



University of Stuttgart
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Complex Network Systems

Gephi tutorial

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Winter

- Java-based interactive environment for complex network analysis
 - Create networks
 - Edit networks
 - Calculate basic network measures
 - Modify
 - Size and colours of nodes
 - Size and colour of label font
 - Colour and thickness of edges
 - Various layouts for network graphs
 - Import and export networks in a variety of formats
 - Save network visualisations as a PNG, PDF, or SVG file
- Download Gephi from www.gephi.org

Gephi tabs and windows

- **Overview**
 - Appearance
 - Layout
 - Measures
- **Data Laboratory**
 - Node and edge tables
- **Preview**
 - Rendering settings
 - Preview visualisation

Gephi 0.9.2 - Project 1

File Workspace View Tools Window Help

Overview Data Laboratory Preview

Workspace 1 x

Appearance x

Nodes Edges

Unique Partition Ranking

cat

Member (90.91%)

Institution (9.09%)

Layout x

ForceAtlas 2

Run

Threads

Threads number 11

Performance

Tolerance (speed) 1.0

Approximate Repulsion ☐

Approximation 1.2

Tuning

Scaling 30.0

Stronger Gravity ☐

Gravity 1.0

Behavior Alternatives

Dissuade Hubs ☐

LinLog mode ☐

Prevent Overlap ☒

ForceAtlas 2

Presets... Reset

Graph x

Dragging (Configure)

Context x

Nodes: 110

Edges: 142

Undirected Graph

Filters Statistics x

Settings

Network Overview

Average Degree Run

Avg. Weighted Degree Run

Network Diameter Run

Graph Density Run

HITS Run

Modularity Run

PageRank Run

Connected Components Run

Node Overview

Avg. Clustering Coefficient Run

Eigenvector Centrality Run

Edge Overview

Avg. Path Length Run

Dynamic

Nodes Run

Edges Run

Degree Run

Clustering Coefficient Run

11

12

10

9

8

7

6

5

1

2

3

4

Overview

- 1:** Tab with operations for the appearance of **nodes**
- 2:** Tab with operations for the appearance of **edges**
- 3:** Select colour as visual property to work on
- 4:** Select size as visual property to work on
- 5:** Change colour of node/edge based on a categorical attribute (select attribute from the drop-down menu)
- 6:** Change colour/size of node/edge/label based on a continuous attribute

Overview

7: Select and customise one of the available layout algorithms

8: Interactive selection of nodes/edges; change size/colour manually; add nodes/edges, etc.

9: Re-centre and reset node size, colour, label, or label size.

10: Change colour, size and other characteristics applying to all nodes, edges, and labels.

Overview

II: Apply filters to select specific nodes and/or edges from your network. Filters are applied by drag-and-drop onto Queries. Filters based on *attributes* include:

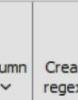
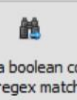
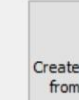
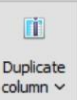
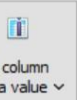
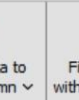
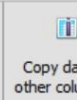
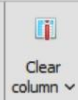
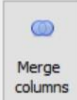
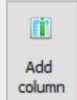
- Equal: select elements with particular attribute values
- Partition: select different levels of categorical attributes
- Range: select nodes/edges with attribute values in particular range
- Inter-edges: select edges with particular attributes, for one-mode networks
- Intra-edges: select edges with particular attributes, going across the modes of multimode networks

Filters based on *edges* allow to select ties with different properties, e.g., particular range of weights. Filters based on *topology* allow for selection based on network structure, such as components, k-cores, degree range, etc. *Operators* allow to combine filters in various ways.

Overview

I2: Calculate a network/node/edge **statistical metric** by clicking on the Run button next to the corresponding metric. Once calculated, many measures will be available in the Data Laboratory view, and can be used for visualisation. For example, Computing average weighted degree will allow to resize nodes based on that attribute.

| Id | Label | Interval | cat |
|-------------|-------------|----------|-------------|
| Committee1 | Committee1 | | Institution |
| Committee2 | Committee2 | | Institution |
| Committee3 | Committee3 | | Institution |
| Committee4 | Committee4 | | Institution |
| Committee5 | Committee5 | | Institution |
| Committee6 | Committee6 | | Institution |
| Committee7 | Committee7 | | Institution |
| Committee8 | Committee8 | | Institution |
| Committee9 | Committee9 | | Institution |
| Committee10 | Committee10 | | Institution |
| name1 | name1 | | Member |
| name2 | name2 | | Member |
| name3 | name3 | | Member |
| name4 | name4 | | Member |
| name5 | name5 | | Member |
| name6 | name6 | | Member |
| name7 | name7 | | Member |
| name8 | name8 | | Member |
| name9 | name9 | | Member |
| name10 | name10 | | Member |
| name11 | name11 | | Member |
| name12 | name12 | | Member |
| name13 | name13 | | Member |
| name14 | name14 | | Member |
| name15 | name15 | | Member |
| name16 | name16 | | Member |
| name17 | name17 | | Member |
| name18 | name18 | | Member |
| name19 | name19 | | Member |
| name20 | name20 | | Member |
| name21 | name21 | | Member |



Data laboratory

- 1:** Data table for nodes and their attributes
- 2:** Data table for edges and their attributes
- 3:** Import nodes and edges data from Excel/CSV and other formats
- 4:** Manipulate data columns (change individual values directly by clicking on them)

Gephi 0.9.2 - Project 1

File Workspace View Tools Window Help

Overview Data Laboratory Preview

Workspace 1 X

Preview Settings X

Presets

Default

Settings Manage renderers

Nodes

Border Width 1.0

Border Color custom [0,0,0]

