

# **Network Analysis with Gephi**

Devin Gaffney

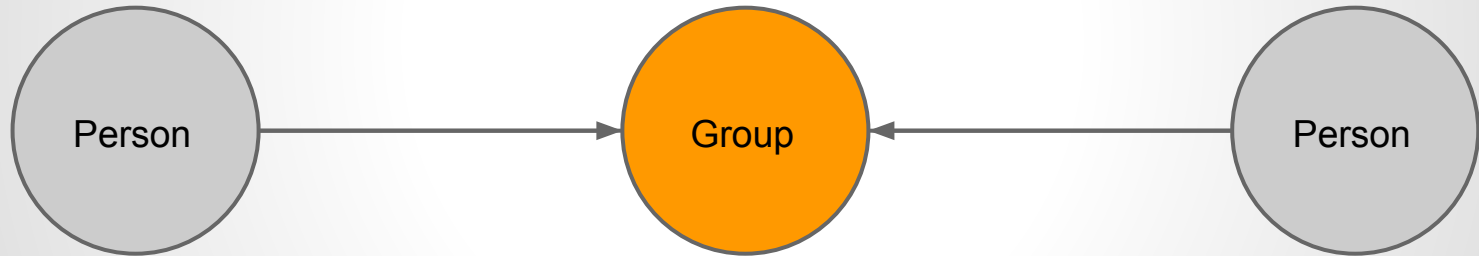
# Our Dataset

[https://github.com/DGaffney/gephi\\_tutorial](https://github.com/DGaffney/gephi_tutorial)

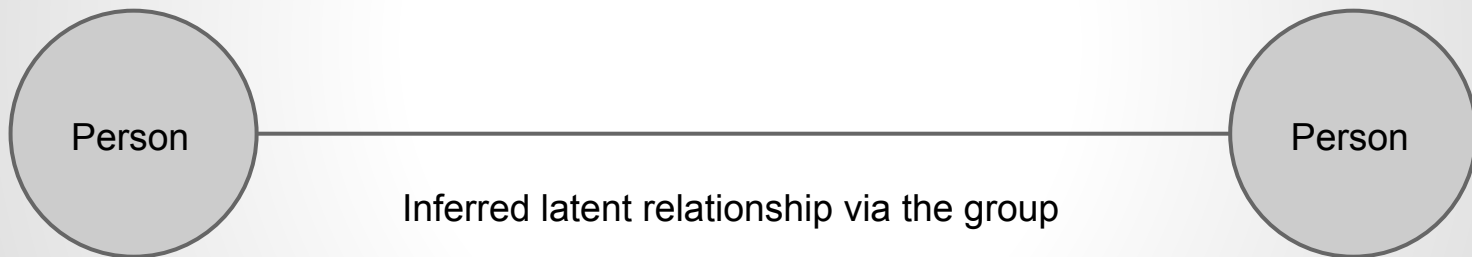
Based off of Kieran Healy's excellent "[Using Metadata to Find Paul Revere](#)"

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.

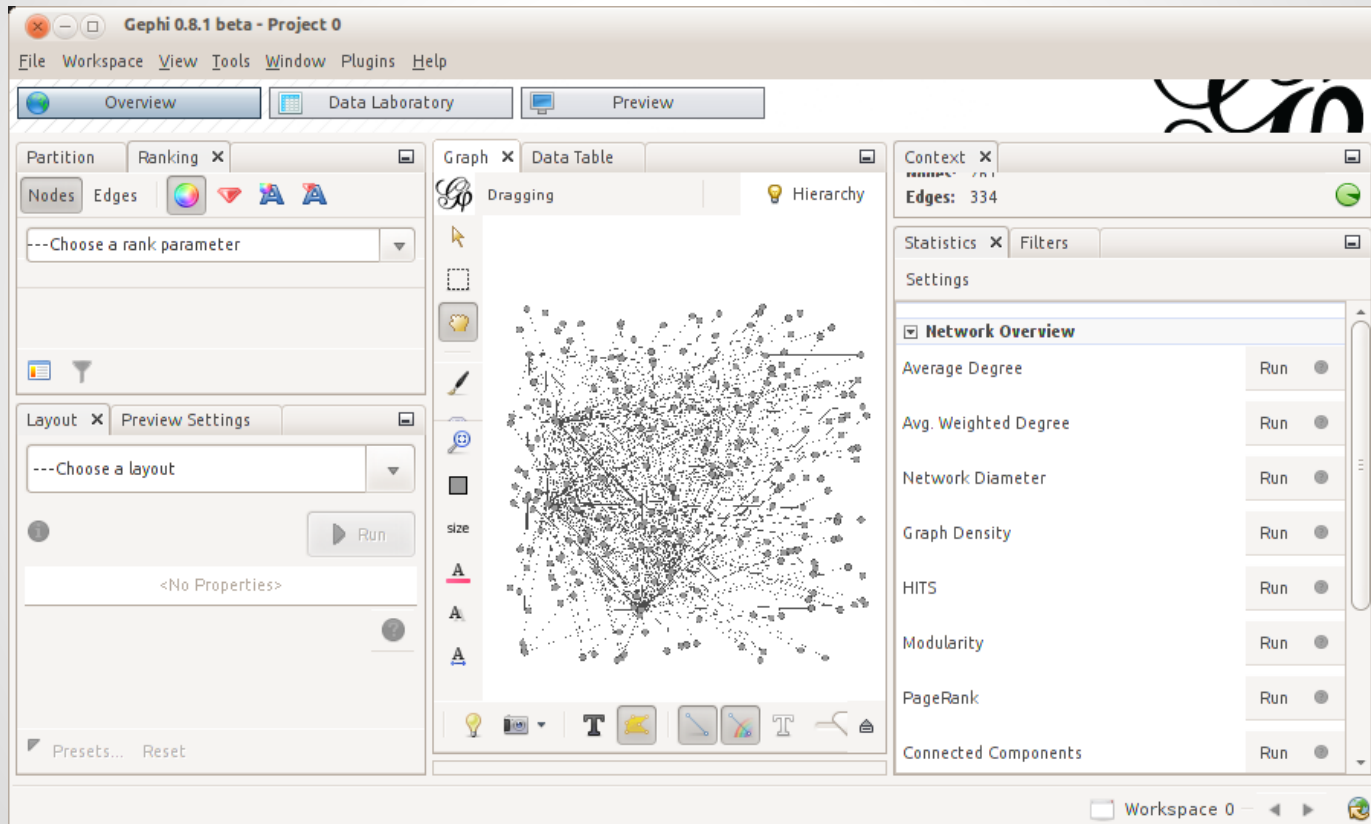
James Starr.  
Abraham Tower.  
\*William Pierce.  
William Russell.  
T. Gammell.  
— McIntosh.  
Dr. Thomas Young.  
Joshua Wyeth.  
Edward Dolbear.  
— Martin.  
Samuel Peck.  
Lendall Pitts.  
\*Samuel Sprague.  
Benjamin Clarke.  
Richard Hunnewell, Jr.  
\*John Prince.

