Gephi Tutorial Quick Start

Welcome to this introduction tutorial. It will guide you to the basic steps of network visualization and manipulation in Gephi.

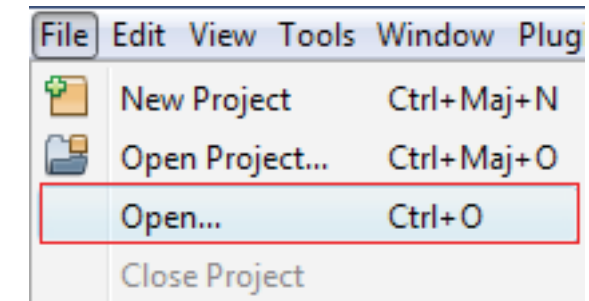Gephi version 0.7alpha2 was used to do this tutorial.

⬇ Get Gephi

Last updated March 05th, 2010

Tutorial
Quick Start

Open Graph File

File	Edit	View	Tools	Window	Plug
New Project				Ctrl+Maj+N	
Open Project...				Ctrl+Maj+O	
Open...				Ctrl+O	
Close Project					

• Download the file   📎 LesMiserables.gexf

• In the menubar, go to File Menu and Open...

💡 Graph Format

- GEXF   - Tulip TLP
- GraphML   - CSV
- Pajek NET   - Compressed ZIP
- GDF
- GML

Import Report

• When your filed is opened, the report sum up data found and issues.

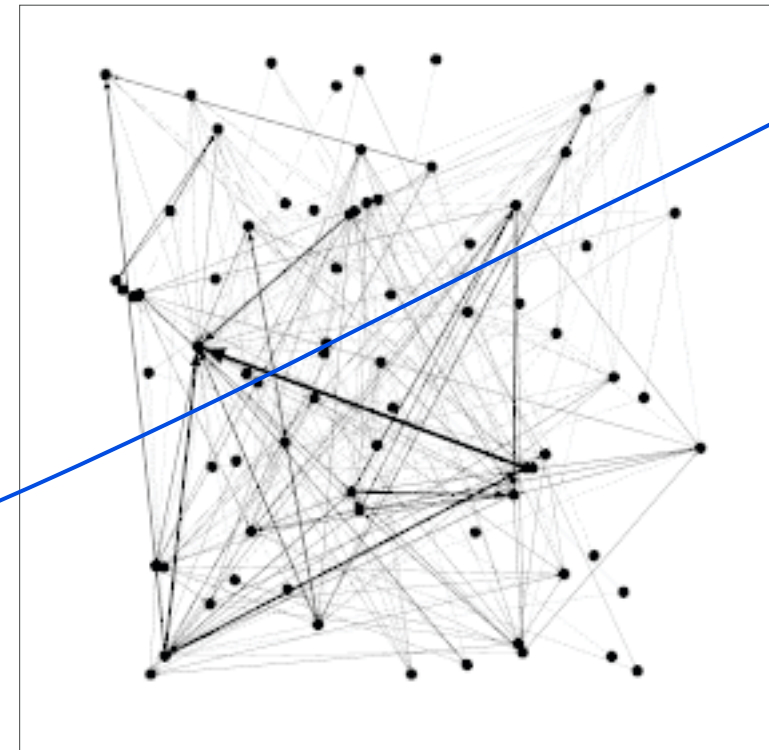 - Number of nodes
  - Number of edges
  - Type of graph
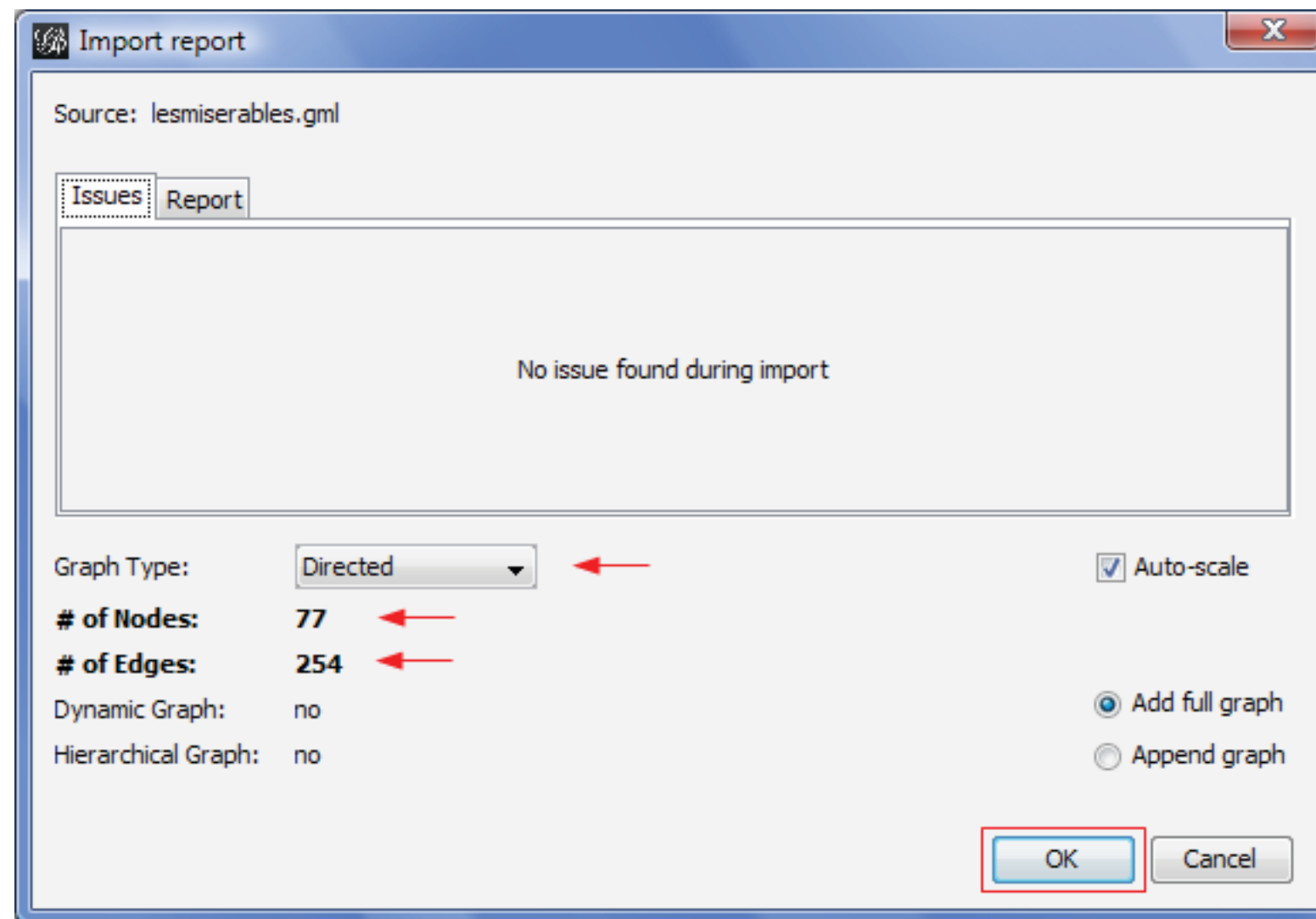
• Click on OK to validate and see the graph

You should now see a graph

We imported "**Les Miserables**" dataset[1]. Coappearance weighted network of characters in the novel "Les Miserables" from Victor Hugo.

Nodes position is random at first, so you may see a slighty different representation.

[1] D. E. Knuth, The Stanford GraphBase: A Platform for Combinatorial Computing, Addison-Wesley, Reading, MA (1993).
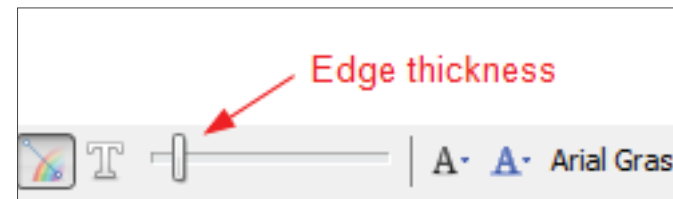
Graph Visualization

- Use your mouse to move and scale the visualization
    - Zoom: Mouse Wheel
    - Pan: Right Mouse Drag

- Locate the "Edge Thickness" slider on the bottom
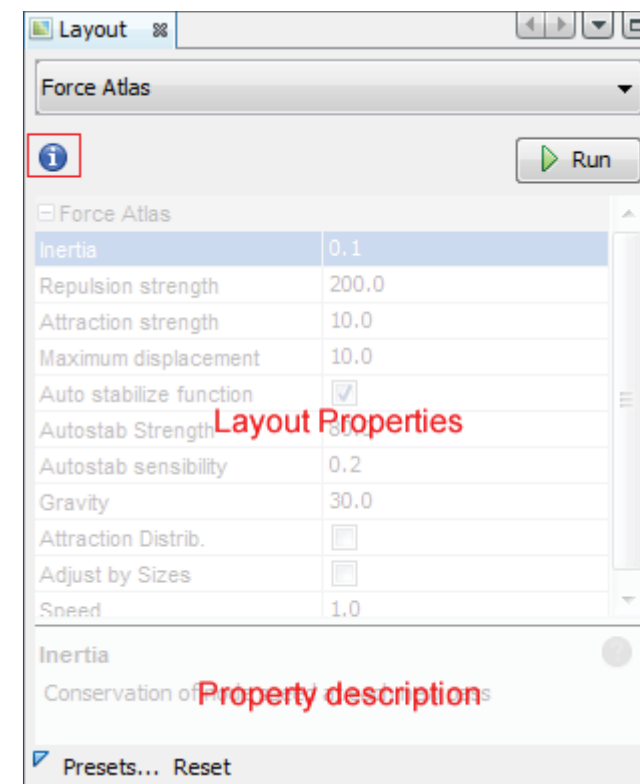

- If you loose your graph, reset the position

Zoom

Drag

Layout the graph

Layout algorithms sets the graph shape, it is the most essential action.

• Locate the ▦Layout module, on the left panel.

• Choose "Force Atlas"

You can see the layout properties below, leave default values.

• Click on [▷ Run] to launch the algorithm

💡 Layout algorithms

Graphs are usually layouted with "Force-based" algorithms. Their principle is easy, linked nodes attract each other and non-linked nodes are pushed apart.

Control the layout
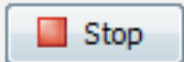
The purpose of Layout Properties is to let you control the algorithm in order to make a aesthetically pleasing representation.

⊟ Force Atlas		
Inertia	0.1	
Repulsion strength	10000.0	
Attraction strength	10.0	
Maximum displacement	10.0	10000.0
Auto stabilize function	☑	
Autostab Strength	80.0	
Autostab sensibility	0.2	
Gravity	30.0	
Attraction Distrib.	☐	
Adjust by Sizes	☐	
Speed	1.0	

• Set the "Repulsion strengh" at 10 000 to expand the graph.

