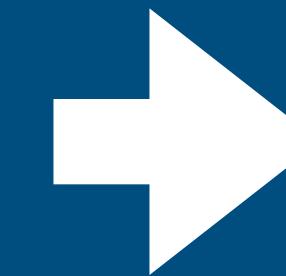
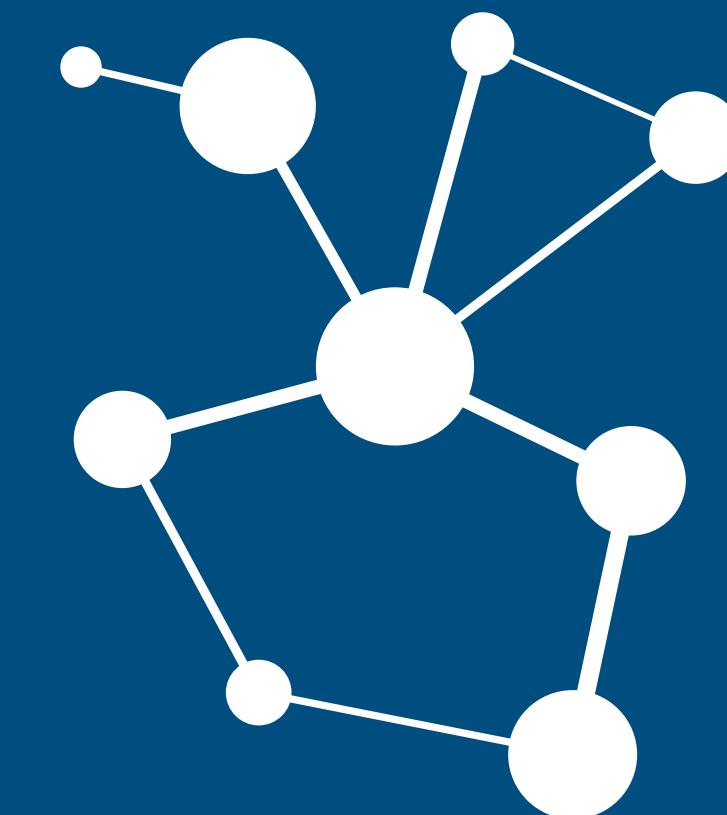
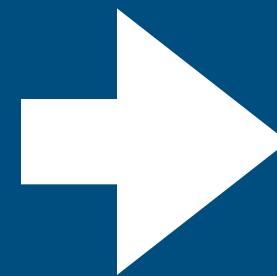