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

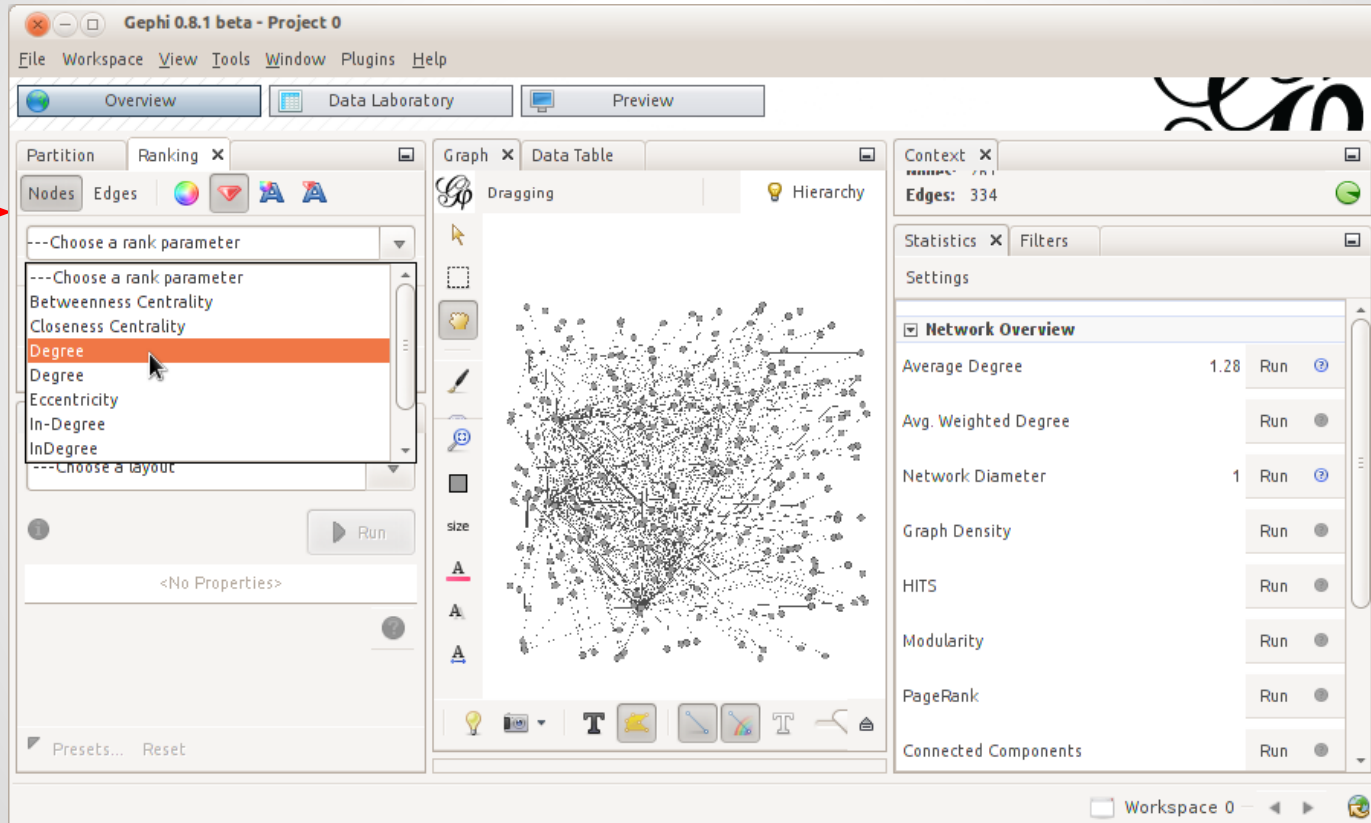
The screenshot displays the Gephi 0.8.1 beta interface. The main window shows a network graph with a large number of nodes and edges. The interface is divided into several panels:

