

DCS/CSCI 2350:
Social and Economic Networks

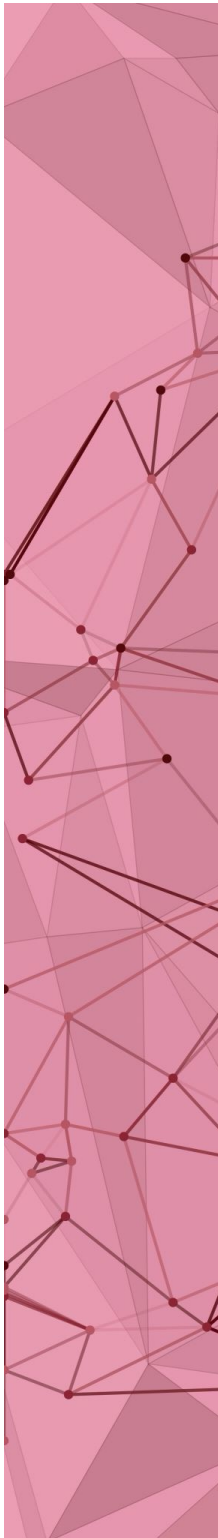
Network visualization and
analysis using Gephi

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Links

- Download
 - <https://gephi.org/>
- Video Tutorial: <https://bit.ly/gephi-panopto>
- Text tutorial: http://bit.ly/gephi_tutorial
- Dataset: http://bit.ly/gephi_dataset



Gephi Demo

Data: .gml

http://bit.ly/gephi_dataset (Les Miserables data)

http://bit.ly/gephi_dolphin (Dolphin network data)

Dolphin network data:
Social network (by
association) among 62
dolphins in Doubtful Sound,
New Zealand



Partition: partition nodes and edges

Ranking: rank and color nodes, edges, and their labels by numeric properties

Data Laboratory: Manipulate the input graph files (e.g., apply labels to nodes)

Statistics: Computes graph-level properties. Some of them (e.g., Average Degree) must be done before using other features

Preview: Produces a nice visualization (next slide)

Color palette for coloring schemes

Layout: Select a graph drawing algorithm

"Magnifying glass": Centers the graphics

T: Toggle showing node labels

T: Toggle showing edge labels

Slider: Tune edge thickness

Slider: Tune the size of the node labels

Filters: Filter out nodes/edges based on their properties

Useful filter: Topology → Degree Range

Network among the characters of Les Misérables

Property	Value
Optimal Distance	100.0
Relative Strength	0.2
Initial Step size	20.0
Step ratio	0.95
Adaptive Cooling	☒
Convergence Threshold	1.0E-4

Metric	Value	Run
Average Degree	3.299	Run
Avg. Weighted Degree		Run
Network Diameter	5	Run
Graph Density		Run
HITS		Run
Modularity		Run
PageRank		Run
Connected Components	1	Run

