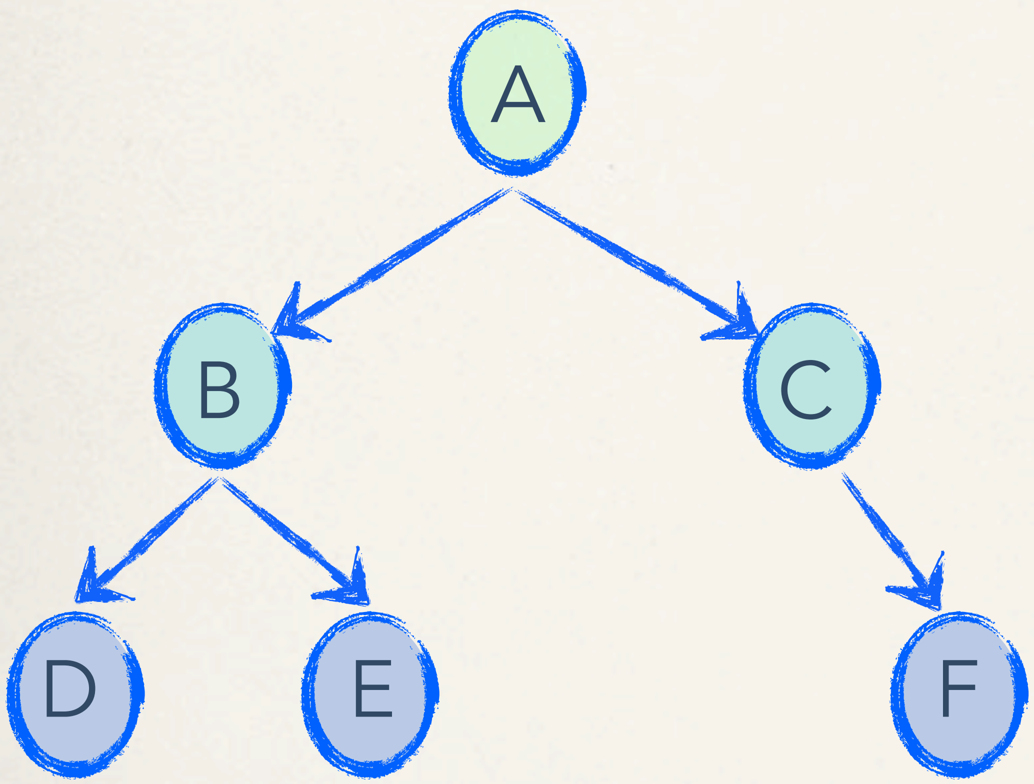
Hierarchies, Graphs, and Networks (oh my) part two

