

Network Analysis with Gephi

Devin Gaffney

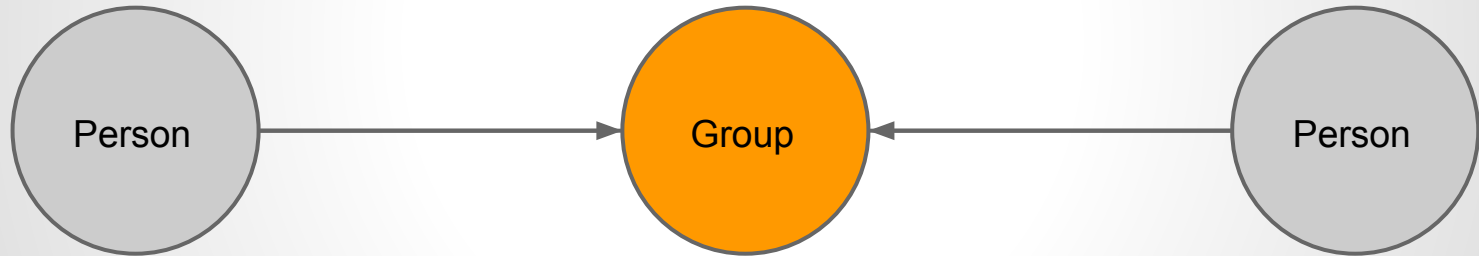
Our Dataset

https://github.com/DGaffney/gephi_tutorial

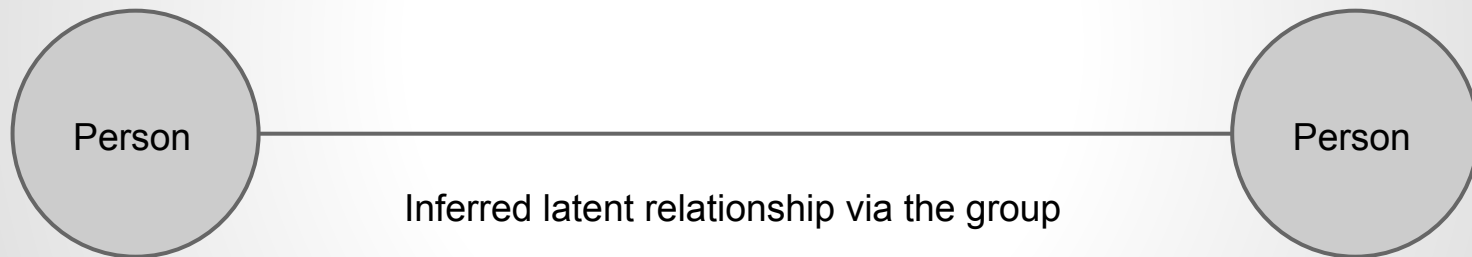
Based off of Kieran Healy's excellent "[Using Metadata to Find Paul Revere](#)"

Two Graphs: Bipartite membership graph and a projection.

Bipartite Graphs



Projections



Our Graph

Bipartite graph of prominent members of colonial society (actors) and associations they belong to (groups).

Compiled by Fischer (1995) from original source materials

Our Question: What can this graph tell us about the social network between likely revolutionaries at the outbreak of the war?

Our limitations: what/whom is not in the graph, the degree to which the data are accurate, etc. This is exploratory in nature.

INTRODUCTION.

XCIII

*John Hooton.
*Jonathan Hunnewell.
Thomas Chase.
Thomas Melvill.
*Henry Purkitt.
Edward C. Howe.
Ebenezer Stevens.
Nicholas Campbell.
John Russell.
Thomas Porter.
William Hendley.
Benjamin Rice.
Samuel Gore.
Nathaniel Frothingham.
Moses Grant.
*Peter Slater.

