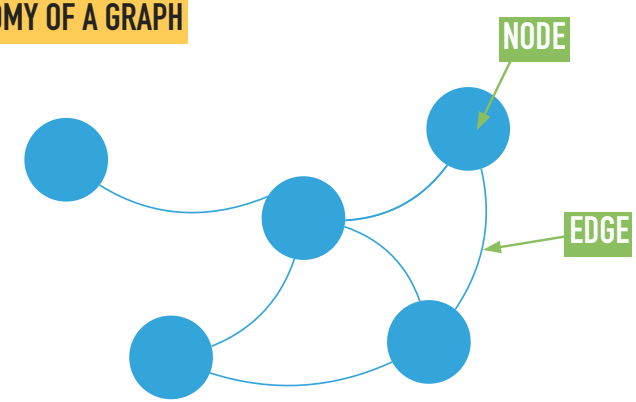
SC207-5-FY: COMPUTATIONAL SOCIAL SCIENCE AND DIGITAL ISSUES

SOCIAL NETWORK ANALYSIS

WITH GEPHI AND NETWORKX

ANATOMY OF A GRAPH



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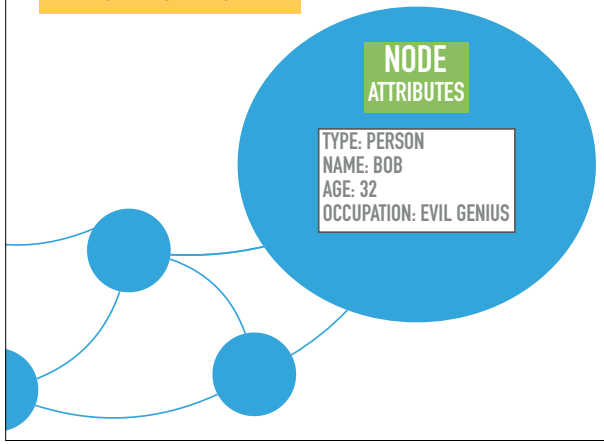

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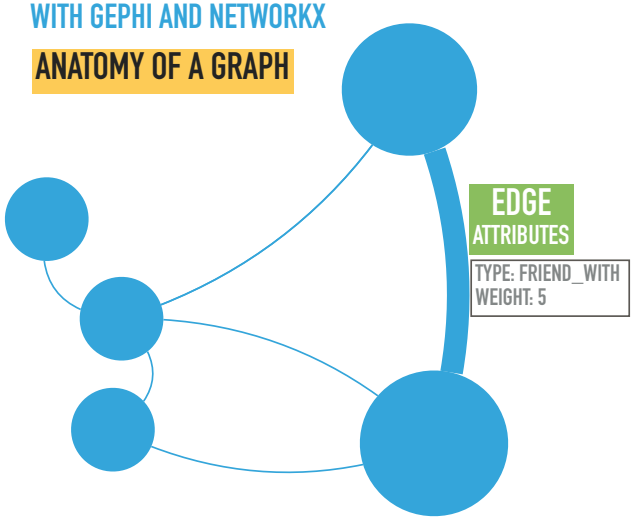

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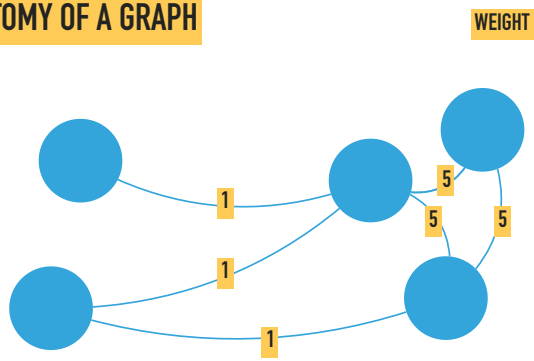
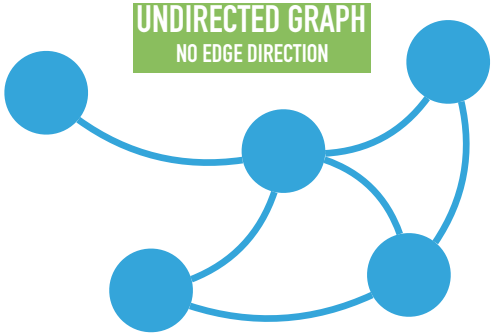


