DSBA 5122: Visual Analytics

Class 10: Networks and Trees

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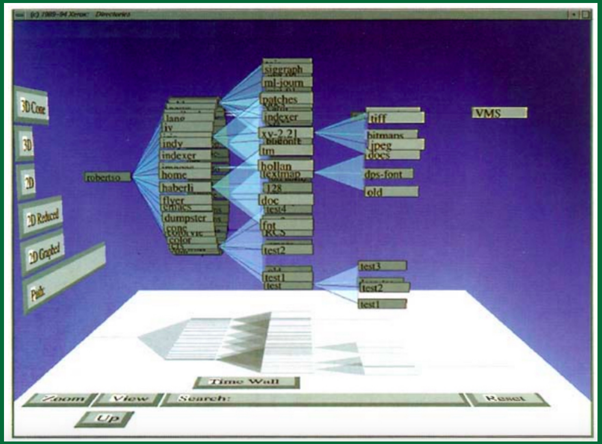
April 1, 2019

Networks and Trees



Read Chapter 5: Networks and Hiearchies of Mazza

Networks (a.k.a. graphs)

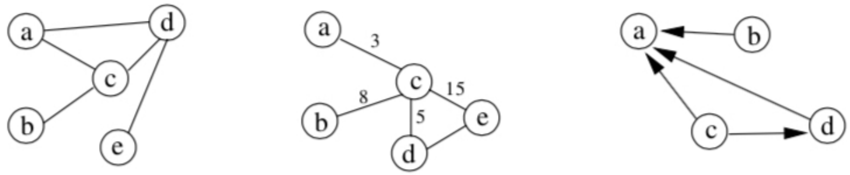
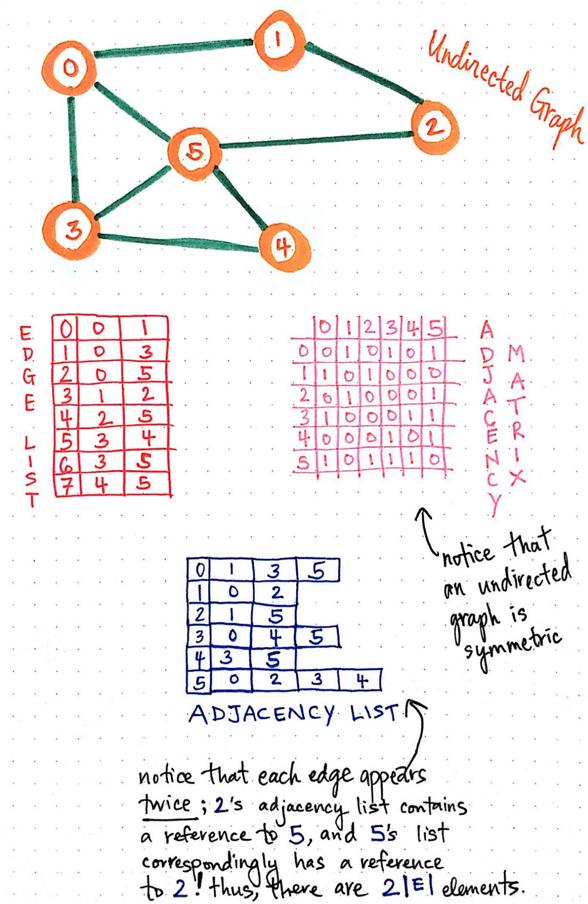
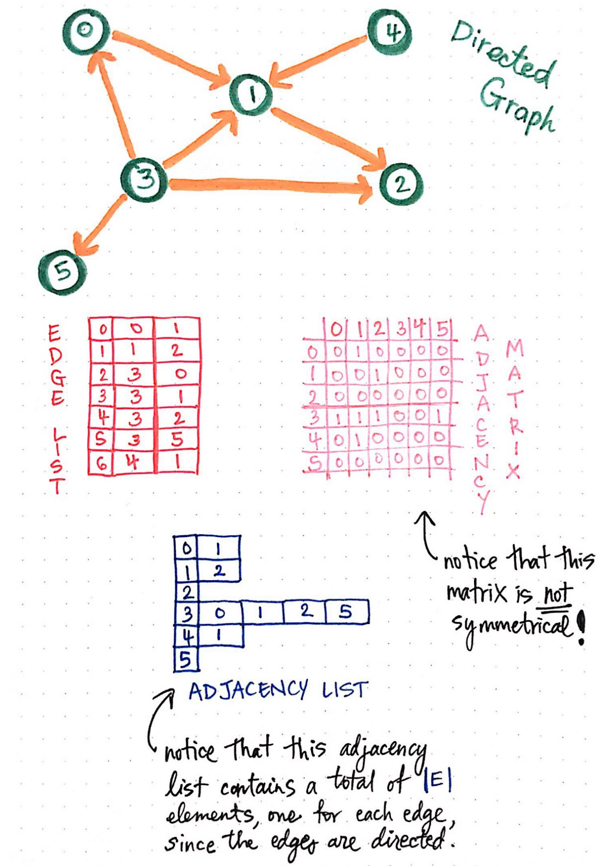