A network science toolbox for Brainlife

Filipi N. Silva

INDIANA UNIVERSITY NETWORK SCIENCE INSTITUTE

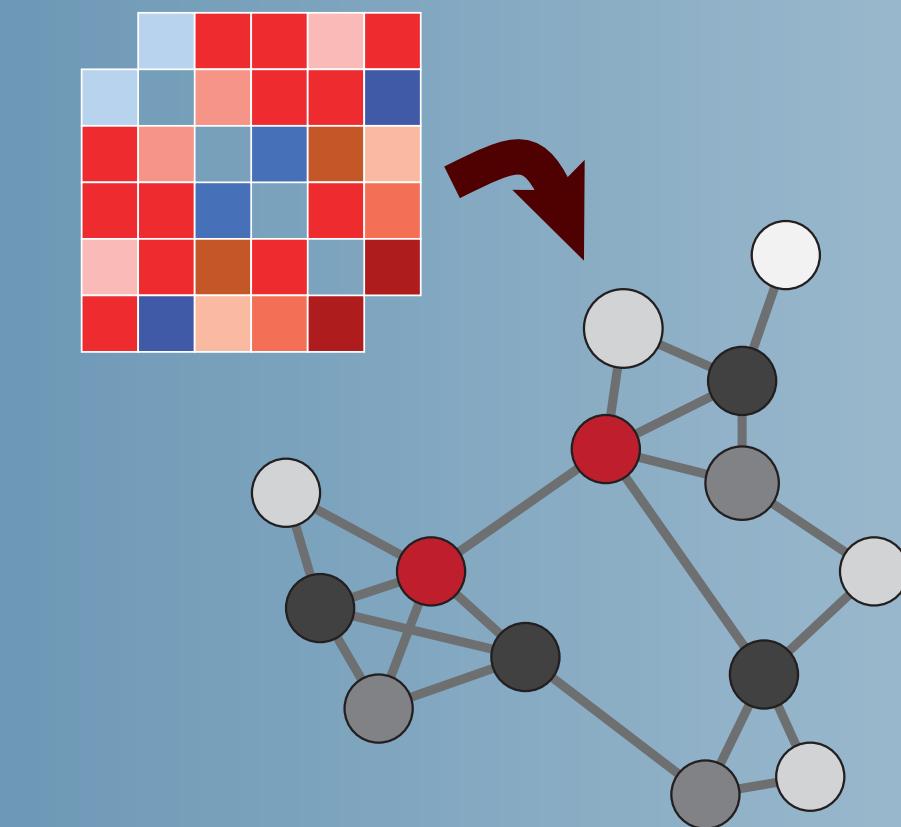
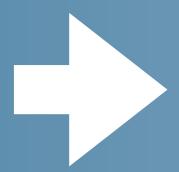
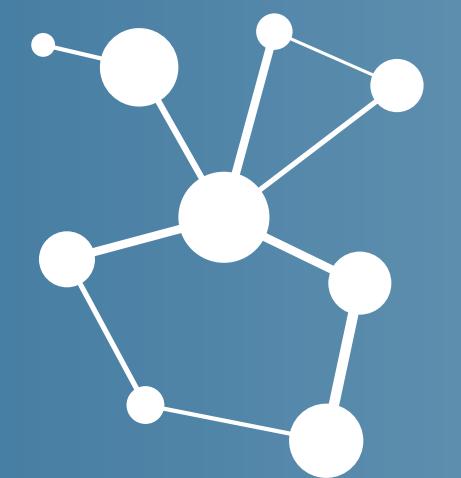
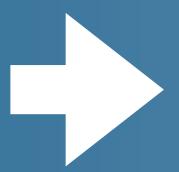