SOCIAL NETWORK ANALYSIS
WITH GEPHI AND NETWORKX

ANATOMY OF A GRAPH

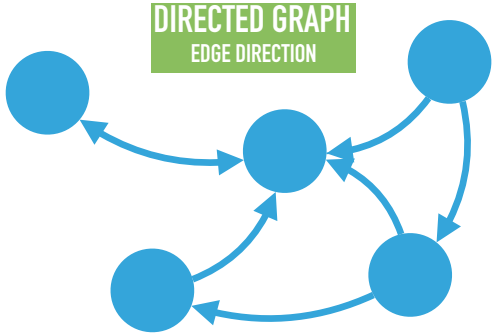
UNDIRECTED GRAPH
NO EDGE DIRECTION



SOCIAL NETWORK ANALYSIS
WITH GEPHI AND NETWORKX

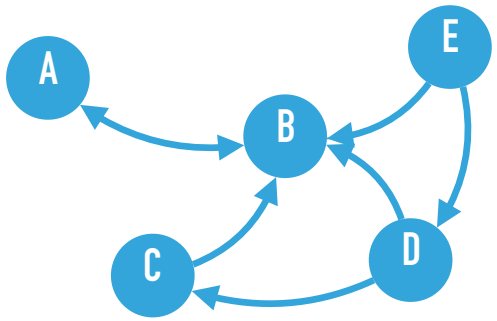
ANATOMY OF A GRAPH

DIRECTED GRAPH
EDGE DIRECTION



SOCIAL NETWORK ANALYSIS
WITH GEPHI AND NETWORKX

DIRECTED GRAPH
EDGE DIRECTION



EDGE LIST

Source	Type	Target
A	-[Influences]->	B
B	-[Influences]->	A
C	-[Influences]->	B
D	-[Influences]->	B
D	-[Influences]->	C
E	-[Influences]->	B
E	-[Influences]->	D

SOCIAL NETWORK ANALYSIS
WITH GEPHI AND NETWORKX

CENTRALITY MEASURES

Understand the different roles of nodes in a network.

Important Nodes

Bridges between groups

Influence of a node over an entire Network

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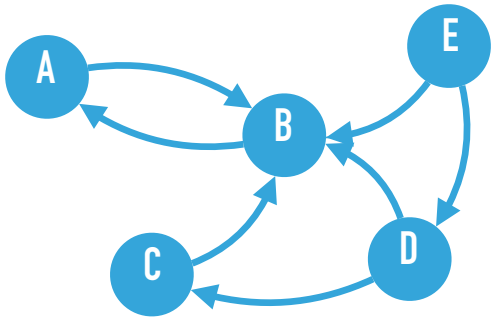
SOCIAL NETWORK ANALYSIS
WITH GEPHI AND NETWORKX

DEGREE CENTRALITY



- B is the most connected node

CENTRALITY MEASURES

Node	Degree
A	2
B	5
C	2
D	3
E	2

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SOCIAL NETWORK ANALYSIS
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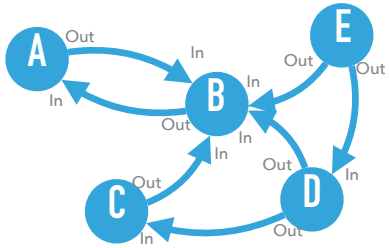
DEGREE CENTRALITY



- B is influenced by the most nodes
- D and E are the most influential

CENTRALITY MEASURES

Node	Degree	In-Degree	Out-Degree
A	2	1	1
B	5	4	1
C	2	1	1
D	3	1	2
E	2	0	2

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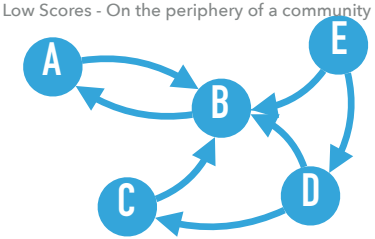
SOCIAL NETWORK ANALYSIS
WITH GEPHI AND NETWORKX

BETWEENNESS CENTRALITY

- Which nodes are the control points.
- If every node wanted to reach every other node, which node would they have to go through most.
- High scores - Very central to a community
- Low Scores - On the periphery of a community



CENTRALITY MEASURES

Node	Betweenness Centrality
A	0
B	3
C	0
D	1
E	0

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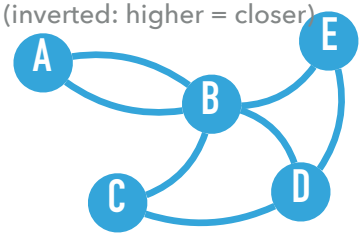
SOCIAL NETWORK ANALYSIS
WITH GEPHI AND NETWORKX

CLOSENESS CENTRALITY

- Which nodes disseminate information the fastest?
- Avg. distance from all other nodes (inverted: higher = closer)

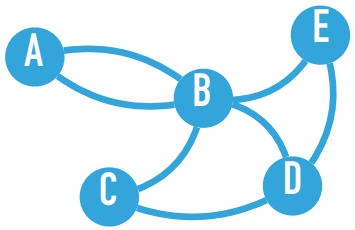


CENTRALITY MEASURES

Node	Closeness Centrality
A	0.57
B	1
C	0.66
D	0.8
E	0.66

SOCIAL NETWORK ANALYSIS
WITH GEPHI AND NETWORKX
PAGERANK CENTRALITY

- Considers both the connectivity of a node, and that node's neighbours.
- If node X is connected to an influential node, node X is considered more influential.

