

HUDK 4050: CORE METHODS IN EDM

In the news



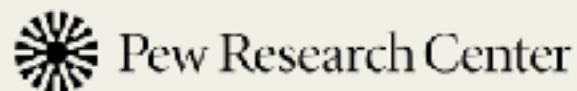
How Can We Reveal Bias in Computer Algorithms?

Center for American Progress

New Federal Data Show a Student Loan Crisis for African American Borrowers



How Copyright Law Can Fix Artificial Intelligence's Implicit Bias Problem



Automation in Everyday Life

The New York Times



Facebook tests a resume "work histories" feature to boost recruitment efforts

Silicon Valley Is Not Your Friend



Student-Run Help Desks Provide Advantages to Schools, Learners

NMC Pushes Better Digital Literacy Standards with a Focus on Content Creation

students **National Academy of Sciences Starts Framing Data Science Education**

Medium

Building Recommender System for GitHub

Faculty Predict Virtual/Augmented/Mixed Reality Will Be Key to Ed Tech in 10 Years



BUSINESS SCIENCE

HR ANALYTICS: USING MACHINE LEARNING TO PREDICT EMPLOYEE TURNOVER

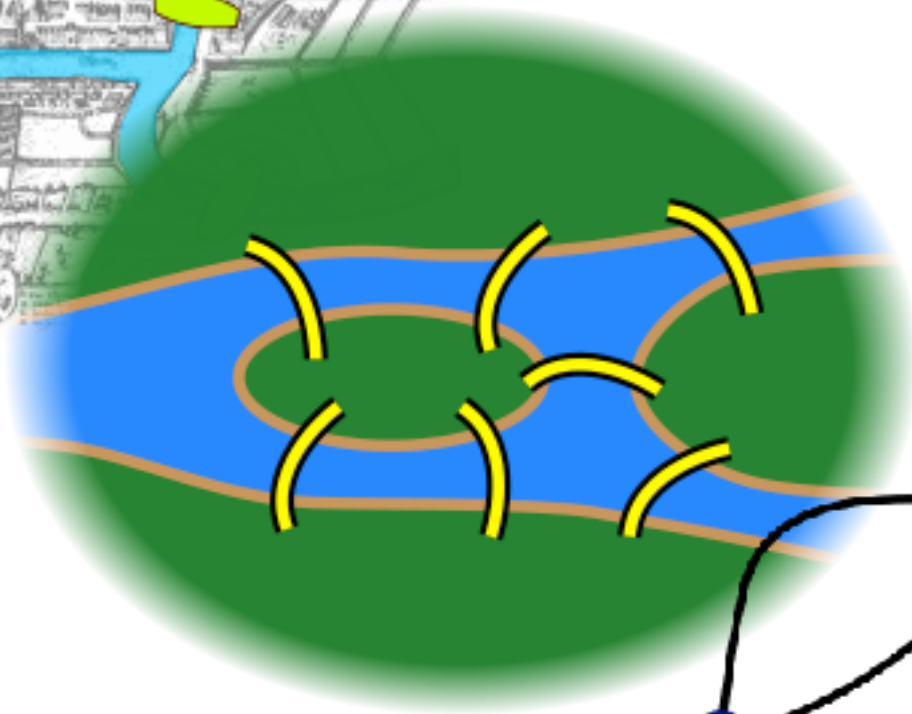
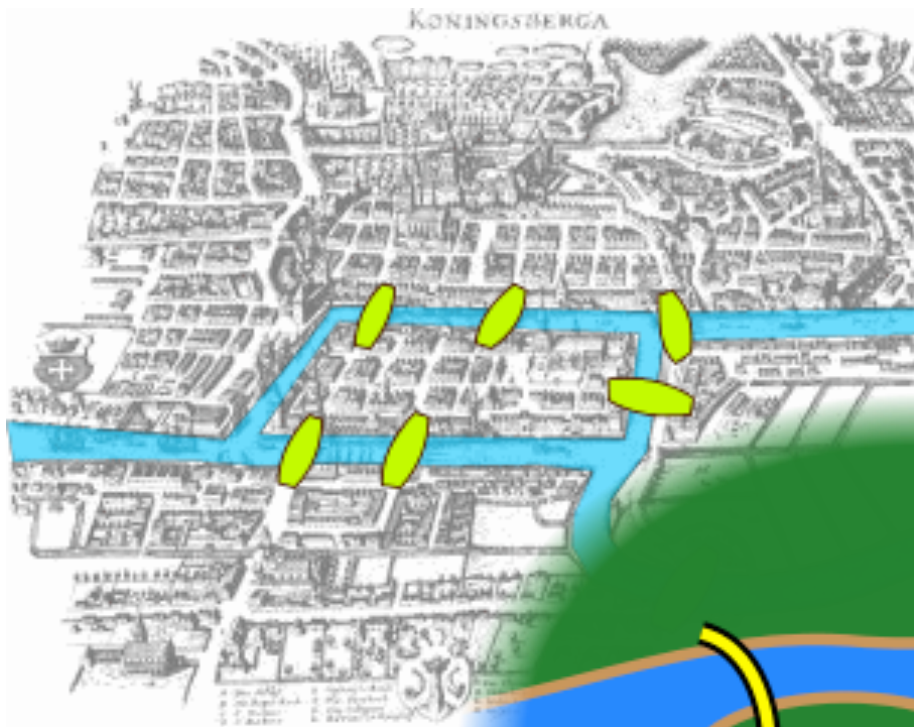


