University of Stuttgart
Germany

Complex Network Systems

Gephi tutorial

Ilche Georgievski
ilche.georgievski@iaas.uni-stuttgart.de
Room: U38 0.353

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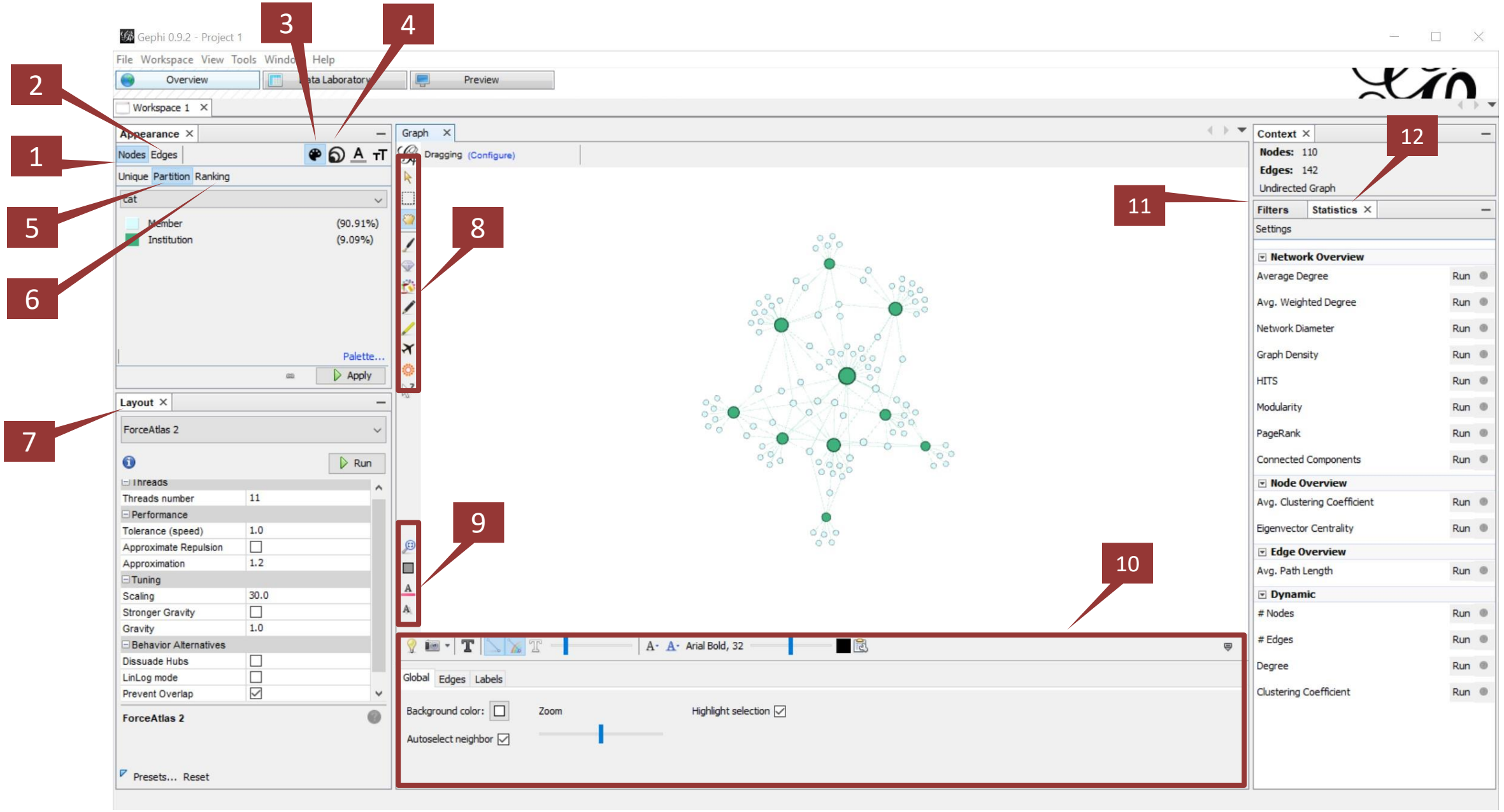
Winter