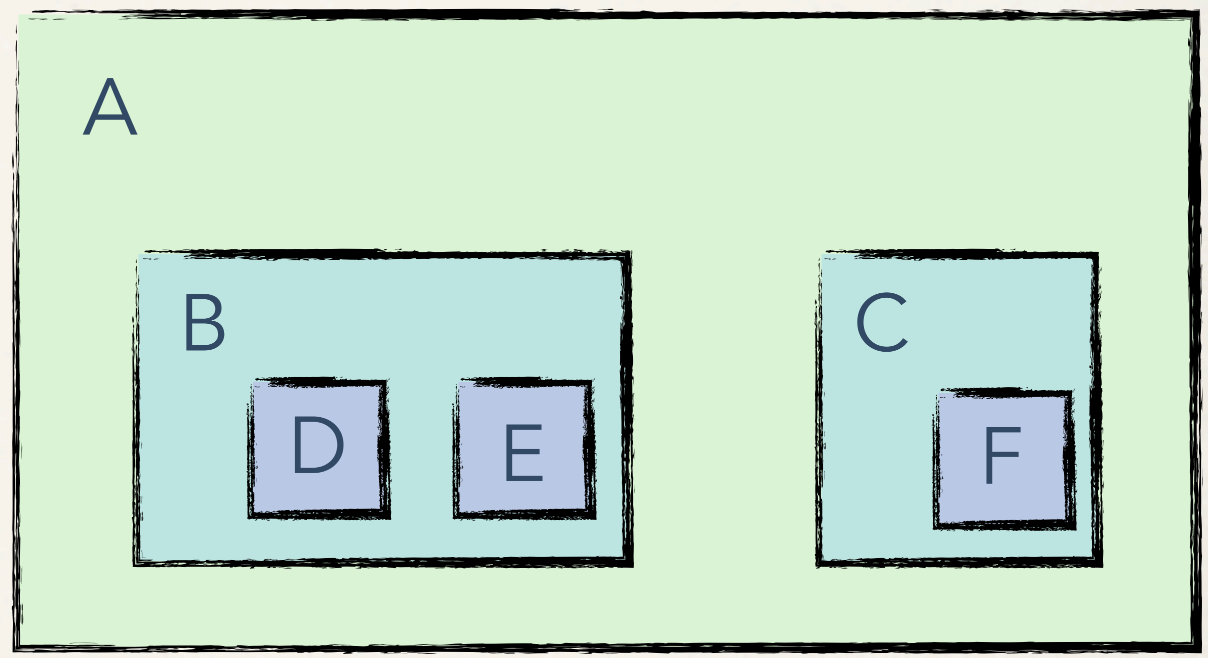
C. Andrews

2014-04-15

Space filling trees



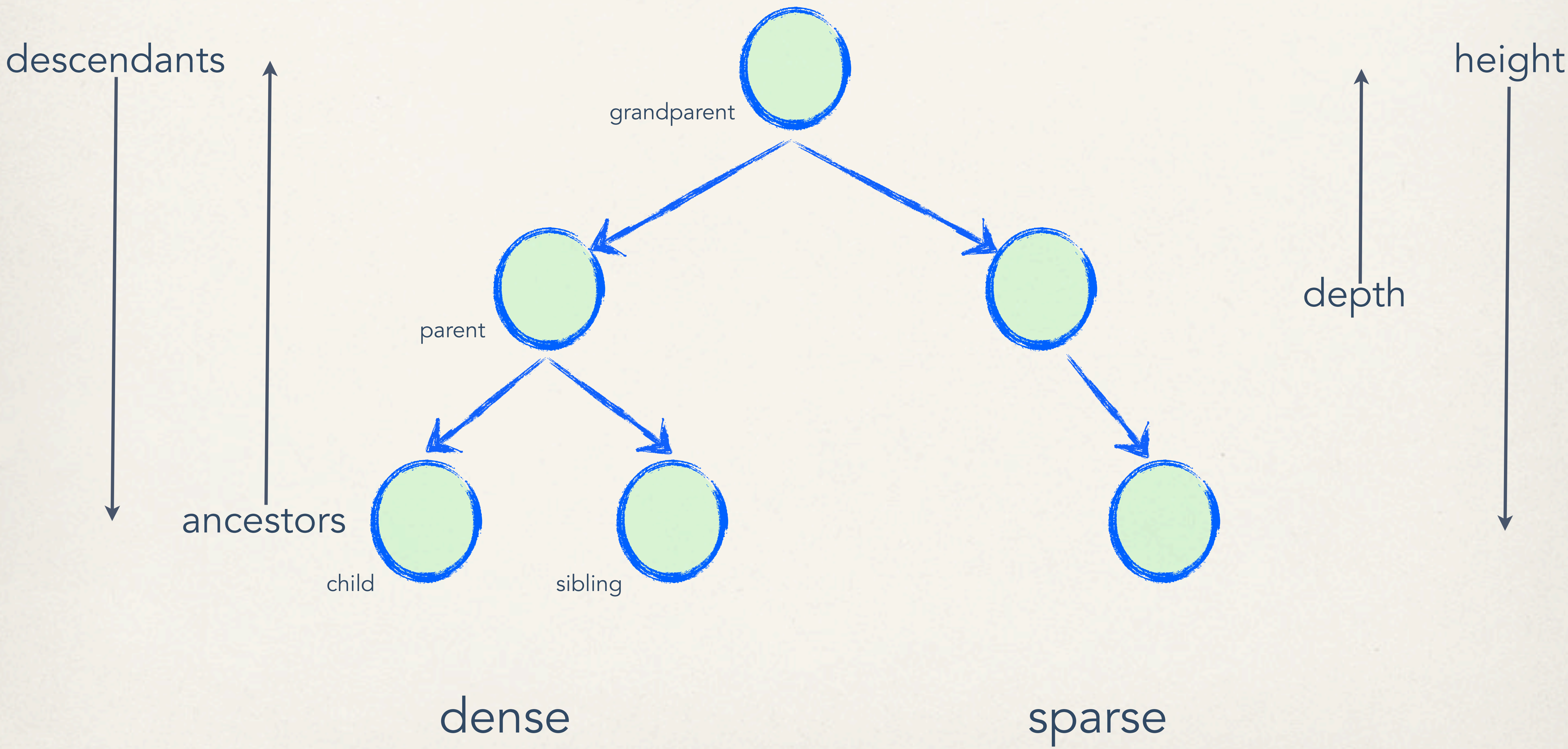
Connections



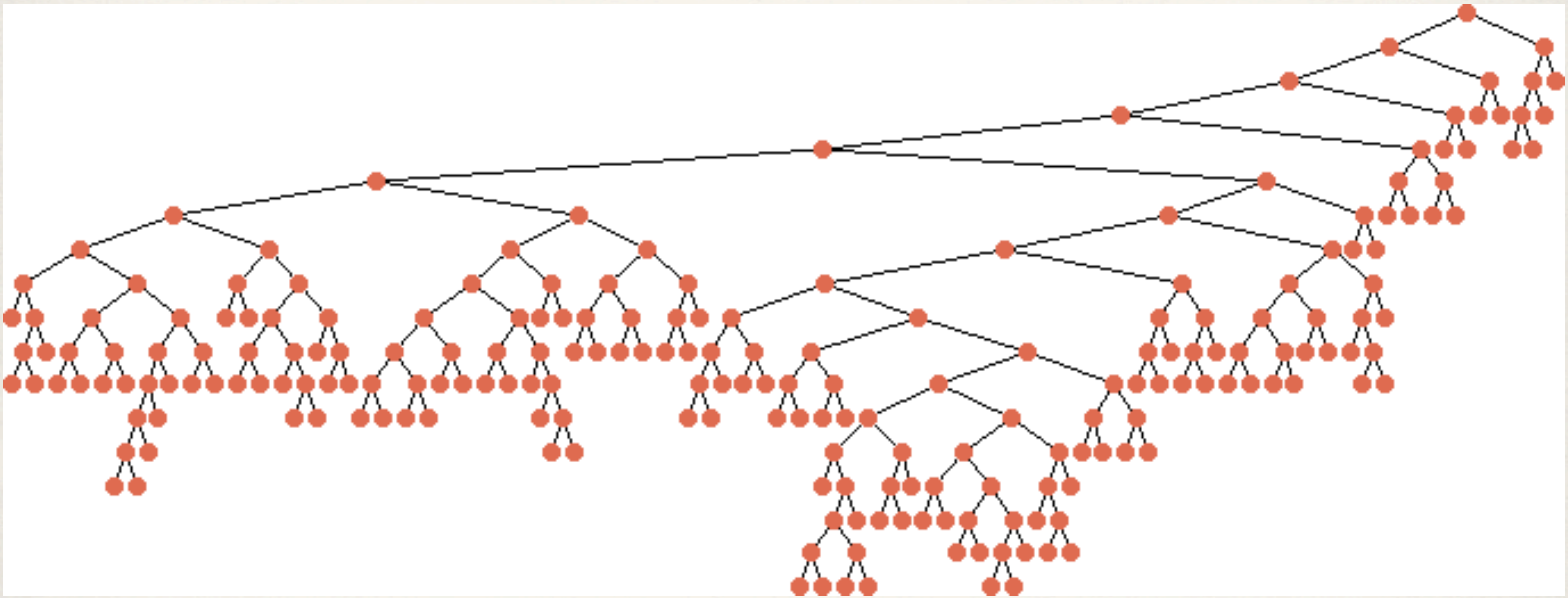
Containment

What are we trying to discover?

It is all about structure and relationships

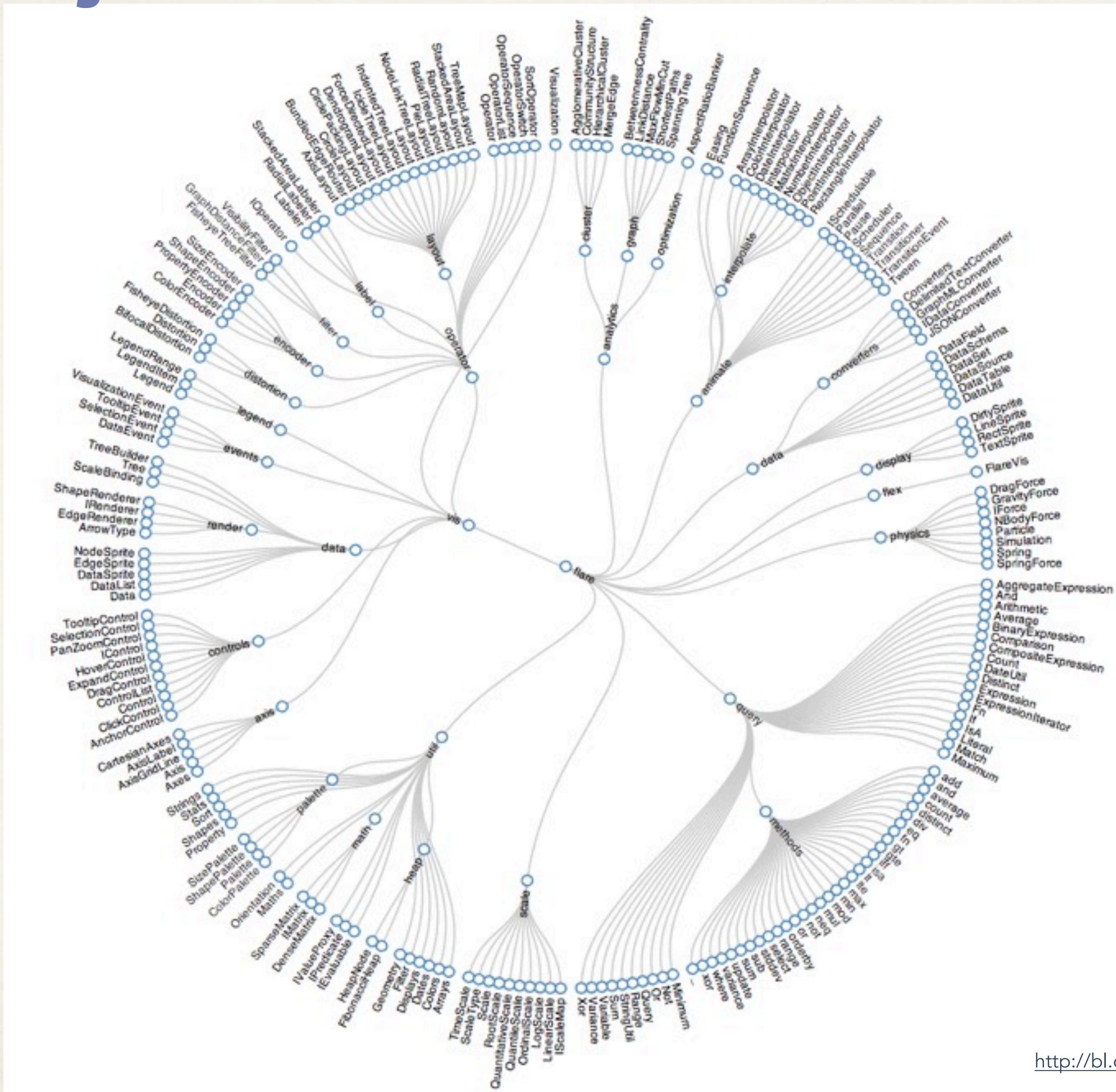


Conventional tree visualization



http://www.informatik.uni-koeln.de/ls_juenger/research/vbctool/

Radial layout



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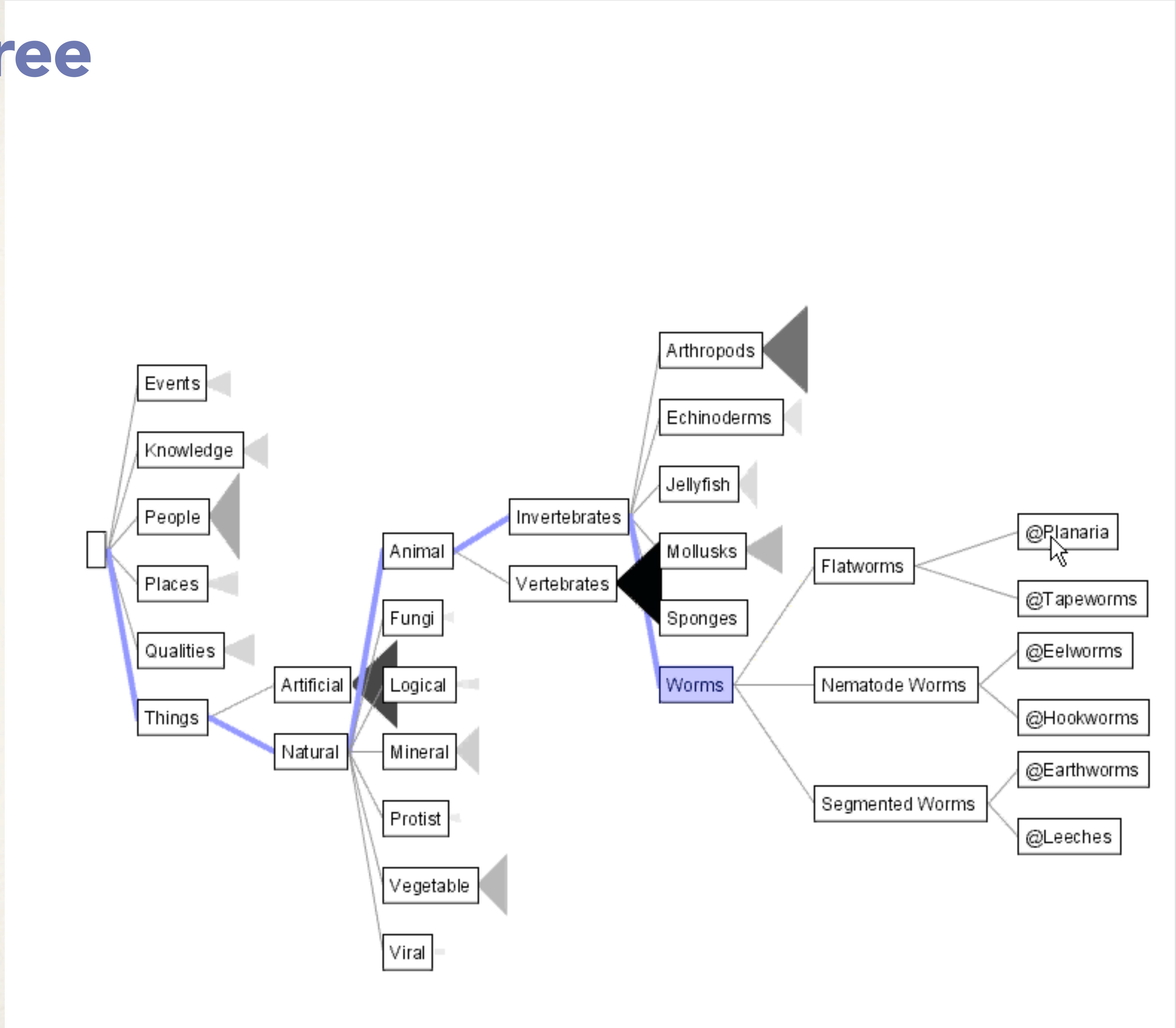
SpaceTree