Events

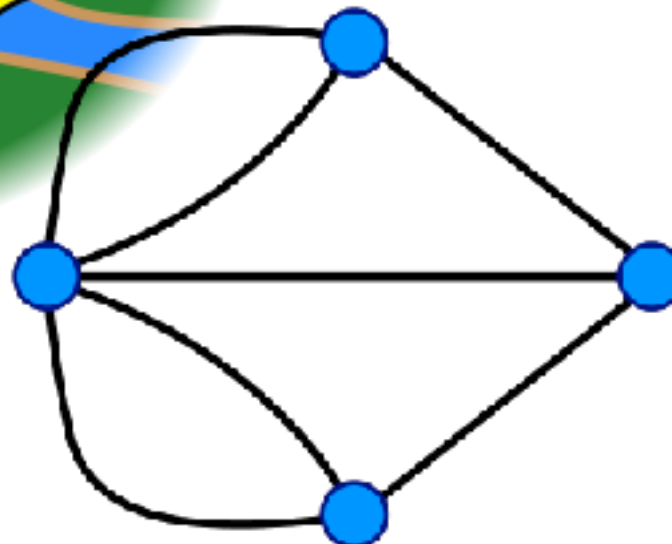
Event	Date	Time	Location	URL
The People's Roadmap: CivicTech & Opendata	October 19	7:00pm	201 Moore St, BK	http://meet.meetup.com/wf/click?upn=pFEcc35imY7Cq0tG1vyTtwOTrZ6JlCkXpTsfzoCLqt37NZZsw4Kh7avCkHlkUV-2FOJz1iuXAqUojA2E7NHfdEK5poT UHmfBN9VCYx16-2FKQsb-2FliFcSJaUjGIDXPZBdhsAbS-2BlcuqZMWb0UixjZDV90HclL-2BABAclmGZvF-2FDfsTkGzr o-2BoztXitOAd6fc9vcbUrbdEiQMauzBZsNr2nYDCYqkQQ6glpmNIIT7BEqkg-3D_I3fs1g-2F466j3y5fD5Q61KtVREvIdS z8eOmcaorpVEXZUrqilf0LysztWxKcBPoNPdk0n1IXrFV-2B6IsEoJmyE-2Fkt-2BYg-2FaE217t-2BvFehSqNc-2BehycuOZlh 8-2F3vmnqaGmhZJlt4oTelEQqSt4M0XsCSjgWYLeOztQEWGcy5q9tQ3xKCyE8-2Br1RibiPHXPDzM-2Bg9HN-2B4EAlJi CYicln8apx2CQquRB6c0ZMJW4TJowsMqztZXghJehtp1PaxSeW-2FoVhnZpICPrFF7uzwqa5A83A8baScilQ9Q3GK-2F qh23NFf3a-2BY579BttglBada4jsSNAqOAc2Cy3qY8QSJMbApKE6AFzUAtXScGjgFKPkpgomXzji-2BP9lU0R8A-2Fskd OOpXEdGj6cBBMBdiH9th7D7v76qUJAzaNCOEbfNku5vylBMVm5C5lurzBHm5W9fICMWvxrew41YjPthzYuvaOm3miv A-3D-3D
NY VR Expo	October 20-21	All day	Javits Center	http://www.nyvrexpo.com (Promo code: "EDUINVR")
Privacy Localism: A New Research Agenda	November 3		NYU Law School	http://www.law.nyu.edu/centers/ili/events/privacy-localism
Learn How to Use NYC Open Data	October 17	6:00pm	Carto 201 Moore St	https://www.meetup.com/betanyc/events/243887488/?https=on&_af=event&_af_eid=243887488
The People's Disruption: Platform Co-Ops for Global Challenges	November 10/11	all day	The New School	https://platform.coop/2017
TC Microsoft Workshop	November 2	7:00pm	Grace Dodge 179	https://www.eventbrite.com/e/tcla-workshop-microsoft-data-science-workshop-tickets-38363319722
EdSurge Career Fair	October 16	7:00pm	Edtech Factory, 860 Broadway	https://www.eventbrite.com/e/ny-edtech-meetup-edsurge-ny-edtech-jobs-fair-tickets-32702090834?aff=es2

