Are the connected nodes in a network kind of the same?

Reading: Ch 4 of Easley-Kleinberg

“Homophily”

Mohammad T. Irfan
Homophily

- What is it?
- How to measure it?
- How does it happen?
- Can we “exploit” it for something good?
- Effects of homophily
  - Segregation
What is homophily?

- Principle that "We are like our friends"
  - Age
  - Place of living
  - Occupation
  - Income
  - Interests
  - Beliefs
  - Opinions

- Homophily illustrates how the surrounding context can drive link formations in a network
  - Intrinsic vs. contextual
How to measure homophily?
Middle and high school friendship
How does homophily happen?
Mechanisms of homophily
1. Selection
2. Social influence

Crandall et al. (2008)

Similarity score =
# articles edited by both A AND B / #... edited by A OR B
Misconception

- In a network, friends share a lot of common characteristics (e.g., drug usage). Changing the behavior of a few nodes will influence many other nodes to change as well.
- Cohen & Kandel (1977)- teenage drug usage
Other topics on context in network

- Affiliation network
Can we “use” homophily for something good?
Are Your Friends Making You Fat?

By CLIVE THOMPSON
Published: September 10, 2009

EILEEN BELLOLI KEEPS very good track of her friends. Belloli, who is 74, was born in Framingham, Mass., which is where she met her future husband, Joseph, when they were both toddlers. (“I tripped her and made her cry,” recalls Joseph, a laconic and beanpole-tall 76-year-old.) The Bellolis never left Framingham, a comfortable, middle-class town 25 miles west of Boston — he became a carpenter and, later, a state industrial-safety official; and after raising four children, she taught biology at a middle school. Many of her friends from grade school never left Framingham, either, so after 60 years, she still sees a half dozen of them every six weeks.

I visited the Bellolis at their home in Framingham last month, and when I asked Eileen about her old friends, she jumped up from her rose-colored rocking chair, ran to her cabinet and pulled down a binder filled with class photos and pictures from her school reunions. Every five years, she told me, she helps organize a reunion, and each time they manage to collect a group of about 30 students she has known since elementary and junior high school. She opened the binder and flipped through the pictures, each carefully laminated with a label on the back listing...
Christakis & Fowler (2007): Obesity

Strong evidence of social influence in 32 years of data
Study Finds Big Social Factor in Quitting Smoking

By GINA KOLATA
Published: May 22, 2008

For years, smokers have been exhorted to take the initiative and quit: use a nicotine patch, chew nicotine gum, take a prescription medication that can help, call a help line, just say no. But a new study finds that stopping is seldom an individual decision.

Smokers tend to quit in groups, the study finds, which means smoking cessation programs should work best if they focus on groups rather than individuals. It also means that people may help many more than just themselves by quitting: quitting can have a ripple effect prompting an entire social network to break the habit.

The study, by Dr. Nicholas Christakis of Harvard Medical School and James Fowler of the University of California, San Diego, followed thousands of smokers and nonsmokers for 32 years, from 1971 until 2003, studying them as part of a large network of relatives, co-workers, neighbors, friends and friends of friends.
Christakis & Fowler (2008)
Social network among smokers (yellow) and non-smokers
Effects of homophily
Residential segregation

(a) Chicago, 1940

(b) Chicago, 1960
Residential segregation

New York (Eric Fischer, 2010)
Schelling's model (1970s)

Thomas Schelling
Nobel Prize (2005)

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Threshold = 3

(a) An initial configuration.

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(b) After one round of movement.
Misconception

- People move because they want to be majority
  - Correct: They want to avoid being extreme minorities
Simulation

- NetLogo
- File → Models Library → Social Science → Segregation