- 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

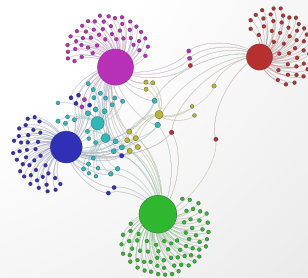
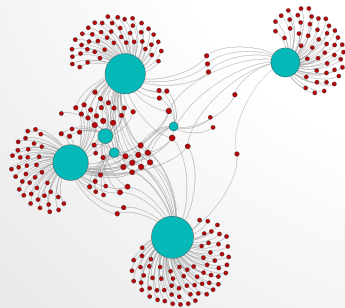
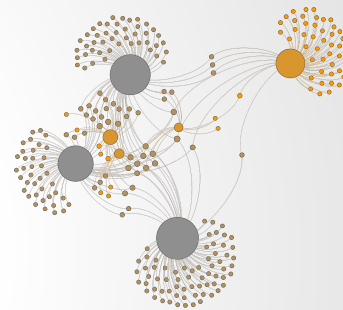
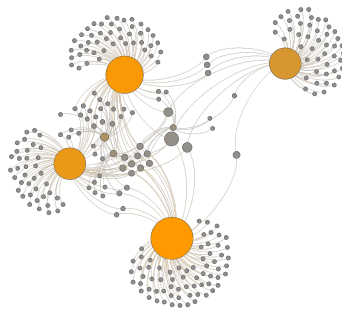
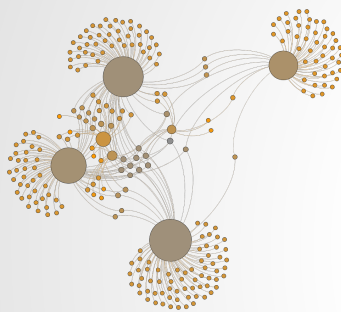


The screenshot shows the Gephi 0.8.1 beta interface. The main window is titled "Gephi 0.8.1 beta - Project 0". The top menu bar includes File, Workspace, View, Tools, Window, Plugins, and Help. Below the menu bar are three tabs: Overview, Data Laboratory, and Preview. The Overview tab is active, showing a network graph with nodes and edges. A red arrow points to the Ranking panel on the left. The Ranking panel has a dropdown menu for "Choose a rank parameter" with the following options: Betweenness Centrality, Closeness Centrality, Degree (highlighted), Eccentricity, In-Degree, and InDegree. Below the dropdown is a "Run" button. The right panel shows the Context tab with "Edges: 334" and the Statistics tab with a "Network Overview" section. The Network Overview section lists various network statistics and their values:

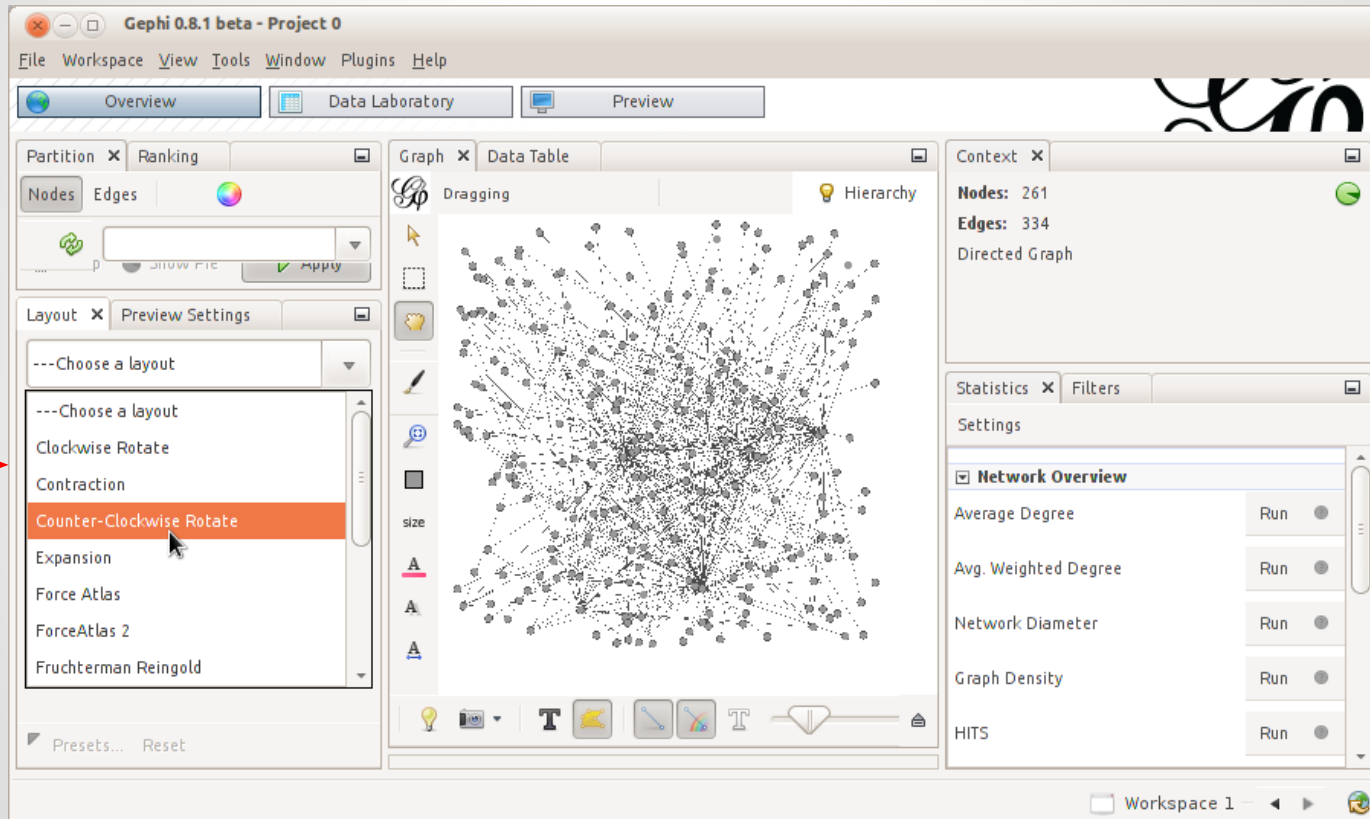
Statistic	Value	Action
Average Degree	1.28	Run
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PageRank		Run
Connected Components		Run