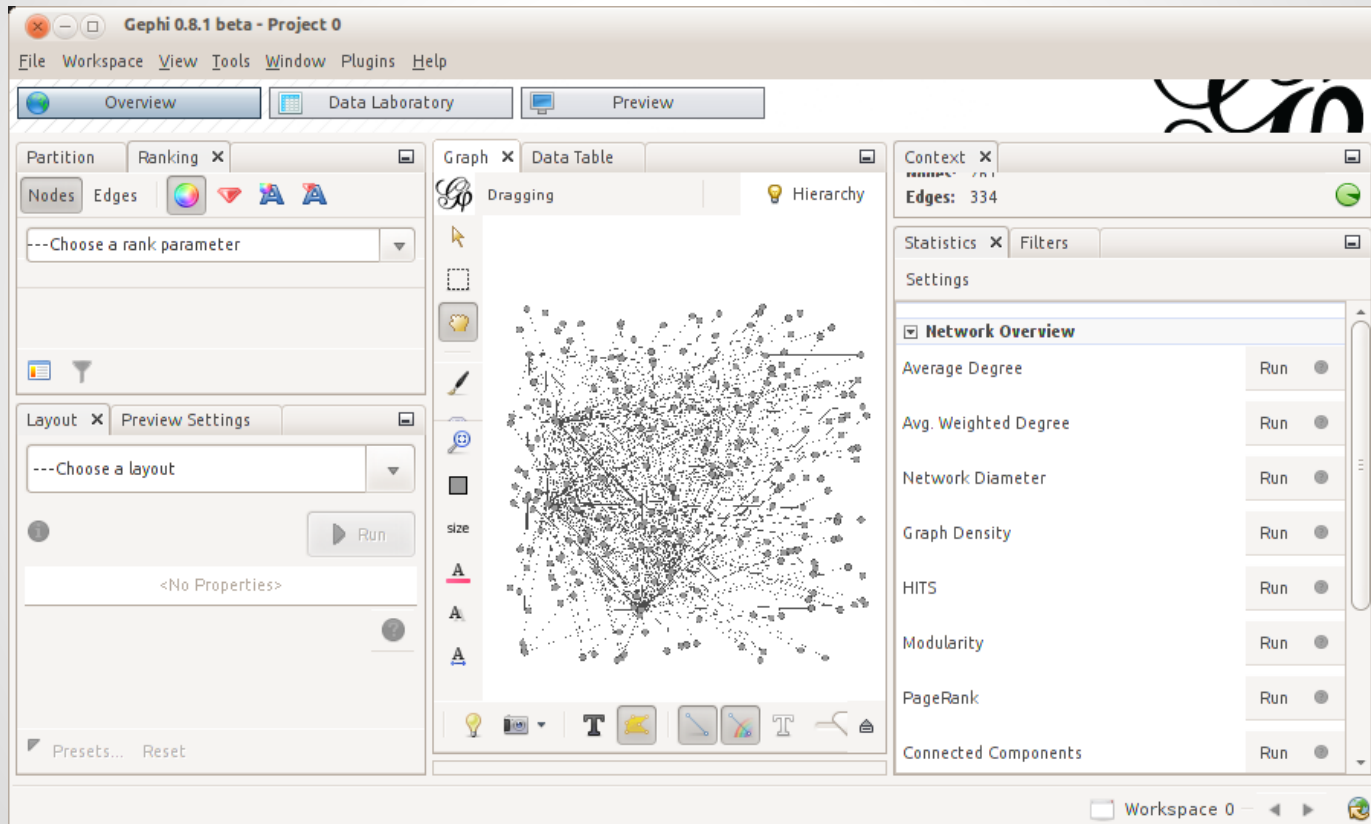
James Starr.
Abraham Tower.
*William Pierce.
William Russell.
T. Gammell.
— McIntosh.
Dr. Thomas Young.
Joshua Wyeth.
Edward Dolbear.
— Martin.
Samuel Peck.
Lendall Pitts.
*Samuel Sprague.
Benjamin Clarke.
Richard Hunnewell, Jr.
*John Prince.

Additional names of the tea party, derived principally from family tradition :

Nathaniel Barber.
Samuel Barnard.
Henry Bass.
Edward Bates.
Nathaniel Bradlee.
David Bradlee.
Josiah Bradlee.
Thomas Bradlee.
Seth Ingersoll Brown.
Sephen Bruce.
Benjamin Burton.
George Carleton.
Gilbert Colesworthy.
John Cochran.
Gershom Collier.
James Foster Condry.
Samuel Cooper.
Thomas Dana, Jr.
Robert Davis.
Joseph Eaton.
— Eckley.

William Etheridge.
Samuel Fenno.
Samuel Foster
John Fulton.
Samuel Hammond.
John Hicks.
Samuel Hobbs.
Thomas Hunstable.
Abraham Hunt.
David Kinnison.
Amos Lincoln.
Thomas Machin.
Archibald Macneil.
John May.
— Mead.
Anthony Morse.
Eliphalet Newell.
Joseph Pearse Palmer.
Jonathan Parker.
John Peters.
Samuel Pitts.

Gephi



Step 1: Analysis

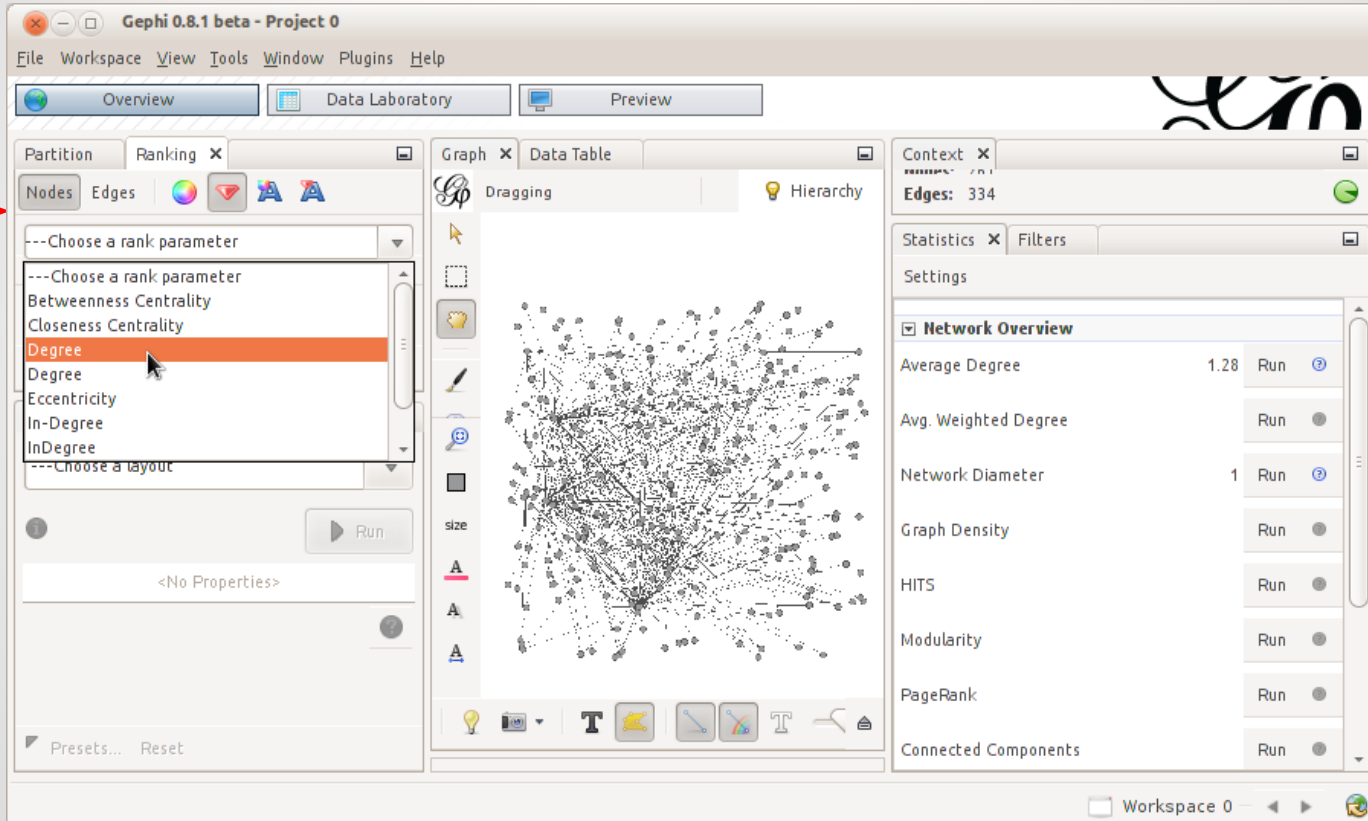
The screenshot displays the Gephi 0.8.1 beta interface. The main window shows a network graph with a dense cluster of nodes and edges. The interface is divided into several panels:

- Overview Panel (Left):** Contains tabs for Partition, Ranking, and Layout. The Ranking tab is active, showing a dropdown menu for "Choose a rank parameter" and a "Run" button.
- Graph Panel (Center):** Displays the network graph. The "Hierarchy" tab is active, showing a hierarchical view of the graph.
- Statistics Panel (Right):** Contains a "Network Overview" section with various network statistics and their corresponding "Run" buttons. A red arrow points to the "Run" button for the "Average Degree" statistic.

The Statistics Panel shows the following network statistics:

Statistic	Value	Action
Average Degree	1.28	Run
Avg. Weighted Degree		Run
Network Diameter	1	Run
Graph Density		Run
HITS		Run
Modularity		Run
PageRank		Run
Connected Components		Run

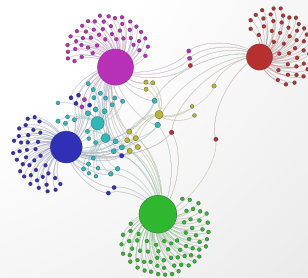
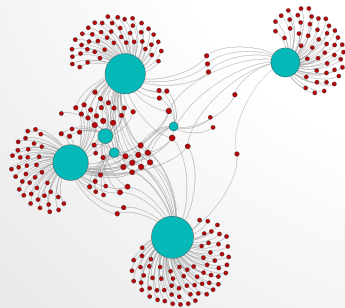
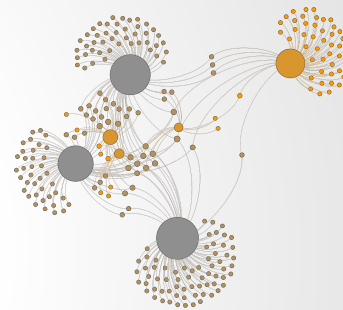
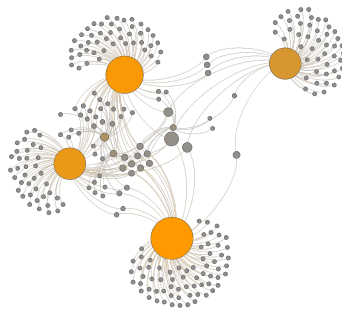
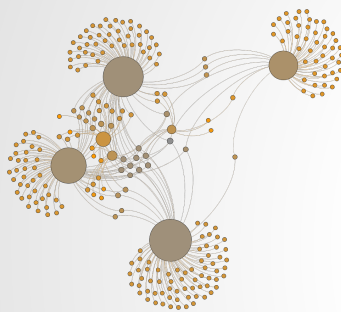
Step 2: Sizing and Coloring