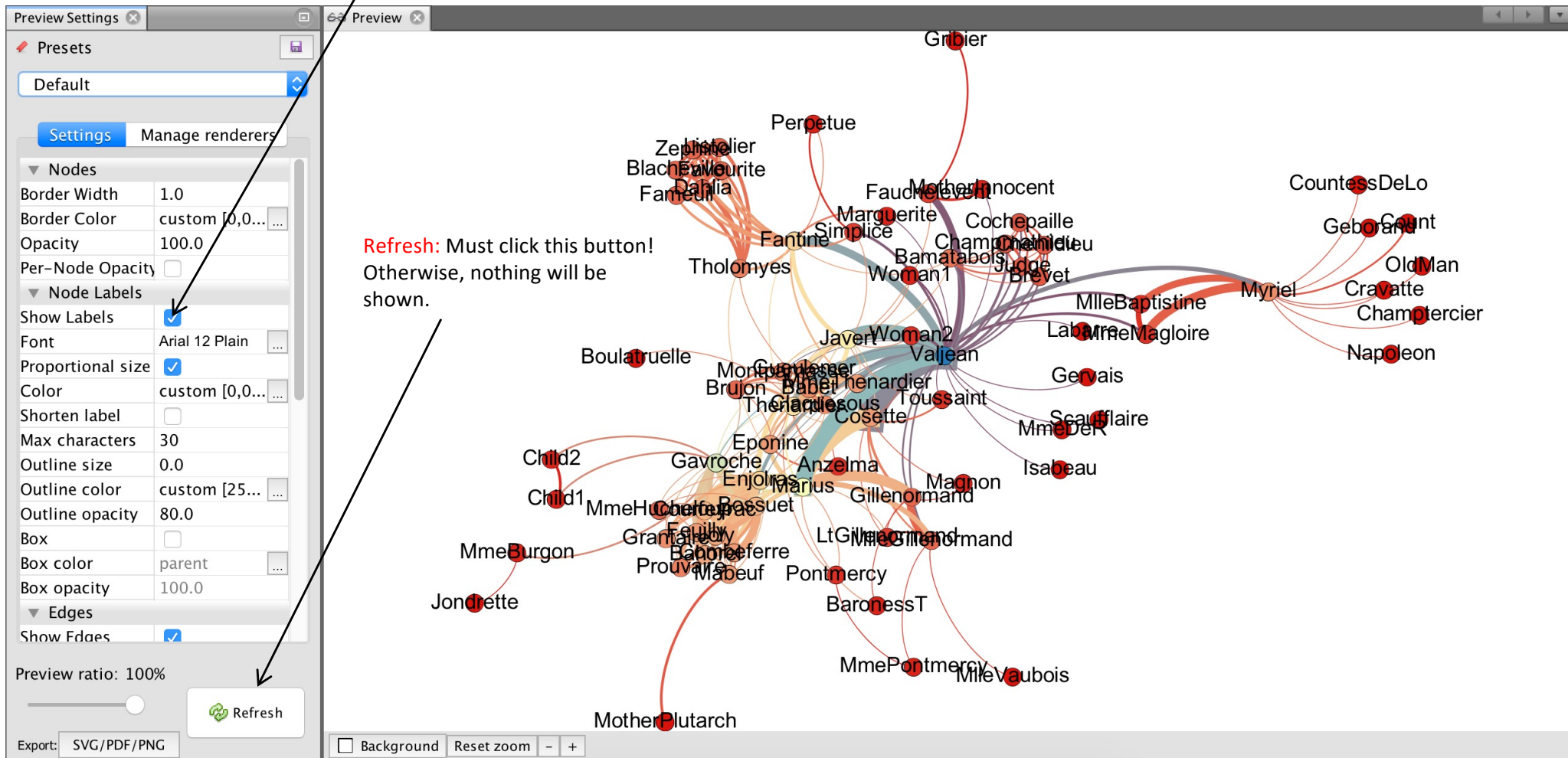
Metric	Value	Run
Avg. Clustering Coefficient		Run
Eigenvector Centrality		Run

Metric	Value	Run
Avg. Path Length	2.4	Run

Metric	Value	Run
# Nodes		Run
# Edges		Run
Degree		Run

Show Labels: Turn it on!

Refresh: Must click this button!
Otherwise, nothing will be shown.



To save the visualization as a pdf file:
File → Save

Red: Graph level (Courier font)

Black: Node/edge level (Cambria font)

Gephi Vocabulary

Avg. clustering coefficient of a graph	Average of the clustering coefficients of the nodes
Betweenness centrality of a node	How often the node appears on the shortest path between all pairs of nodes in the network
Closeness centrality of a node	Inverse of the average distance from that node to all other nodes in the network
Clustering coefficient of a node	How well connected a node's friend group is: for the perfect clustering coefficient of 1, all friends of the node are also friends with each other
Degree of a node	The number of edges connected to the node (also connectedness); in a directed graph a node can have in-degree and out-degree measures
Diameter of a graph	The longest shortest path between any two nodes in the graph
Directed vs. undirected graph	Edges are directed vs. undirected
Eccentricity of a node	The distance (shortest-path length) from the node to the farthest node from it in the network
Edge	A representation of the connection between two nodes, expresses a relationship (a line)
Eigenvector centrality of a node	A measure of influence: a node is very influential if it is connected to other influential nodes
Layout algorithms	Also known as graph drawing algorithm; e.g., force-directed drawing where linked nodes attract and non-linked nodes repel each other
Leaf node	Node with a single edge in a "tree-structured" graph
Modularity	A measure of connectedness among groups of nodes (greater than 0.4 is usually considered meaningful) - often applied to community detection
Node	Also called a vertex by mathematicians; an agent in a social network graph (drawn as a bubble)
Distance from one node to another	The length of the shortest path (counted in the number of edges) from one node to another
Path length	The number of edges in a path
Singleton or isolated node	Node with no edge/connection