• Type "Enter" to validate the changed value.

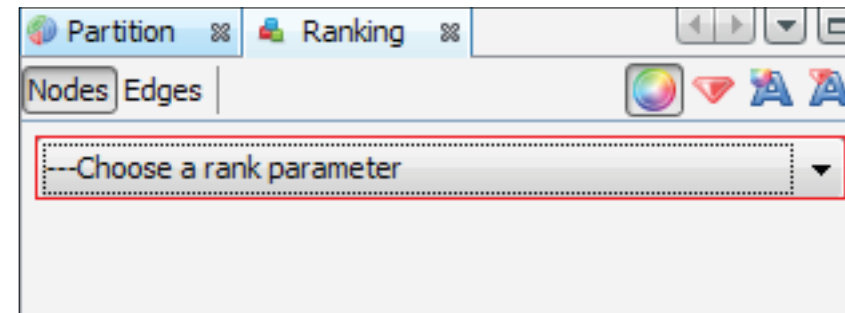• And now [■ Stop] the algorithm.
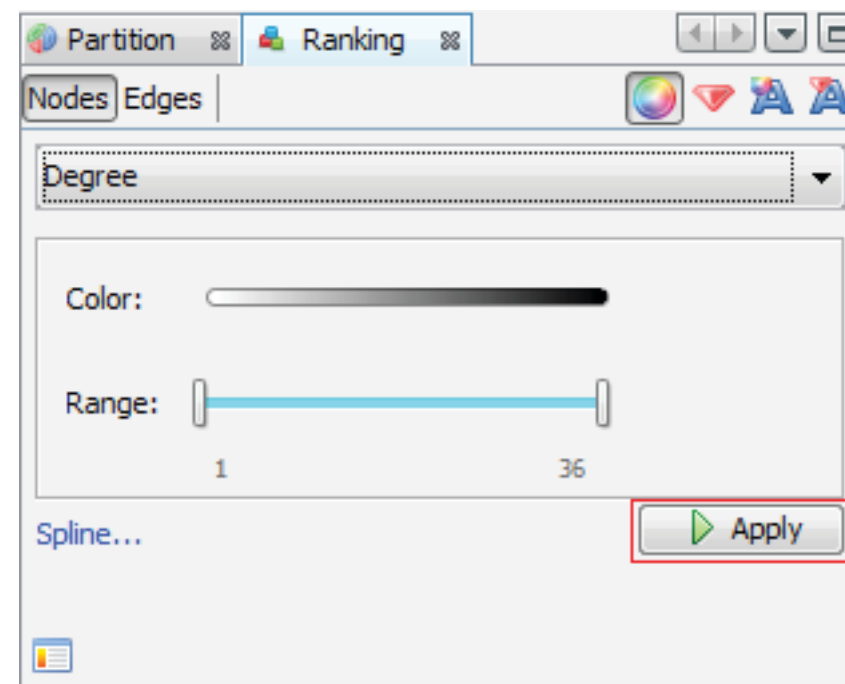
You should now see a layouted graph

Ranking (color)

Ranking module lets you configure node's color and size.

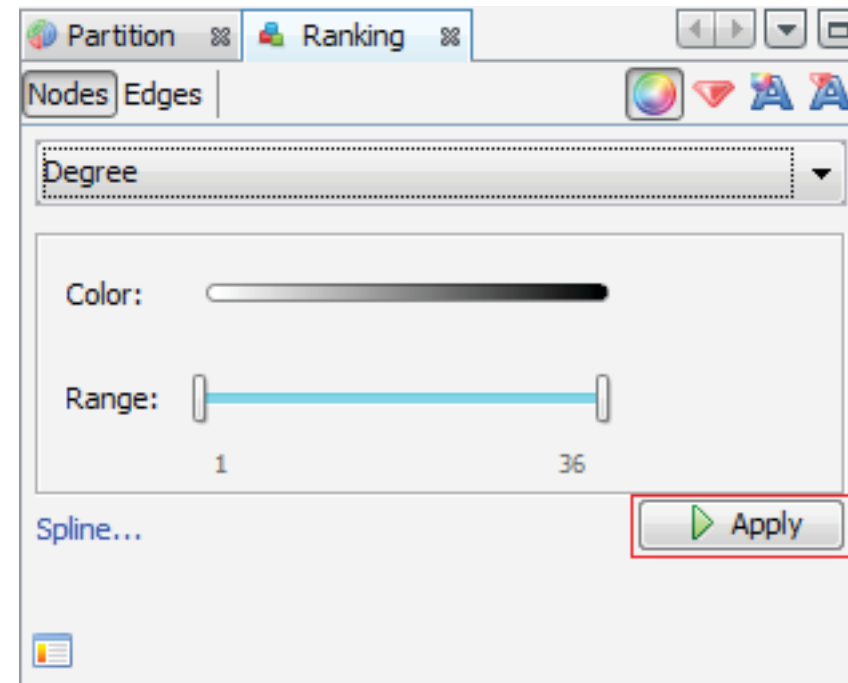
- Locate 🔳 Ranking module, in the top left.

- Choose "Degree" as a rank parameter.

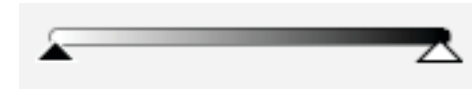You should obtain the configuration panel below:

- Click on [▷ Apply] to see the result.

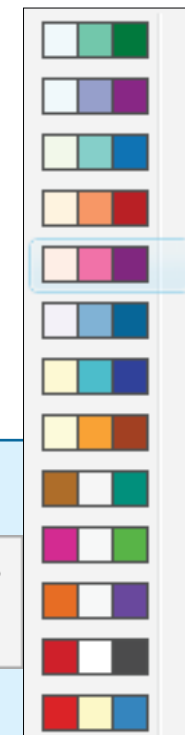# Let's configure colors

- Move your mouse over the gradient component.

- Double-click on triangles to configure the color
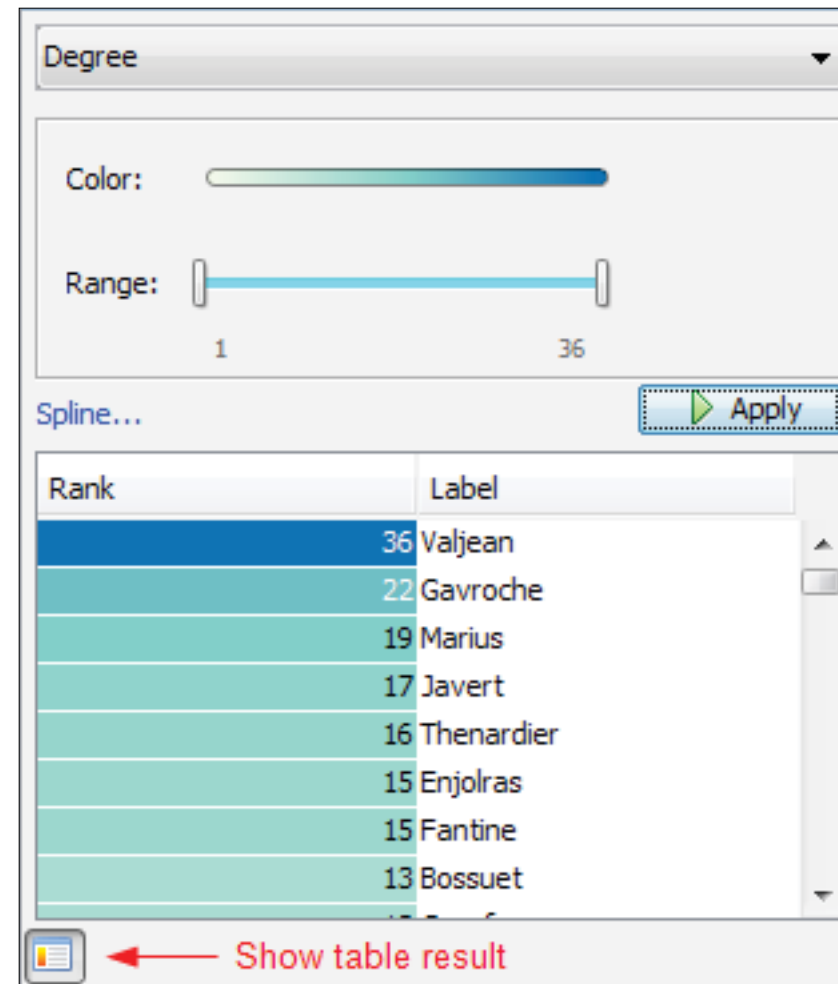
💡 **Palette**

Use palette by right-clicking on the panel.

Default ▸
Invert

Ranking result table

You can see rank values by enabling the result table. Valjean has 36 links and is the most connected node in the network.
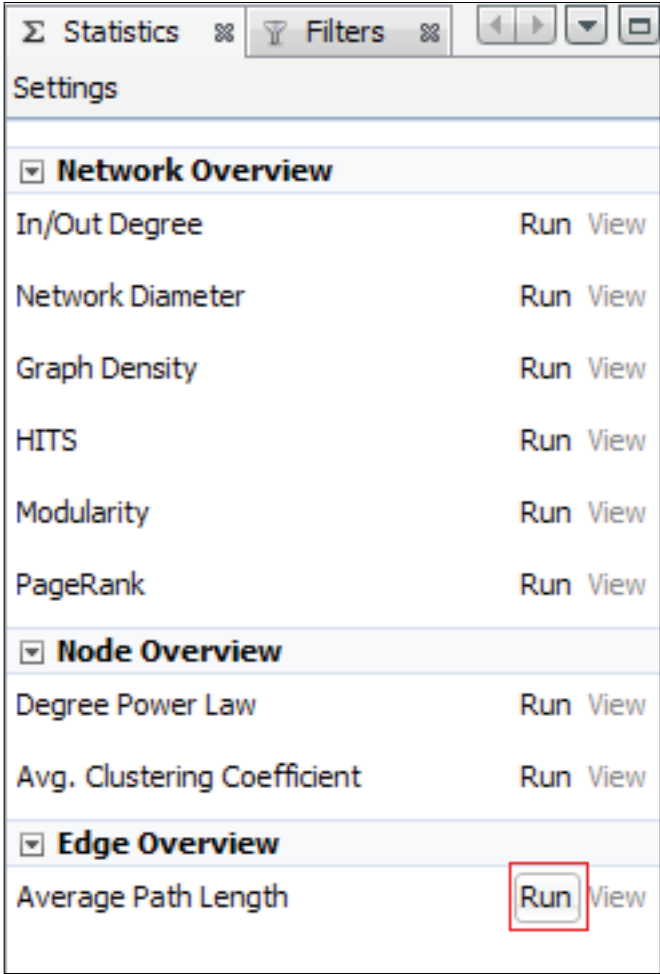

- Enable table result view at the bottom toolbar

- Click again on [▷ Apply]

Metrics

We will calculate the average path length for the network. It computes the path length for all possibles pairs of nodes and give information about how nodes are close from each other.