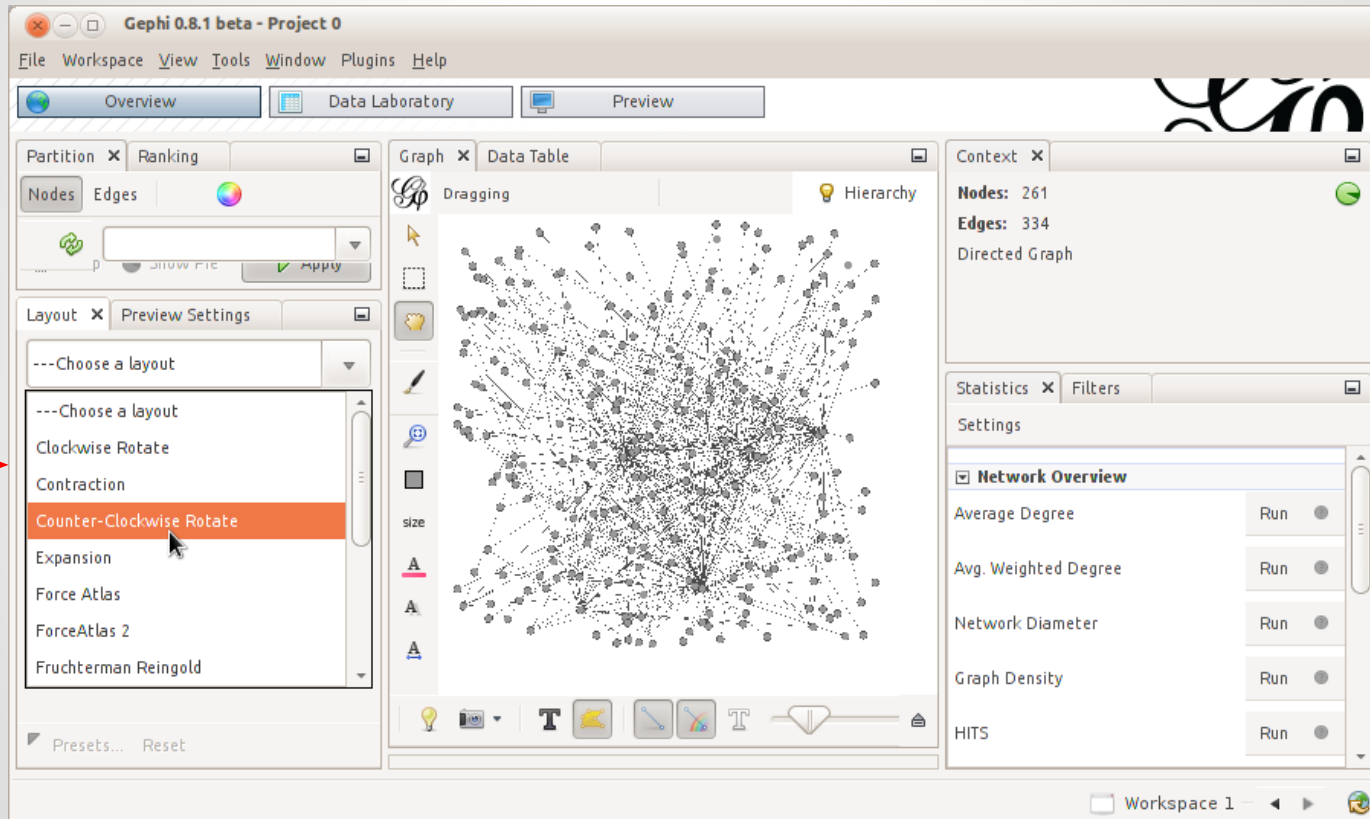
The screenshot shows the Gephi 0.8.1 beta interface. A red arrow points to the 'Ranking' panel on the left, where the 'Nodes' tab is selected. The 'Ranking' panel has a dropdown menu open, showing a list of rank parameters: 'Betweenness Centrality', 'Closeness Centrality', 'Degree' (highlighted), 'Eccentricity', 'In-Degree', and 'InDegree'. Below the dropdown is a 'Run' button. The central 'Graph' window displays a network graph with nodes and edges. The right sidebar contains the 'Context' panel (showing 'Edges: 334'), the 'Statistics' panel (with 'Filters' and 'Settings' tabs), and the 'Network Overview' table.

Network Overview		
Average Degree	1.28	Run ?
Avg. Weighted Degree		Run
Network Diameter	1	Run ?
Graph Density		Run
HITS		Run
Modularity		Run
PageRank		Run
Connected Components		Run

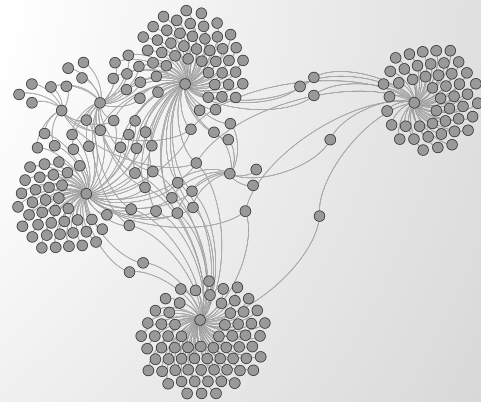
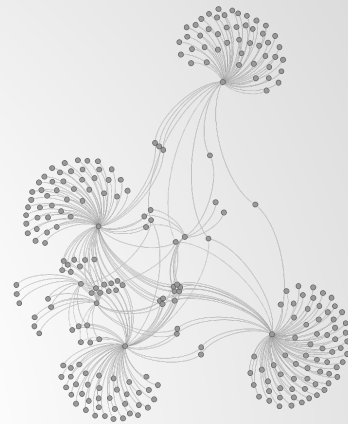
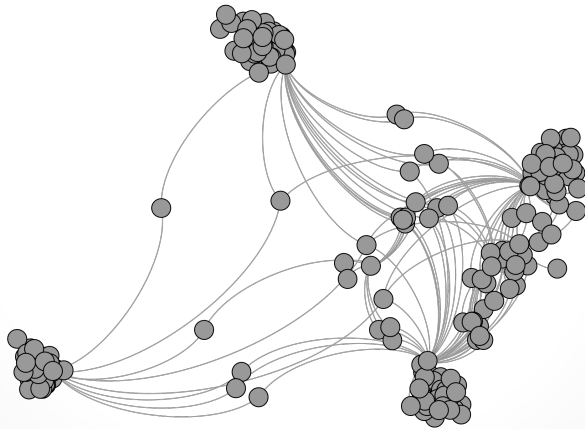
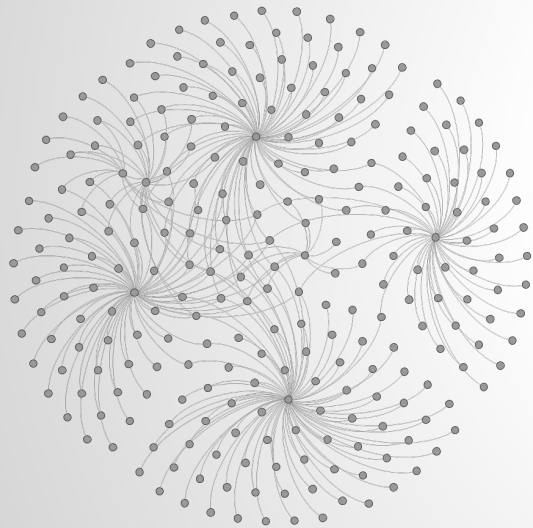
Sizing and Coloring Decisions



