3. Descriptive Network Statistics

Introduction to Social Network Analysis in R

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Descriptive Network Statistics (Metrics)

Centrality

Introduction to Social Network Analysis(SNA) in R

1. Introduction to R as we will use R language for SNA for the rest of the lecture series
2. Introduction to basic concepts in SNA
3. Visualization of networks
4. Descriptive Network Statistics (*Metrics - Individual and Whole Network*)
5. (Time permitting) Network models, algorithms and Inference.
6. SNA in Education, Surveys and Data Manipulation.
7. Ongoing Research Project with Keio University.

Descriptive Network Statistics (Metrics)

Connectedness

Density

Proportion of actual edges out of possible edges.

how connected is the network overall

Reciprocity

Definition:

- Dyad : pair of vertices
- Reciprocal edge: a dyad for which connection goes both ways

Reciprocity

Two types

- Number of reciprocal edges over the total number of edges
- Number of reciprocal edges over the number of dyads with only one unreciprocated edge

Indication of connectivity

Dyad Census

In directed graphs, **dyads** can be:

- Null: no edge between the pair.
- Asymmetric: one directed edge.
- Mutual: two directed edges.

Indication of hierarchical structure

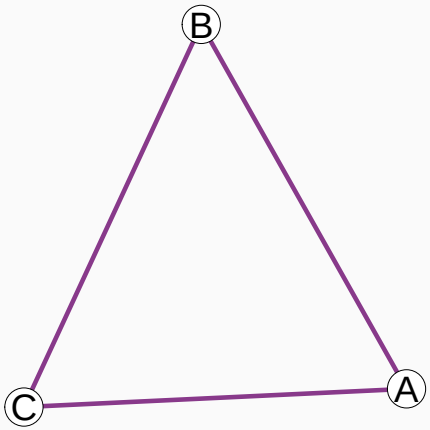
Transitivity (clustering coefficient)

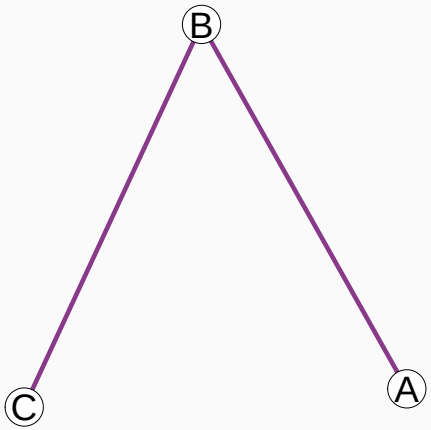
Fraction of transitive triplets

Definition:

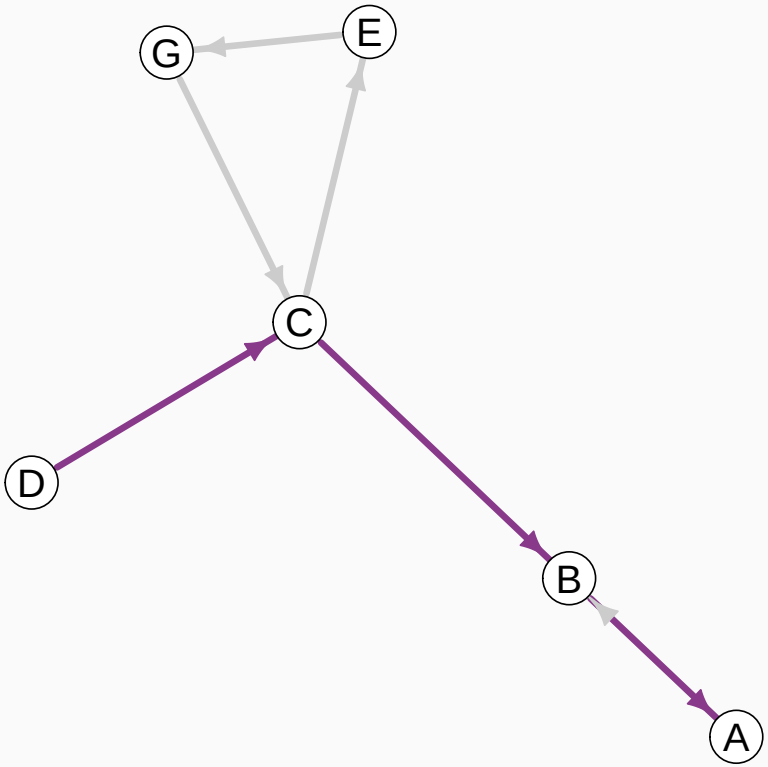
- Triad/triplet : set of three vertices

Transitive triplet and **Intransitive triplet**

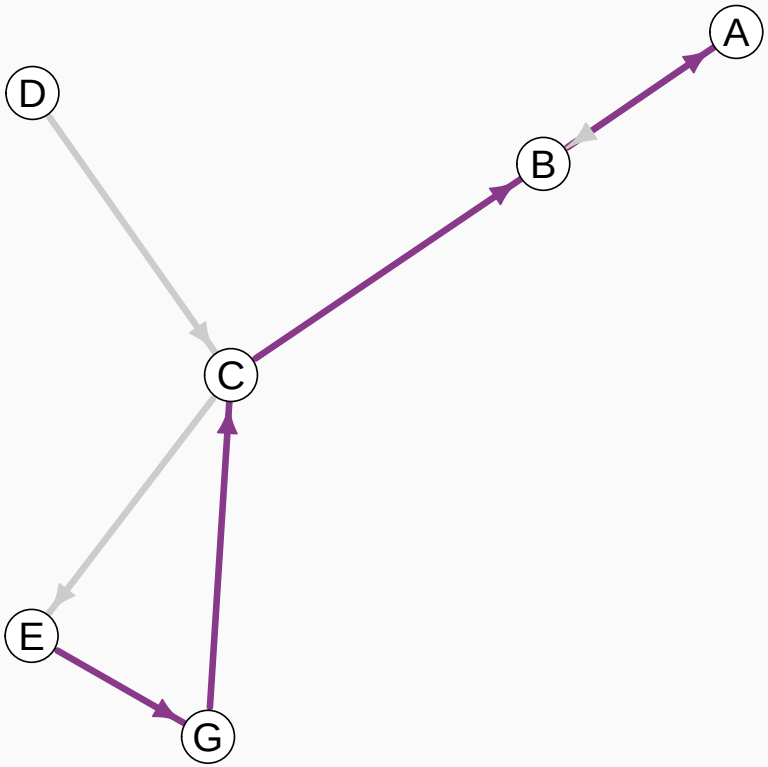




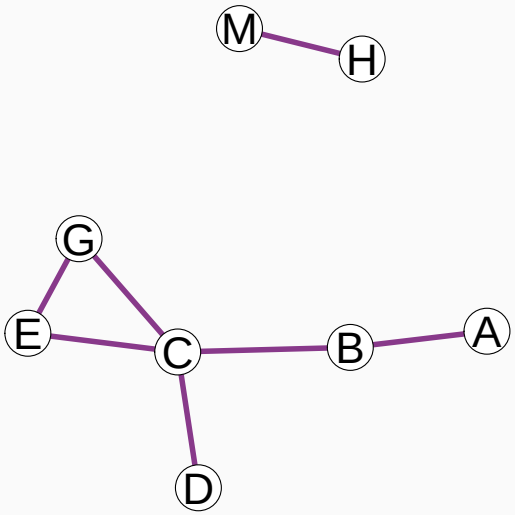
Reachability - Average path length

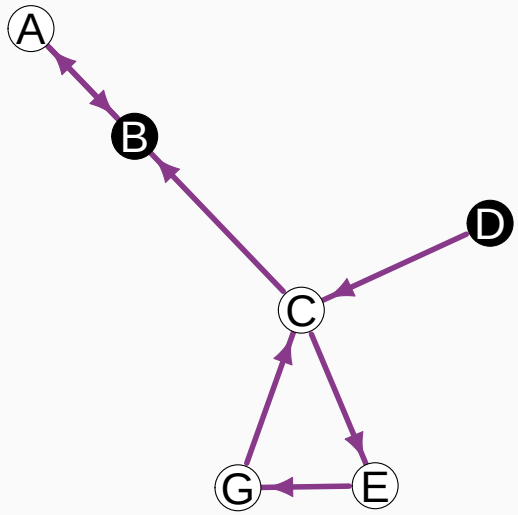


Diameter



Connected components

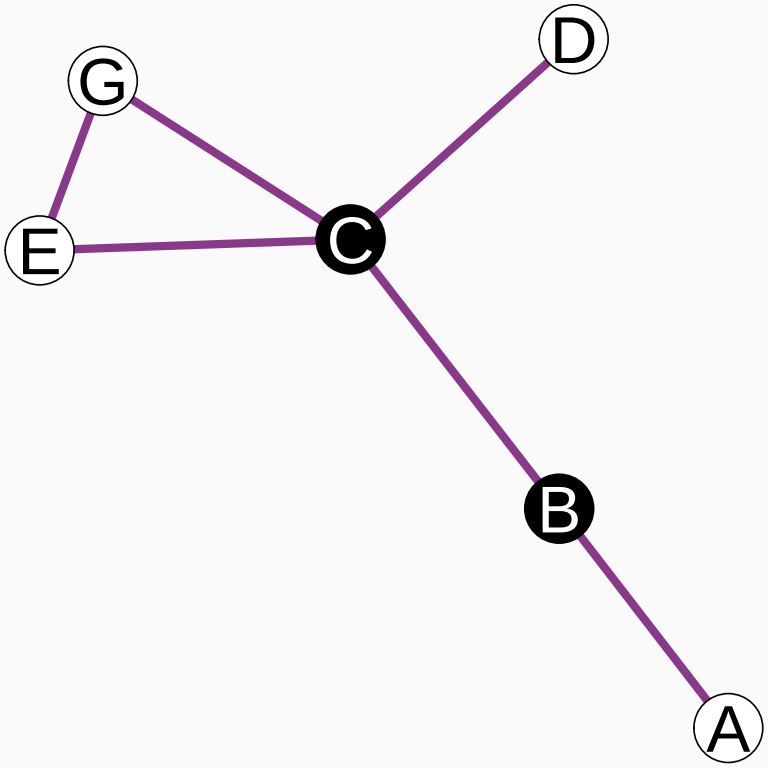




Strongly connected and **Weakly connected**

Articulation points

Nodes that if removed would break the network into more components.



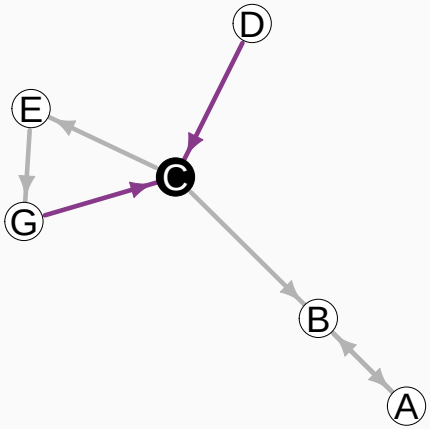
Let's try these!

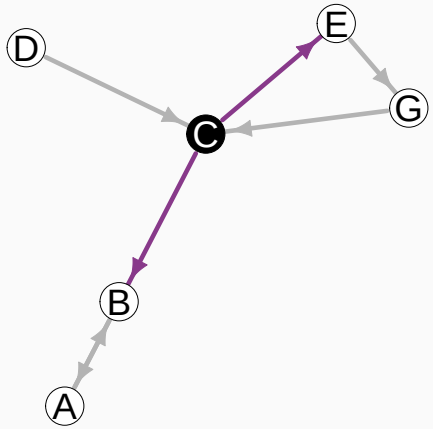
3_WA_NetworkMetrics.Rmd

Centrality

Centrality

Degree Centrality