Fig. 5.1 Examples of graphs. On the left is a normal graph, in the center is a graph in which each edge is given a numerical value, and to the right is a directed graph.

- Graphs are visual representations in which the points, called nodes or vertices, represent instances of the data.
- Nodes are correlated by connections, called edges, which represent relationships between the instances.
- Possible features of a network: weights, direction, labels.





Vaidehi Joshi Medium post

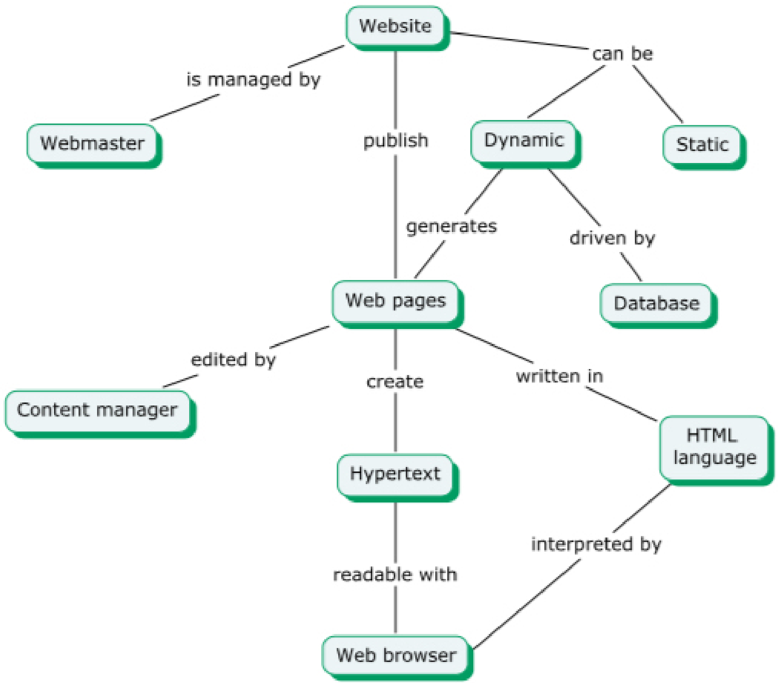


Fig. 5.2 Example of a concept map that describes concepts regarding a website.

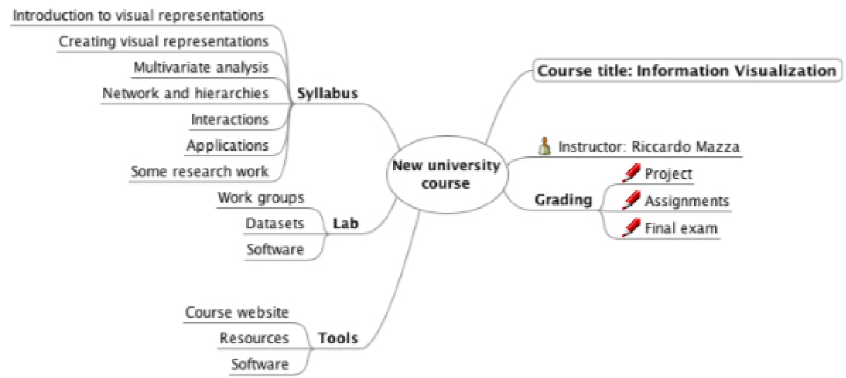


Fig. 5.3 Example of mind map for the planning of a university course.