- 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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10
11
12
Gephi 0.9.2 - Project 1
File Workspace View Tools Window Help
Overview
Data Laboratory
Preview
Workspace 1
Appearance
Nodes Edges
Unique Partition Ranking
cat
Member (90.91%)
Institution (9.09%)
Palette...
Apply
Layout
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
Dragging (Configure)
Arial Bold, 32
Global Edges Labels
Background color:
Zoom
Highlight selection
Autoselect neighbor
Context
Nodes: 110
Edges: 142
Undirected Graph
Filters
Statistics
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

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

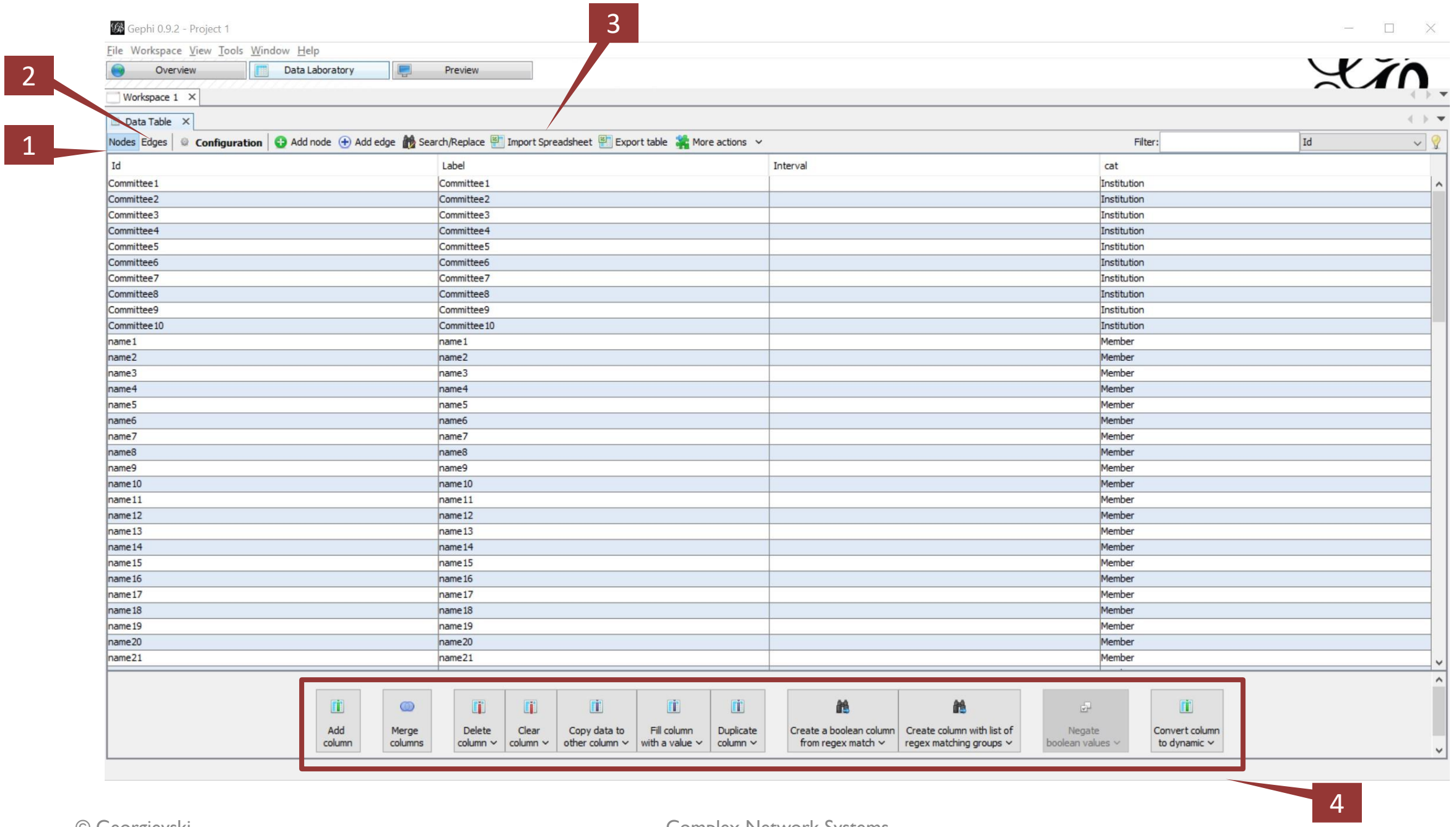
I1: Apply filters to select specific nodes and/or edges from your network. Filters are applied by drag-and-drop onto Queries. Filters based on *attributes* include:

- 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

12: 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.