- Locate the Σ Statistics module on the right panel.

- Click on Run near "Average Path Length".

Σ Statistics ⊠ 🔽 Filters ⊠		
Settings		
🔽 **Network Overview**		
In/Out Degree	Run	View
Network Diameter	Run	View
Graph Density	Run	View
HITS	Run	View
Modularity	Run	View
PageRank	Run	View
🔽 **Node Overview**		
Degree Power Law	Run	View
Avg. Clustering Coefficient	Run	View
🔽 **Edge Overview**		
Average Path Length	Run	View

💡 Metrics available

- Diameter
- Average Path Length
- Clustering Coefficient
- PageRank
- HITS

- Betweeness Centrality
- Closeness Centrality
- Eccentricity
- Community Detection (Modularity)

Metric settings

The settings panel immediately appears.
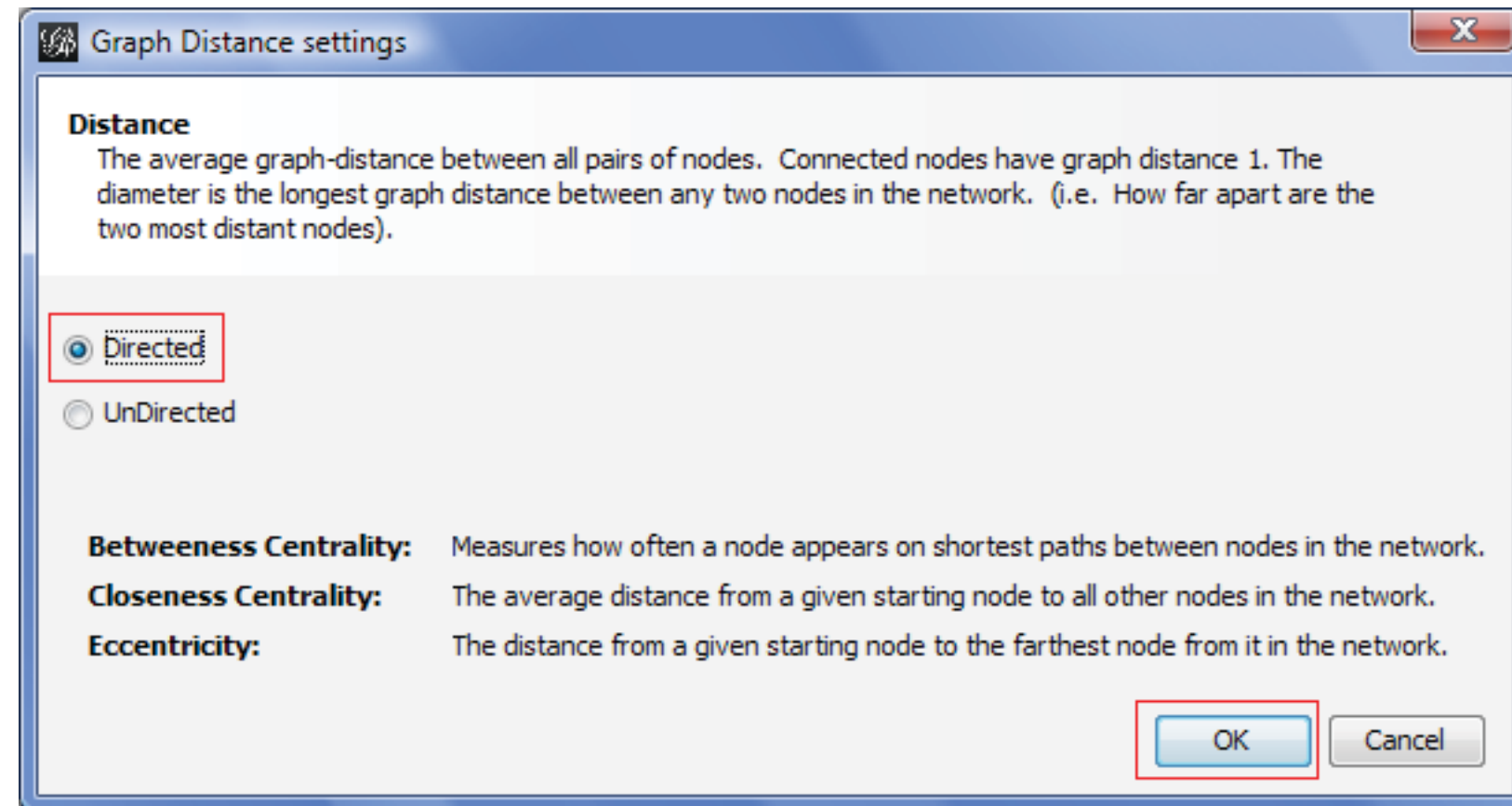
• Select "Directed" and click on OK to compute the metric.
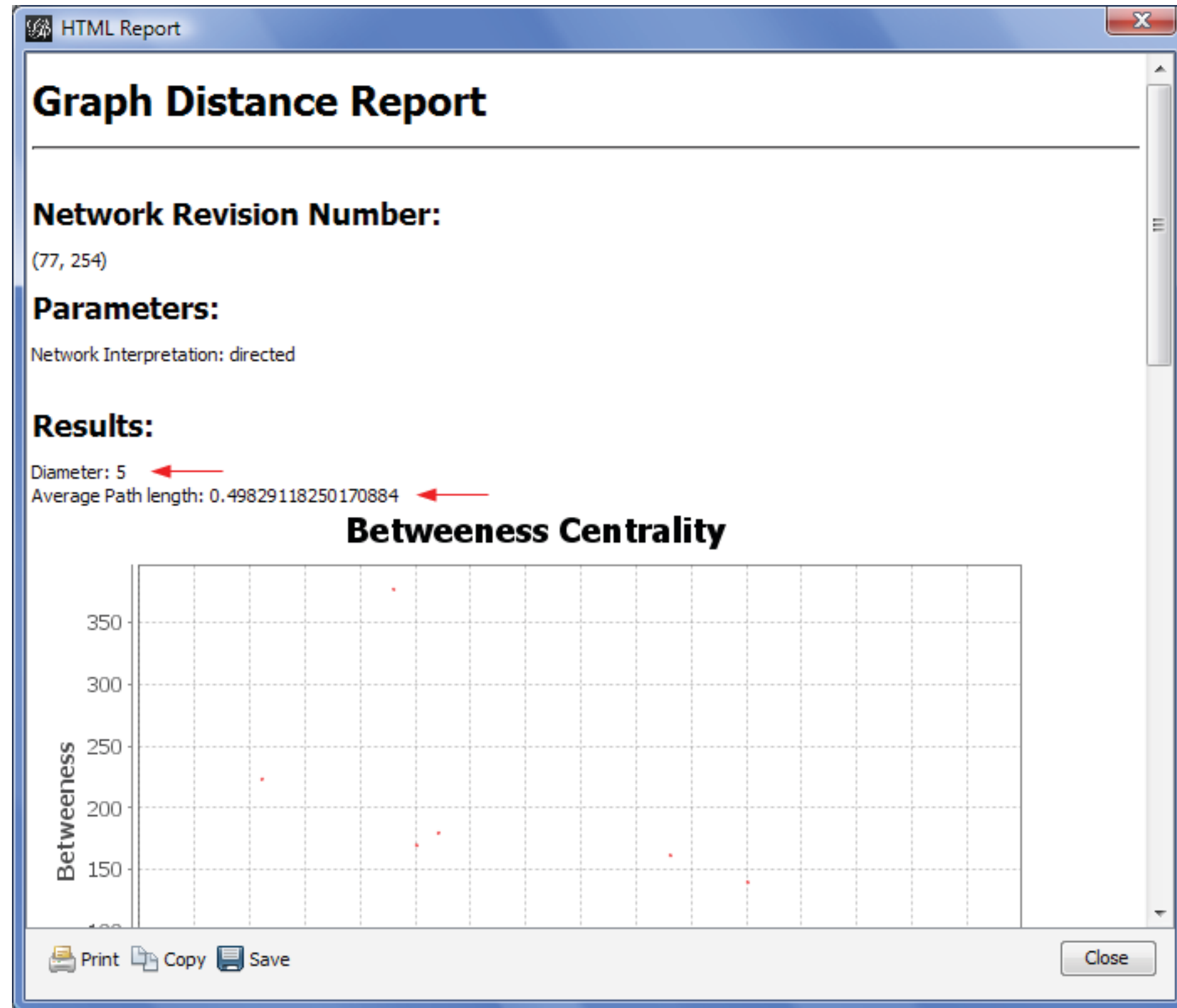
Metric result

When finished, the metric displays its result in a report

HTML Report

Graph Distance Report

Network Revision Number:

(77, 254)

Parameters:

Network Interpretation: directed

Results:

Diameter: 5
Average Path length: 0.49829118250170884

Betweeness Centrality

Print   Copy   Save

Close

Ranking (size)

Metrics generates general reports but also results for each node. Thus three new values have been created by the "Average Path Length" algorithm we ran.