Social Network Analysis

History

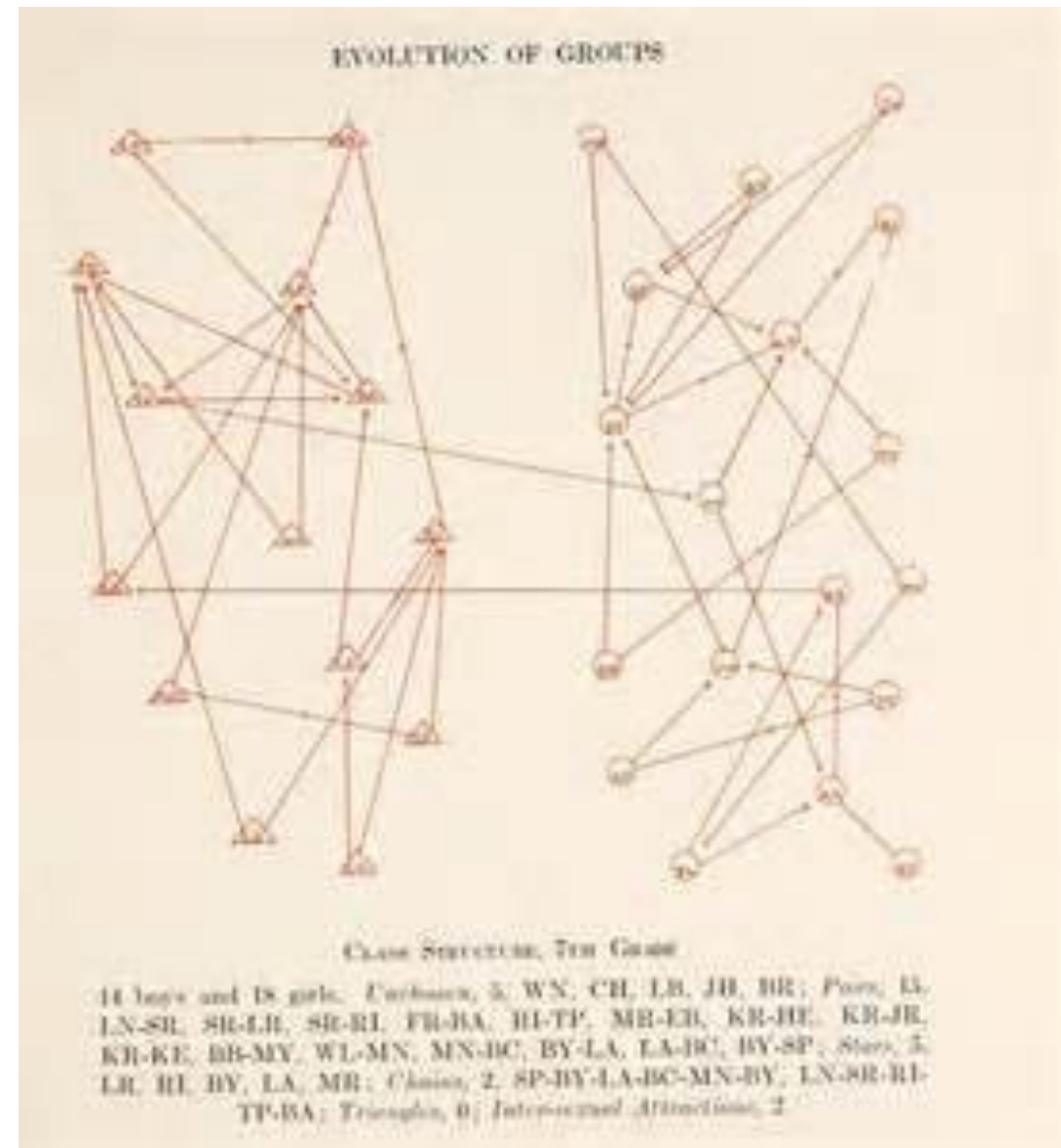


Leonhard Euler



Use in Education

- Helen Jennings & Jacob Levy Moreno
- Hudson School for Girls (1934)



History

- Random network the size of the US (in 1950) would require at most two intermediaries to connect any two people (Kochen)
- Small World Experiments (Miligram)
 - Postcards sent to random people in Kansas
 - People instructed to send their postcard to a target person in Boston or someone that they think might know that person