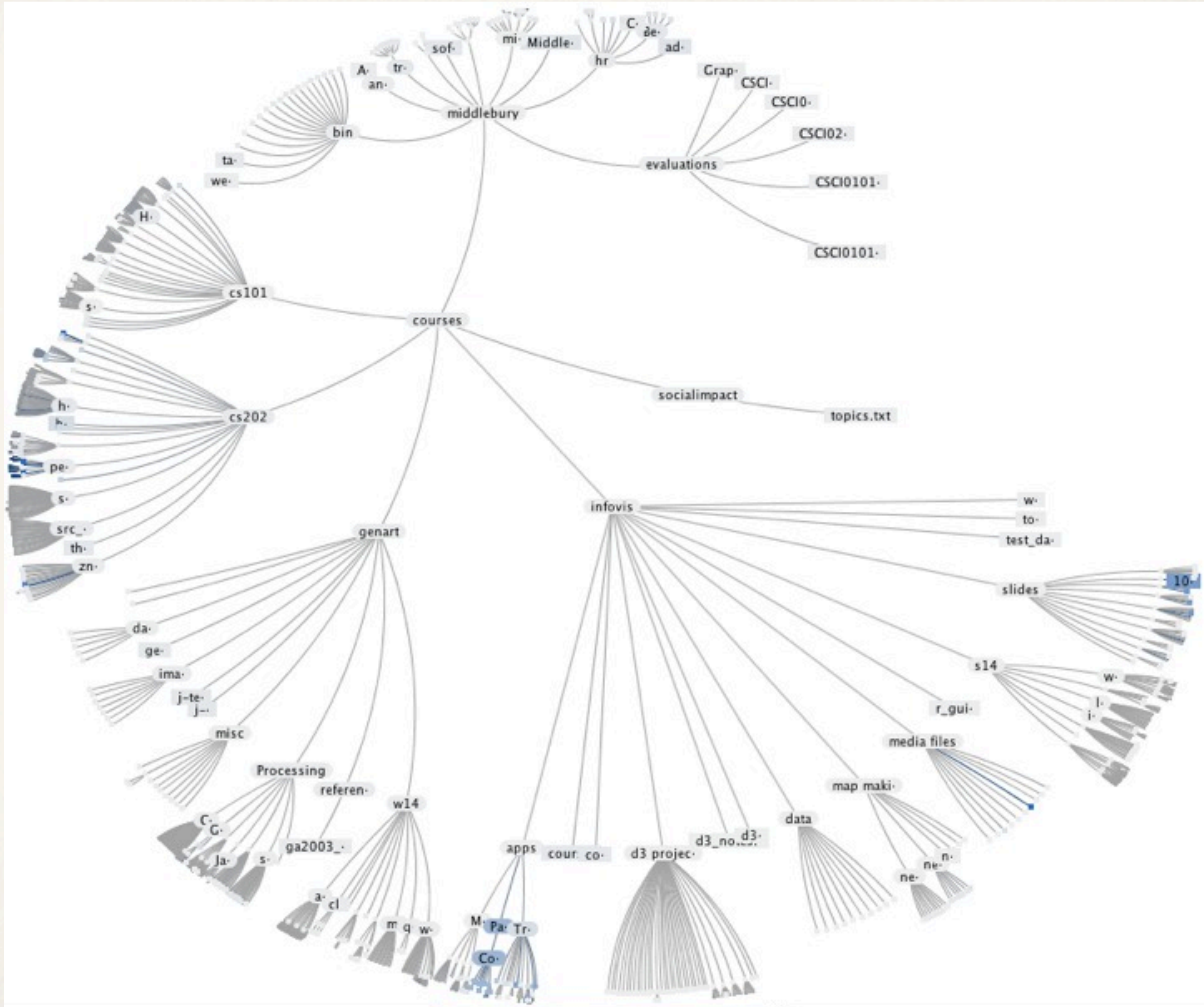


Grosjean, et al. "SpaceTree: Supporting Exploration in Large Node Link Tree, Design Evolution and Empirical Evaluation"

Hyperbolic browser

The tree is laid out in hyperbolic space and mapped back to the unit circle.

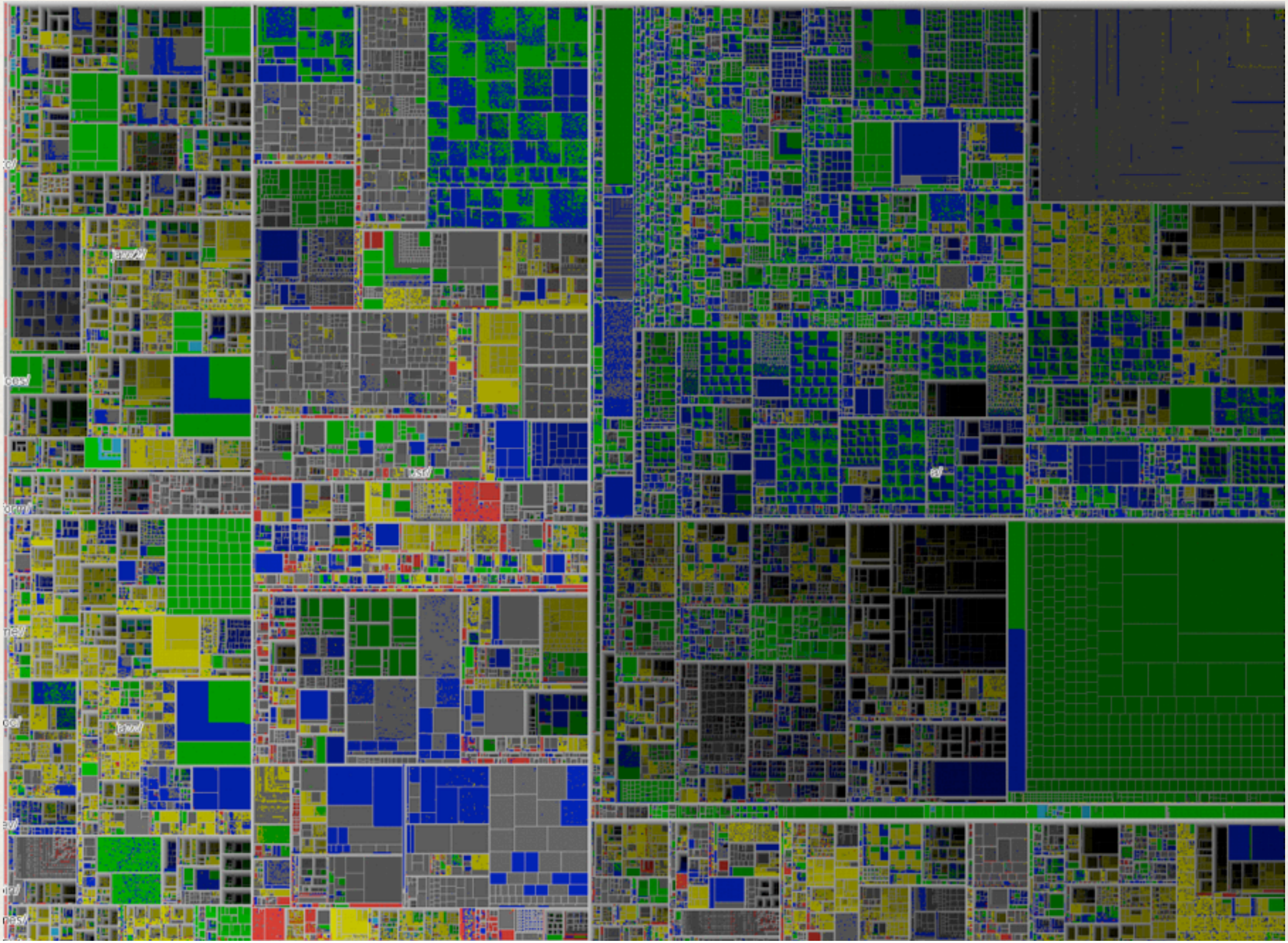
Can show 10x the number of nodes of a standard 2D approach (1000 vs. 100)



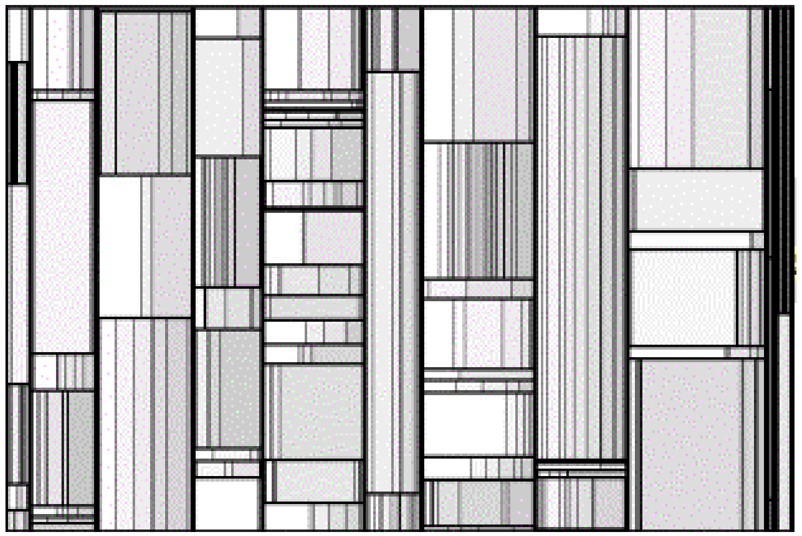
Lamping et al. "A Focus + Context Technique Based on Hyperbolic Geometry for Visualizing large Hierarchies"