BNOSAC: R NLP packages ecosystem

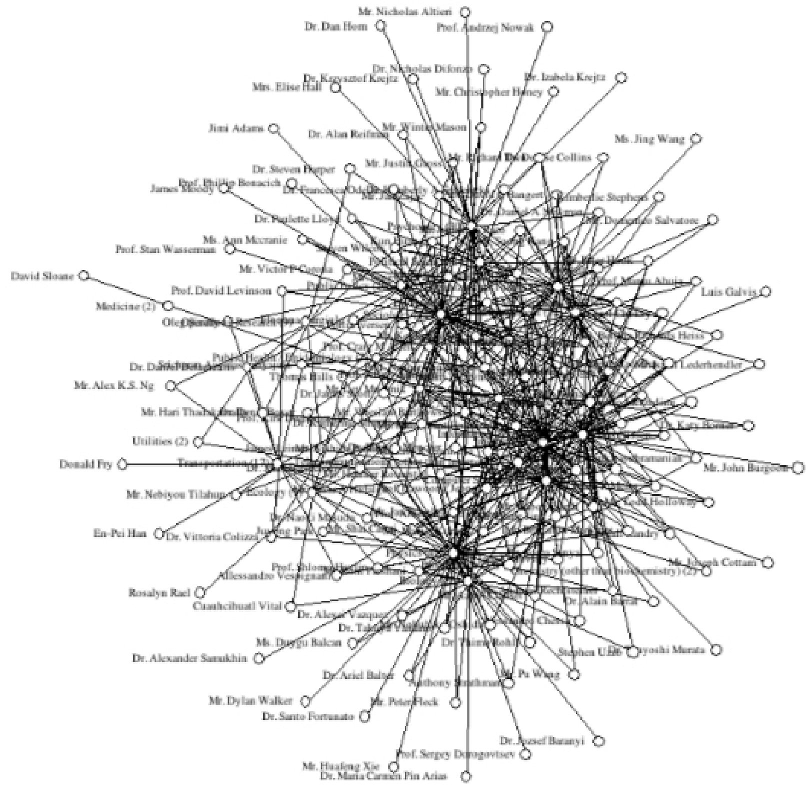


Fig. 5.4 An example of a complex graph.

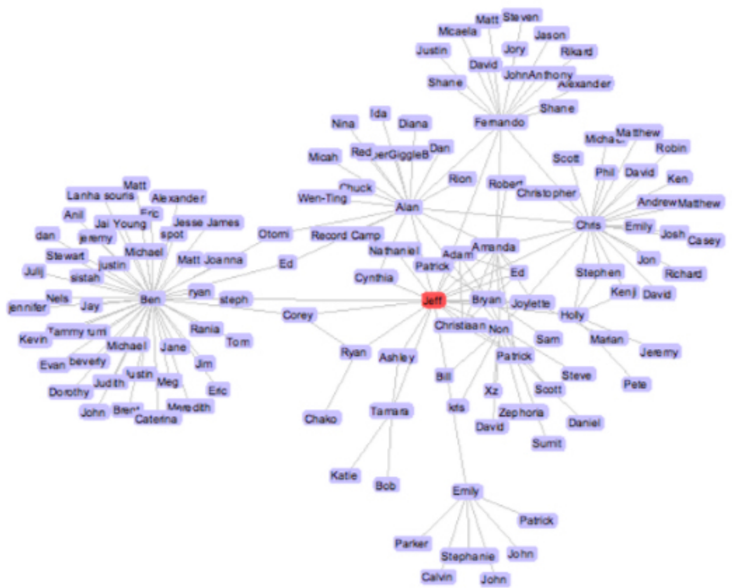


Fig. 5.5 An example of a graph that uses a force-directed algorithm to represent a social network. Image created with the prefuse tool and reproduced with the permission of Jeffrey Heer, University of California, Berkeley.