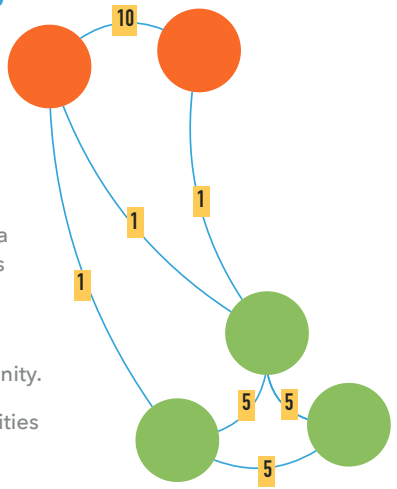


CENTRALITY MEASURES

Node	PageRank Centrality
A	0.42
B	0.46
C	0.04
D	0.04
E	0.03

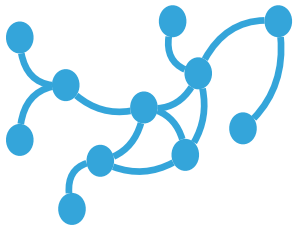
SOCIAL NETWORK ANALYSIS
WITH GEPHI AND NETWORKX
IDENTIFYING COMMUNITIES

- Louvain Modularity
- Based on connectivity and weights.
- Compares the density of edges 'within' a possible community, to density of edges between communities.
- Attempts to optimise so you have more density between nodes of same community.
- Resolution: 0->1 More -> Less Communities
- Modularity score of 0.4+ is optimal

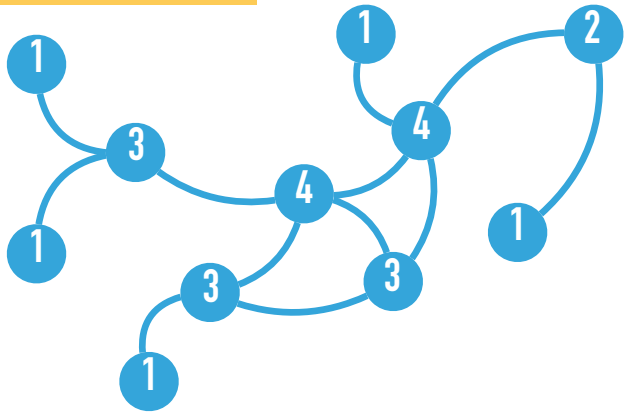


SOCIAL NETWORK ANALYSIS
WITH GEPHI AND NETWORKX
K-CORE
FILTERING FOR STRUCTURE

- K-Core trims a network down to its 'core'.
- Helpful in identifying underlying structure of a network
- K refers to the minimum number of degrees (connections) each node must have.



SOCIAL NETWORK ANALYSIS
WITH GEPHI AND NETWORKX
K-CORE
K = 1
FILTERING FOR STRUCTURE



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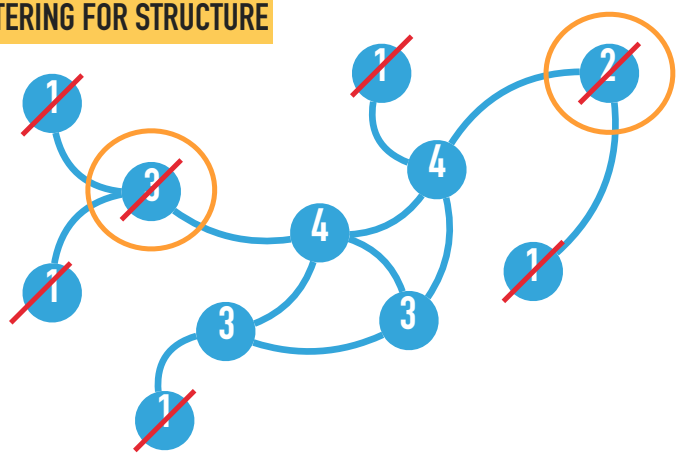
SOCIAL NETWORK ANALYSIS

WITH GEPHI AND NETWORKX

K-CORE K = 2

FILTERING FOR STRUCTURE



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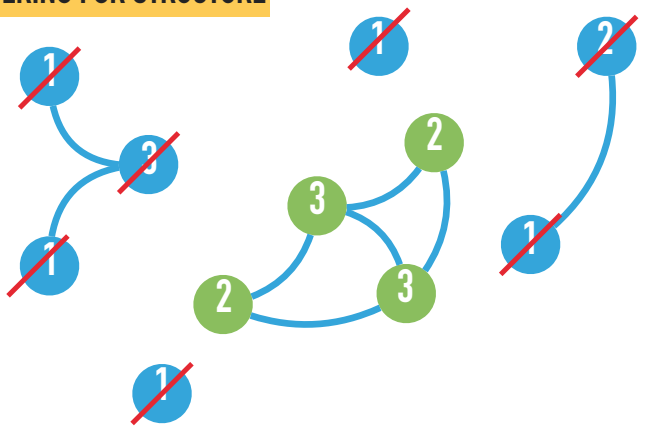
SOCIAL NETWORK ANALYSIS

WITH GEPHI AND NETWORKX

K-CORE K = 2

FILTERING FOR STRUCTURE



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SOCIAL NETWORK ANALYSIS

WITH GEPHI AND NETWORKX

K-CORE K = 3

FILTERING FOR STRUCTURE