Treemaps

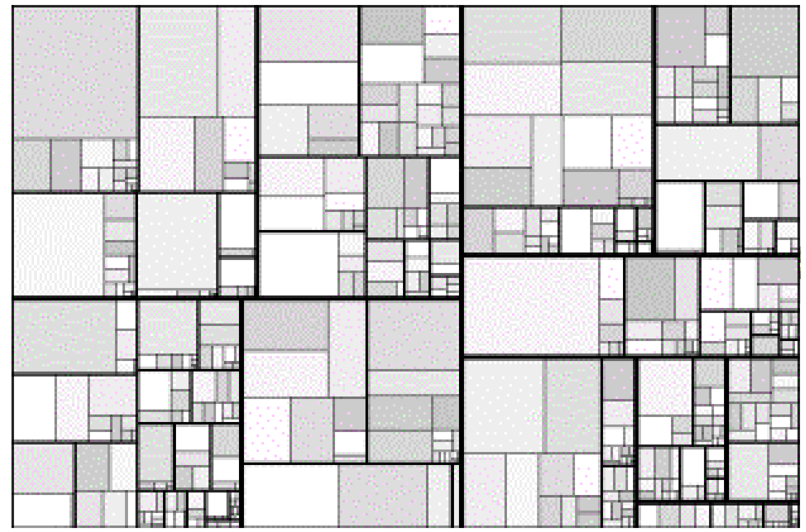
http://www.cs.umd.edu/hcil/VisuMillion/



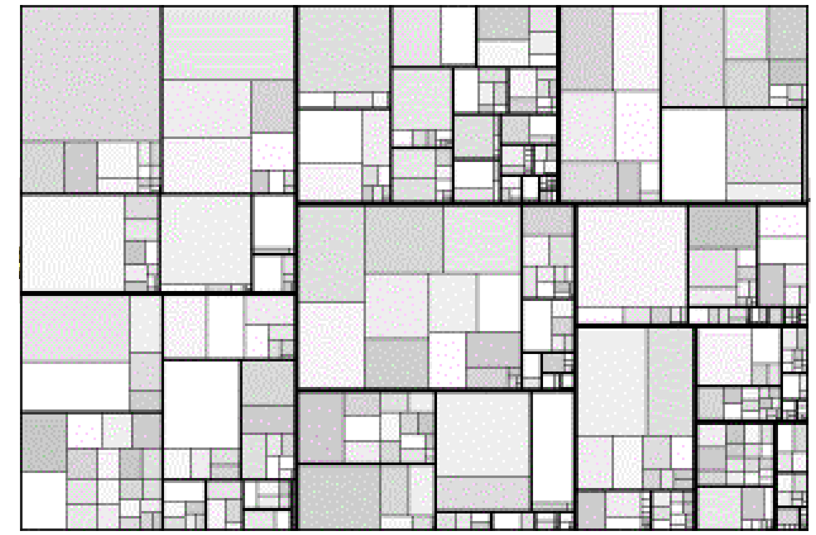
Even more approaches...