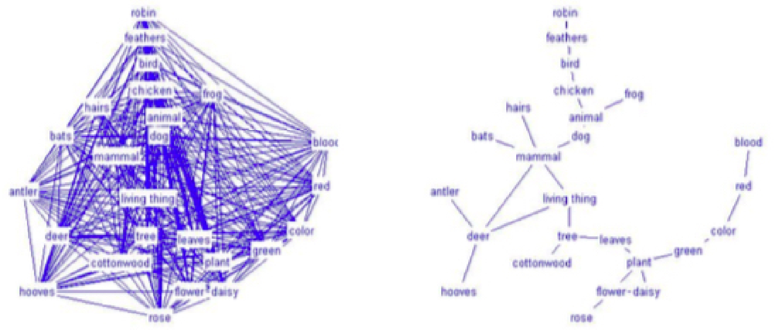


Fig. 5.6 Complete graph (left) and the reduced link version (right), achieved using the pathfinder technique. Graphs were generated with the KNOT analysis tool. Images courtesy of Interlink.

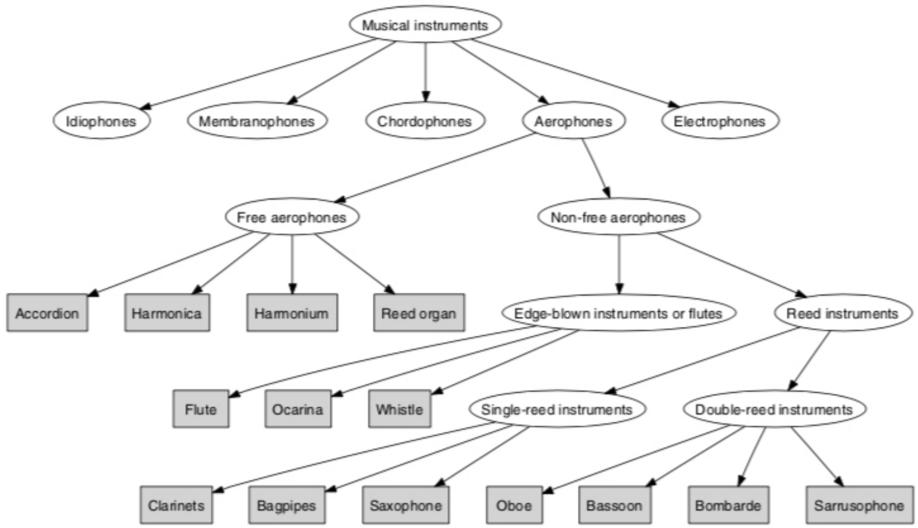


Fig. 5.13 A tree representing the classification of the wind instruments according to Curt Sachs and Erich von Hornbostel.

- A **tree** (hierarchy) can be represented through a graph with a starting node called root.
- Each node has zero or more child nodes its ancestor is called the **parent** node. A node has at most one parent.