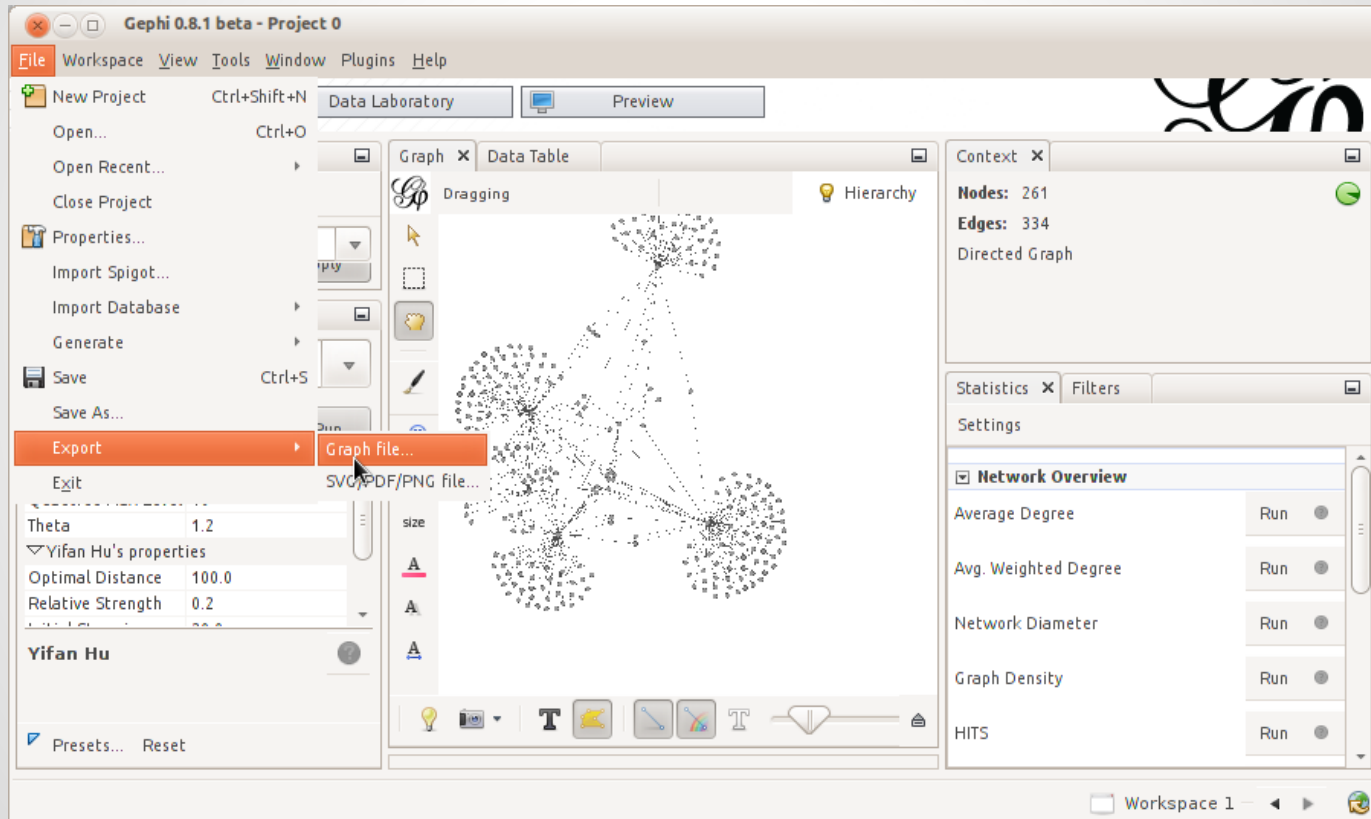
Step 3: Layout



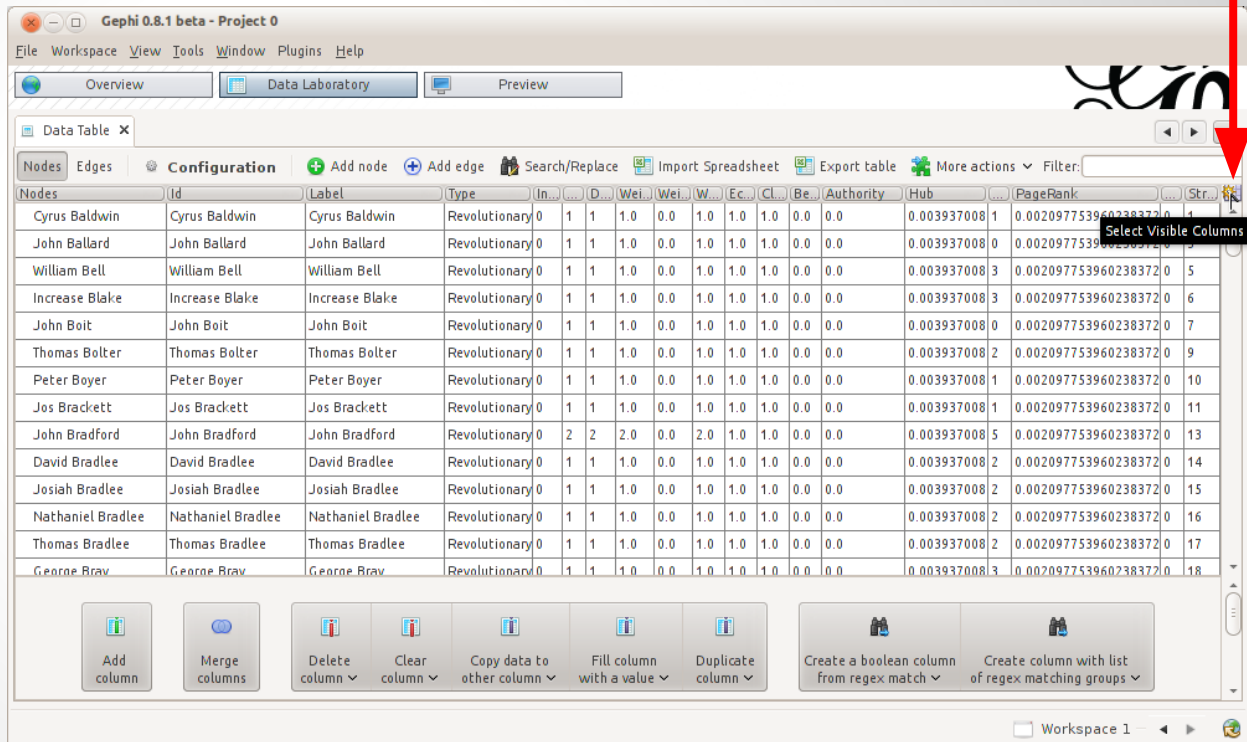
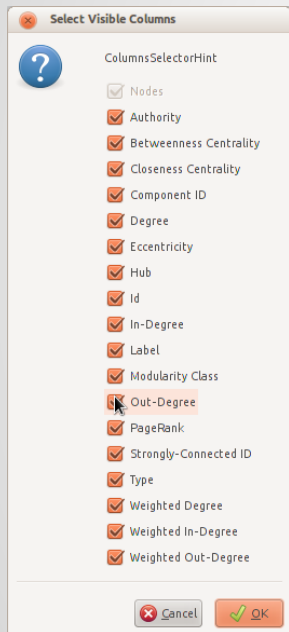
Layout Decisions