Use in Education

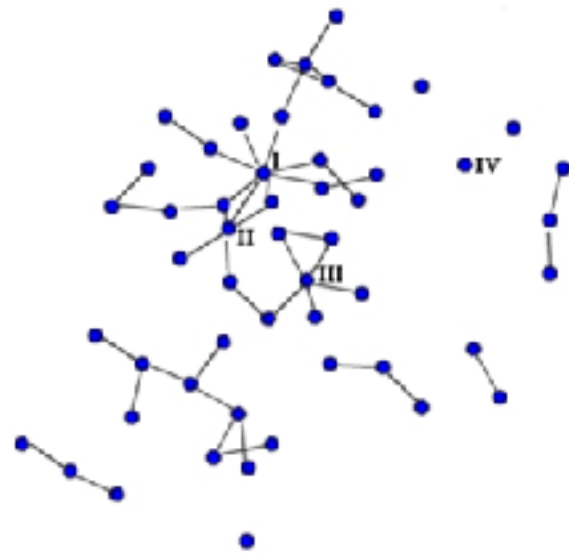
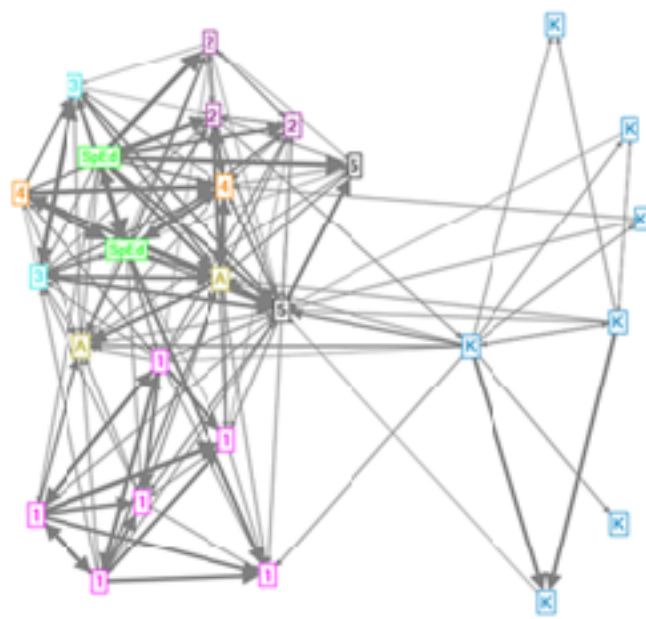


Figure 2. Sociogram of discussion forum interactions

Dawson (2008)

Centrality measures from forum posts correlate to student sense of belonging (mediated by external network)

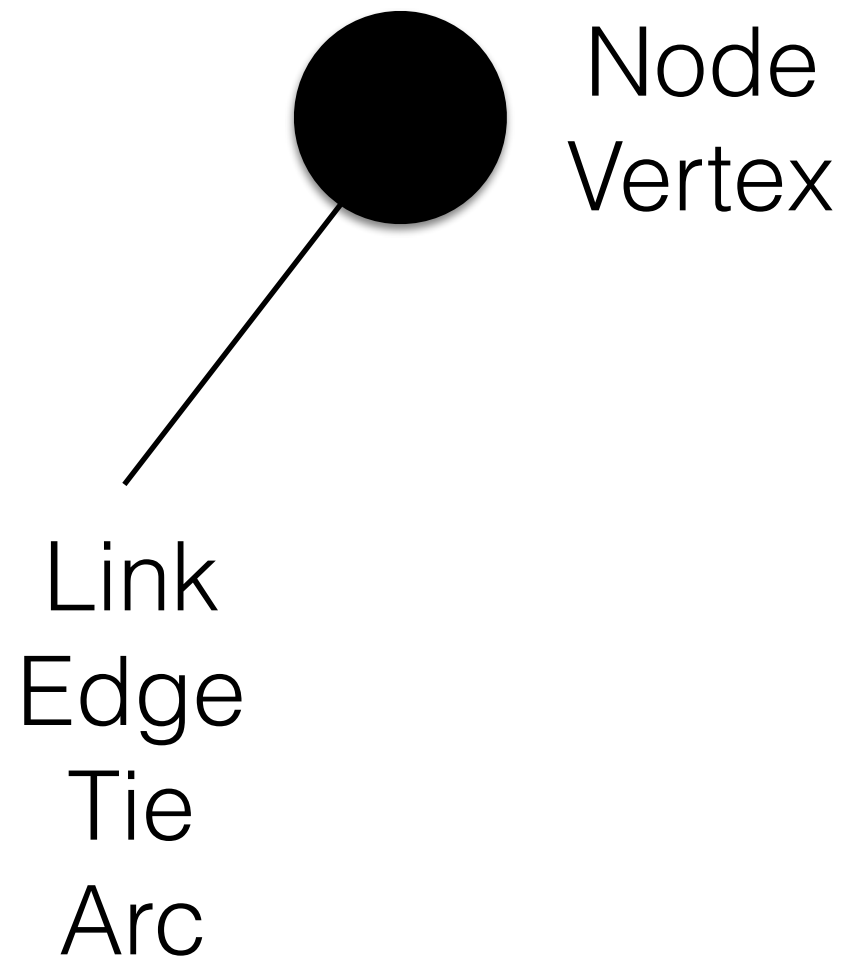


Smith, Trygstad, Hayes (2016)

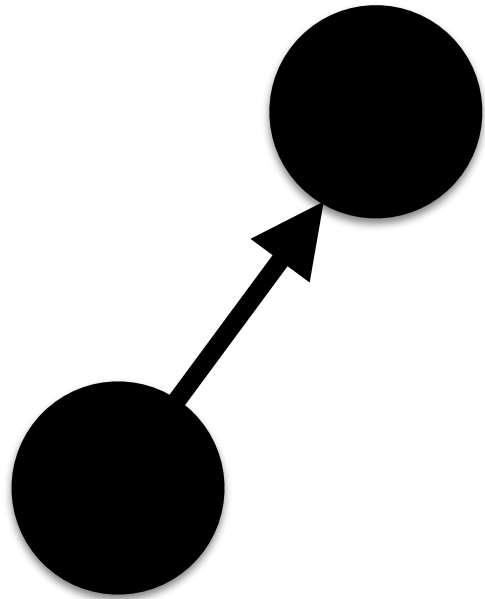
SNA can be used to identify influential teachers within their peer group