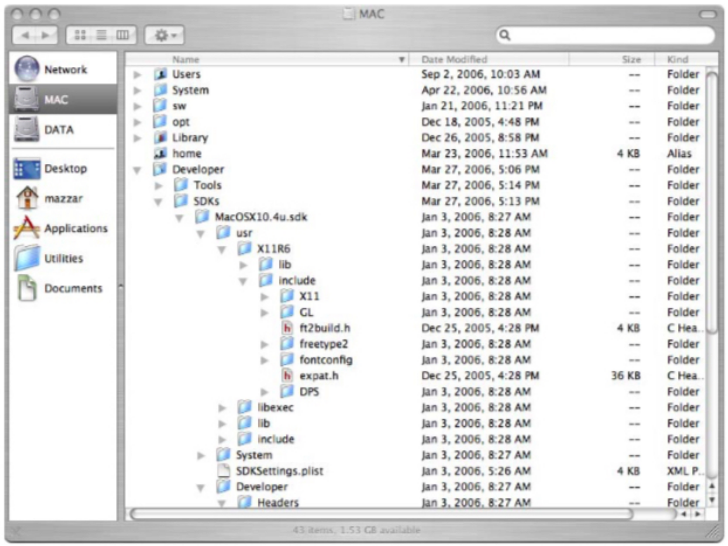


Fig. 5.14 Representation of the file system by the graphical interface Finder in the Mac OS X system.

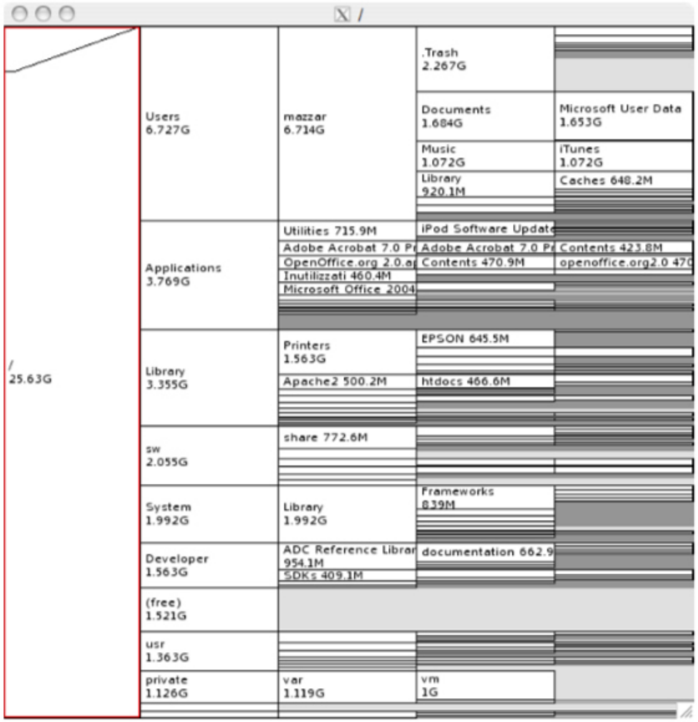


Fig. 5.15 Xdiskusage uses a representation with rectangles of the file system.

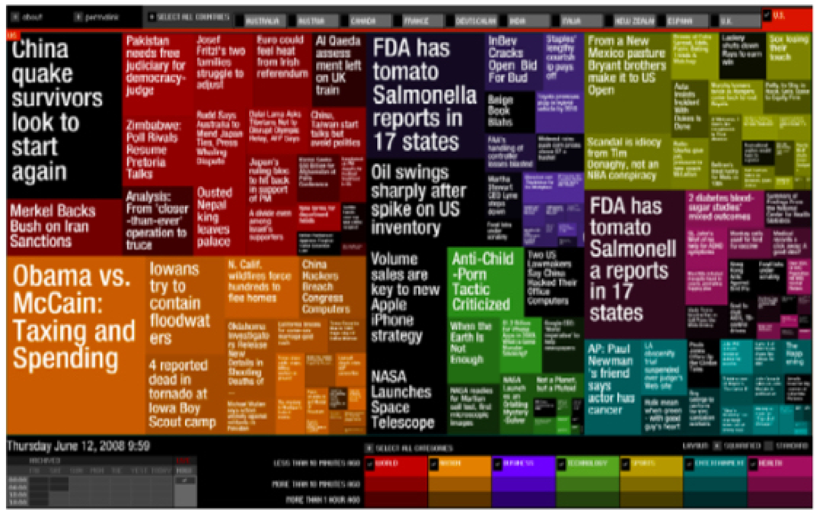


Fig. 5.22 Newsmap uses a treemap algorithm to represent news from Google News U.S. on June 12, 2008. Image reproduced with the permission of Marcos Weskamp.

