October 2004.   .3

A. Clauset, C.R. Shalizi, and M.E.J. Newman, "**Power-law distributions in empirical data**" *SIAM Review* **51**(4), 661-703 (2009)   .4

Milojević, Staša. "Power law distributions in information science: Making the case for logarithmic binning." *Journal of the American Society for Information Science and Technology* 61.12 (2010): 2417-2425.   .5

Mark Granovetter. The strength of weak ties. American Journal of Sociology, 78:1360– 1380, 1973.   .6

Leskovec, Jure, Jon Kleinberg, and Christos Faloutsos. "Graphs over time: densification laws, shrinking diameters and possible explanations." *Proceedings of the eleventh ACM SIGKDD international conference on Knowledge discovery in data mining*. ACM, 2005.   .7

Yang, Jaewon, and Jure Leskovec. "Defining and evaluating network communities based on ground-truth." *Knowledge and Information Systems* 42.1 (2015): 181-213.   .8