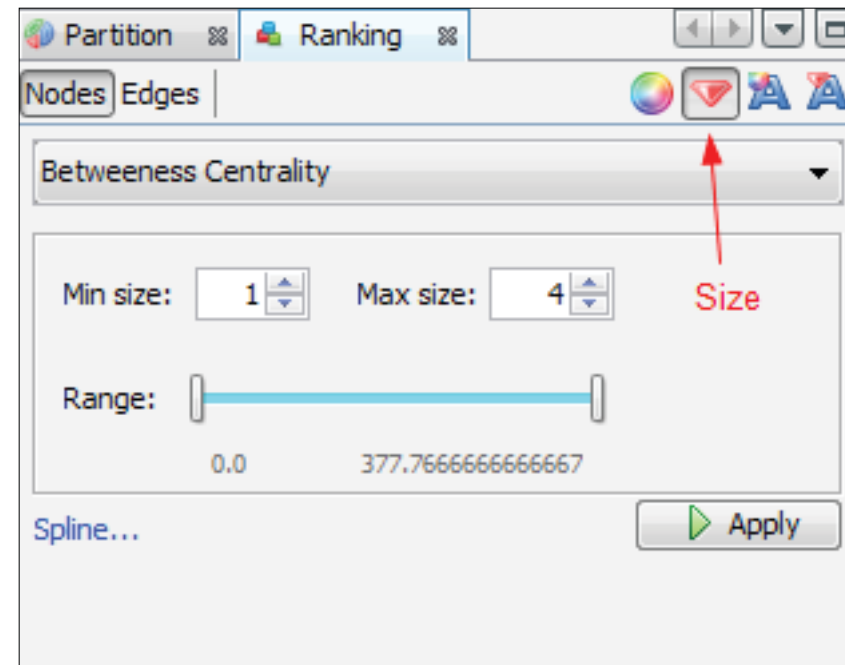- Betweeness Centrality
- Closeness Centrality
- Eccentricity
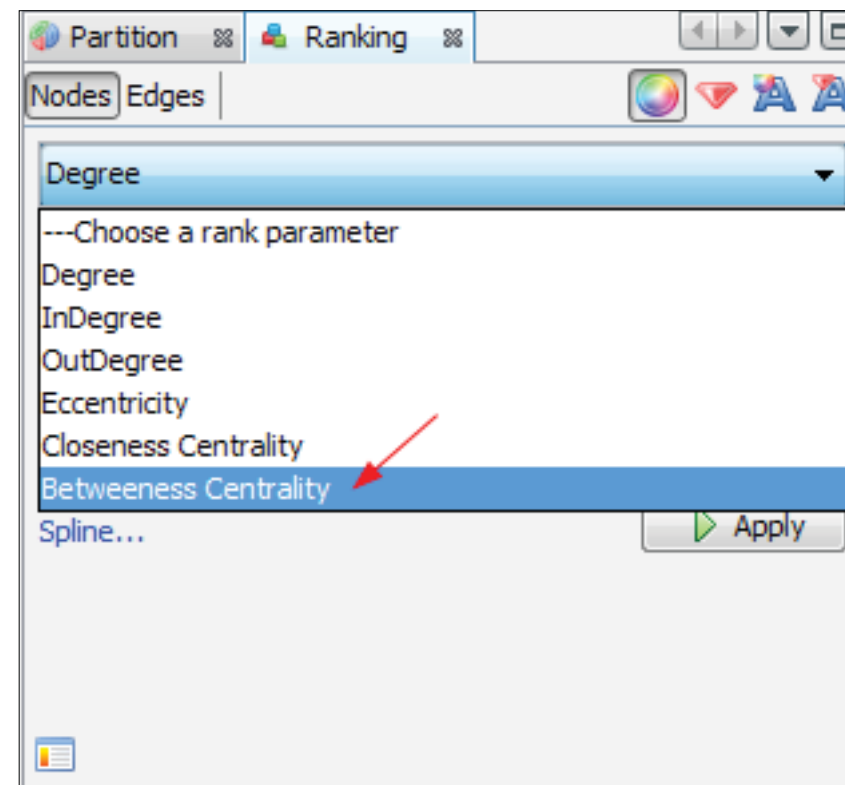
- Go back to 🔲 Ranking

- Select "Betweeness Centrality" in the list.

This metrics indicates influencial nodes for highest value.

Ranking (size)

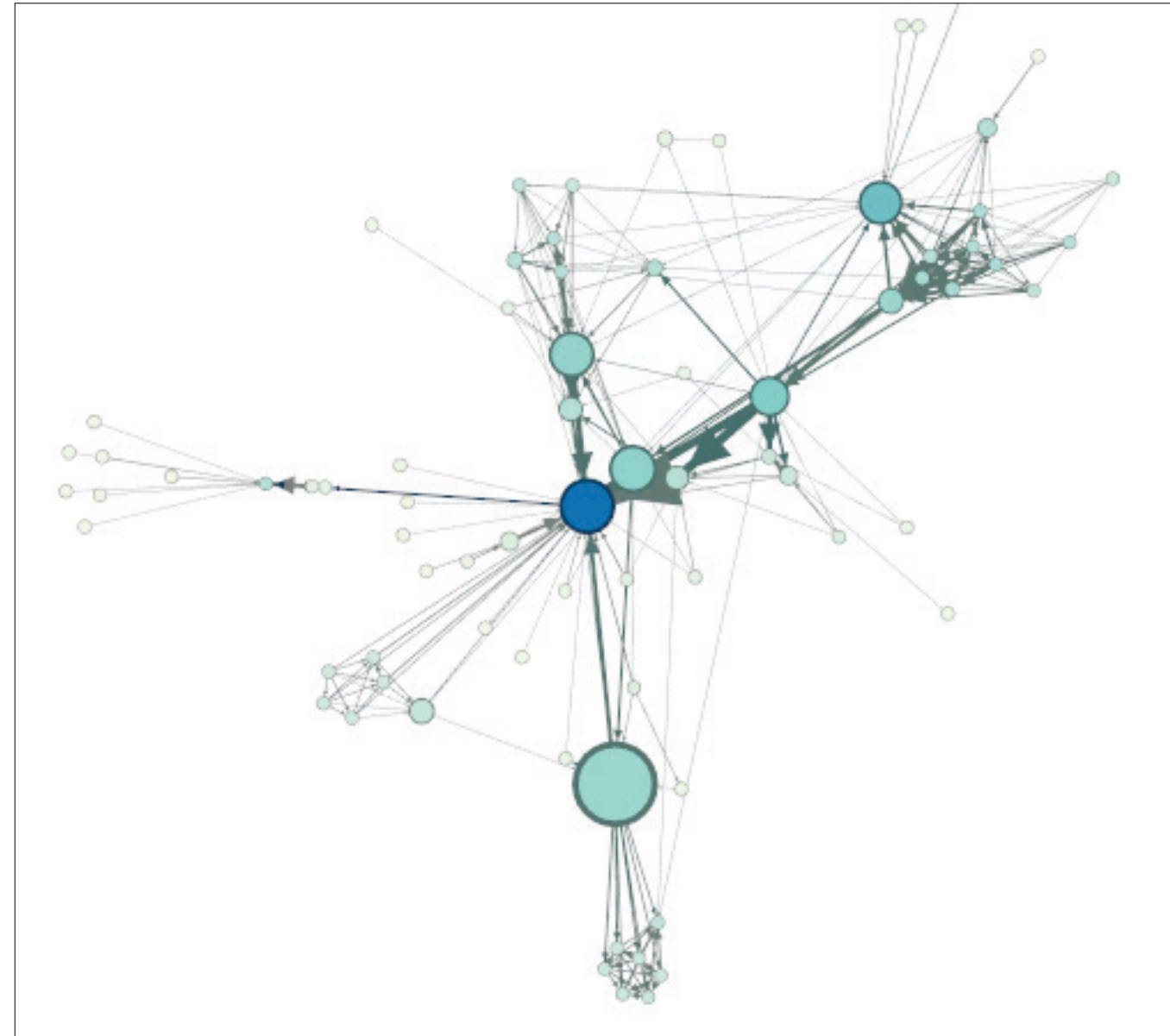The node's size will be set now. Colors remain the "Degree" indicator.

- Select the diamond icon in the toolbar for size.

- Set a min size at 10 and a max size at 50.

- And click on ▷ Apply to see the result.

You should see a colored and sized graph

Color: Degree
Size: Betweeness Centrality metric

Layout again

The layout is not completely satisfying, as big nodes can overlap smaller.

The "Force Atlas" algorithm has an option to take node size in account when layouting.
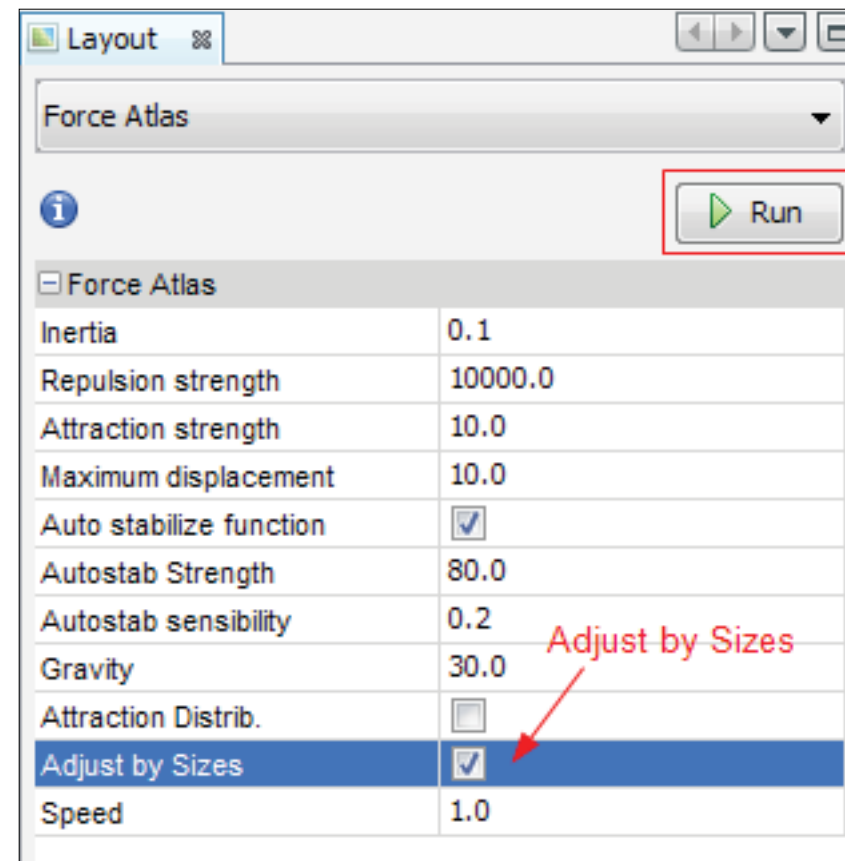
• Go Back to the ▣ Layout panel.

• Check the "Adjust by Sizes" option and run again the algorithm for short moment.

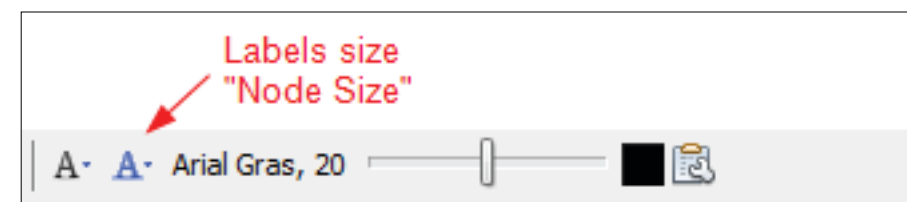• You can see nodes are not overlapping anymore.