Networks

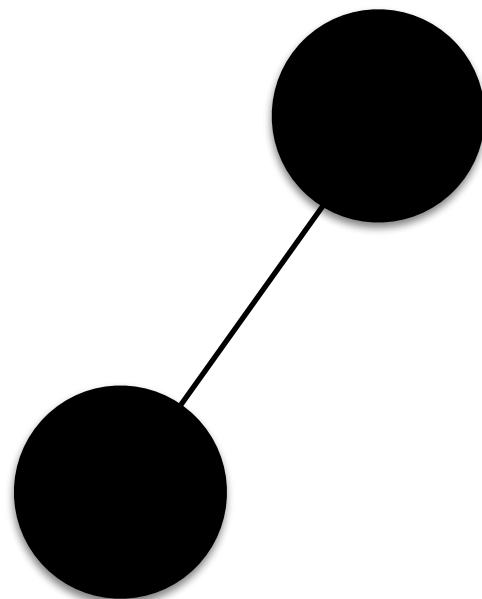
(Graphs)



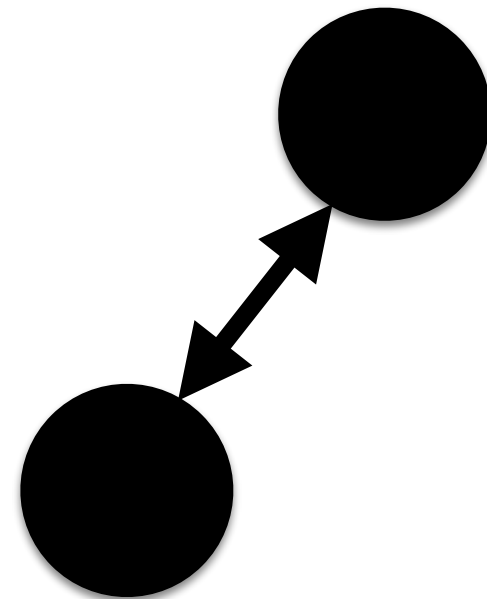
Networks



Directed



Undirected

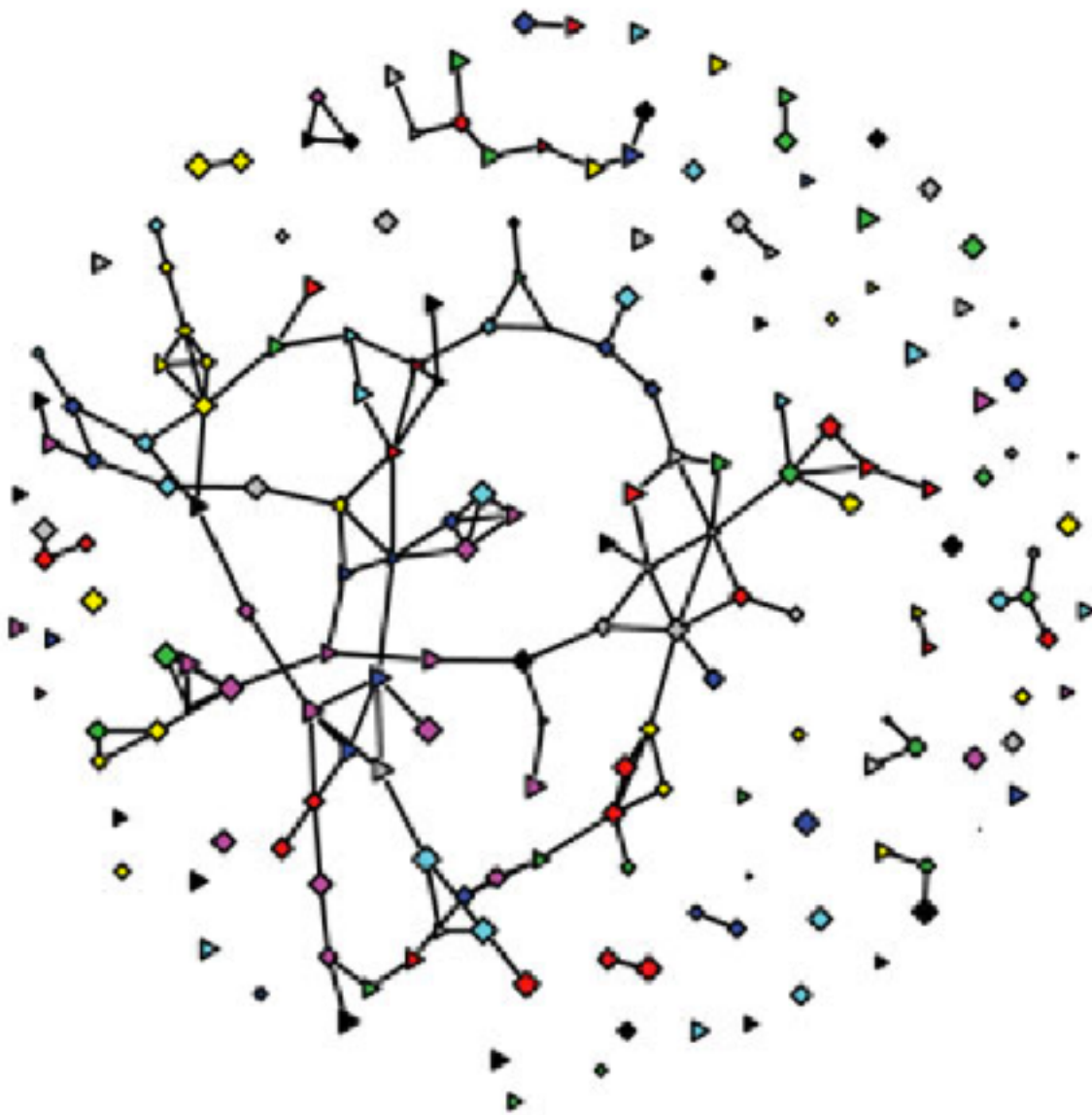


Reciprocal

Degree