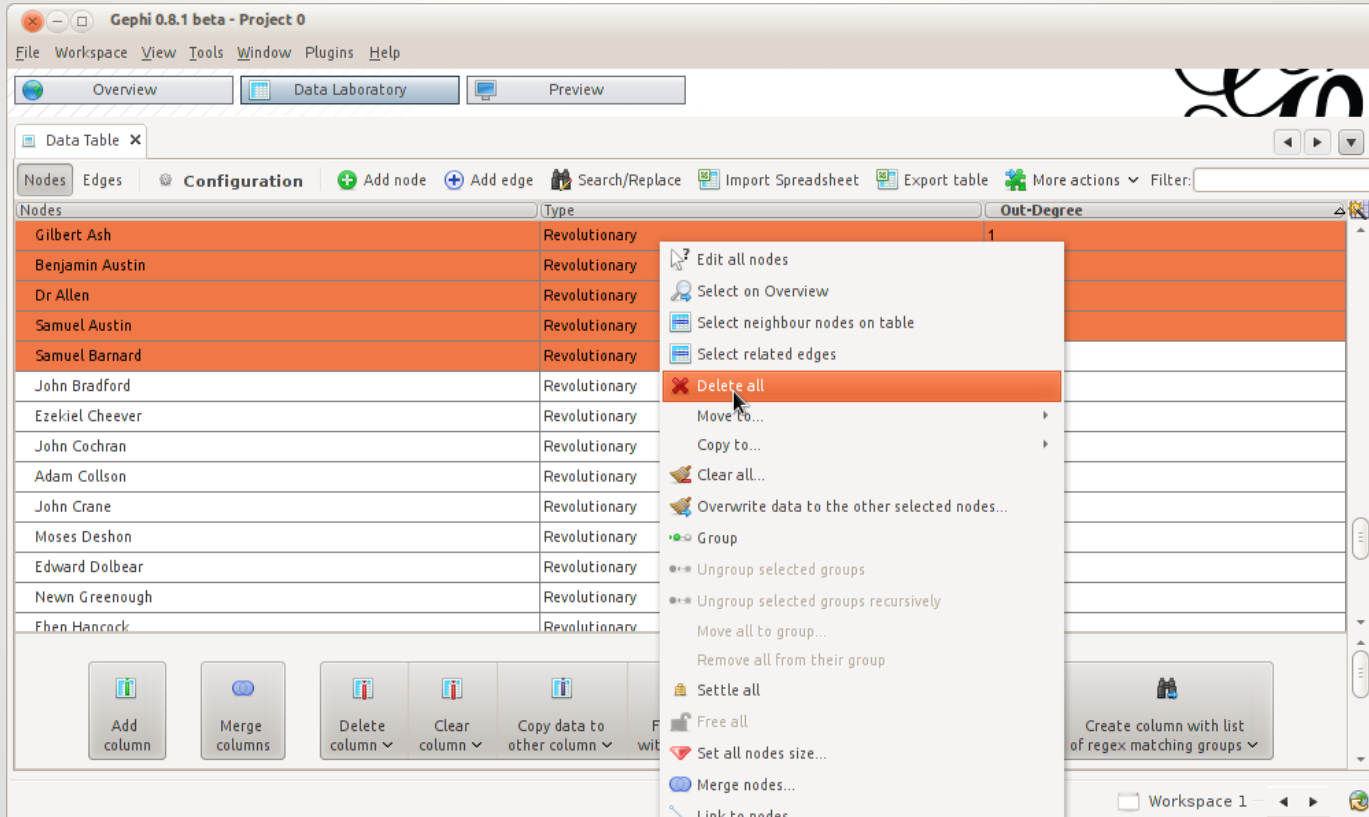
Step 4: Export



Advanced Steps 1: Deletion



Advanced Steps 1: Deletion



The screenshot shows the Gephi 0.8.1 beta interface. The 'Data Table' window is open, displaying a table of nodes and their attributes. A context menu is open over the 'Delete all' option, which is highlighted in orange. The menu options include: Edit all nodes, Select on Overview, Select neighbour nodes on table, Select related edges, Delete all (highlighted), Move to..., Copy to..., Clear all..., Overwrite data to the other selected nodes..., Group, Ungroup selected groups, Ungroup selected groups recursively, Move all to group..., Remove all from their group, Settle all, Free all, Set all nodes size..., Merge nodes..., and Link to nodes.