Show labels

Let's explore the network more in details now that colors and size indicates central nodes.
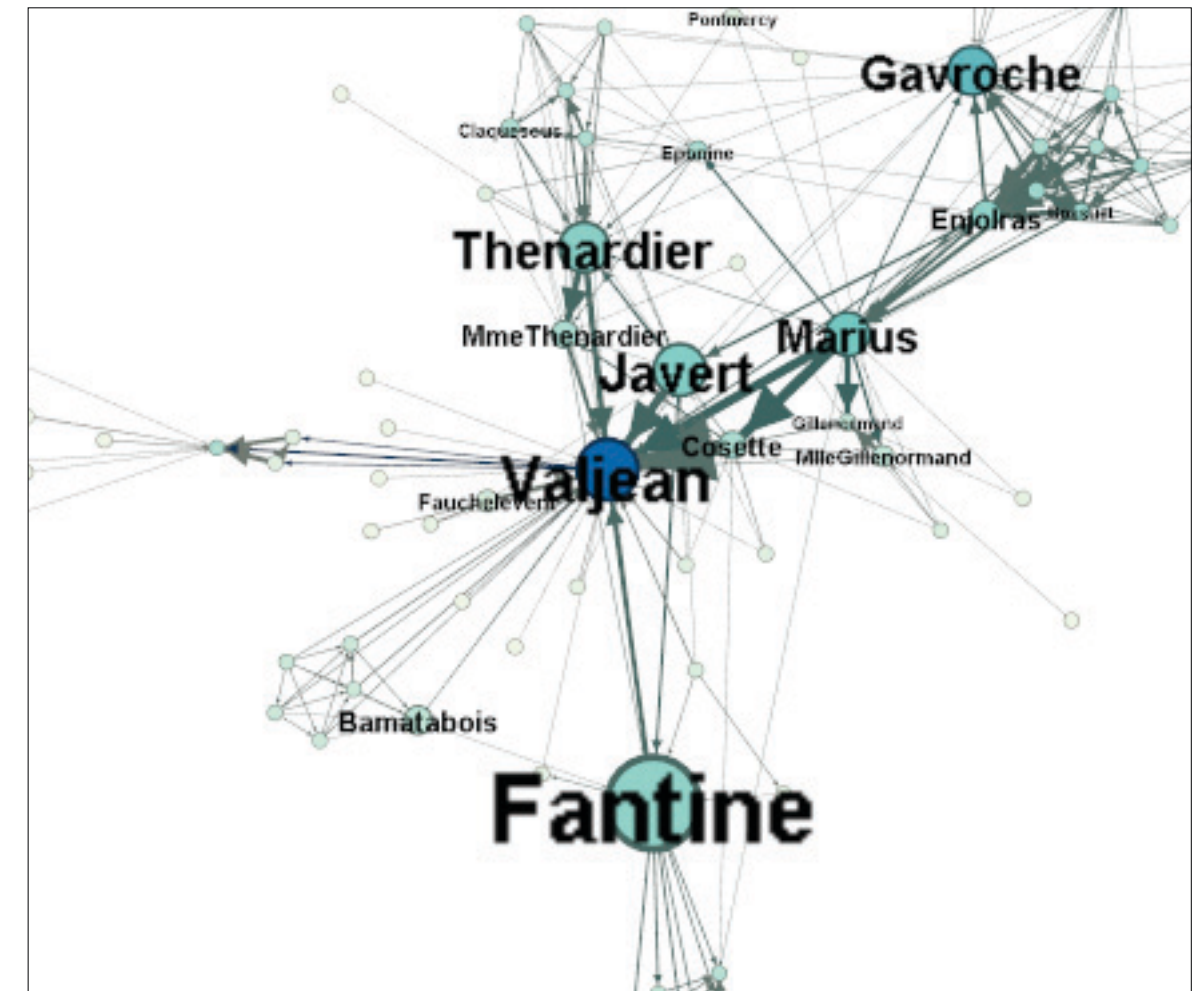
• Display node labels

• Set label size proportional to node size

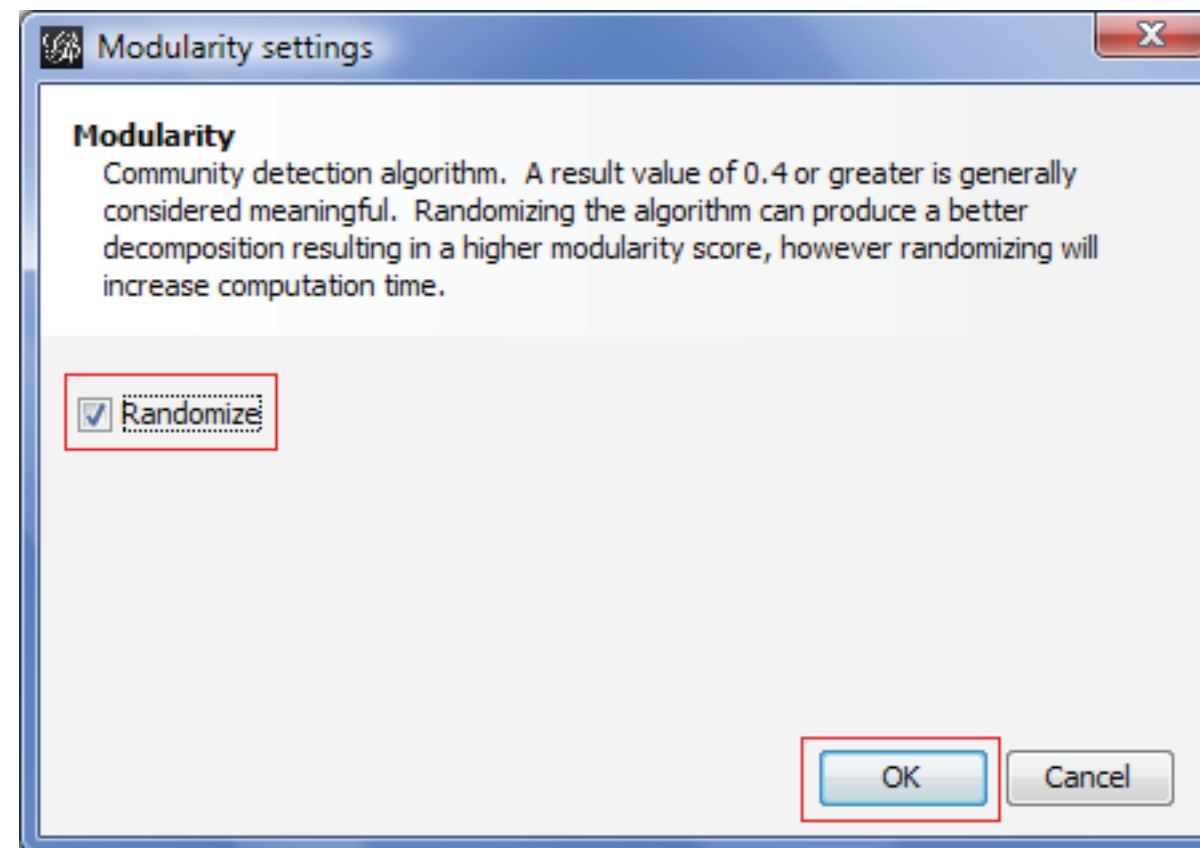• Set label size with the scale slider

Community detection

The ability to detect and study communities is central in network analysis. We would like to colorize clusters in our example.

Gephi implements the Louvain method[1], available from the Σ Statistics panel.

Click on [Run] near the "Modularity" line

Modularity	Run View

Modularity settings

Modularity
Community detection algorithm. A result value of 0.4 or greater is generally considered meaningful. Randomizing the algorithm can produce a better decomposition resulting in a higher modularity score, however randomizing will increase computation time.

☑ Randomize

[OK] [Cancel]

• Select "Randomize" on the panel.

• Click on OK to launch the detection.

[1] Blondel V, Guillaume J, Lambiotte R, Mech E (2008) Fast unfolding of communities in large networks. J Stat Mech: Theory Exp 2008:P10008. (http://findcommunities.googlepages.com)

Partition

The community detection algorithm created a "Modularity Class" value for each node.

The partition module can use this new data to colorize communities.
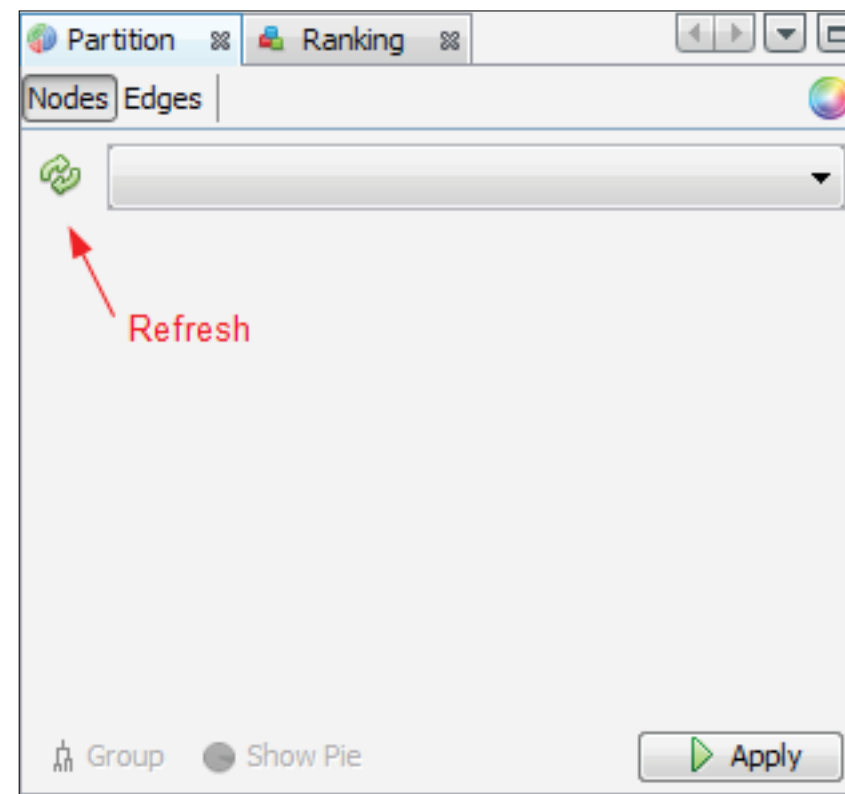
- Locate the ⊕ Partition module on the left panel.