The number of links to other nodes in the network

Undirected



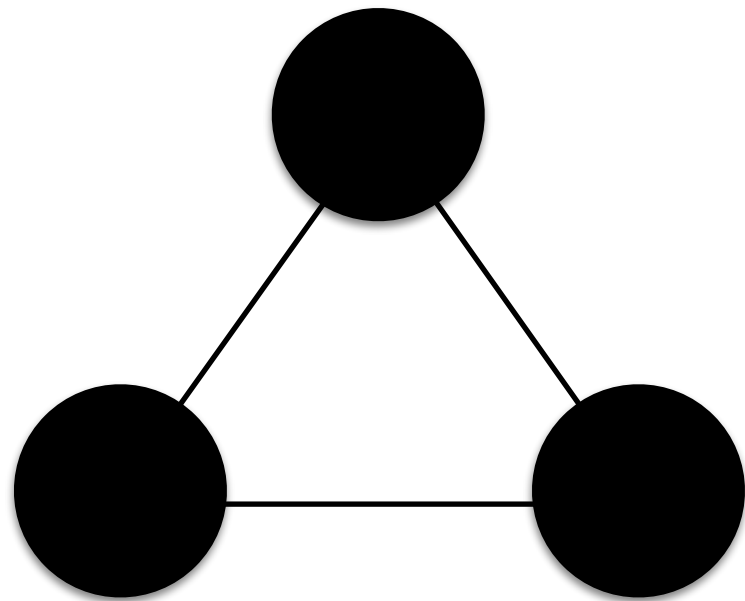
Directed



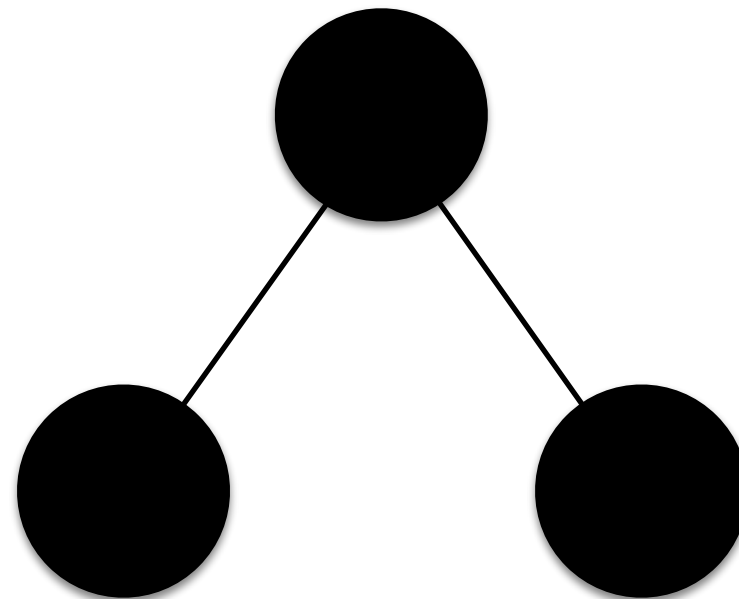
Indegree = Popularity
Outdegree = No shame