Gephi 0.9.2 - Project 1
File Workspace View Tools Window Help
Overview
Data Laboratory
Preview
Workspace 1
Data Table
Nodes Edges Configuration Add node Add edge Search/Replace Import Spreadsheet Export table More actions
Filter:
Id
Label
Interval
cat
Add column
Merge columns
Delete column
Clear column
Copy data to other column
Fill column with a value
Duplicate column
Create a boolean column from regex match
Create column with list of regex matching groups
Negate boolean values
Convert column to dynamic
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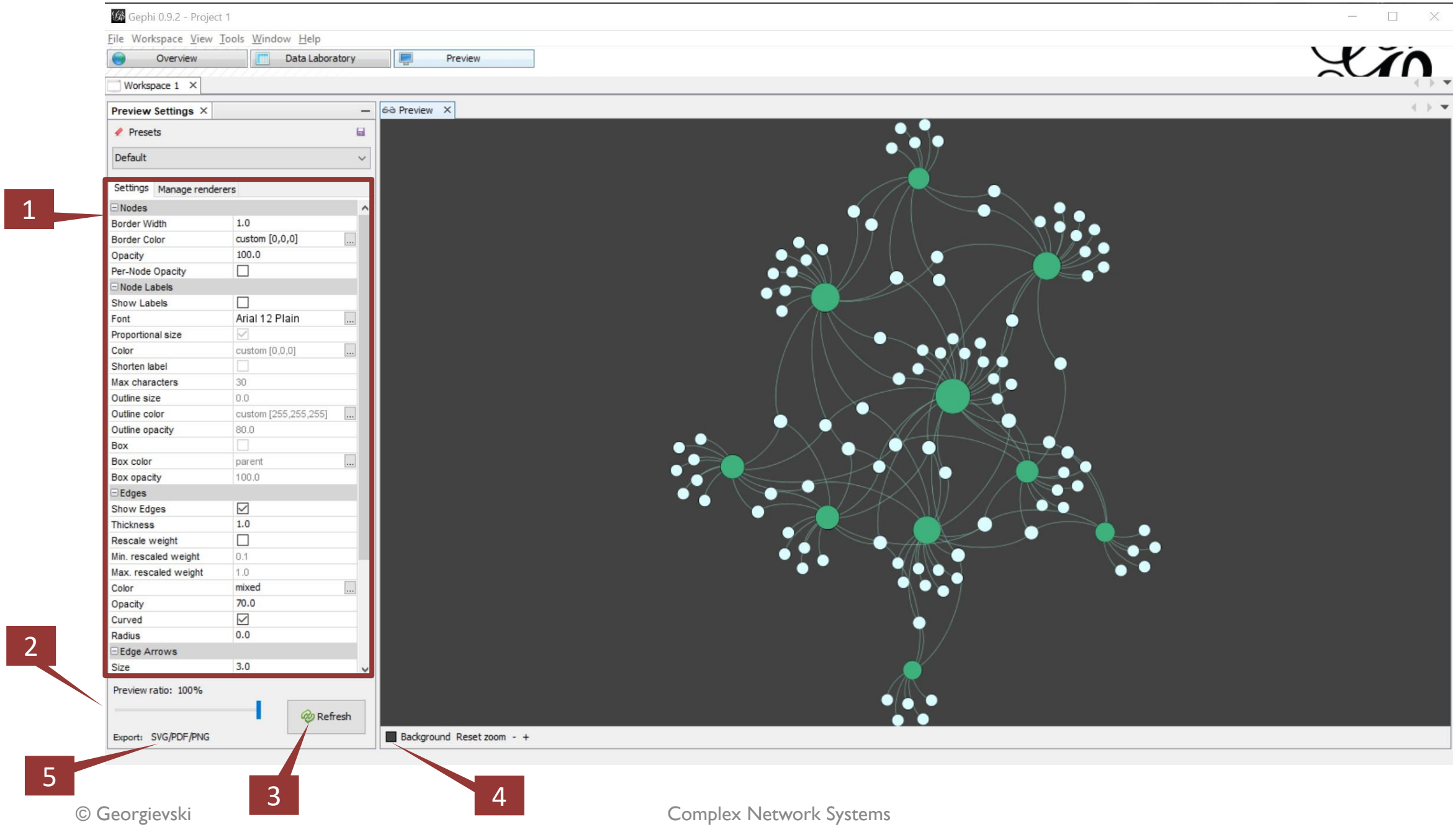
Data laboratory