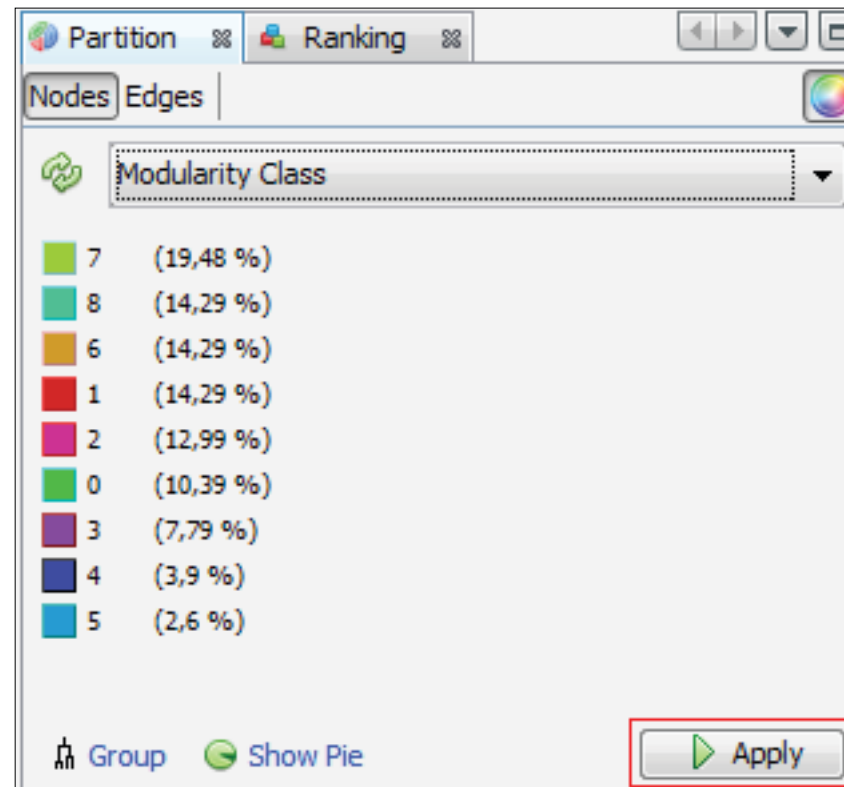- Immediately click on the "Refresh" button to populate the partition list.

💡 How to visualize nodes & edges columns?

See columns and values for nodes and edges by looking at the Data Table view.

Select 🔲 Data Laboratory tab and click on "Nodes" to refresh the table.

Partition

- Select "Modularity Class" in the partition list.

You can see that 9 communities were found, could be different for you. A random color has been set for each community identifier.
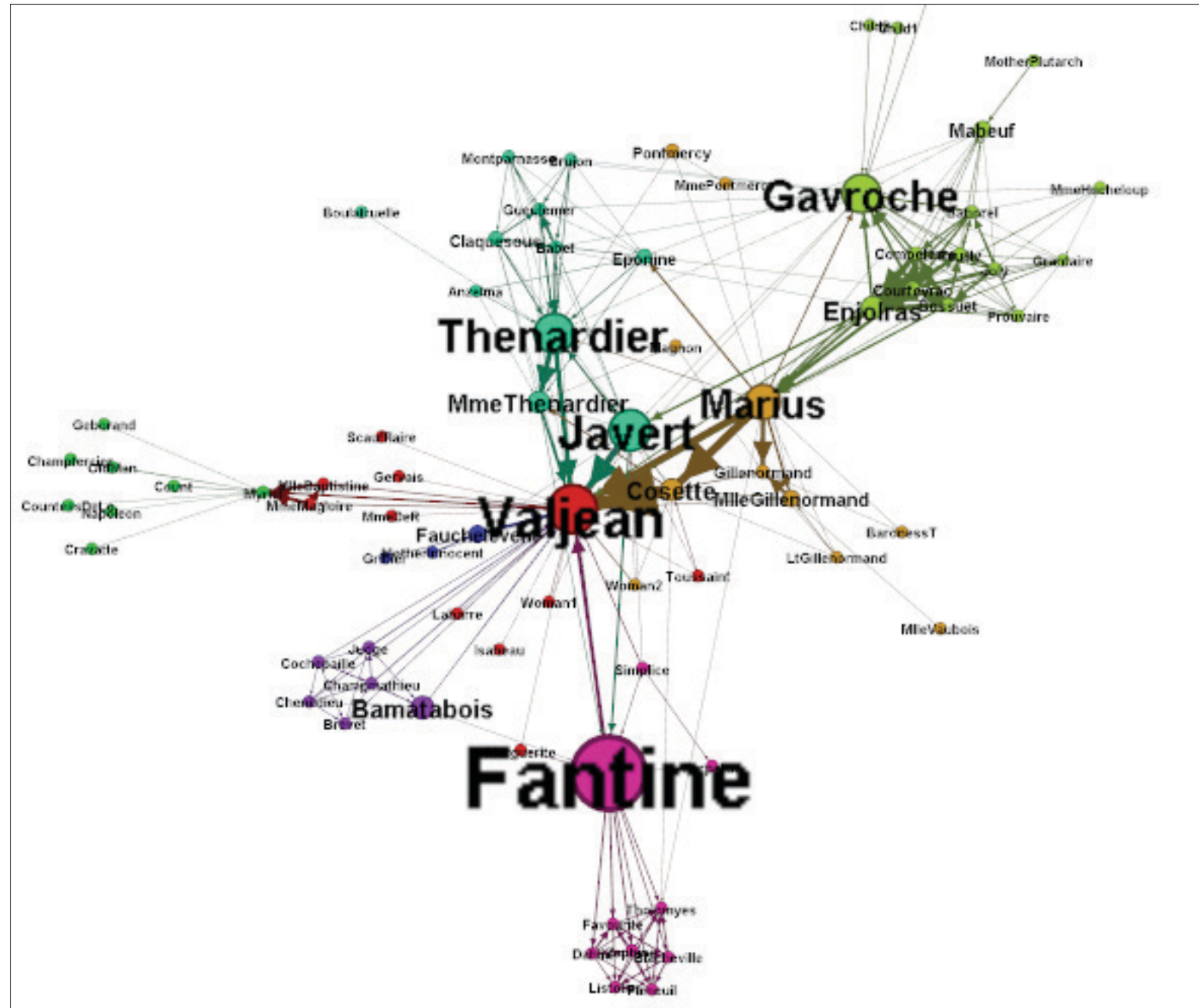
- Click on [▷ Apply] to colorize nodes.

Right-click on the panel to access the Randomize colors action.
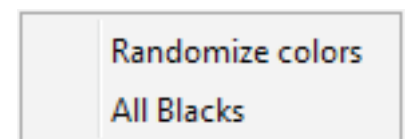
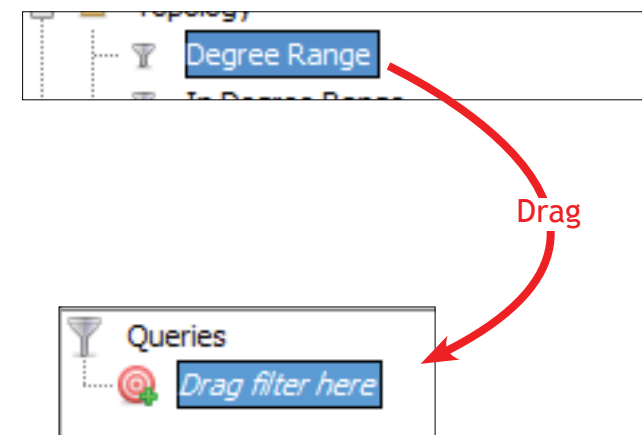# What the network looks like now

Filter

The last manipulation step is filtering. You create filters that can hide nodes and egdes on the network. We will create a filter to remove leaves, i.e. nodes with a single edge.
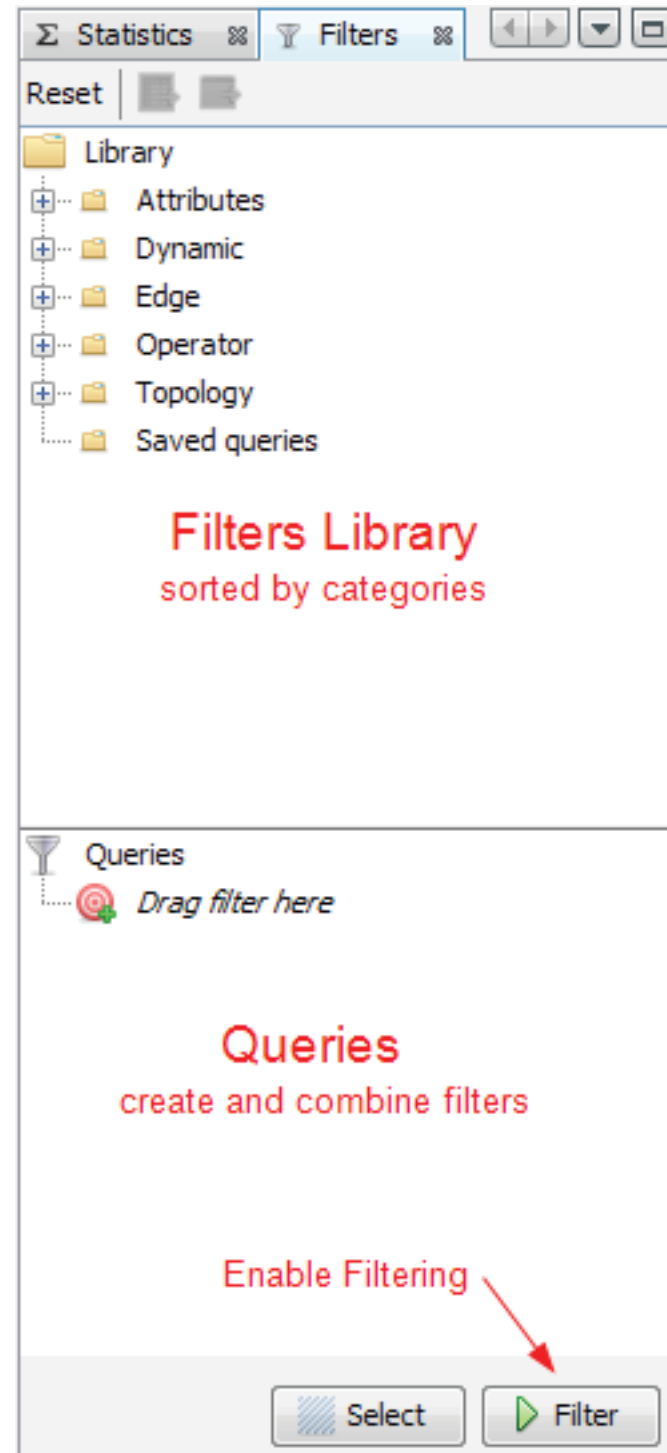
- Locate the ⧩ Filters module on the right panel.