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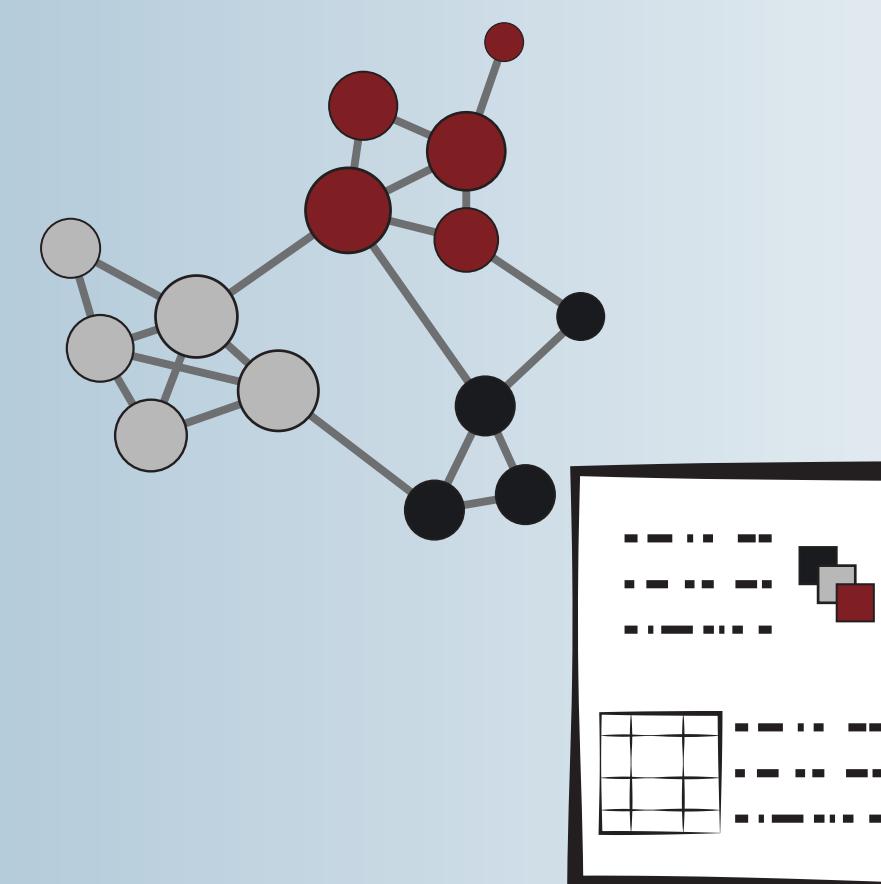
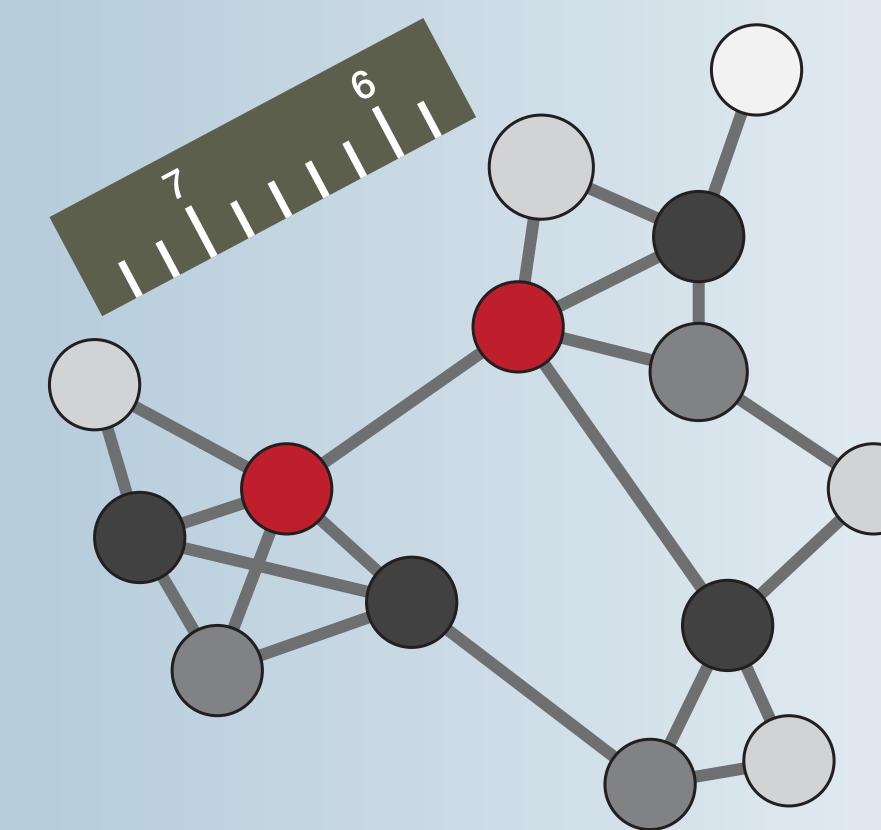
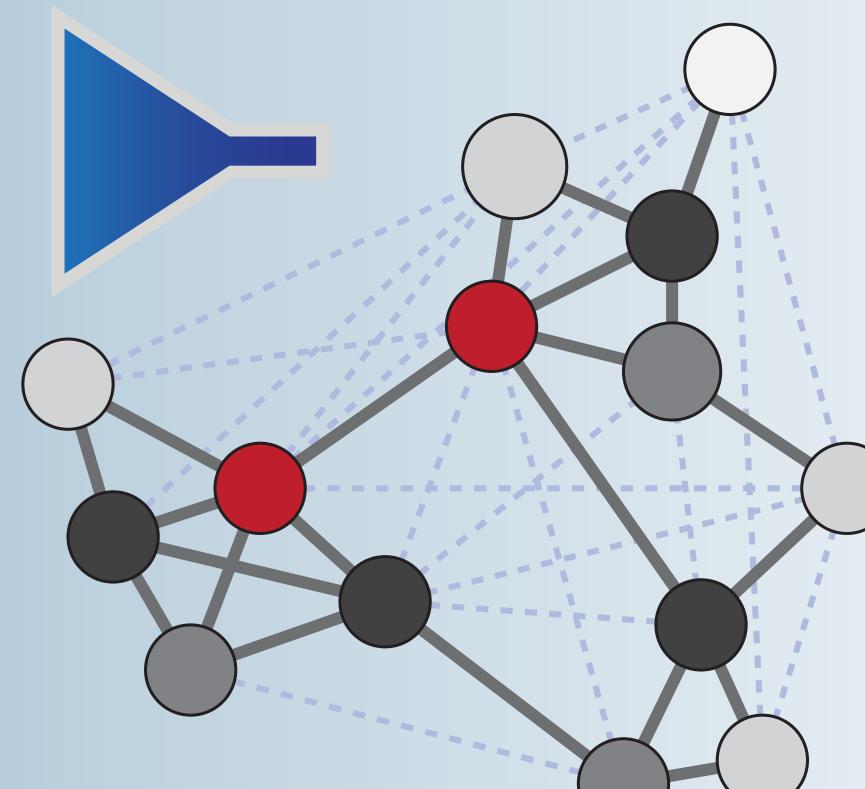
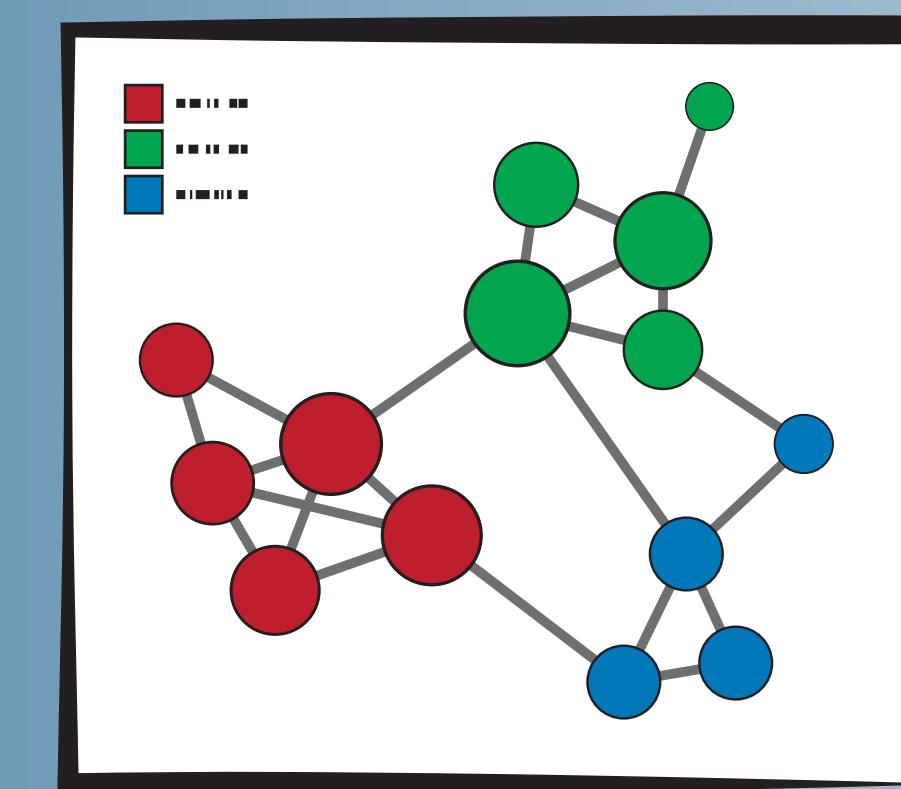
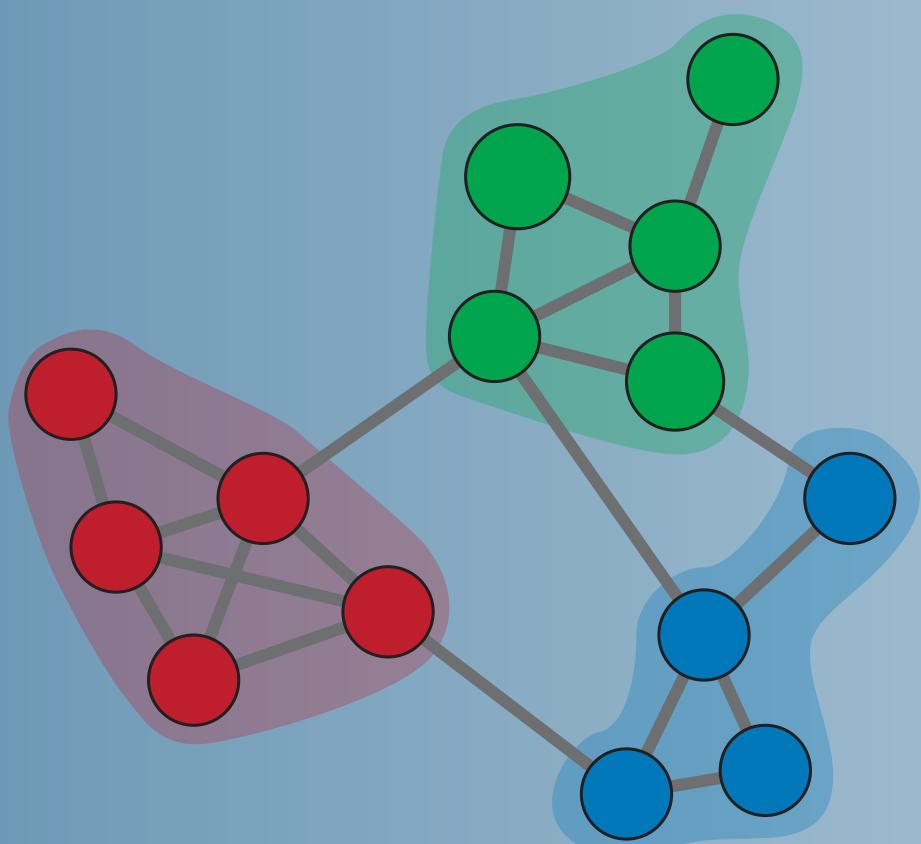
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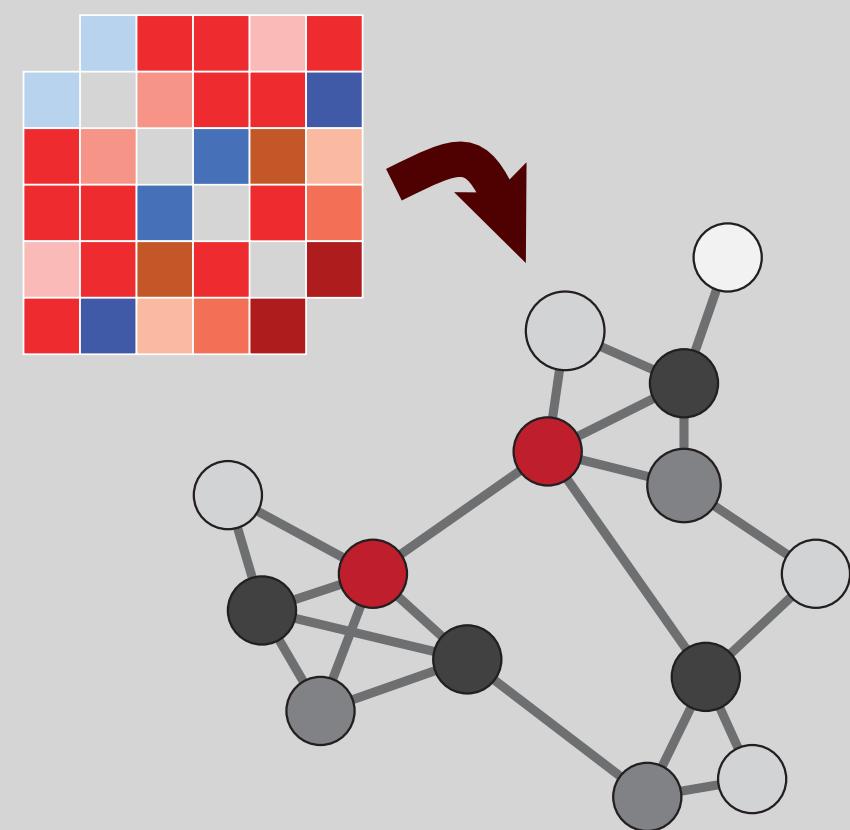