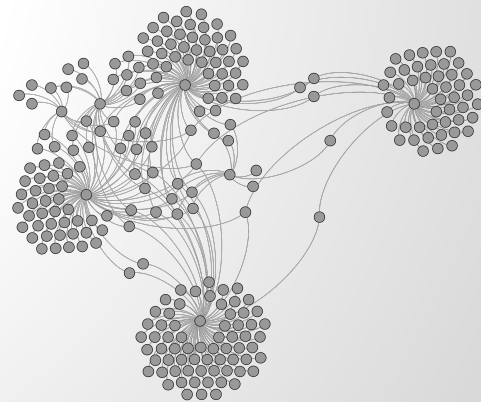
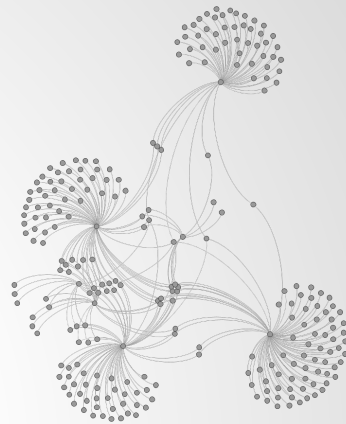
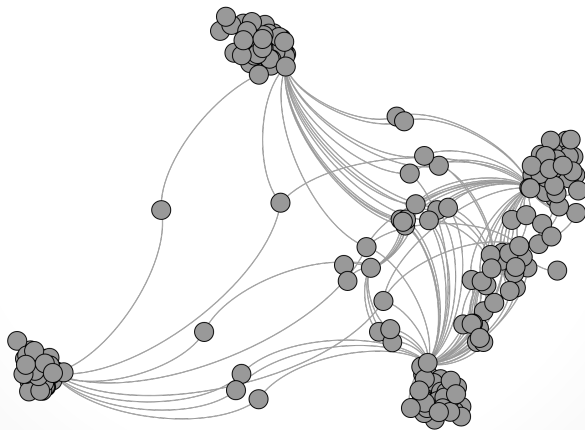
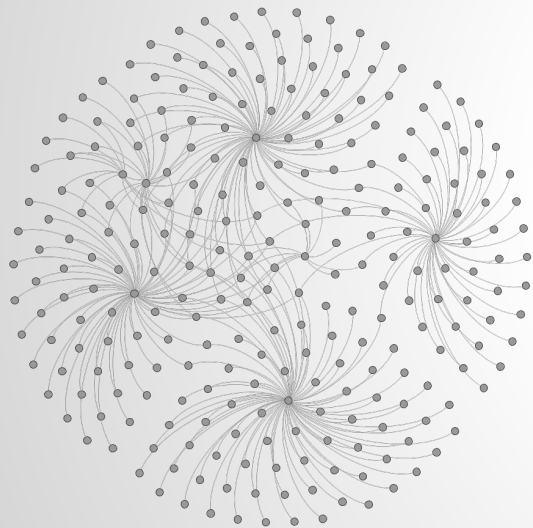
# Sizing and Coloring Decisions