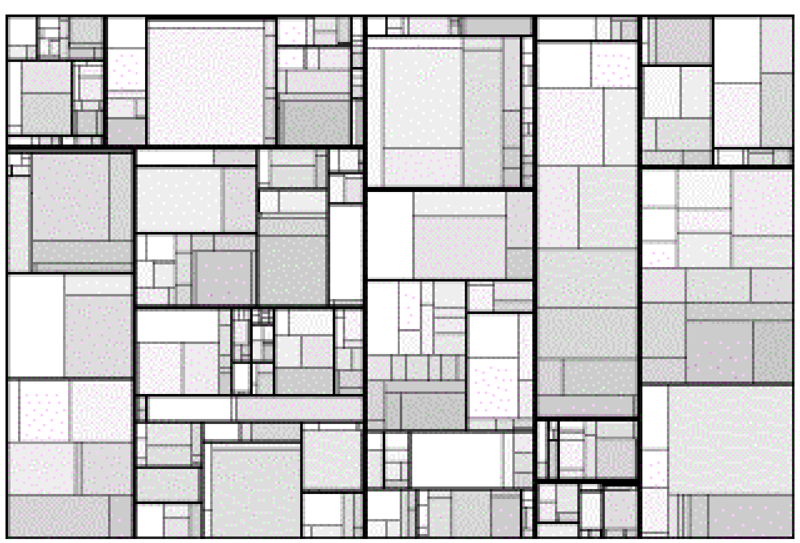
Slice-and-dice



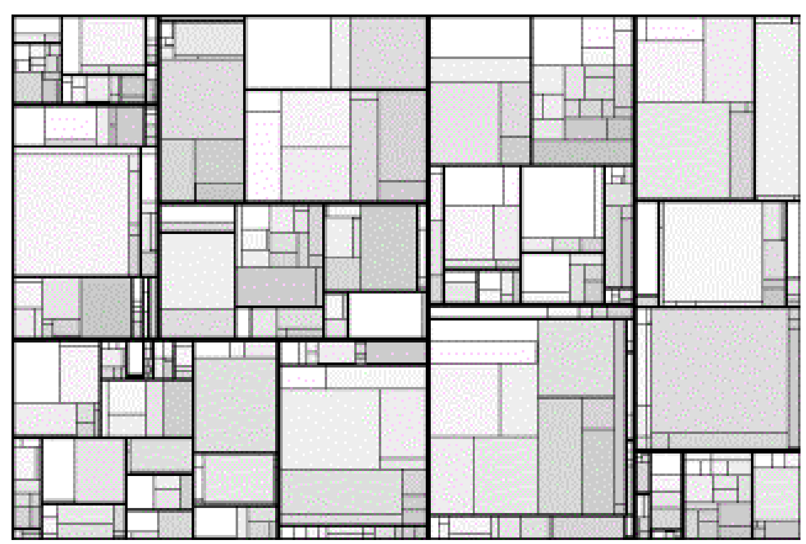
Cluster



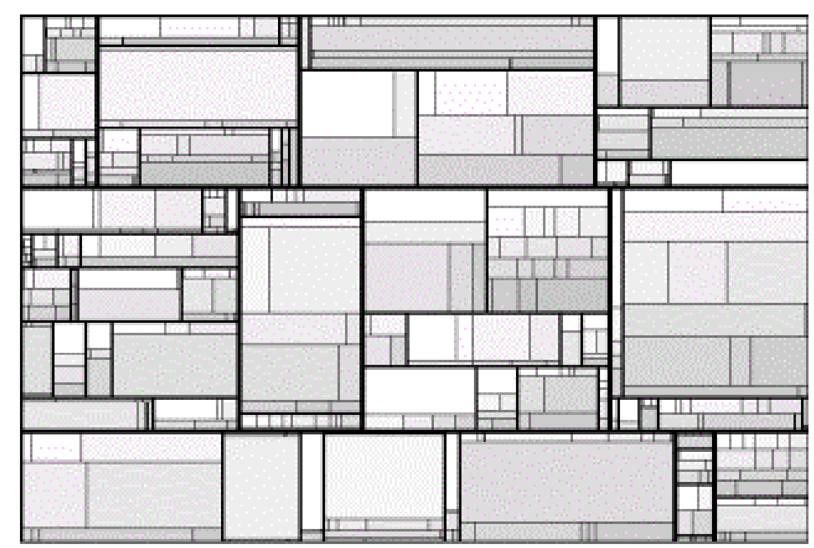
Squarified



Pivot-by-middle



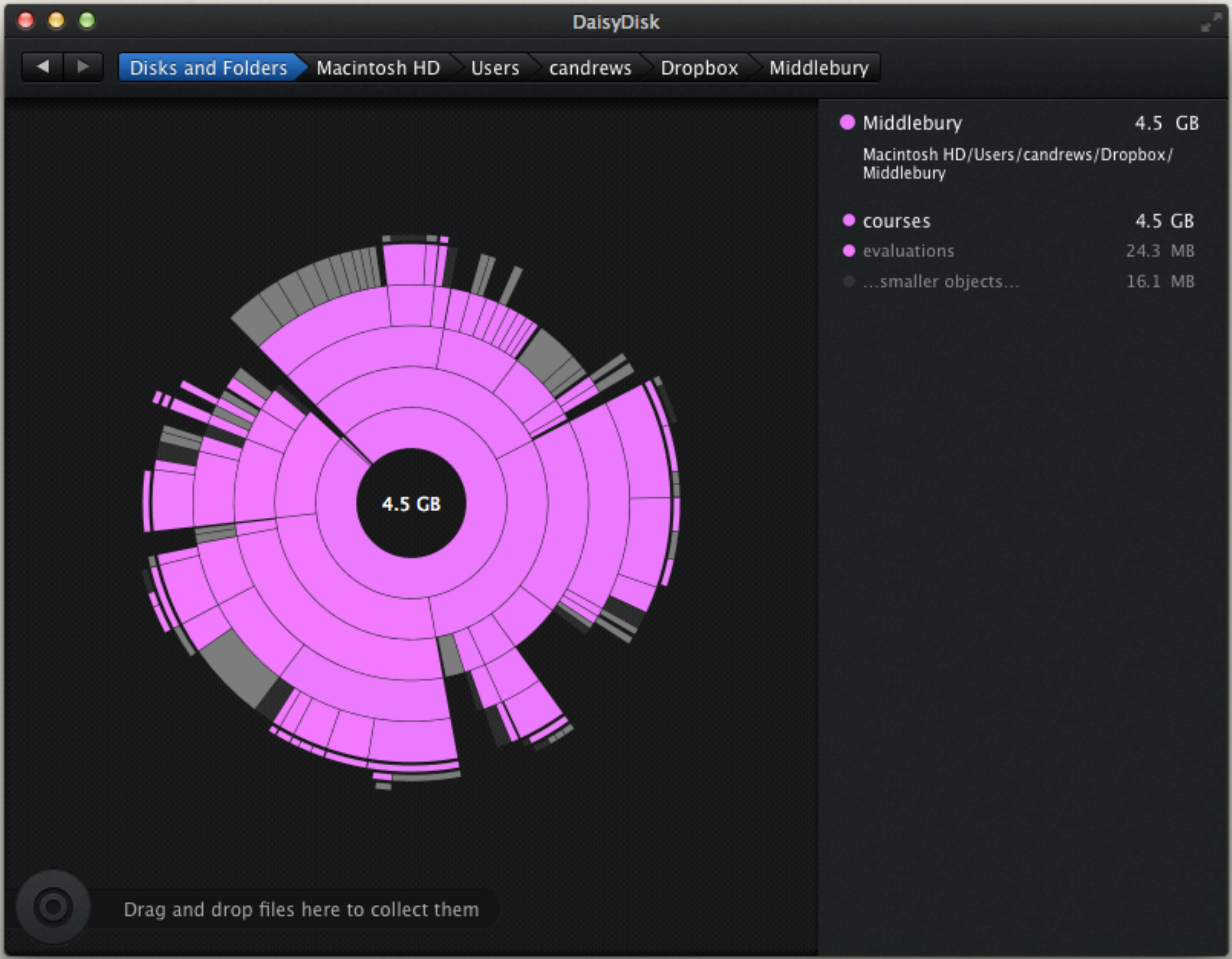
Pivot-by-size



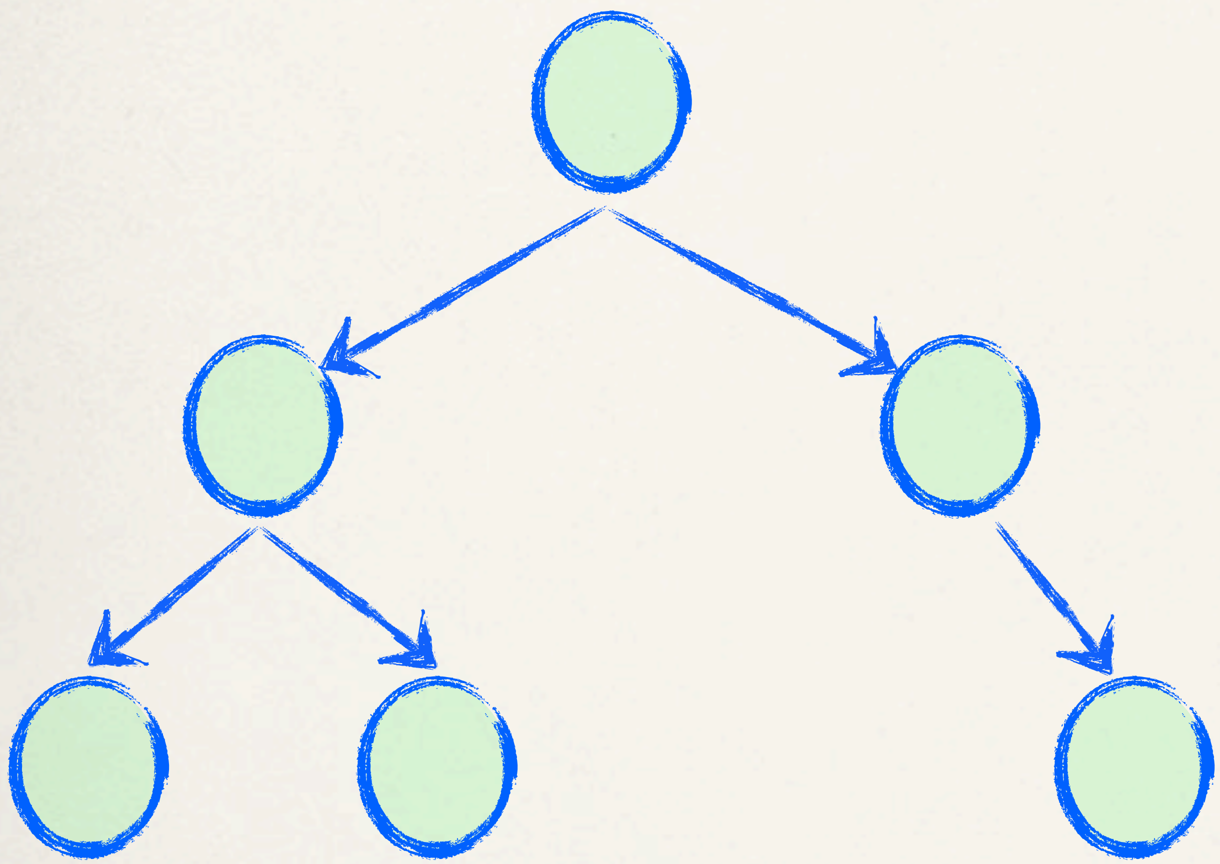
Strip

borrowed from J. Stasko

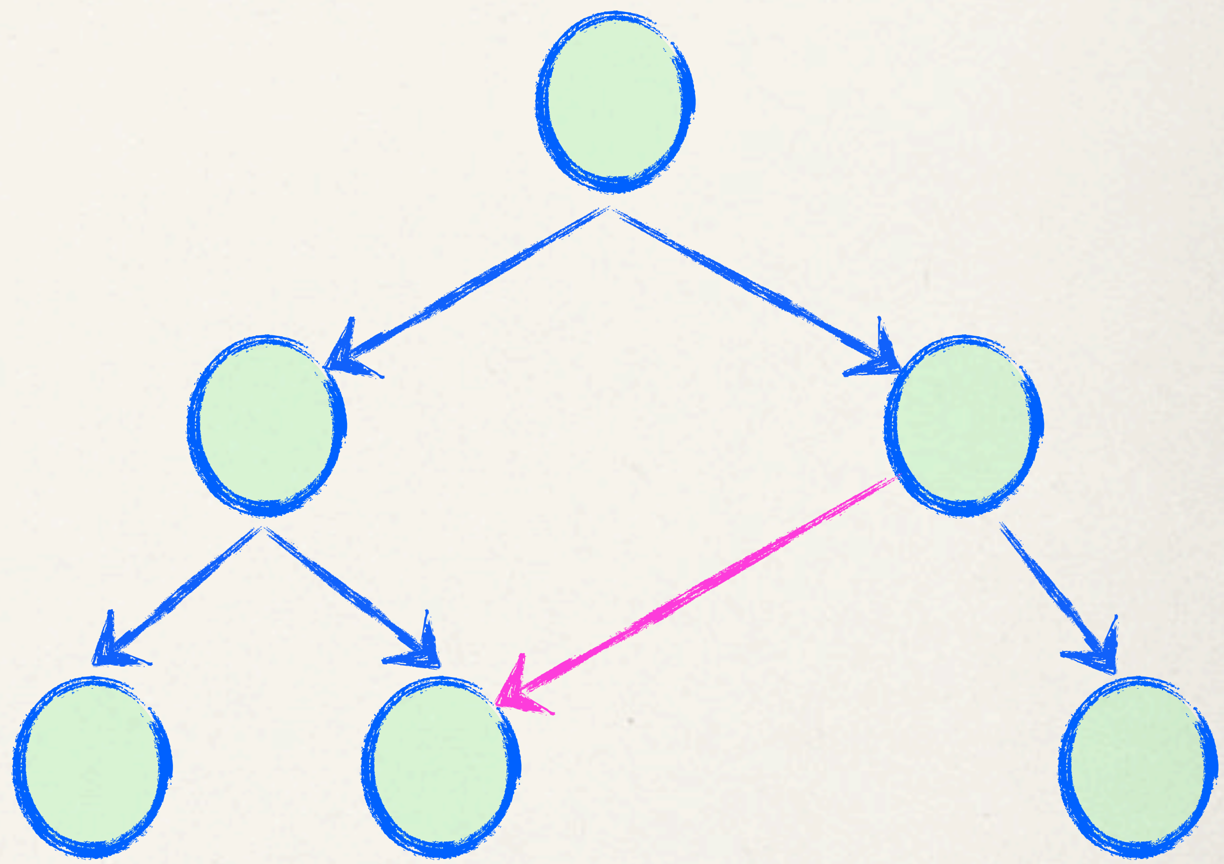
Radial space filling



Networks



Tree



Network

Graph representations

vertex and edge tables

edge	source	sink
1	A	B
2	B	C

node	attr1	attr2
A	-	-
B	-	-
C	-	-

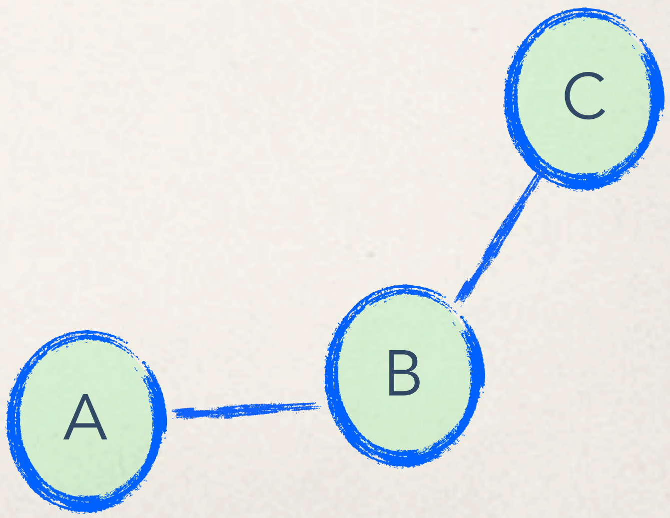
adjacency lists

A: B
B: A, C
C: B

adjacency matrix

	A	B	C
A	0	1	0
B	1	0	1
C	0	1	0

Node - link diagram



Shneiderman’s NetViz Nirvana

Every node is visible

For every node, you can count its degree

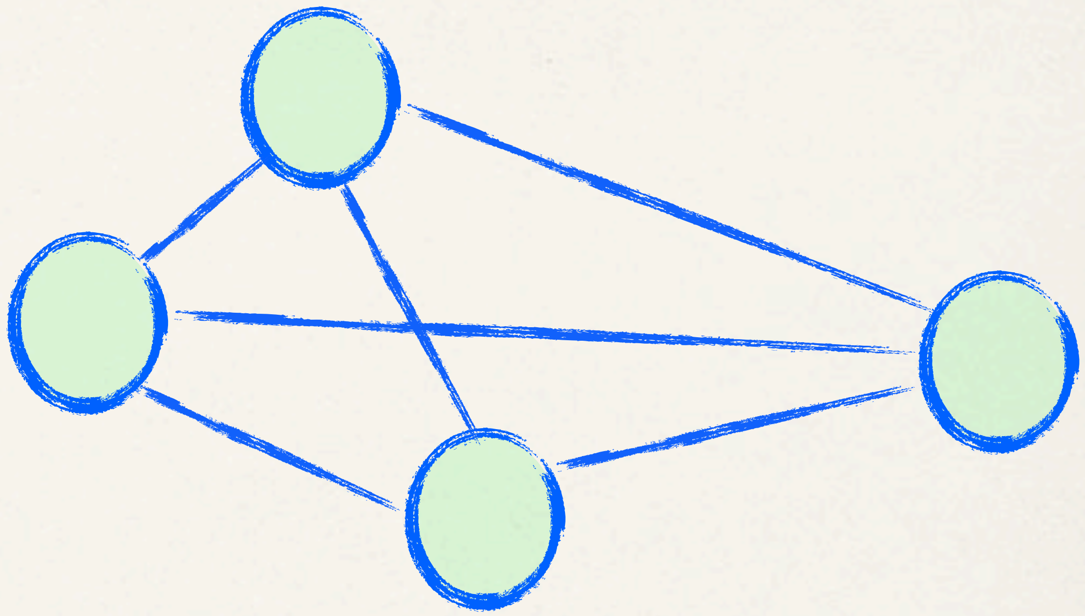
For every link you can follow it from source to destination