Density

How close is the graph to the maximal number of links



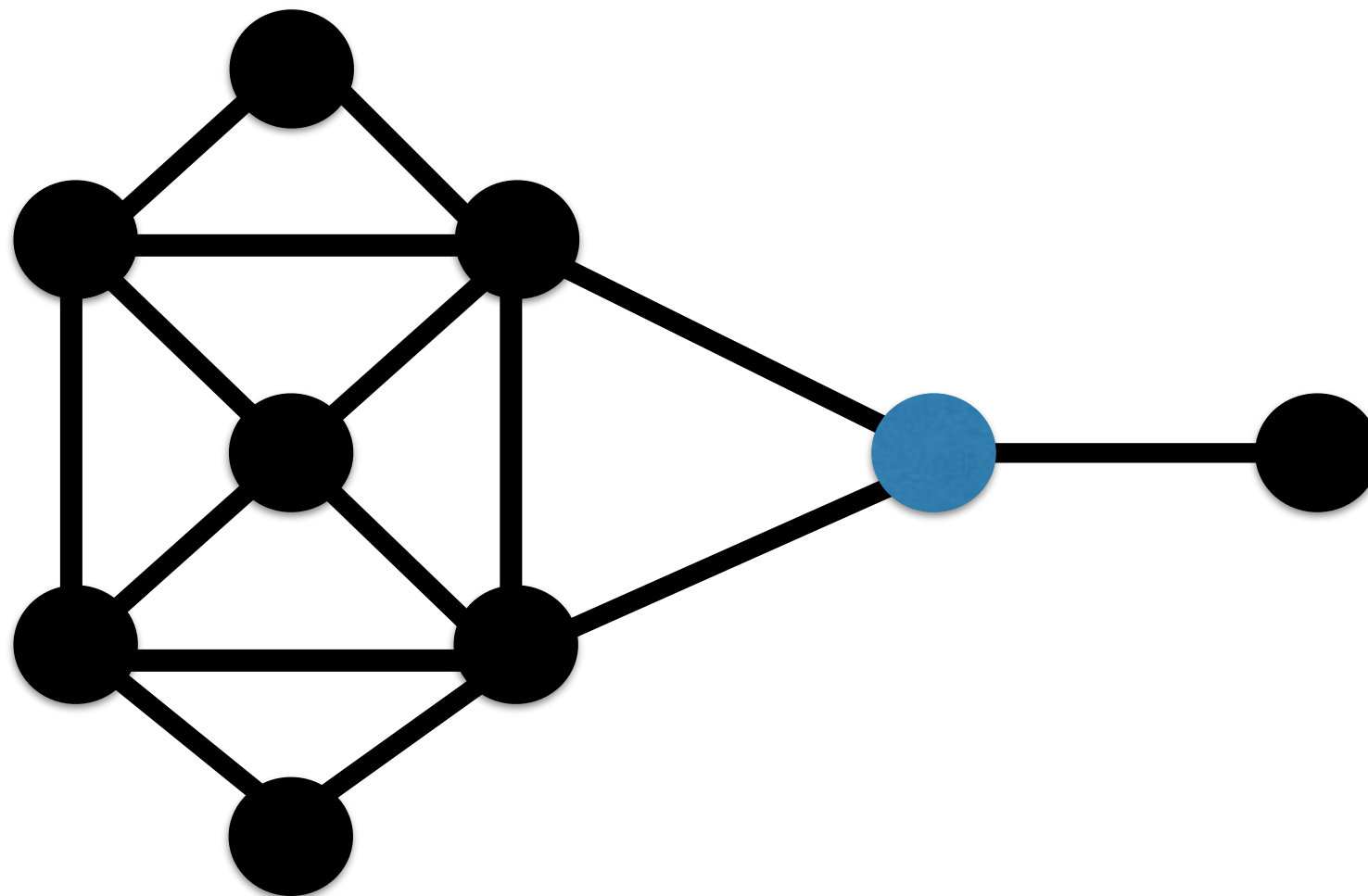
3 actual
3 possible
Density = 1



2 actual
3 possible
Density = 0.67

Betweenness Centrality

The extent to which a node lies between other nodes



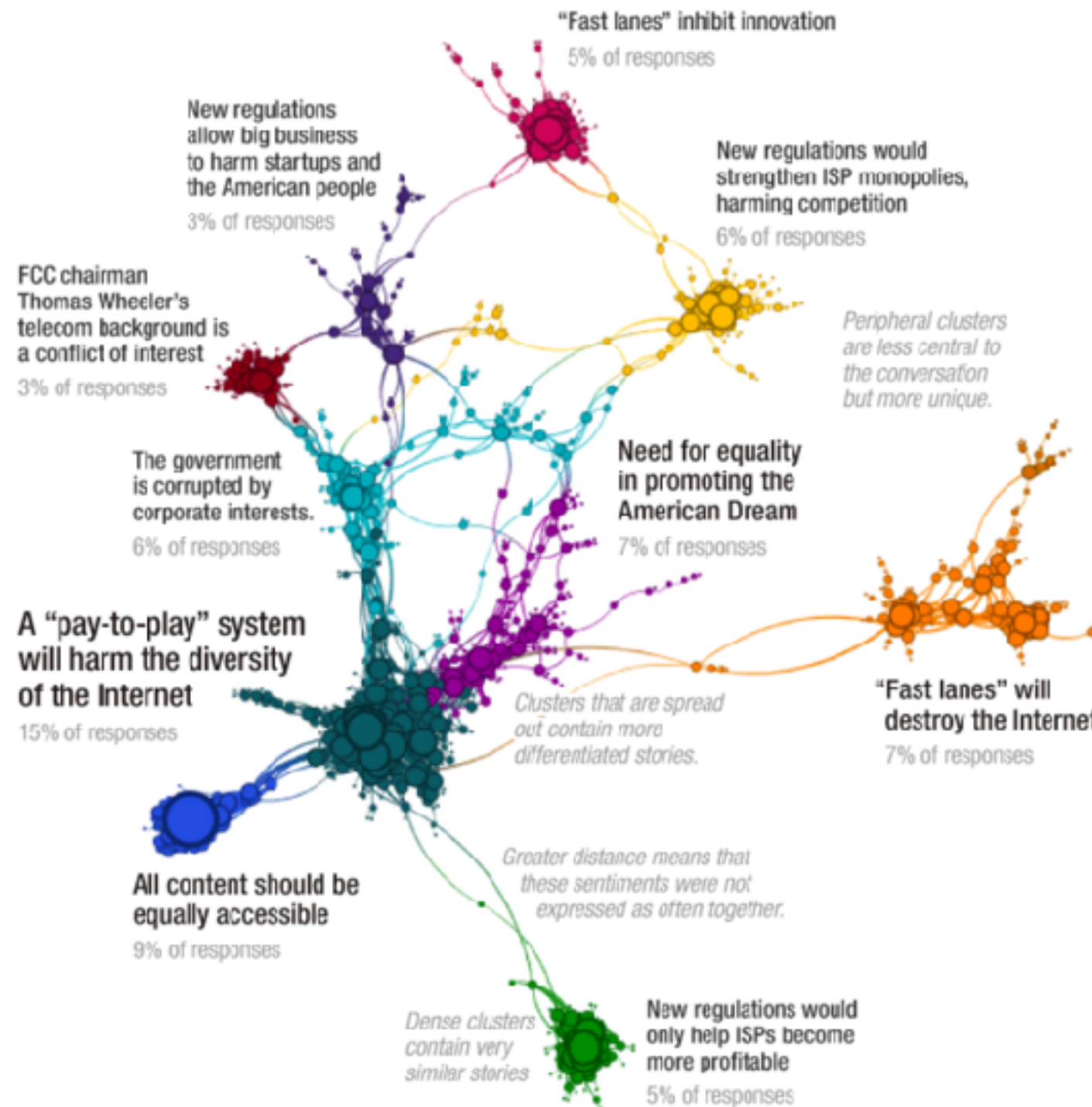
It is equal to the number of shortest paths from all nodes to all others that pass through that node

Modularity

The fraction of the edges that fall within the given groups minus the expected such fraction if edges were distributed at random

$$\begin{aligned} Q_s &= \frac{1}{2\bar{w}} \sum_i \sum_j \left(\bar{w}_{ij} - \frac{\bar{w}_i \bar{w}_j}{2\bar{w}} \right) \delta(C_i, C_j) \\ &= \frac{1}{4w} \sum_i \sum_j \left(w_{ij} + w_{ji} - \frac{(w_i^{\text{out}} + w_i^{\text{in}})(w_j^{\text{out}} + w_j^{\text{in}})}{4w} \right) \delta(C_i, C_j) \\ &= \frac{1}{4w} \sum_i \sum_j \left[\left(w_{ij} - \frac{w_i^{\text{out}} w_j^{\text{in}}}{2w} \right) + \left(w_{ji} - \frac{w_i^{\text{in}} w_j^{\text{out}}}{2w} \right) \right] \delta(C_i, C_j) \\ &= -\frac{1}{(4w)^2} \sum_i \sum_j (w_i^{\text{out}} - w_i^{\text{in}})(w_j^{\text{out}} - w_j^{\text{in}}) \delta(C_i, C_j) \\ &= Q_D - \frac{1}{(4w)^2} \sum_i \sum_j (w_i^{\text{out}} - w_i^{\text{in}})(w_j^{\text{out}} - w_j^{\text{in}}) \delta(C_i, C_j). \end{aligned}$$

How do we make the network look nice?



How do we make the network look nice?

Force directed graphing

- Attractive forces

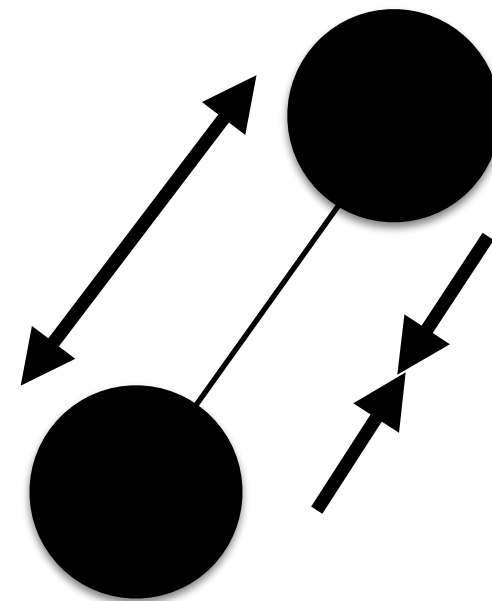
Springs

Hooke's Law: $F = kX$

- Repulsive forces

Electrons

Coulomb's Law: $|\mathbf{F}| = k_e \frac{|q_1 q_2|}{r^2}$



<https://youtu.be/YGDvR6CRwEc>

<http://bit.ly/2gMIRKD>