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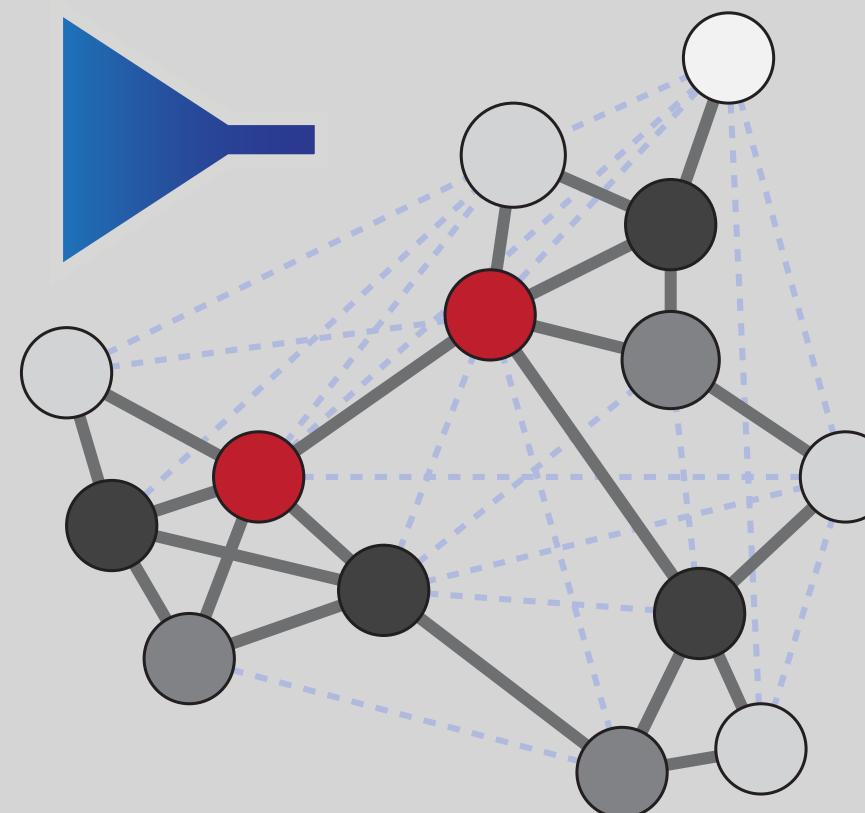
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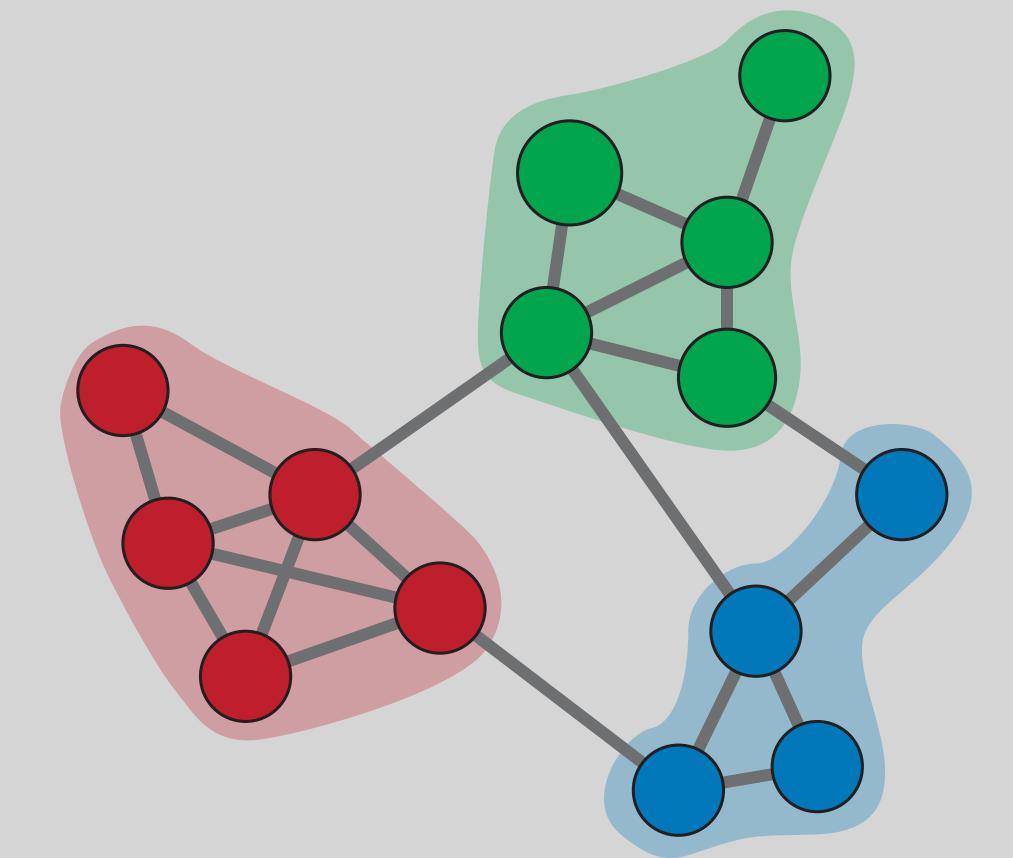
Network from
connectivity
matrix

