Week 04
Node-level metrics
Thursday, September 16

INFO 5613: Network Science

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Agenda

○ Activity: Measuring centrality with network

○ Discussion: Social capital

Review

- Centrality
  - Degree, closeness, betweenness, eigenvector

- Online political network of Boulder
  - Ego network terminology: ego, alter, N-step ego network
  - Getting digital trace data requires many research design decisions that shape network structure (Week 2)
  - Many real-world networks don't have a clear structure in a visualization! (Week 3)
  - That doesn't mean there is no structure – centrality metrics can capture variation across nodes!
  - Imputing weights from binary edges using Jaccard index and filtering network
  - Visualizing different centrality metrics in Gephi

Activity

Measure centrality in networkx

○ Download "Class 07 – Node-level metrics.ipynb" and launch

○ Computing node-level centrality metrics, handling normalized values, inspecting top results

○ Correlations across centrality metrics

○ Optional exercises applying to boulder_politics data

Discussion

Reading responses

○ Answer any, all, or none of them if there's something else you'd like to contribute!

○ What centrality metrics do you find hard to intuitively understand or apply? What centrality metrics seem more applicable or promising to your research interests?

○ What is an example of social capital from your research interests, current events, or history? Is this kind of social capital at the level of individuals or groups, internally-focused or externally? Which of the boxes from Borgatti, *et al*. (1998) contains network measures most relevant to it?

○ Social capital as access to resources through social relation is often compared to "classical" forms of financial, human, cultural capital. Information exchange, influence, credentials, reinforcements (pg. 31) differentiate its mechanisms from others. How do you see these mechanisms at work in your research, current events, or historical cases?

○ What is it like to read Lin (1999)'s account of "cyber-networks" contributing to a rise of social capital from 2021? What did it get right or wrong and why?

Applications of centrality metrics

- Many people struggling with closeness centrality!

- Clustering: a good measure of echo chambers in online conversations
- Eigenvector: strategic information operations identifying and targeting influencers
- Betweenness: marginalization of queer identity representation
- Closeness: road networks and urban planning
- Clustering: recommendation algorithms like TikTok
- Degree: Popular hashtags and users
- Centralization in distributed ecosystems and 51% attacks
- Neighbor eigenvector for measuring polarization

Types of social capital

- Social capital as a back door for interviews, collaborations, etc. with VIPs

- Social capital mechanisms of gatekeeping in fandoms reinforcing/undermining hierarchies

- Disruptions to youth social networks in foster care transitions undermining social capital processes

- Civic participation and social media use among teens influencing/ed by social capital processes

- Social capital as political capital: loyalty to Trump in early pandemic granted access to resources

Social capital and cyber-networks

○ OSN led to new forms of power: online influencers, trolls, etc.

○ Missed: power of the platforms, infrastructure, algorithms; social contexts and values

○ Personal vs. social capital in cyber-networks

○ "Declaration of the Independence of Cyberspace" optimism

○ Anti-authoritarianism, Great Walls & filtering, FUD campaigns

○ Freedom of information vs. financial realities of running newspapers

Module assignment 1

Module Assignment 1

- Due Friday, September 17 by midnight on Canvas

- Find an article around your research interests employing network theories/concepts/methods
- How did you encounter this paper, it or its authors' influence in your research area, *etc*.
- Summarize the key relational constructs used by the paper: what are nodes and links?
- Write a critique using the concepts about data collection, validity, ethics, visual rhetorics
- Outline how the research could've/should've been done if you were driving it

Next class

Next class

○ Readings

   ○ Feld, S. L. (1991). Why your friends have more friends than you do. *American Journal of Sociology*, 96(6):1464–1477

   ○ Milo, R., Shen-Orr, S., Itzkovitz, S., Kashtan, N., Chklovskii, D., and Alon, U. (2002). Network motifs: Simple building blocks of complex networks. *Science*, 298(5594):824–827

   ○ Newman, M. E. J. and Park, J. (2003). Why social networks are different from other types of networks. *Physical Review E*, 68(3):036122