Opacity 100.0

Per-Node Opacity ☐

Node Labels

Show Labels ☐

Font Arial 12 Plain

Proportional size ☒

Color custom [0,0,0]

Shorten label ☐

Max characters 30

Outline size 0.0

Outline color custom [255,255,255]

Outline opacity 80.0

Box ☐

Box color parent

Box opacity 100.0

Edges

Show Edges ☒

Thickness 1.0

Rescale weight ☐

Min. rescaled weight 0.1

Max. rescaled weight 1.0

Color mixed

Opacity 70.0

Curved ☒

Radius 0.0

Edge Arrows

Size 3.0

Preview ratio: 100%

Export: SVG/PDF/PNG

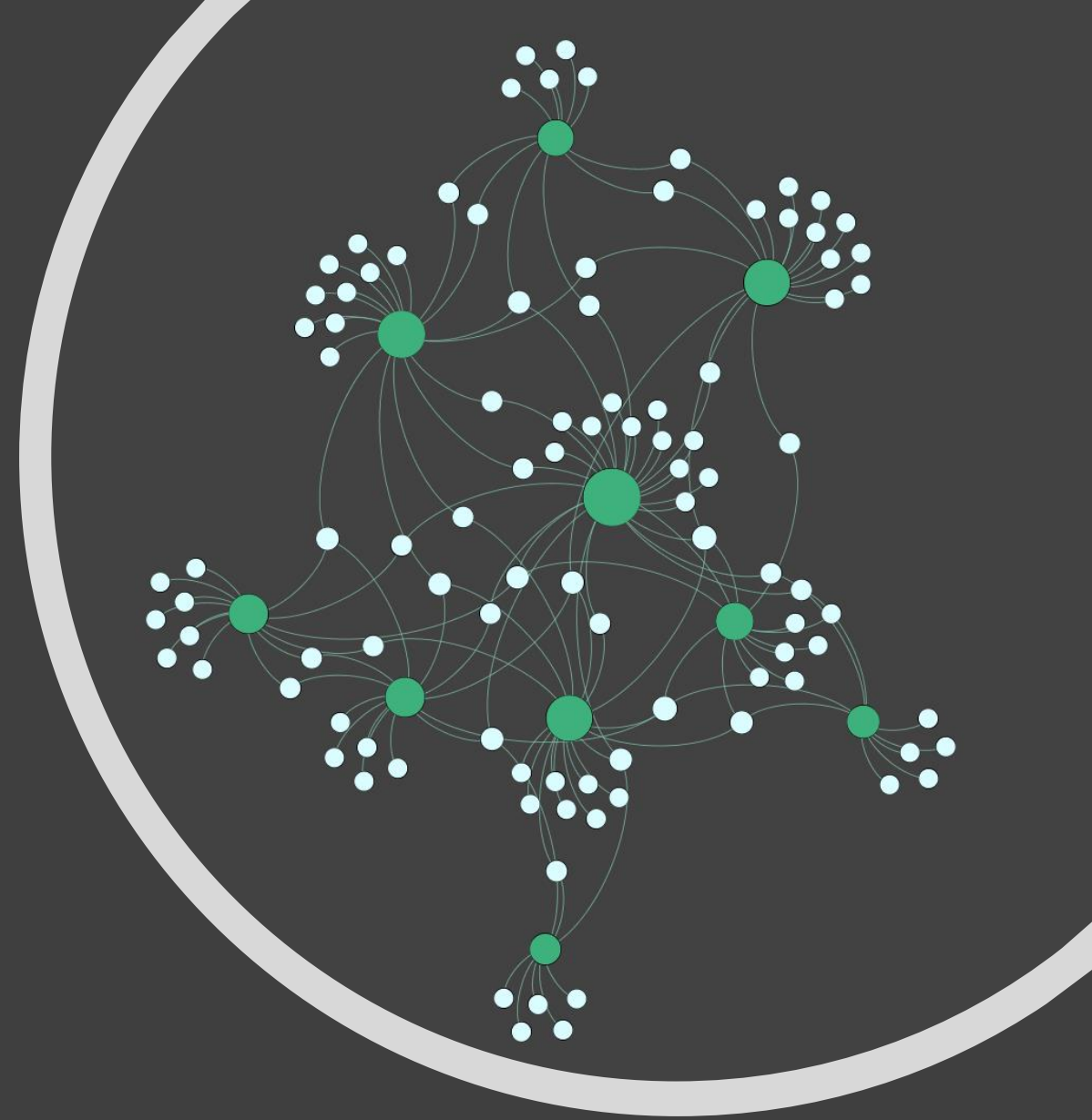
Refresh

Background Reset zoom - +

Preview

- 1:** Configure rendering settings: size, colour and other attributes of nodes, edges and labels. These apply only to the visualisation. Modifying the actual graph is done in the *Overview* tab
- 2:** If visualising a large network, rendering it may be time- and resource-intensive. While tweaking the visualisation properties, preview a portion of the network by using the *Preview ration* setting
- 3:** Refresh the network preview after changes of rendering settings
- 4:** Change the preview background colour
- 5:** Save the network as image or PDF

Bipartite network of 100
members of 10 different
institutions



Resources

- Gephi Docs, <https://networkx.github.io/documentation/stable/>
- Ognyanova, K., Introduction to Gephi, <http://www.kateto.net/wp-content/uploads/2012/12/COMM645%20-%20Gephi%20Handout.pdf>
- Grandjean, Gephi – Introduction to network analysis and visualization, <http://www.martingrandjean.ch/gephi-introduction/>