Uses compressed
JsonGraph (JGF)
to store connections
and metadata



Preprocess
network

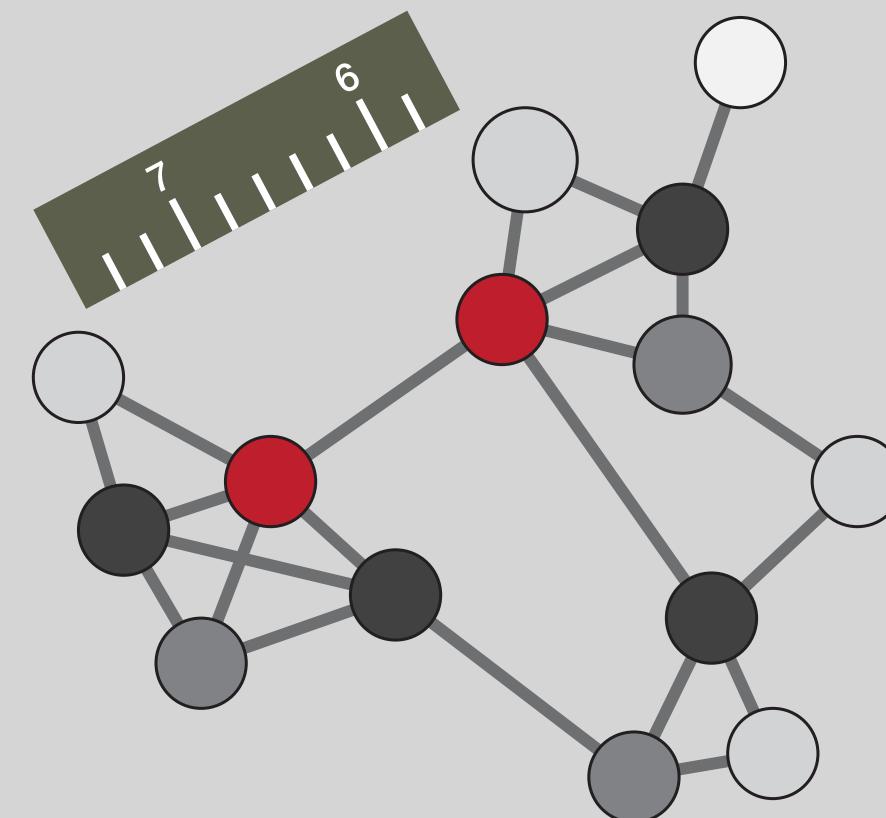
Use this App to apply thresholds
based on percentile. handles
negative weights as
layered networks