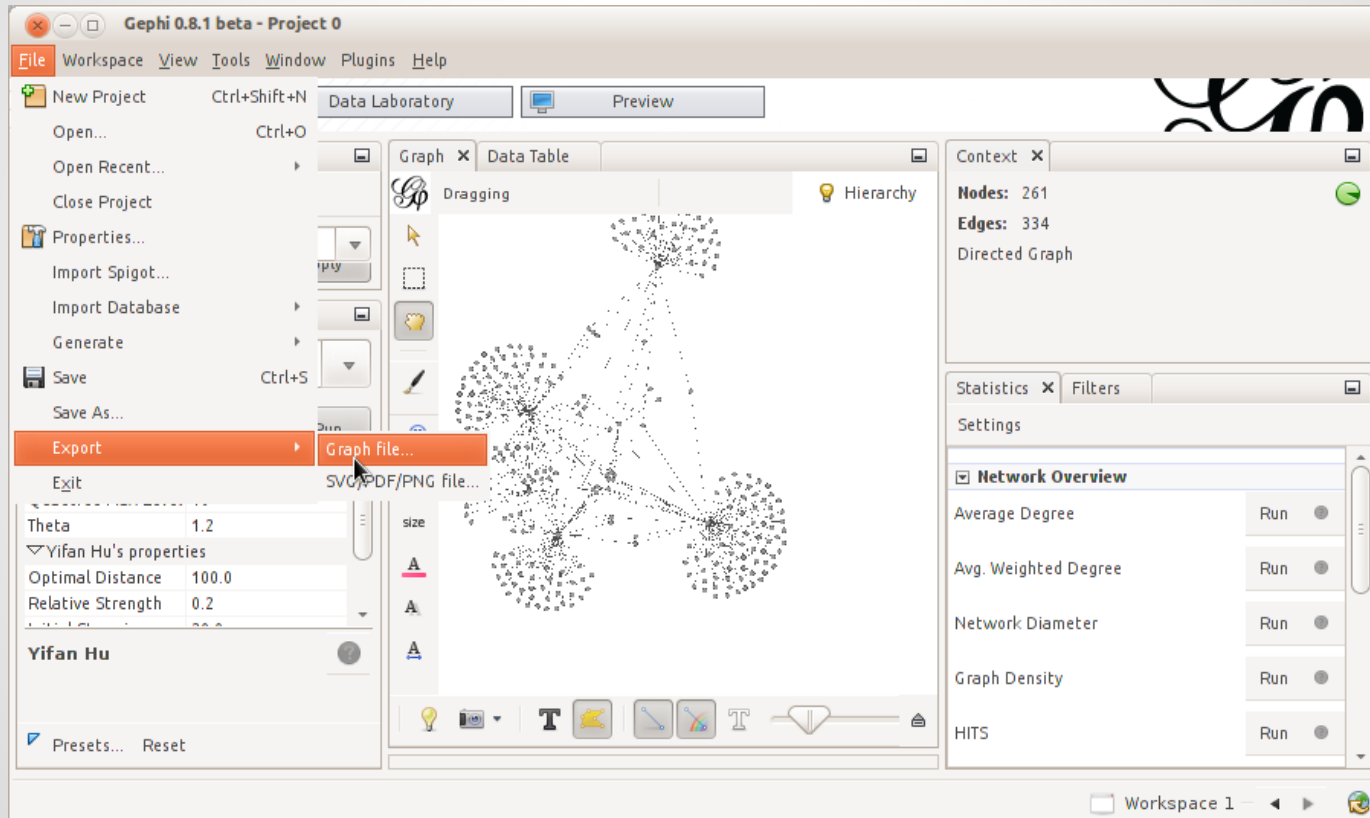
# Step 3: Layout



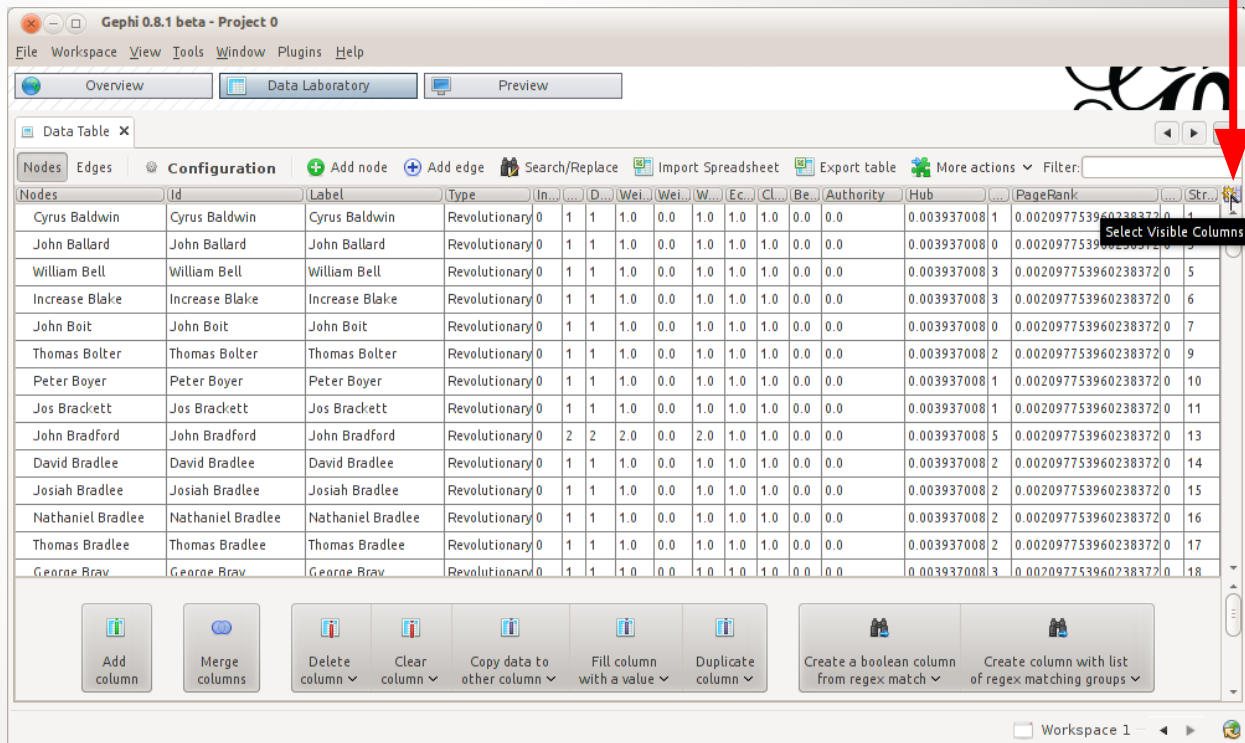
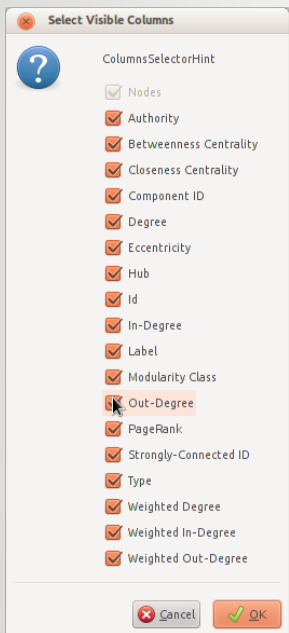
# Layout Decisions