- Select "Degree Range" in the "Topology" category.
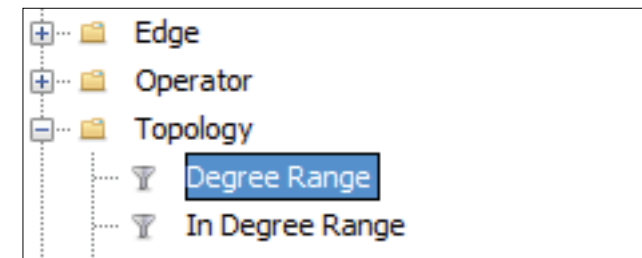
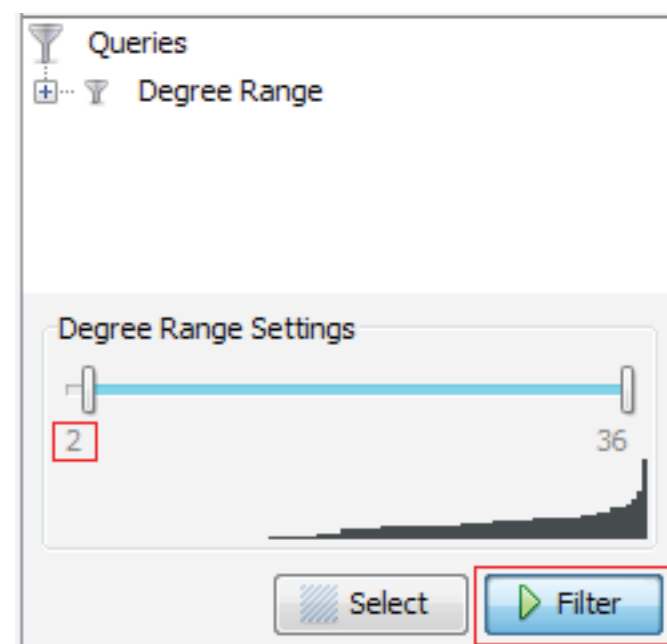- Drag it to the Queries, drop it to "Drag filter here".

Filter

• Click on "Degree Range" to activate the filter. The parameters panel appears.

It shows a range slider and the chart that represents the data, the degree distribution here.
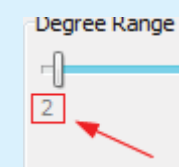
• Move the slider to sets its lower bound to 2.

• Enable filtering by pushing the ▷ Filter button.

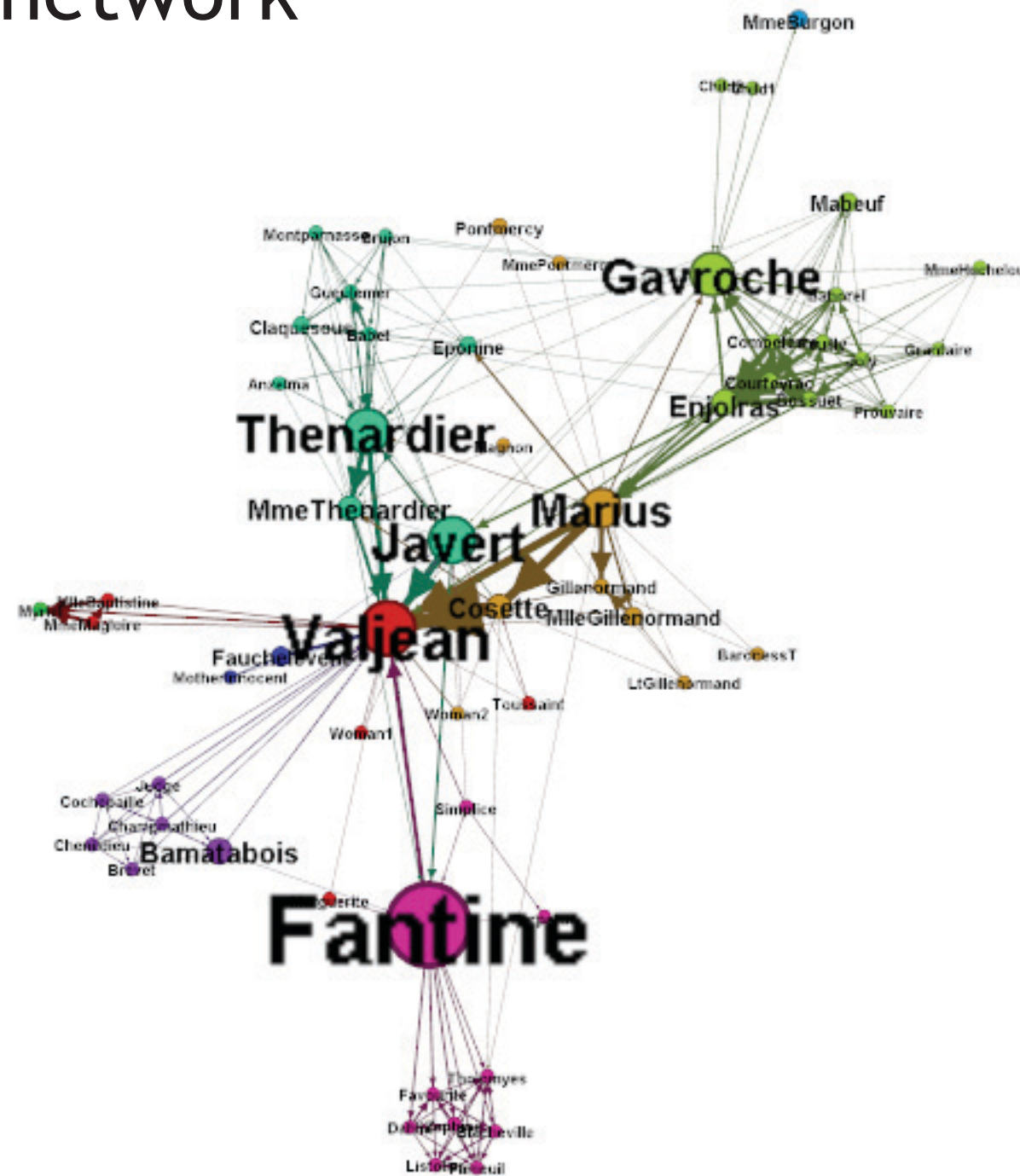Nodes with a degree inferior to 2 are now hidden.

💡 Tip

You can edit bounds manually by double-clicking on values.

The filtered network

That ends the manipulation. We will now preview the rendering and prepare to export.
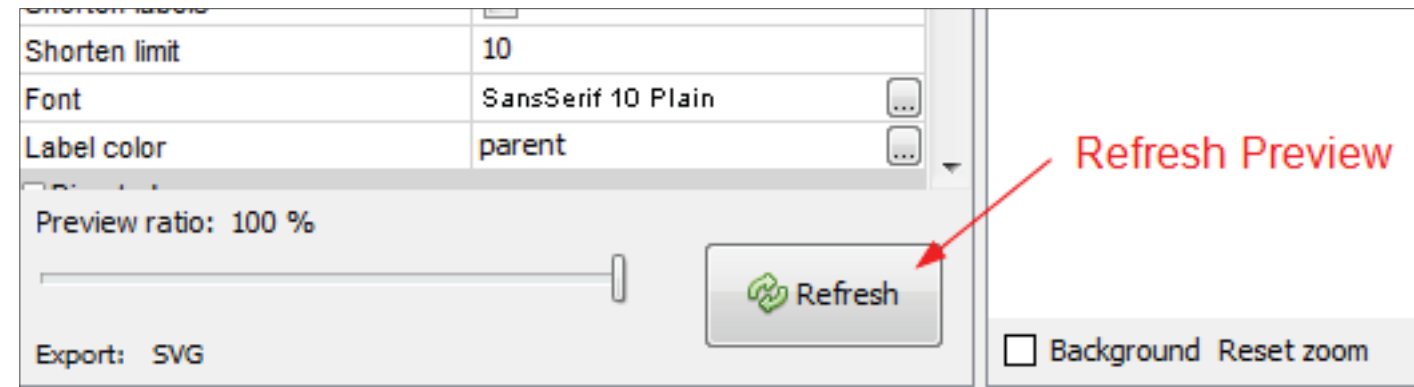
Preview

- Before exporting your graph as a SVG or PDF file, go to the Preview to:

    - See exactly how the graph will look like
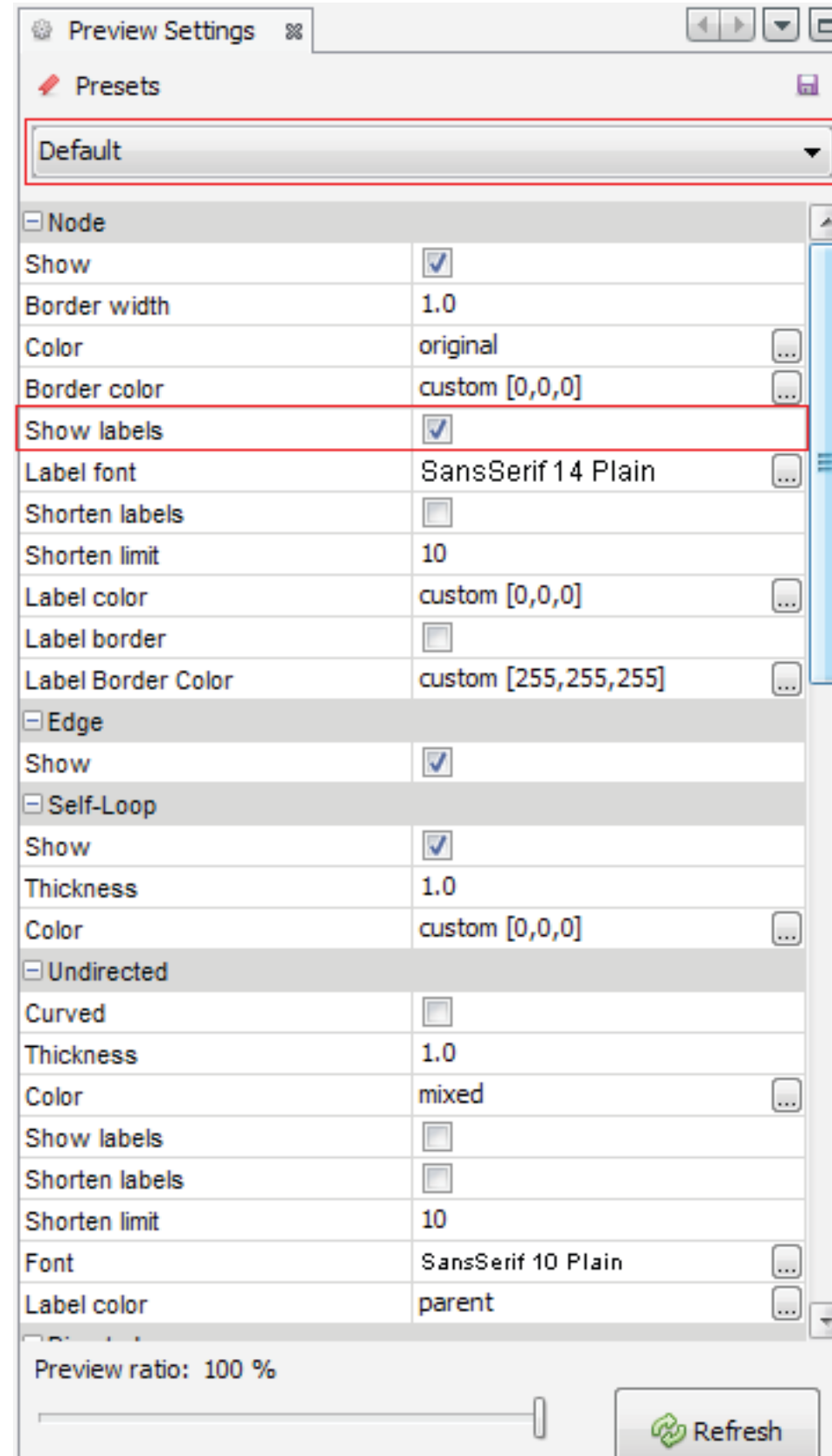   - Put the last touch

- Select the "Preview" tab in the banner:
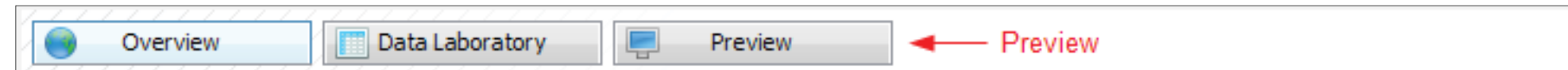
- Click on Refresh to see the preview

> 💡 Tip
>
> If the graph is big, reduce the "Preview ratio" slider to 50% or 25% to display a partial graph.