Detect communities

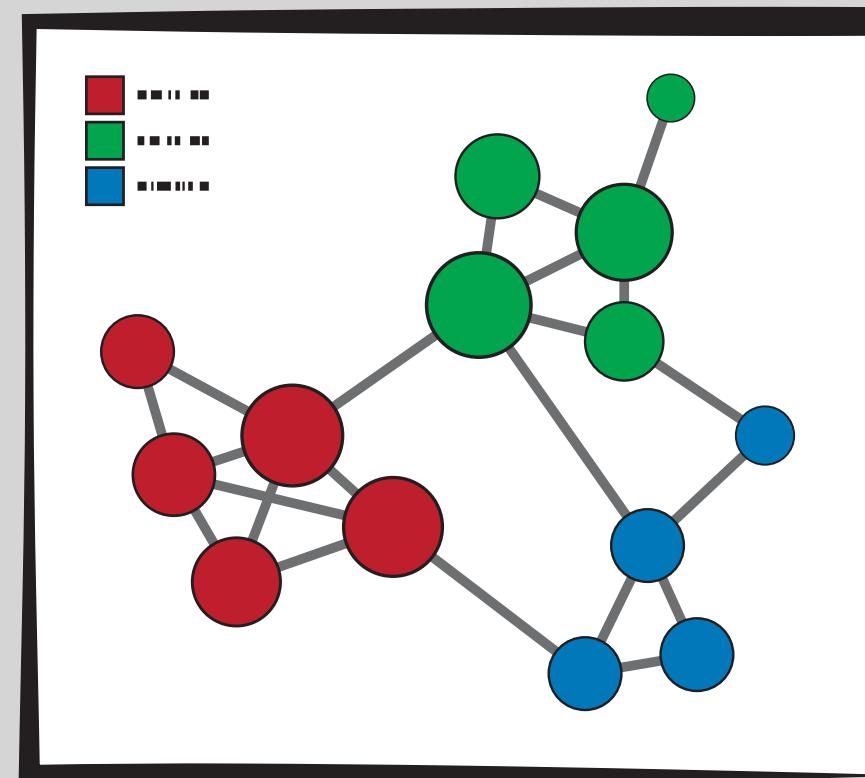
Implementation for
Louvain, Infomap
and SBM*

*SBM option will be available soon



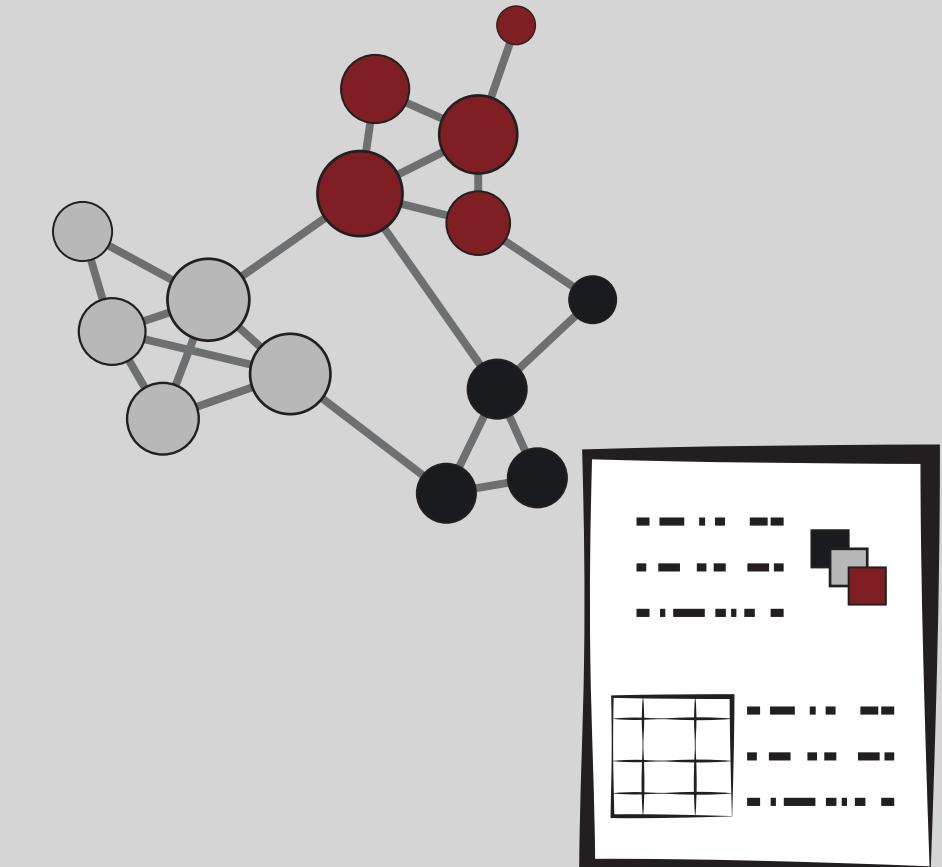
Network measurements

Obtain several network measurements, including: strength, clustering coeff., centralities, etc



Network visualization

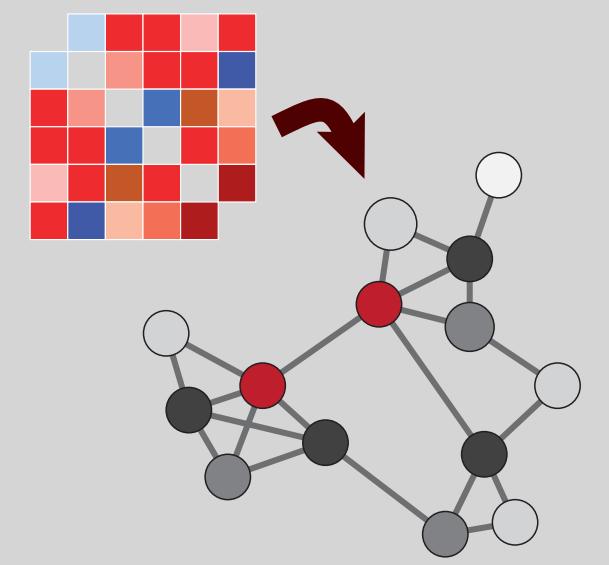
Creates a simple visualization of the networks. Colors and size of nodes can be associated to other network properties