Nodes	Type	Out-Degree
Gilbert Ash	Revolutionary	1
Benjamin Austin	Revolutionary	
Dr Allen	Revolutionary	
Samuel Austin	Revolutionary	
Samuel Barnard	Revolutionary	
John Bradford	Revolutionary	
Ezekiel Cheever	Revolutionary	
John Cochran	Revolutionary	
Adam Collson	Revolutionary	
John Crane	Revolutionary	
Moses Deshon	Revolutionary	
Edward Dolbear	Revolutionary	
Newn Greenough	Revolutionary	
Eben Hancock	Revolutionary	

Advanced Steps 2: Filtering

The screenshot displays the Gephi 0.8.1 beta software interface. The main window shows a network graph with nodes and edges. The left sidebar contains a list of visual styles, including 'Barnes-Hut', 'Quadrant', 'Theta', 'Yifan Hu', 'Optimal', 'Relative', and 'Initial'. The right sidebar is divided into 'Context' and 'Filters' sections. The 'Context' section shows 'Edges: 129 (38.62% Visible)'. The 'Filters' section is active, showing a list of node attributes: Authority, Betweenness Centrality, Closeness Centrality, Component ID, Degree, Eccentricity, and In-Degree. The 'Degree' attribute is selected, and a tooltip indicates 'Keep nodes/edges with number values within a range (inclusive)'. Below this, the 'Range (Degree) Settings' section shows a slider and input fields for the range. The bottom status bar indicates 'Workspace 1'.

Gephi 0.8.1 beta - Project 0

File Workspace View Tools Window Plugins Help

Overview Data Laboratory Preview

Graph Data Table

Dragging Hierarchy

Nodes Edges

Yifa...

Yifa...

Presets...

Context

Edges: 129 (38.62% Visible)

Statistics Filters

Reset

Authority Float (Node)

Betweenness Centrality Double (Node)

Closeness Centrality Double (Node)

Component ID Integer (Node)

Degree Integer (Node)

Eccentricity Double (Node)

In-Degree Integer (Node)

Keep nodes/edges with number values within a range (inclusive)

Queries

Range (Degree) Settings

Select Filter

Workspace 1

Advanced Steps 2a: Chained Filters

The screenshot displays the Gephi 0.8.1 beta software interface. The main window shows a network graph with nodes and edges. The left sidebar contains various toolbars for node and edge manipulation, including a 'Yifa...' dropdown and a 'Presets...' section. The top menu bar includes 'File', 'Workspace', 'View', 'Tools', 'Window', 'Plugins', and 'Help'. The 'Overview' tab is selected, showing a 'Dragging' mode. The right sidebar features the 'Statistics' and 'Filters' panels. The 'Filters' panel is active, showing a list of filters: 'Degree Integer (Node)' and 'Eccentricity Double (Node)'. Below these, the 'Range (Degree)' filter is expanded, showing its 'Parameters' section. The 'Range (Modularity Class)' filter is also expanded, showing its 'Parameters' section with a 'Drag sub-filter here' button. The 'Range (Modularity Class) Settings' section is visible at the bottom of the filter panel, showing a range slider and a histogram. The bottom status bar indicates 'Workspace 1'.

Gephi 0.8.1 beta - Project 0

File Workspace View Tools Window Plugins Help

Overview Data Laboratory Preview

Graph Data Table

Dragging Hierarchy

Nodes Edges

Yifa...

Yifa...

Presets...

Filters

Reset

Degree Integer (Node)

Eccentricity Double (Node)

Queries

Range (Degree)

Parameters

Range (Modularity Class)