Clusters and outliers are identifiable

Aesthetic considerations

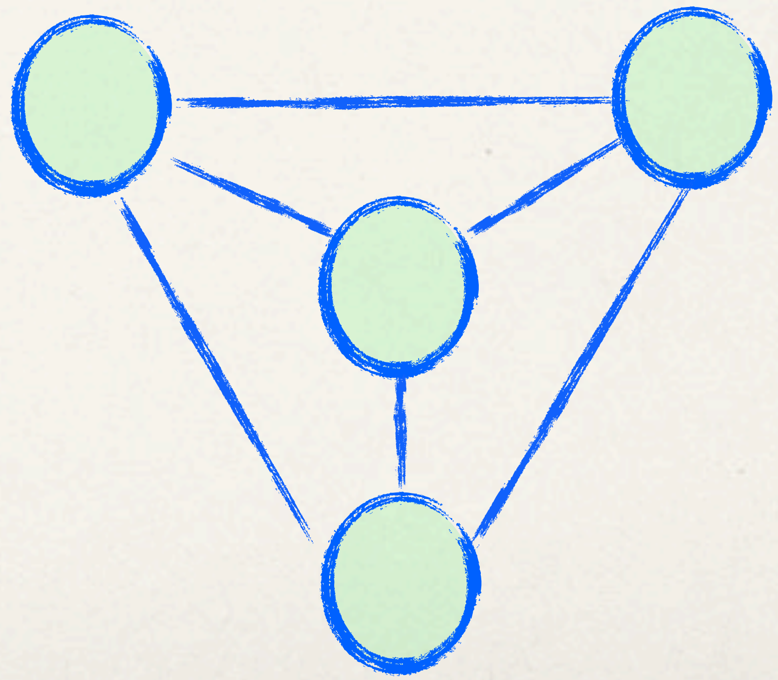
Minimize

- edge crossings
- area
- line bends
- line slopes
- total edge length
- max edge length
- edge length variance



Maximize

- smallest angle between edges
- symmetry

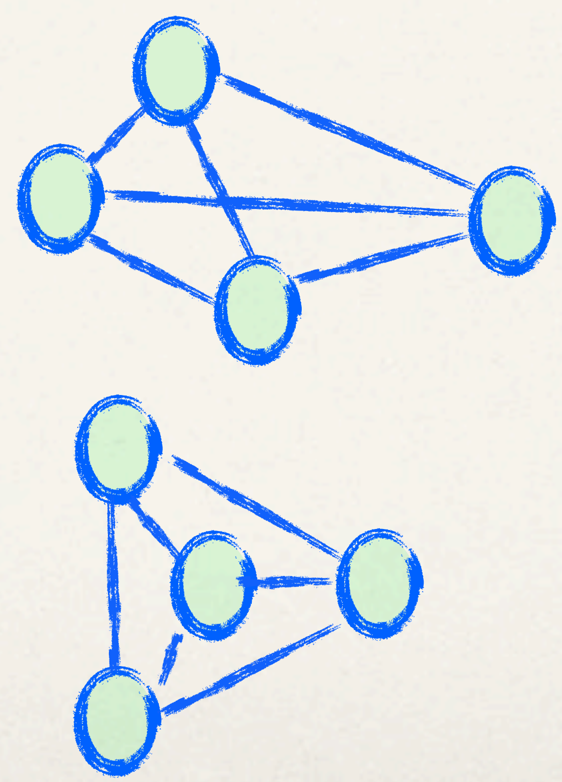


Graph visualization

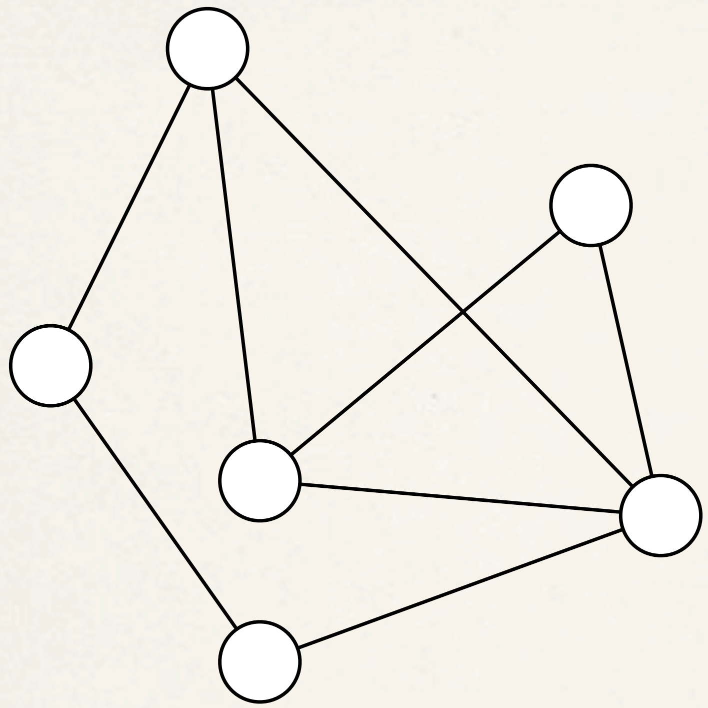
What do nodes look like?

What do links look like?

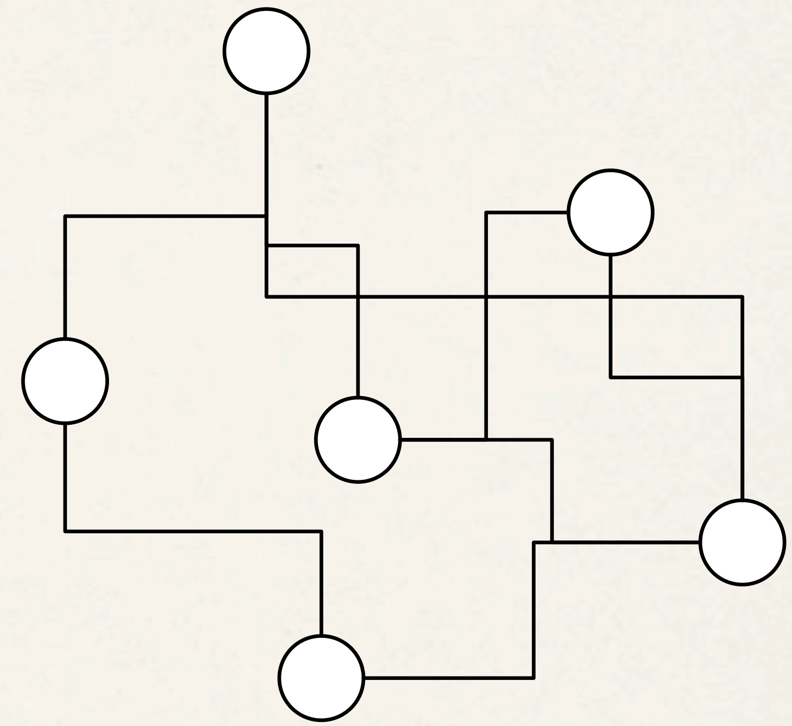
How do we lay out the graph?