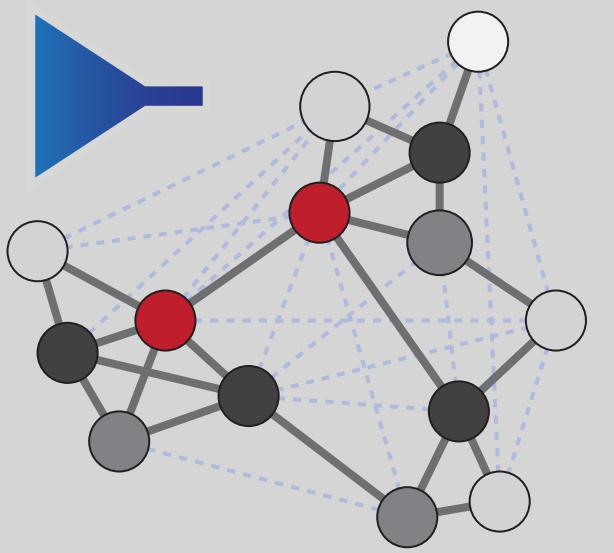
Network report*

Build tables and plots for metadata and measurements stored in the networks

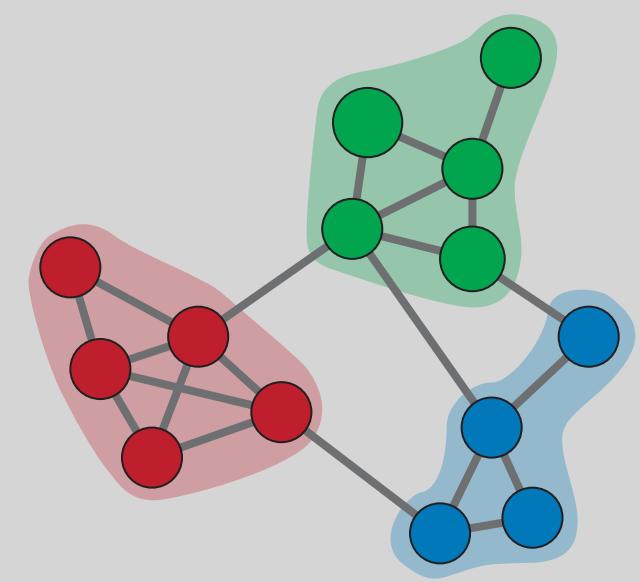
*Network report will be available soon



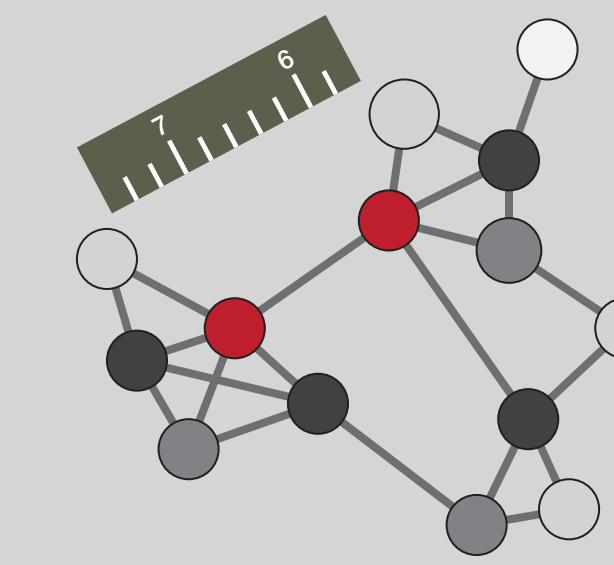
Network from
connectivity
matrix



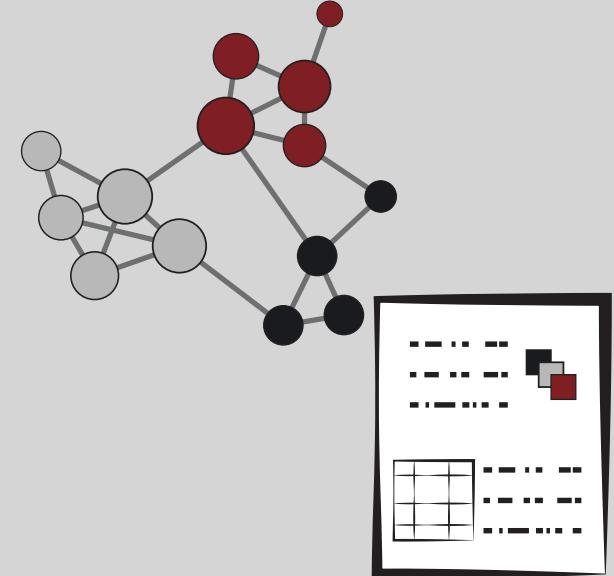
Preprocess



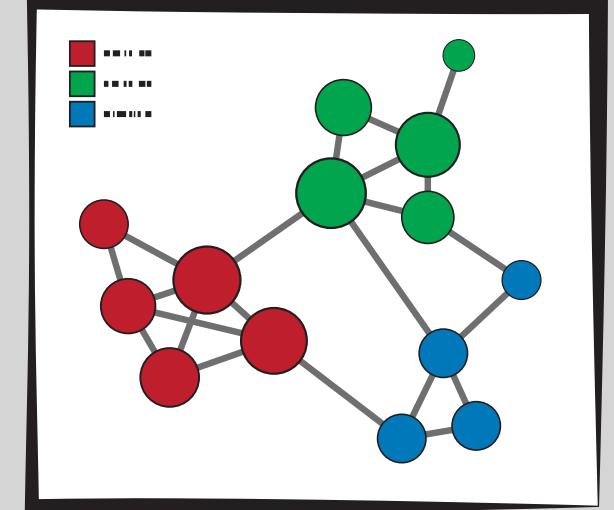
Community
detection



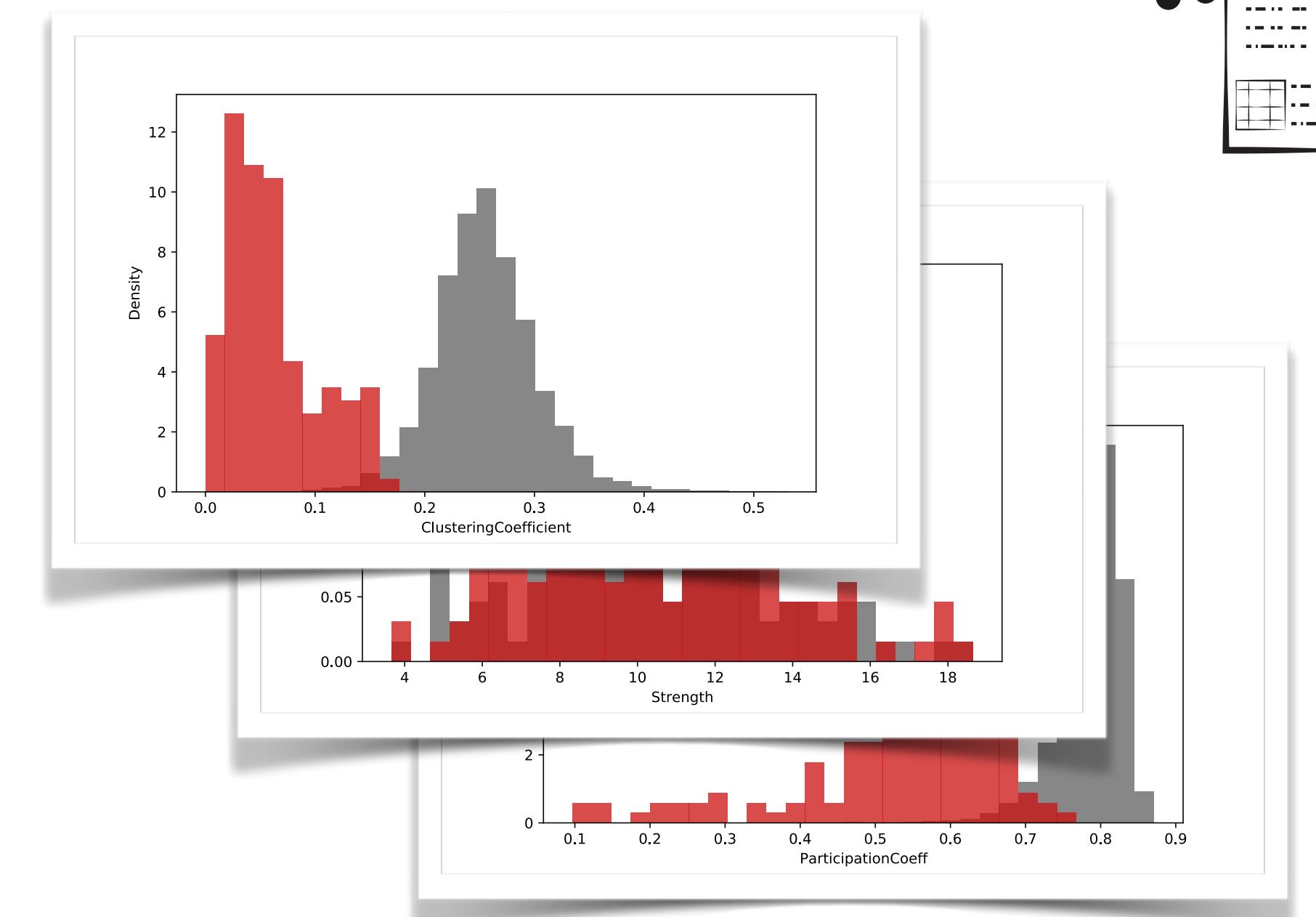
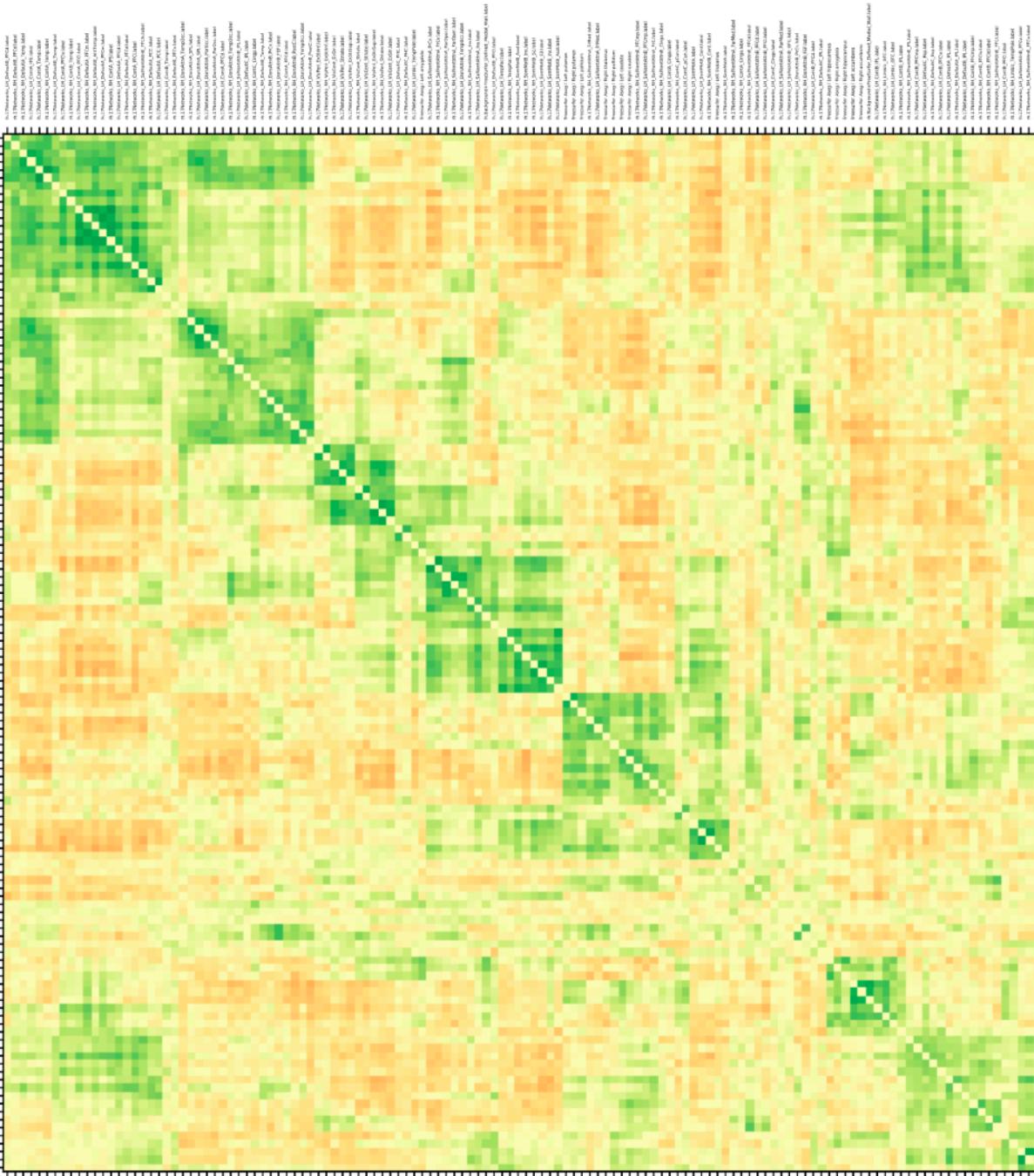
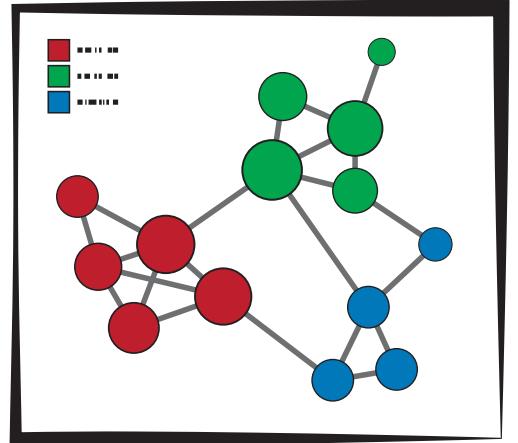
Network
measurements