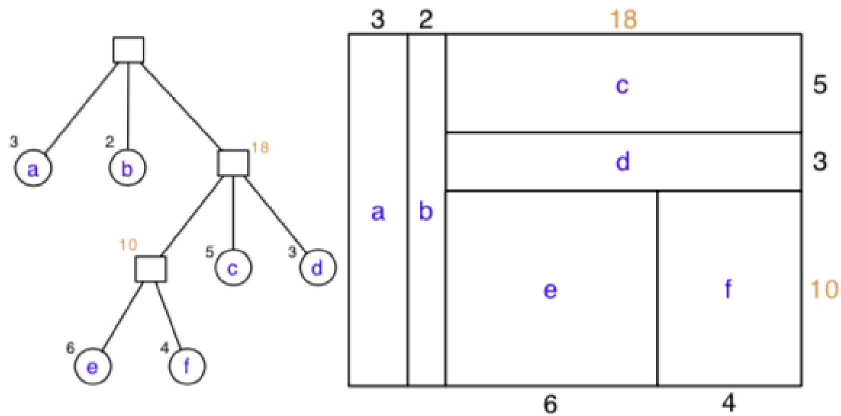
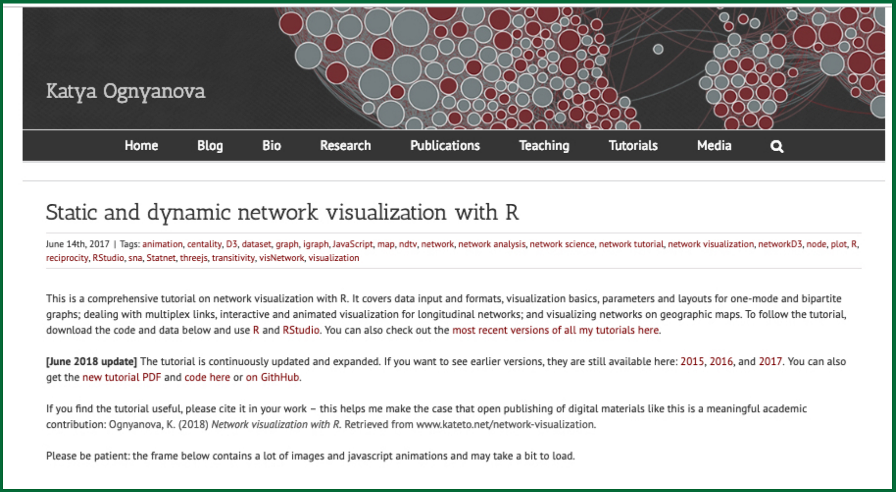


Fig. 5.20 On the left is an example of a tree representation, where a numerical value is associated with each leaf. The internal nodes report the sum of the values of the nodes below. On the right is the treemap representation of the tree.

Katya Ognyanova's "Network visualization with R."


Katya Ognyanova

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Static and dynamic network visualization with R

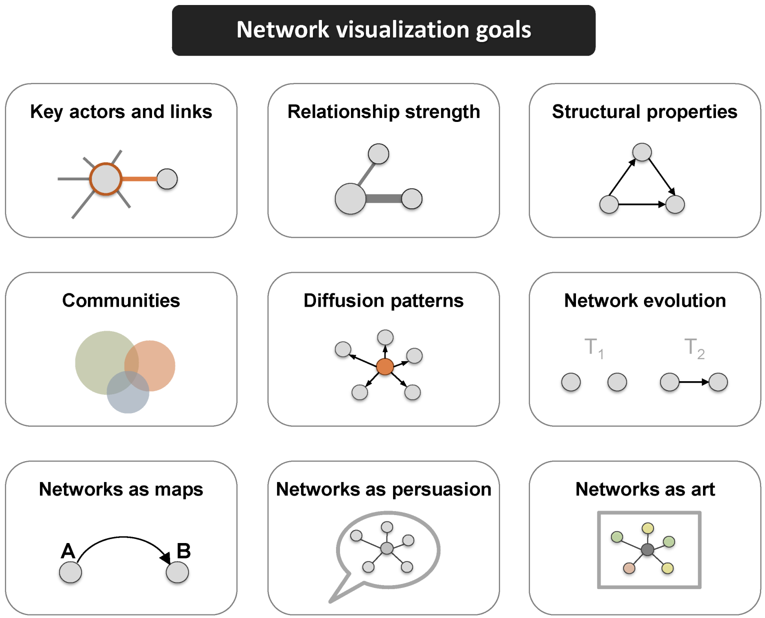
June 14th, 2017 | Tags: animation, centality, D3, dataset, graph, igraph, JavaScript, map, ndtv, network, network analysis, network science, network tutorial, network visualization, networkD3, node, plot, R, reciprocity, RStudio, sna, Statnet, threejs, transitivity, visNetwork, visualization