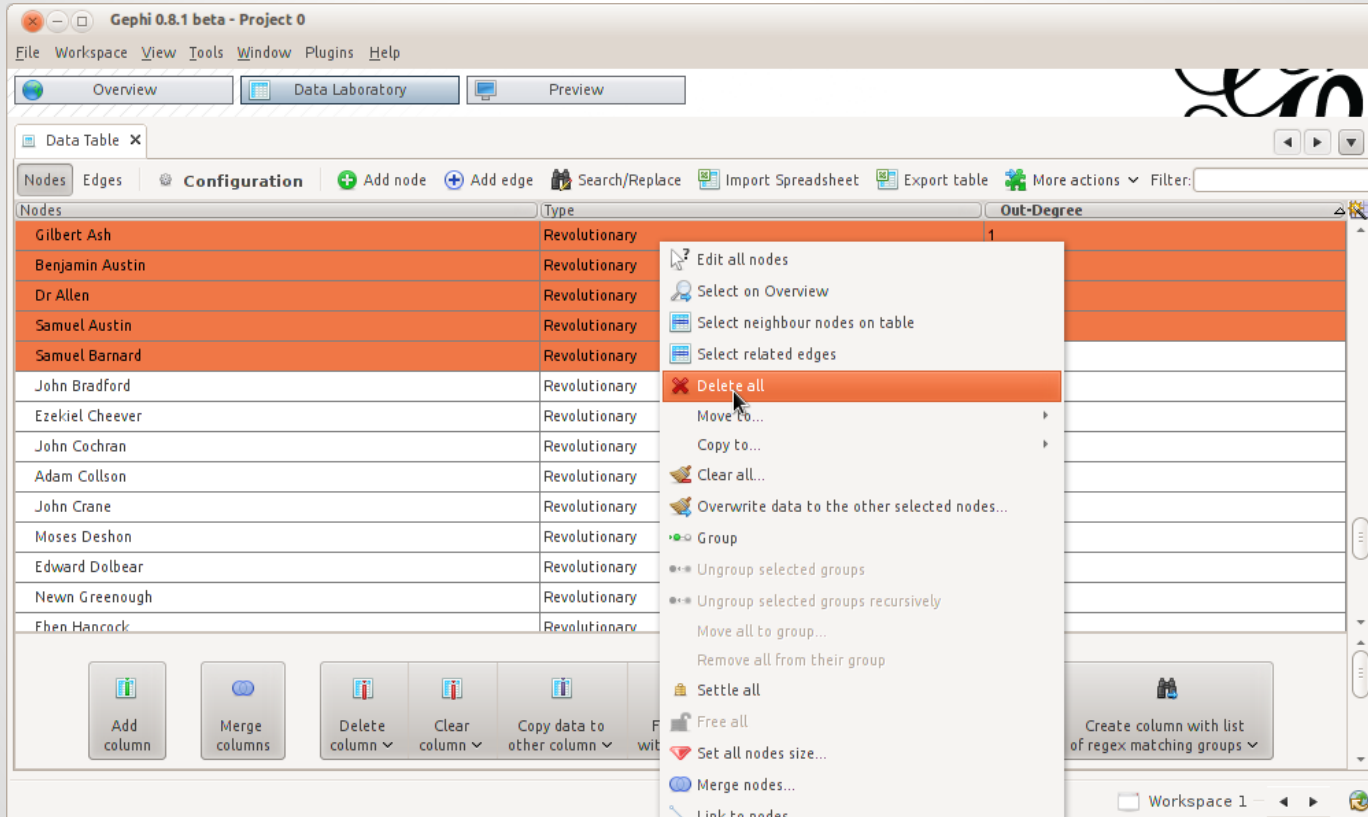
# Step 4: Export



# 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. A context menu is open over the 'Delete all' option, which is highlighted in orange. The table has columns for 'Nodes', 'Type', and 'Out-Degree'. The 'Nodes' column lists names, and the 'Type' column lists 'Revolutionary'. The 'Out-Degree' column shows values, with '1' visible for Gilbert Ash.

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	
Fhen Hancock	Revolutionary	

The context menu options are:

- Edit all nodes
- Select on Overview
- Select neighbour nodes on table
- Select related edges
- Delete all**
- 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...
- Link to nodes

# 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 two panels: 'Context' and 'Filters'. The 'Context' panel shows 'Edges: 129 (38.62% Visible)'. The 'Filters' panel is active, showing a list of node attributes: 'Authority Float (Node)', 'Betweenness Centrality Double (Node)', 'Closeness Centrality Double (Node)', 'Component ID Integer (Node)', 'Degree Integer (Node)', 'Eccentricity Double (Node)', and 'In-Degree Integer (Node)'. The 'Degree Integer (Node)' attribute is selected and highlighted. Below the list, a tooltip reads: 'Keep nodes/edges with number values within a range (inclusive)'. The 'Range (Degree) Settings' section shows a slider with a value of 83. At the bottom right, there are 'Select' and 'Filter' buttons. 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