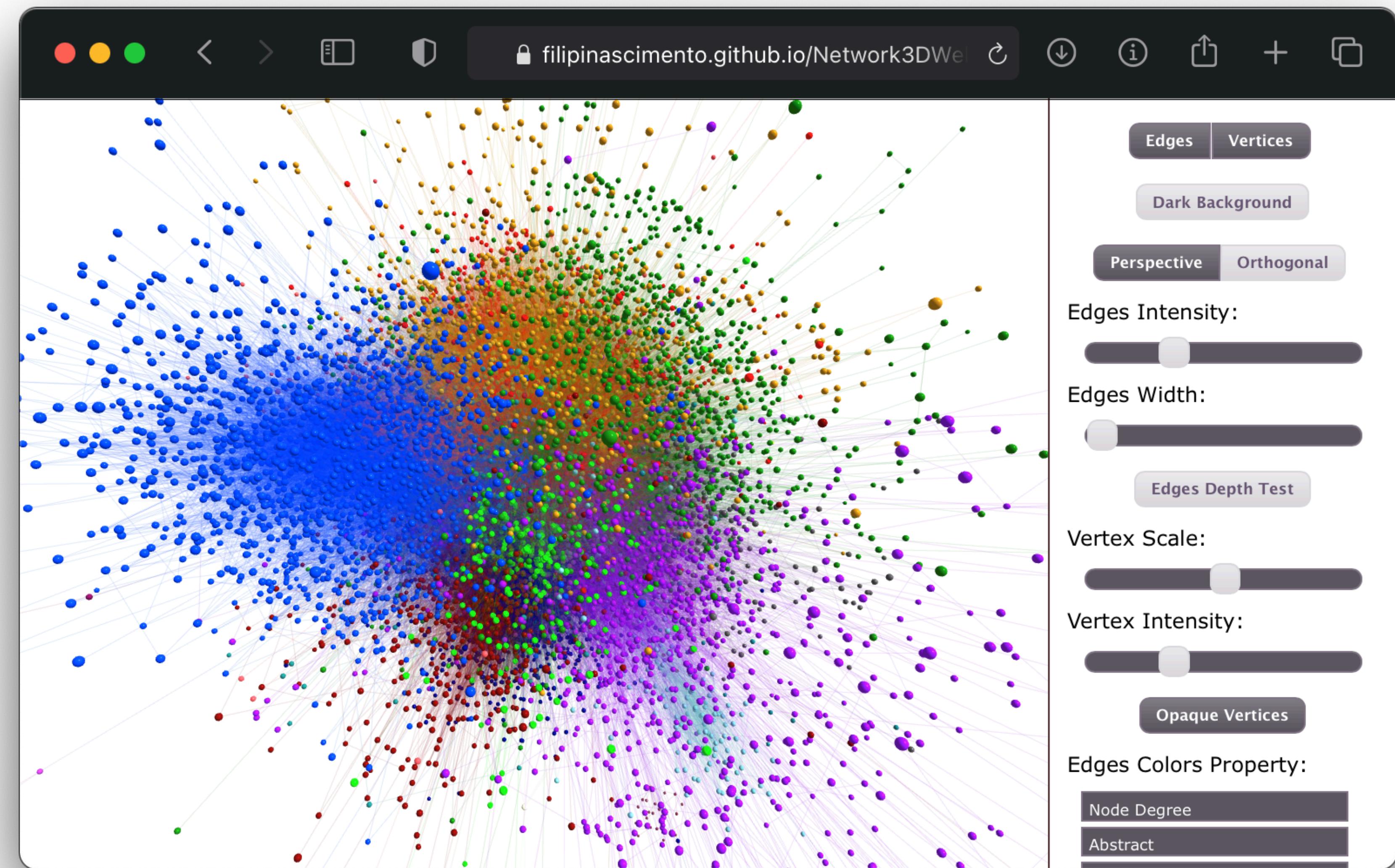
Network report



Network
visualization



What is next?



Interactive network visualizer

Network Null Model filipinascimento/bl-network-nullmodel 0.2 ● network → ● network null-model Generates an ensemble of networks according to null models that try to reproduce the data. Erdos reyni (random), Barabási-Albert and Configuration model are implemented	Network Preprocess filipinascimento/bl-network-preprocess 0.2 ● network → ● network network-preprocess App to preprocess connectivity/similarity matrices (commat) and generate a filtered version of the network, which can be directed or undirected, weighted or unweighted.	Network Communities filipinascimento/bl-network-communities 0.2 ● network → ● network communities App to obtain the community structure of networks by using the Louvain or Infomap methods. All the Louvain quality functions work for networks with negative weights.
▶ 9 ⚡ 3 📂 2 ✓ 77.8%	▶ 18 ⚡ 6 📂 4 ✓ 80.0%	▶ 22 ⚡ 5 📂 2 ✓ 61.1%
Network Visualization filipinascimento/bl-network-visualization 0.2 ● network → ● pdf visualization This app generates simple 2D static visualizations for networks by using a force-directed algorithm. The current implementation uses the Large Graph Layout (LGL) algorithm.	Network Measurements filipinascimento/bl-network-measurements 0.2 ● network → ● network measurements App to calculate several basic statistics for networks and their respective null model distributions.	Commat 2 Network filipinascimento/bl-commat2network 0.2 ● commat → ● network Simple brainlife app to create a network from a commat matrix.
▶ 59 ⚡ 19 📂 2 ✓ 69.1%	▶ 15 ⚡ 4 📂 1 ✓ 45.5%	▶ 8 ⚡ 3 📂 3 ✓ 100.0%

<https://brainlife.io/apps#network>

Contact information: filsilva@iu.edu

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