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Preview

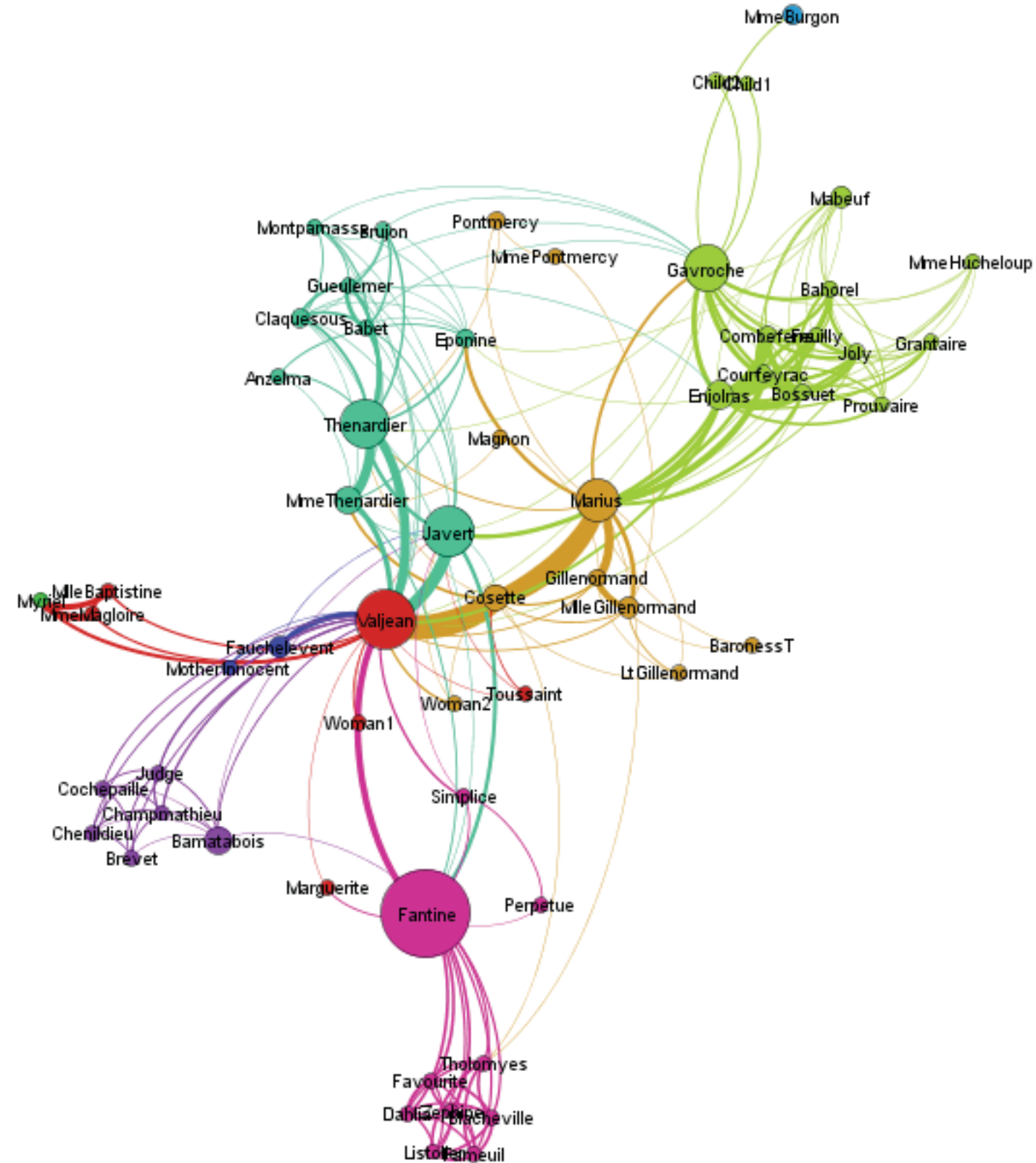- In the Node properties, find "Show Labels" and enable the option.

- Click on [Refresh]

Preview Settings supports Presets, click on the presets list and try different configurations.
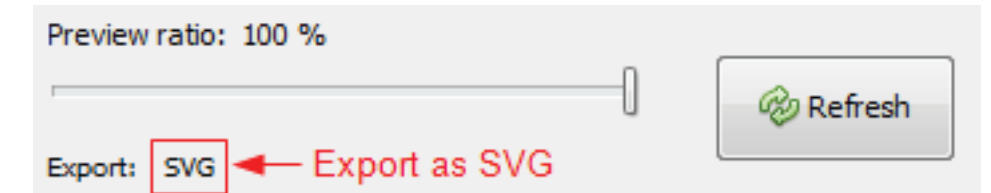
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The Previewed Graph

Export as SVG

From Preview, click on SVG near Export.

ⓘ SVG Files are vectorial graphics, like PDF. Images scale smoothly to different sizes and can therefore be printed or integrated in high-res presentation.

Transform and manipulate SVG files in Inkscape or Adobe Illustrator.

Inkscape

💡 High-resolution screenshots

If you prefer hi-resolution PNG screenshots only, look at the 🖼 ▾ icon in the visualization properties bar, located at the bottom of the visualization.

Save your project

Saving your project encapsulates all data and results in a single session file.

LesMiserables.gephi
Gephi Project File
11,3 Ko

If you missed some steps, you can download the session:

📎 LesMiserables.gephi

New Project	Ctrl+Maj+N
Open Project...	Ctrl+Maj+O
Open...	Ctrl+O
Close Project	
Properties...	
Import Database	▶
Generate	▶
Save	Ctrl+S
Save As...	
Export	▶
Exit	
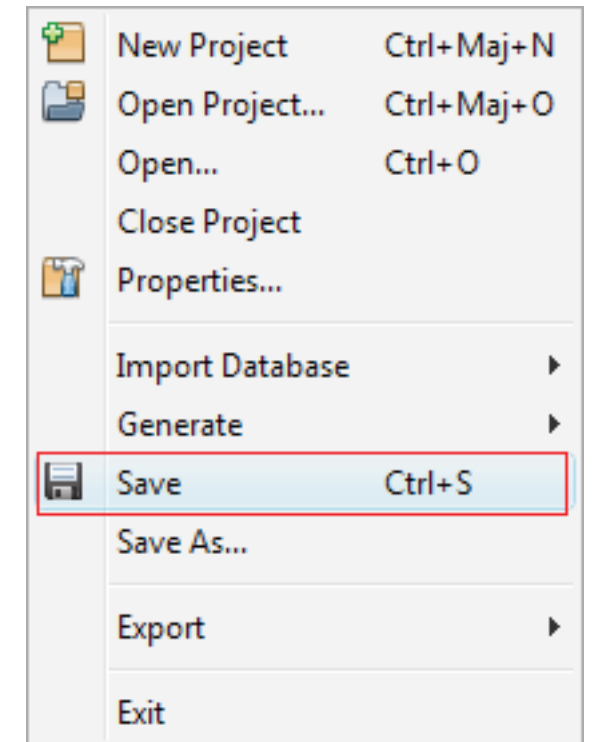
Conclusion

In this tutorial you learned the basic process to open, visualize, manipulate and render a network file with Gephi.
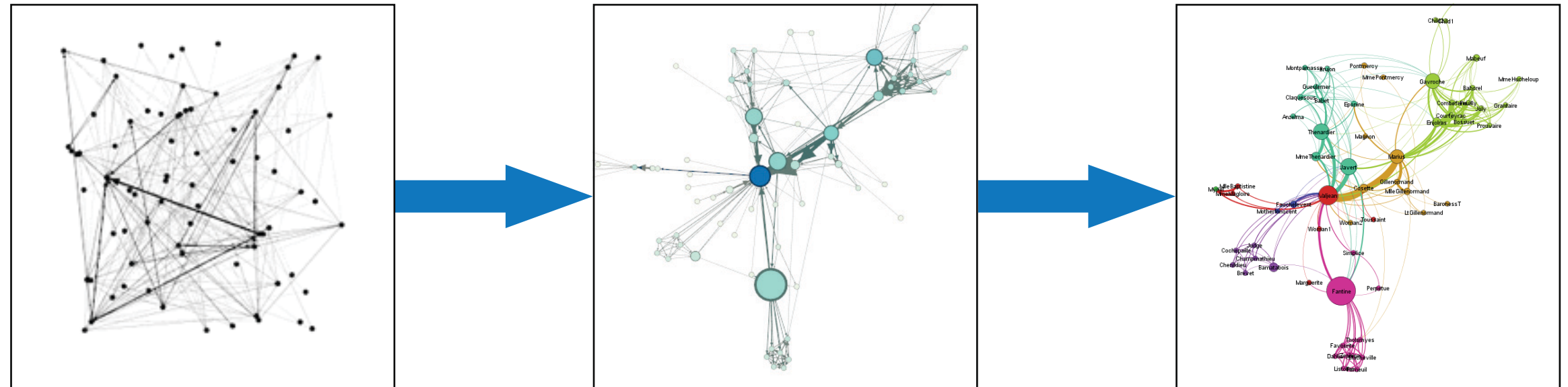
Go further:
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  🌐 Gephi Wiki
  🌐 Gephi forum