This is a comprehensive tutorial on network visualization with R. It covers data input and formats, visualization basics, parameters and layouts for one-mode and bipartite graphs; dealing with multiplex links, interactive and animated visualization for longitudinal networks; and visualizing networks on geographic maps. To follow the tutorial, download the code and data below and use R and RStudio. You can also check out the most recent versions of all my tutorials here.

[June 2018 update] The tutorial is continuously updated and expanded. If you want to see earlier versions, they are still available here: 2015, 2016, and 2017. You can also get the new tutorial PDF and code here or on GithHub.

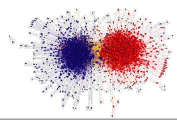
If you find the tutorial useful, please cite it in your work – this helps me make the case that open publishing of digital materials like this is a meaningful academic contribution: Ognyanova, K. (2018) *Network visualization with R*. Retrieved from www.kateto.net/network-visualization.

Please be patient: the frame below contains a lot of images and javascript animations and may take a bit to load.


Network visualization goals
Key actors and links
Relationship strength
Structural properties
Communities
Diffusion patterns
Network evolution
T1
T2
Networks as maps
A
B
Networks as persuasion
Networks as art

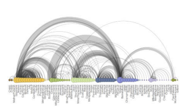
Some network visualization types

Network Maps

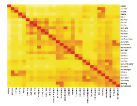


Statistical charts

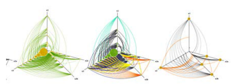
Arc diagrams



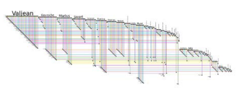
Heat maps

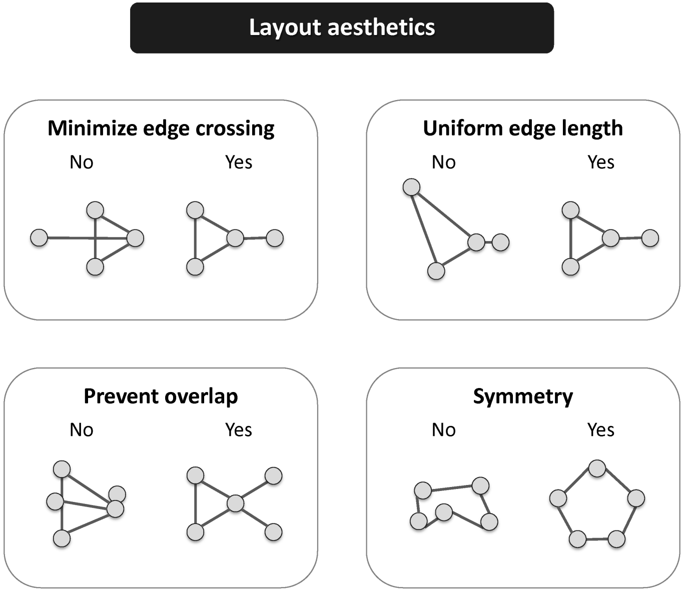


Hive plots



Biofabric





Layout aesthetics
Minimize edge crossing
No
Yes
Uniform edge length
No
Yes
Prevent overlap
No
Yes
Symmetry
No
Yes