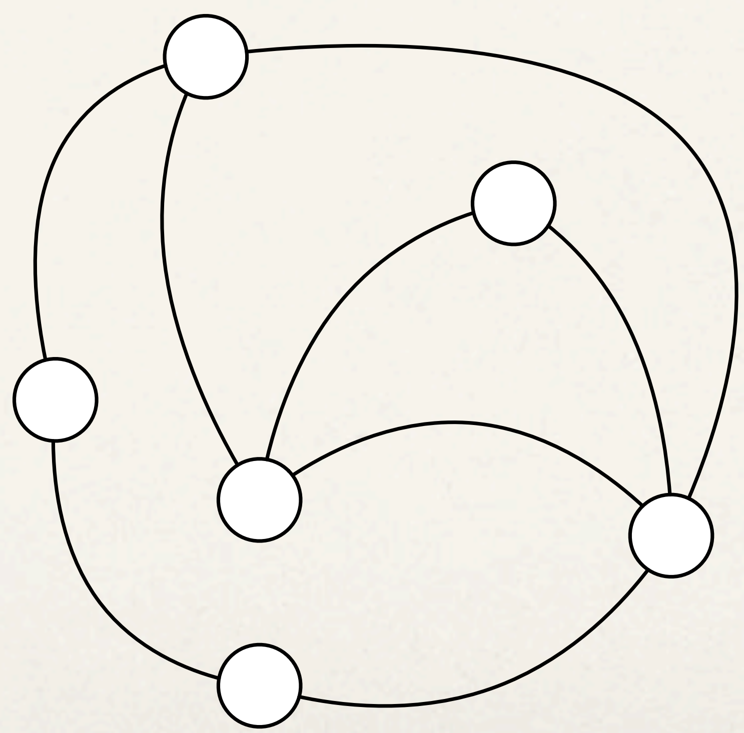
Edge styles



Straight



Orthogonal



Curved

Common layout styles

Hierarchical

Force directed

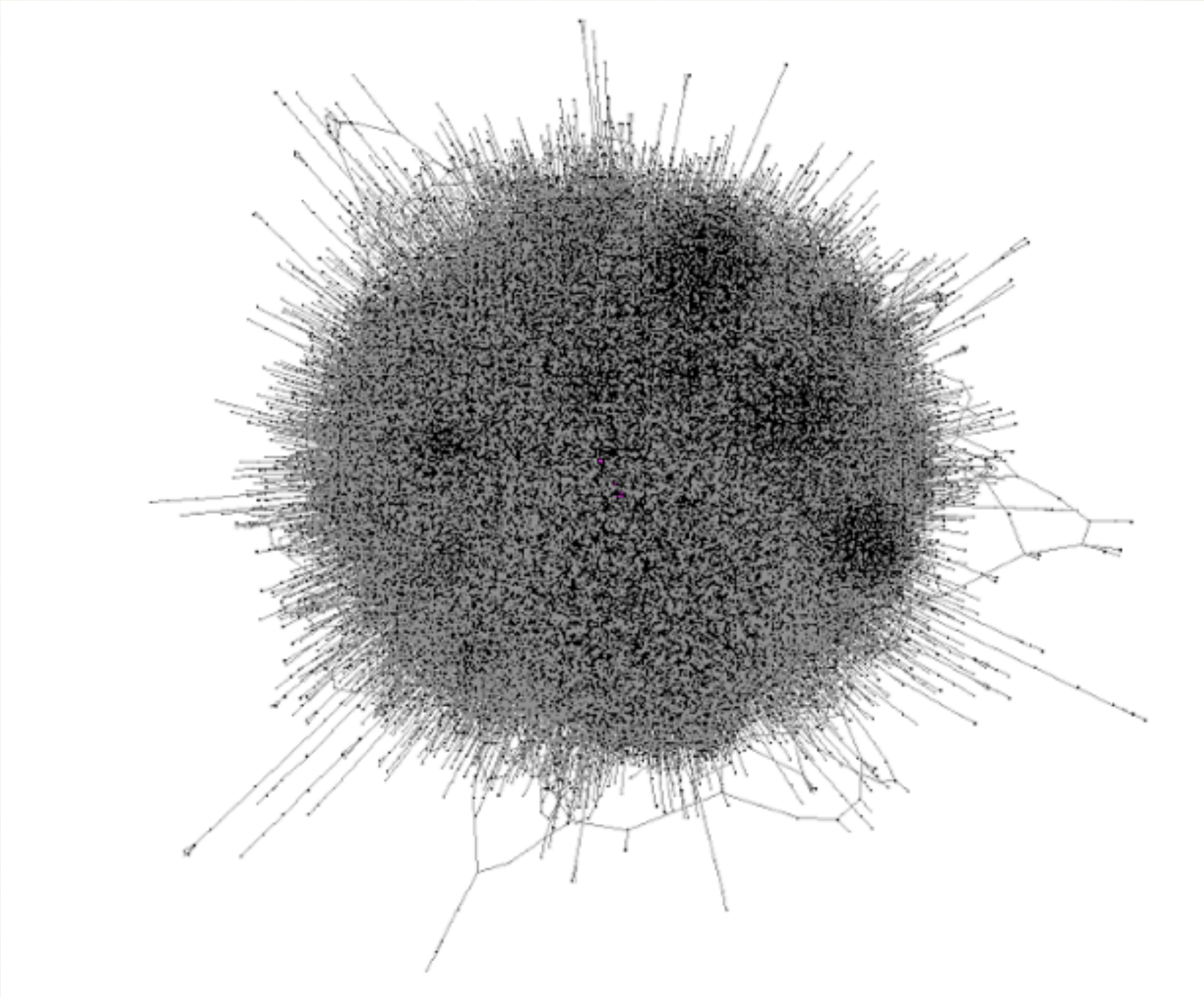
Circular

Geographic

Clustered

Matrix

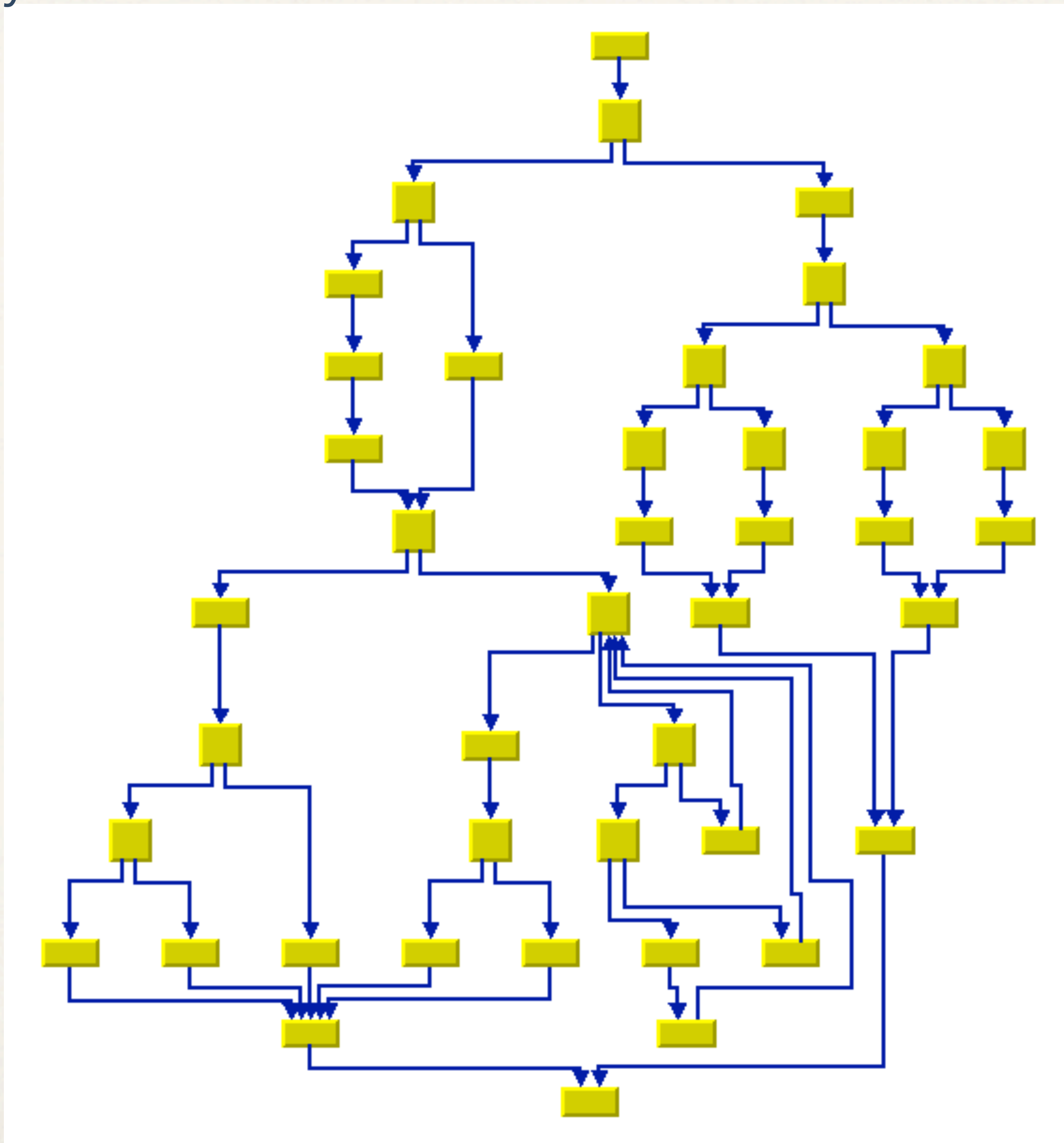
Attribute based