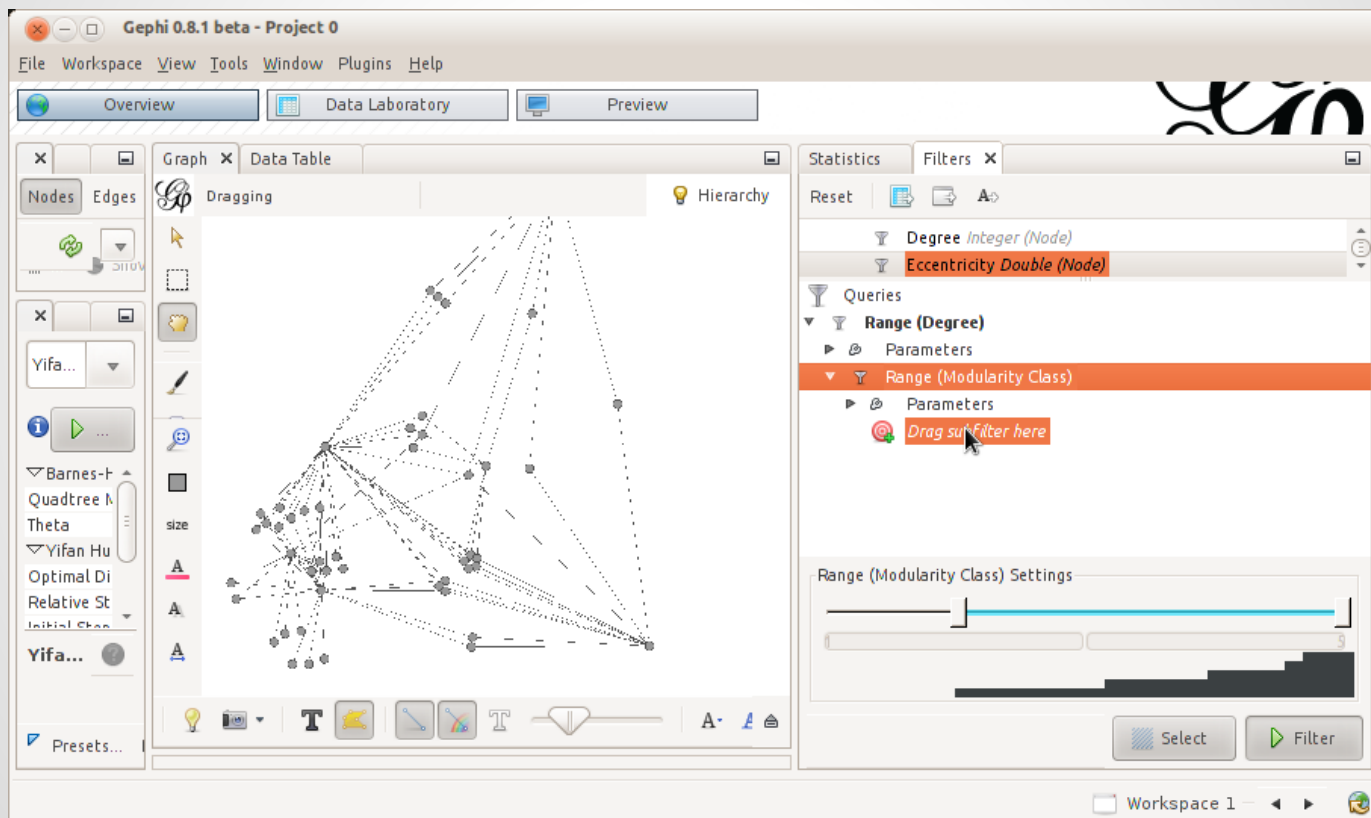
Range (Degree) Settings

83

Select Filter

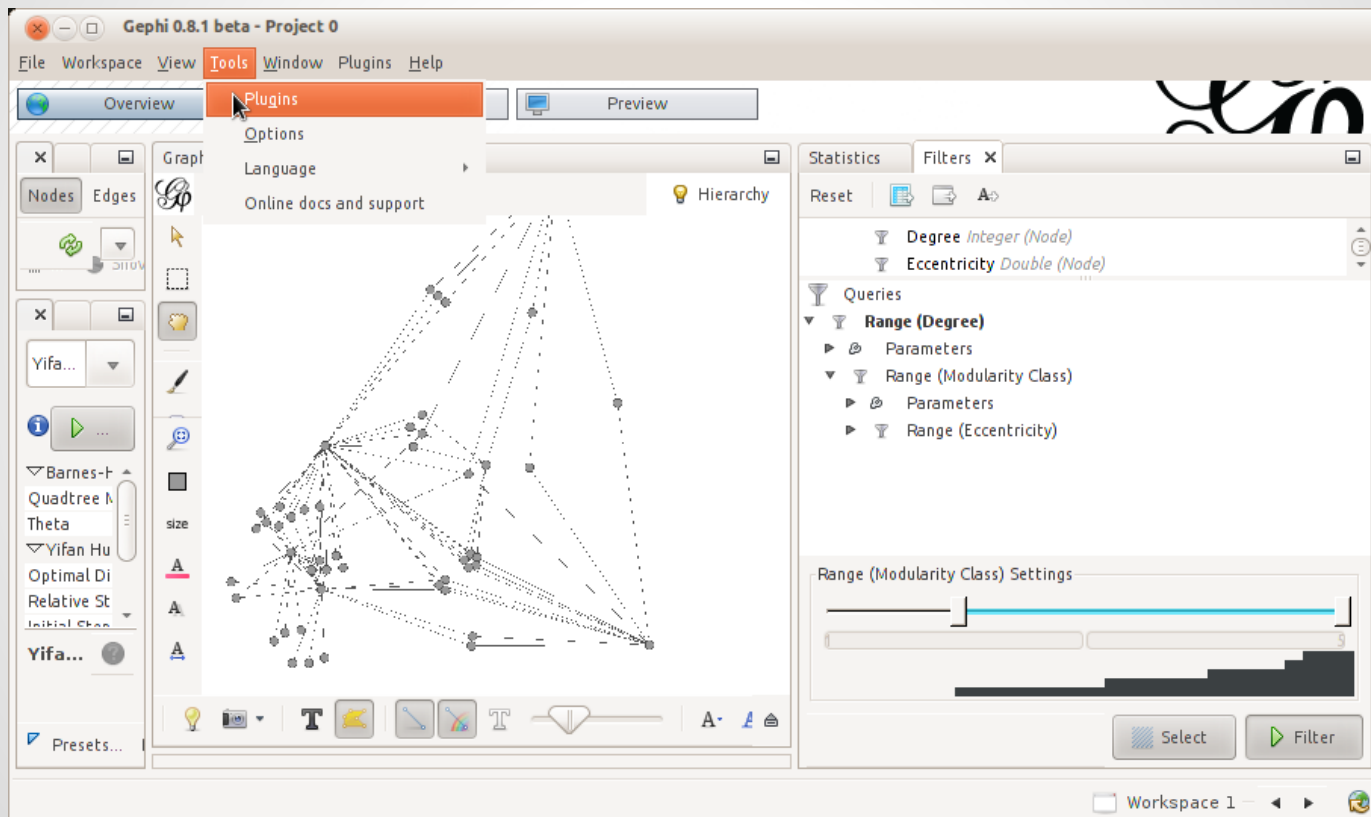
Workspace 1

# Advanced Steps 2a: Chained Filters

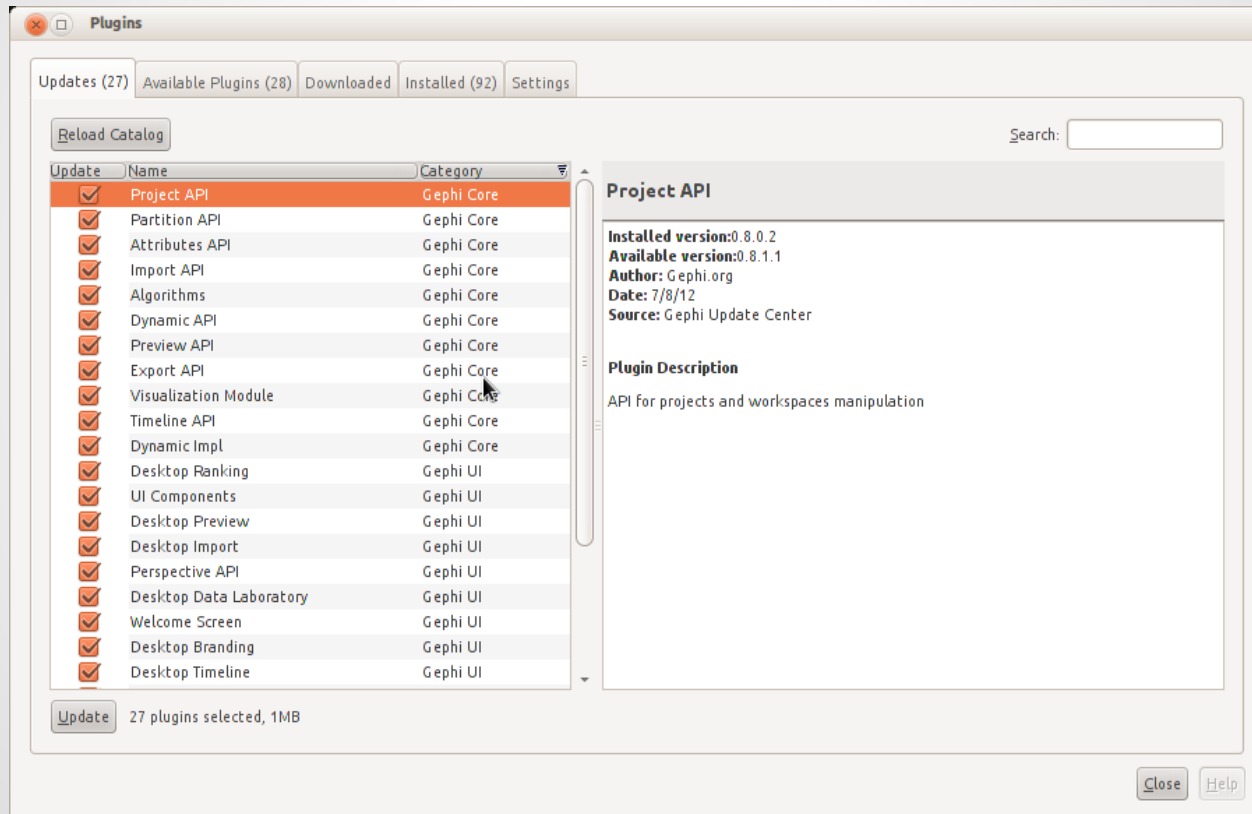




# Advanced Steps 3: Plugins



# 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](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: [https://github.com/DGaffney/gephi\\_tutorial/blob/master/presentation.pdf](https://github.com/DGaffney/gephi_tutorial/blob/master/presentation.pdf)