Indegree and Outdegree

Centrality

Closeness Centrality

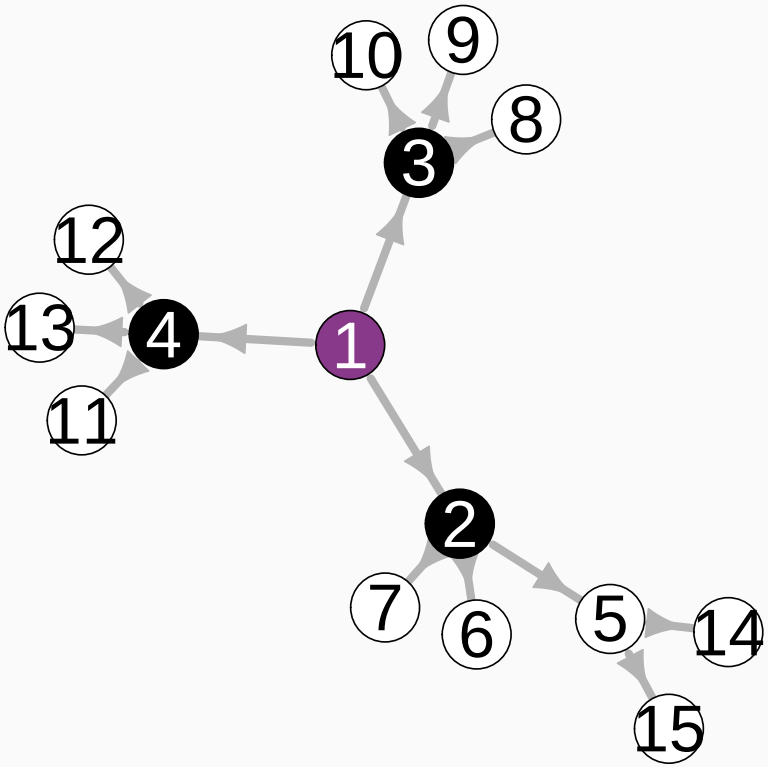
- Based on the distance to all other nodes.
- Inverse of the node's average geodesic distance to others in the network.

Betweenness Centrality

- Based on its brokerage position.
- Number of shortest that pass through the node.

Tease out local versus global patterns

Centrality



Let's try these metrics!

Summary:

Today we looked at

3. Visualization of networks
4. Descriptive Network Statistics (*Metrics - Individual and Whole Network*)

Next session:

5. Community detection
6. SNA in Education, Surveys and Data Manipulation.
7. Ongoing Research Project with Keio University.