

COMP5048 Week 4 Tutorial

1. Gephi installation instructions

1. Go to the Gephi website at <https://gephi.github.io/>.
2. Download the appropriate installer/archive for your system.
3. Run the installer or decompress the archive.
4. Go to the installation directory and open the executable from the bin folder.

Note: make sure to have Java 1.7 or 1.8 installed.

2. Examples runthrough

2.1 Drawing graphs

1. Open the Gephi executable.
2. Under "Samples" on the "Welcome" window, select "Les Miserables.gexf". Select "Undirected" under "Graph Type", leave other options unchanged, and click "OK".
3. You should see a graph drawn on the main window. Try to navigate around by using right-click drag or zooming with mouse wheel.
4. The appearance of the graph (e.g. node shape, edge colour) can be modified from the visualisation pane, which can be expanded using the arrow button on bottom right of "Graph" tab (Fig. 1).
5. To show node labels, go to the "Labels" tab and check the "Node" checkbox.
6. To create a screenshot, click the camera icon on the bottom of the "Graph" window.

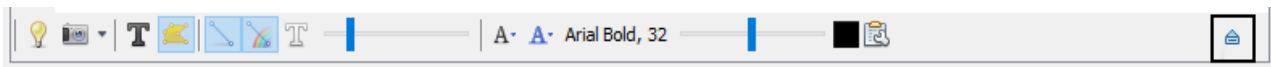


Figure 1: Visualisation pane button

2.2. Graph layouts

1. A number of layout options can be chosen from the "Layout" sidebar. Select "Force Atlas" from the drop-down menu and click "Run".
2. The resulting layout may result in too many overlapping nodes. Click "Stop", try increasing the repulsion strength and/or decreasing the attraction strength, and click "Run" again. Repeat if necessary until you have a satisfactory layout.
3. If you wish, you can try other layout options. Note: The first four options ("Clockwise Rotate", "Contraction", "Counter-Clockwise Rotate", "Expansion"), as well as "Label Adjust", are not layout algorithms, but tools to modify the current layout.

2.3. Metrics

1. Locate the Statistics tab on the sidebar. Under "Edge Overview", find "Average Path Length" and click "Run". Keep the options on the pop-up window unchanged and click "OK".
2. A pop-up window containing the results of the calculations should appear.
3. The result of the metrics can now be used to modify the appearance of the graph. Under the "Ranking" tab of the left sidebar, click "Nodes", select the diamond icon to modify the size, and select "Betweenness Centrality" from the drop down box. Adjust the minimum and maximum sizes and click "Apply".

4. Click on the "Data Laboratory" button above the graph window. You should see a spreadsheet of node and edge information, with some of the columns on the "Nodes" spreadsheet being the metrics calculated in the previous steps. The table can be exported using the "Export table" button.

2.4. Community Detection

1. Under the "Statistics" tab, locate "Modularity" and click "Run". Leave the options unchanged and click "OK". This runs a community detection algorithm that allocates the nodes to a number of classes/clusters.
2. This will create a new option under the ranking tab. Select "—Choose a rank parameter" from the drop down box, select the colour wheel icon, then select "Modularity Class" from the drop down box.
3. Select a colour scheme and press "Apply". The nodes will now be coloured according to the cluster they belong to based on the community detection algorithm.

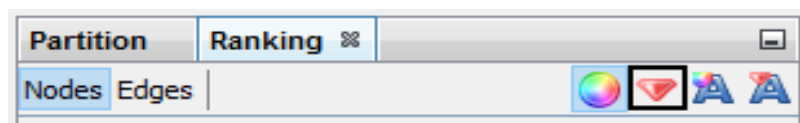


Figure 2: Colour wheel (blue highlight) icon to modify colour and diamond (black border) icon to modify size.

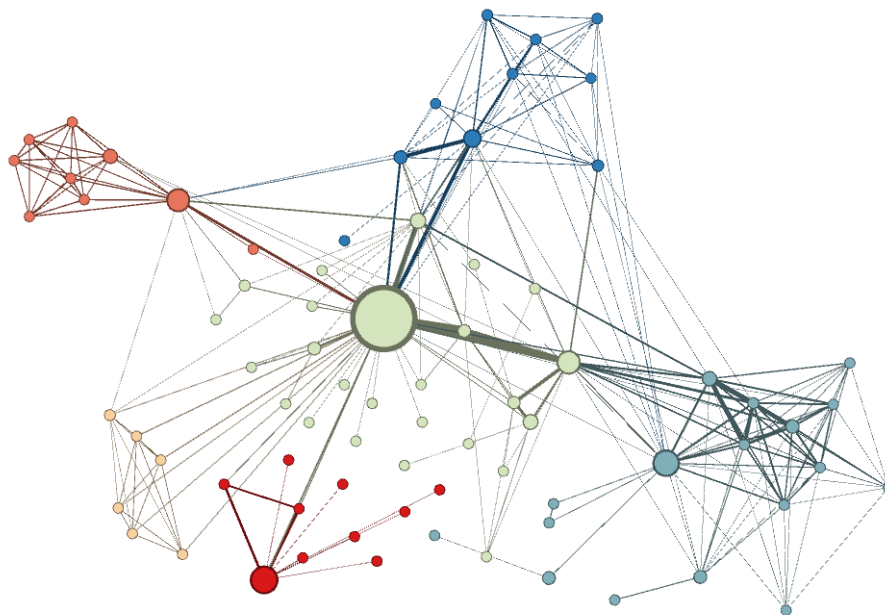


Figure 3: Result using Force Atlas layout with 300 repulsion strength and 0.1 attraction strength, nodes sized according to betweenness centrality and coloured according to clusters.

2.5. Dynamic Graphs

1. Open dynamic.gexf in a text editor. This is a dynamic graph in the GEXF format (<http://gexf.net/format/>). Note the mode="dynamic" declaration for the graph object, as well as the start and end properties of the nodes and edges.
2. Load the file onto Gephi and click on "Enable Timeline" below the graph window.

3. Drag the boundaries of the blue rectangle on the timeline to modify the time frame displayed. Depending on the highlighted time frame, the graph display will change to only display the nodes and edges which appear in that time frame.
4. An automated animation of the evolution of the graph can be played. Reduce the size of the time frame to the smallest possible size, drag it to the left end of the timeline, and press the play button to the left of the timeline.



Figure 4: Timeline view

Exercises

1. Use different layouts such as Random, Force Atlas and Yifan Hu.
2. Arrange the node ranks such that the resulting visualisation has small edge crossings.
3. Save edited .gml file and export the resulting image.