Parameters

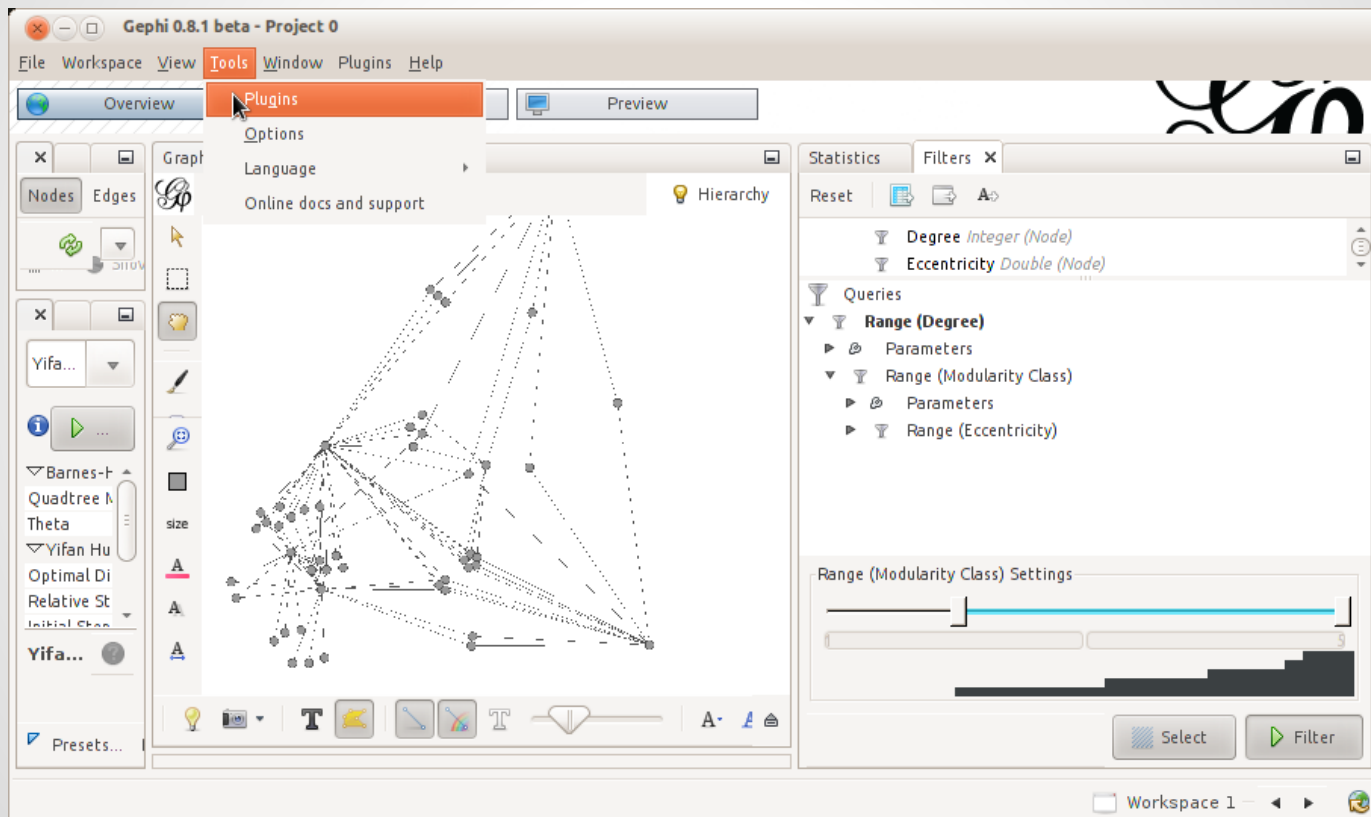
Drag sub-filter here

Range (Modularity Class) Settings

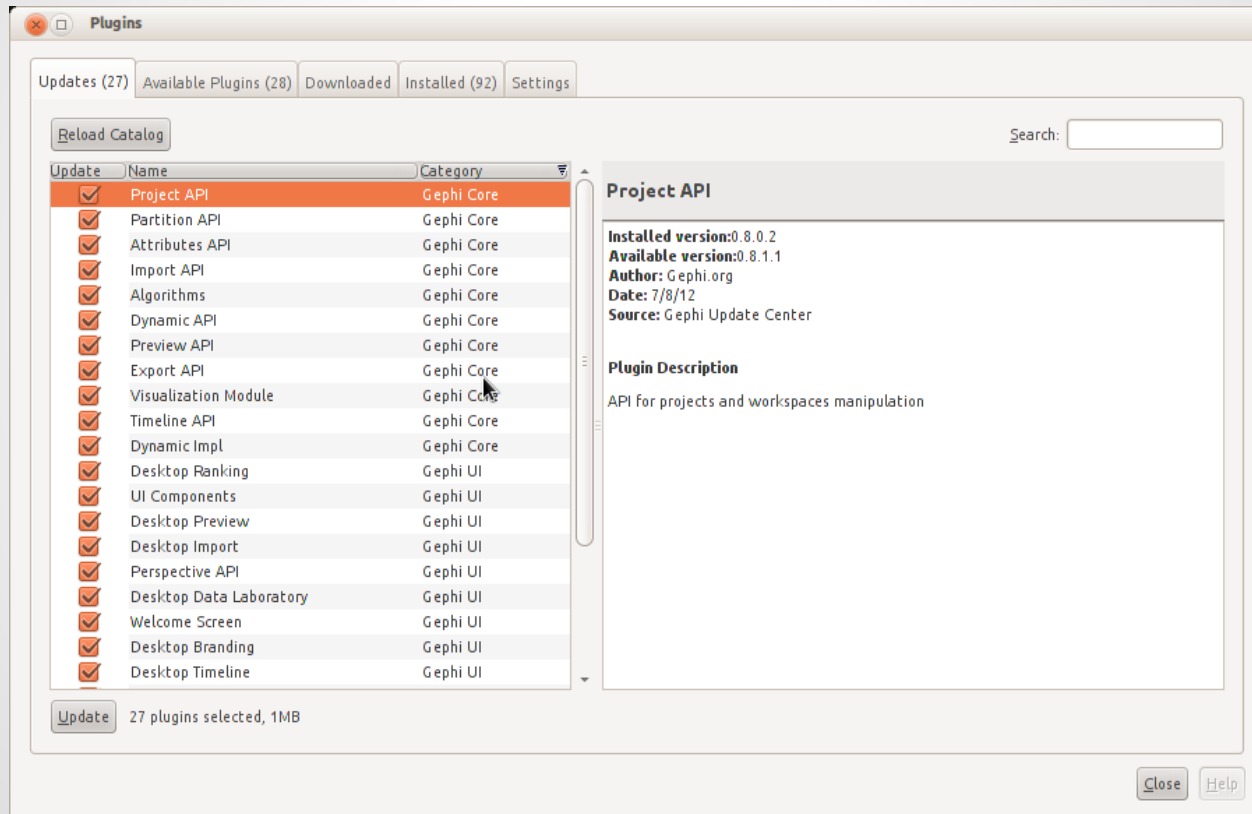
Select Filter

Workspace 1

Advanced Steps 3: Plugins



Advanced Steps 3: Plugins



Live Demo

Analyzing, Sizing, Coloring, Visualizing, and Exporting the Bipartite Projection

Data Source: https://github.com/DGaffney/gephi_tutorial/blob/master/paul_revere_projection.gexf

Break into groups of three, walk through Steps 1-4, Advanced Steps 1-2

Slides: