Unit 8: Analysis

Network analysis

Lesson 57

Derek Ruths

Lesson overview

Objectives

- Understand when network analysis methods are used

Outline

- What is a network?
- Core network concepts
- Centrality

What is a network?

Network analysis focuses on analyzing the relationships between entities.

structure of the network- the way we're connected to one another

how fast does something spread through the network? depends on the structure

Key Concepts

- Node (vertex)
- Edge

  edges can have weights.

  weights often indicate "strength" of a connection
- Path

paths, multiple nodes connected by edges in order

paths can have weights: sum of edges weights if applicable

in code:
library: networkx

draw_network.py:

```
import networkx as nx

def main():
    G = nx.Graph()
    G.add_edge('1', '3', weight=3)
    G.add_edge('2', '3', weight=4)
    G.add_edge('3', '4', weight=2)
    G.add_edge('4', '5', weight=7)
    G.add_edge('4', '6', weight=1)

    f = plt.figure()
    nx.draw_networkx(G)
    f.savefig("network.png")

    nx.degree_centrality(G) // normalized by # edges



if __name__=='__main__':
     main()
```

looking at networks is very hard
typically we don't visualize networks
after 30 nodes its not super easy to make sense of

this is why we have stats associated with networks--easier to understand

importance of a node to a network
how important is a node to a network?
a node by itself cannot make itself important

Centrality

- Degree

how many nodes is it connected to
DEGREE = # of edges incident to the node

degree centrality

- Closeness

- Betweenness

betweenness centrality

shortest paths thorugh node n / # of shortest paths in the netwrok

importance from a structural connectivity perspective

Lesson wrap-up

Takeaways

- Network analysis is a powerful technique for studying relationships