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
Preview Settings
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%
Refresh
Export: SVG/PDF/PNG
Preview
Background Reset zoom - +
1
2
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4
5

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

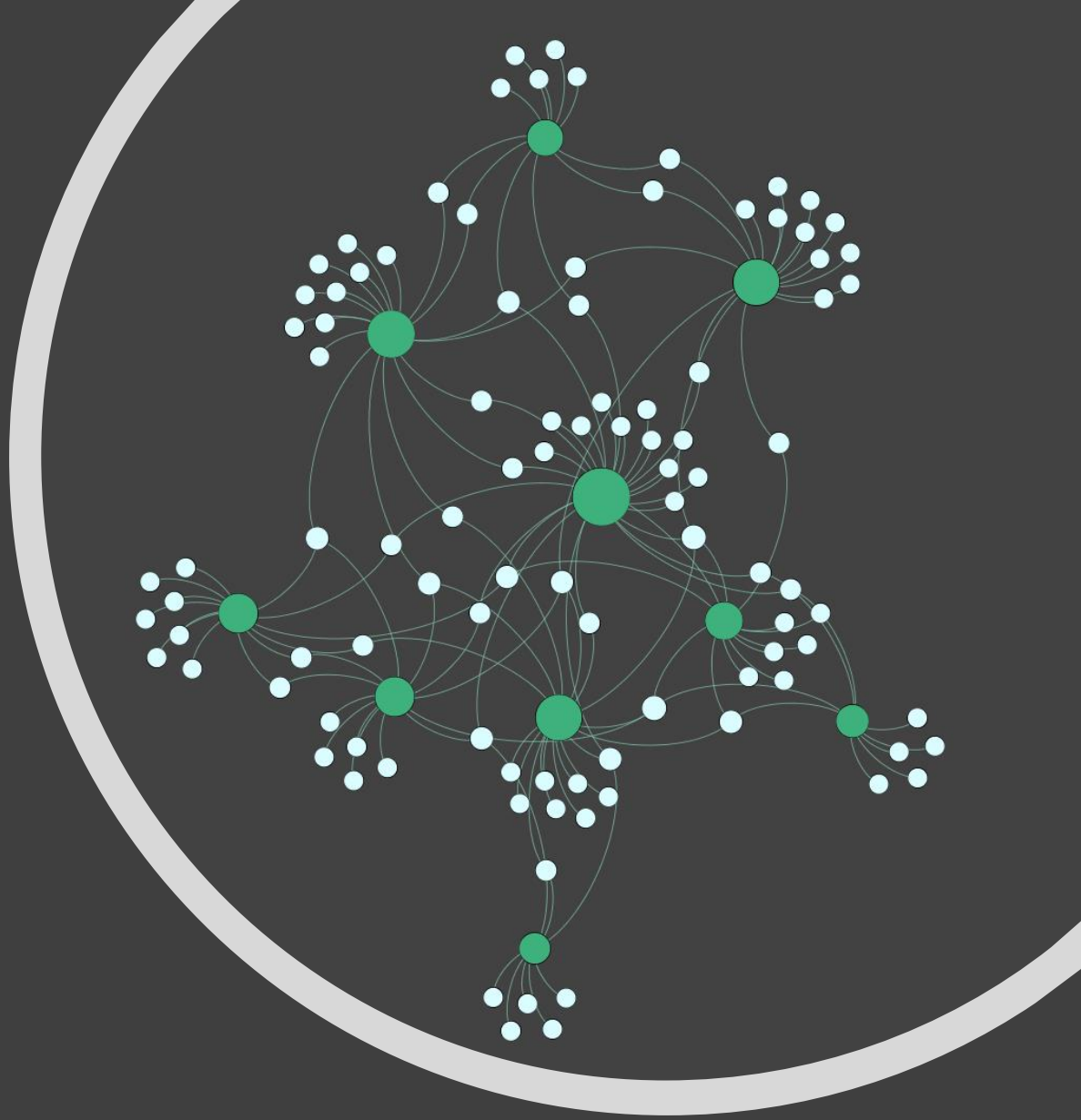
2: If visualising a large network, rendering it may be time- and resource-intensive. While tweaking the visualisation properties, preview a portion of the network by using the *Preview ration* setting

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



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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/