http://www.thenetworkthinkers.com/2013/03/big-data.html

Hierarchical graph layout

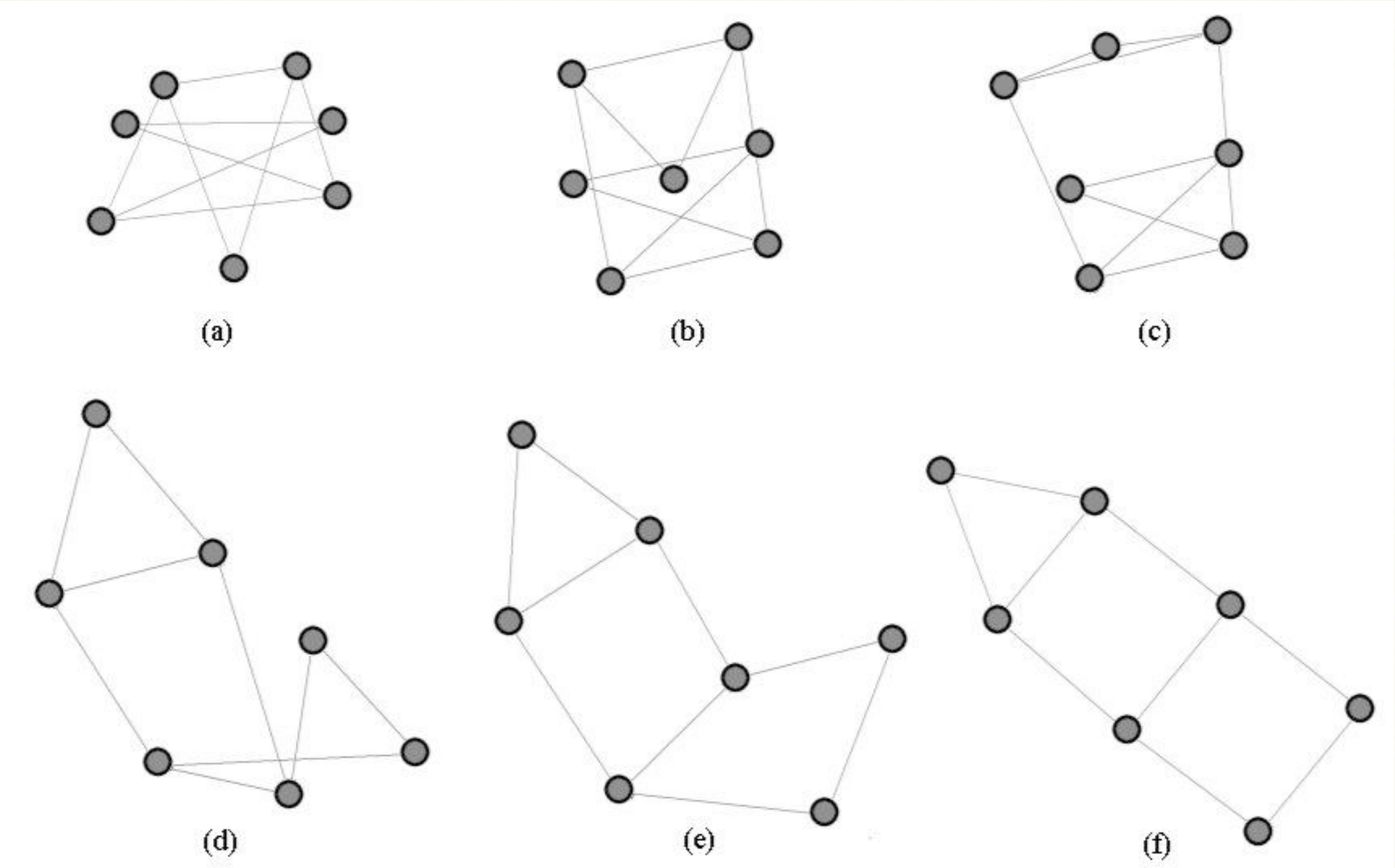
Sugiyama layout



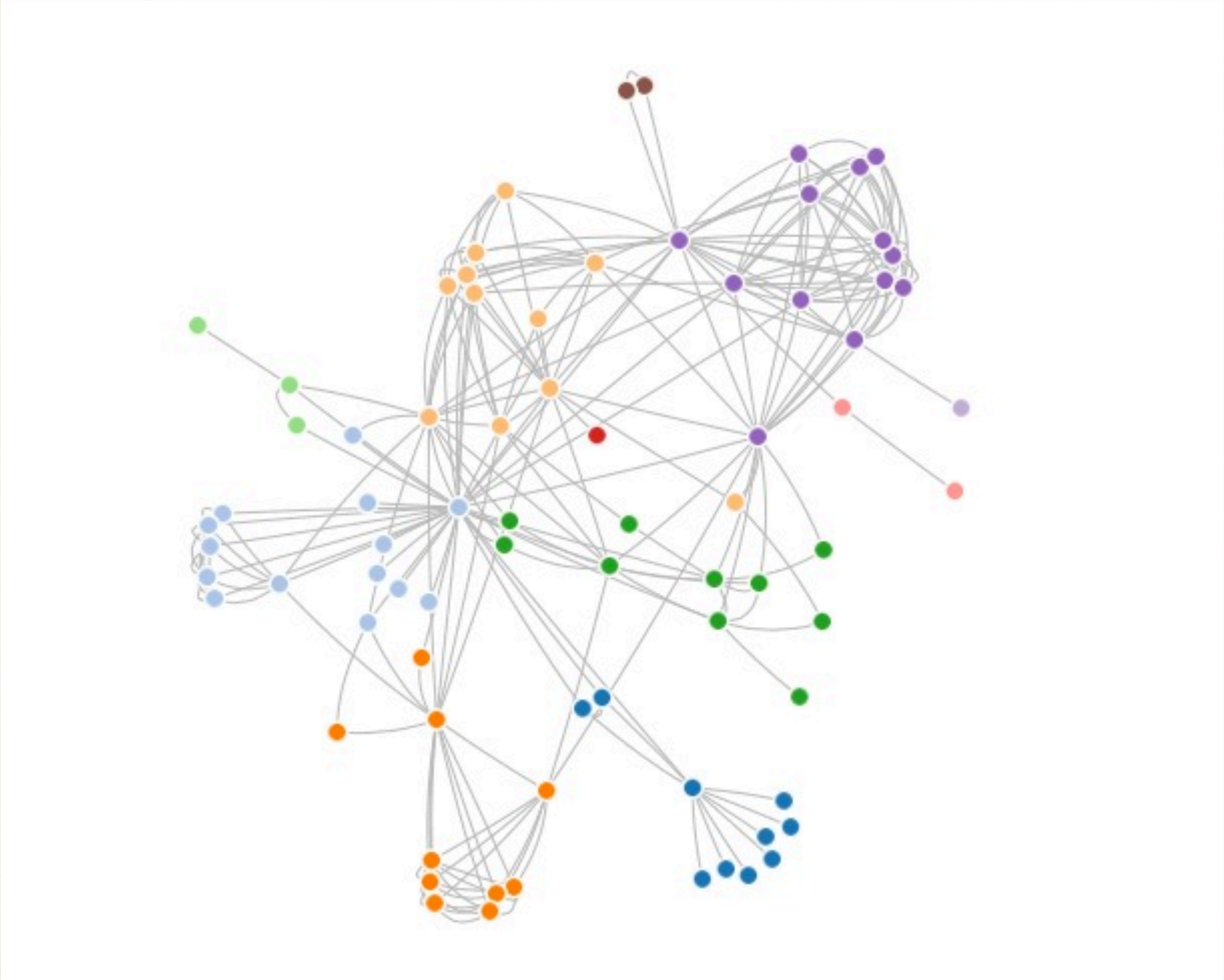
http://www.roguewave.com/

Force-directed layout

Constraint-based layout

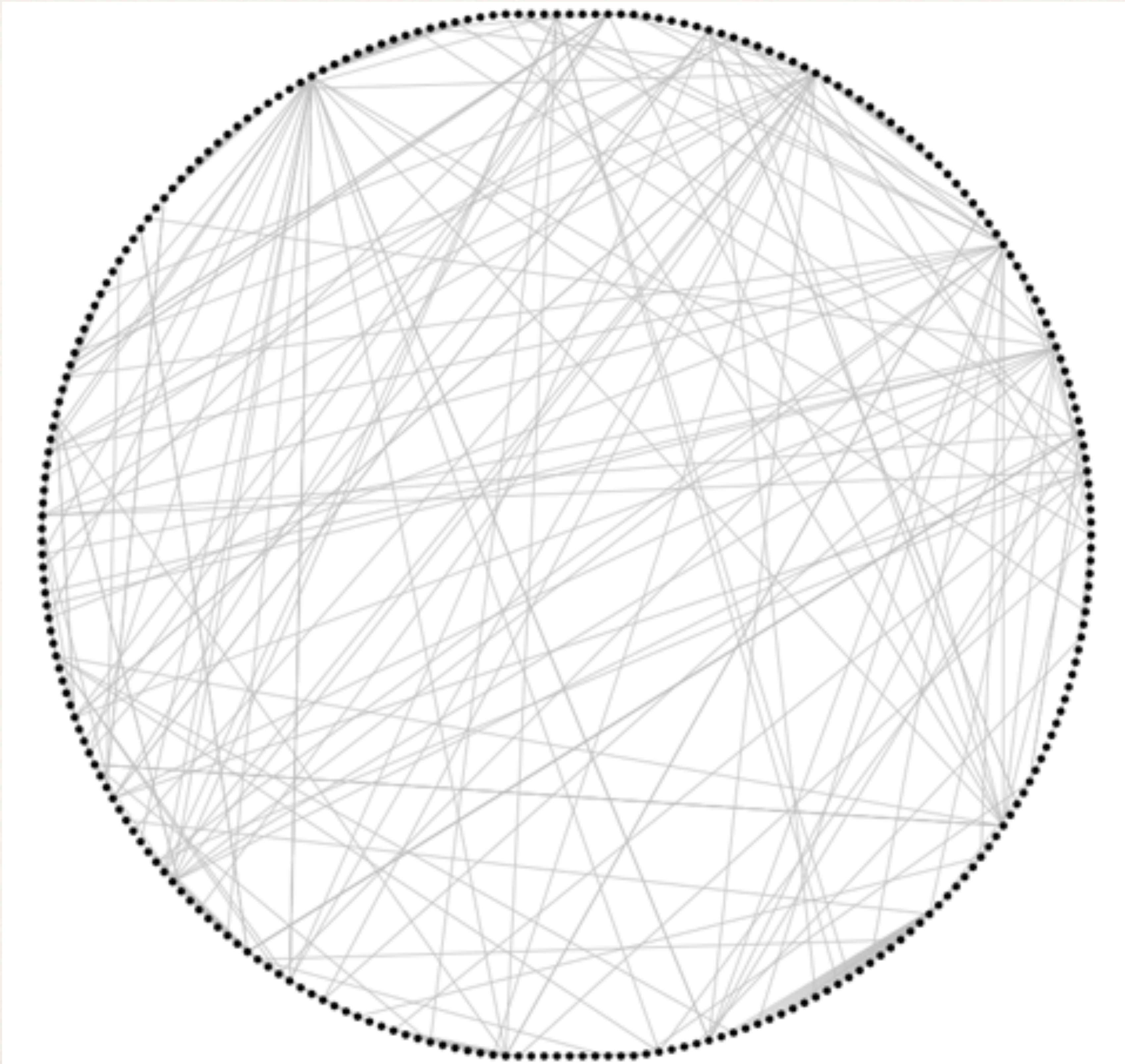


Force directed layout



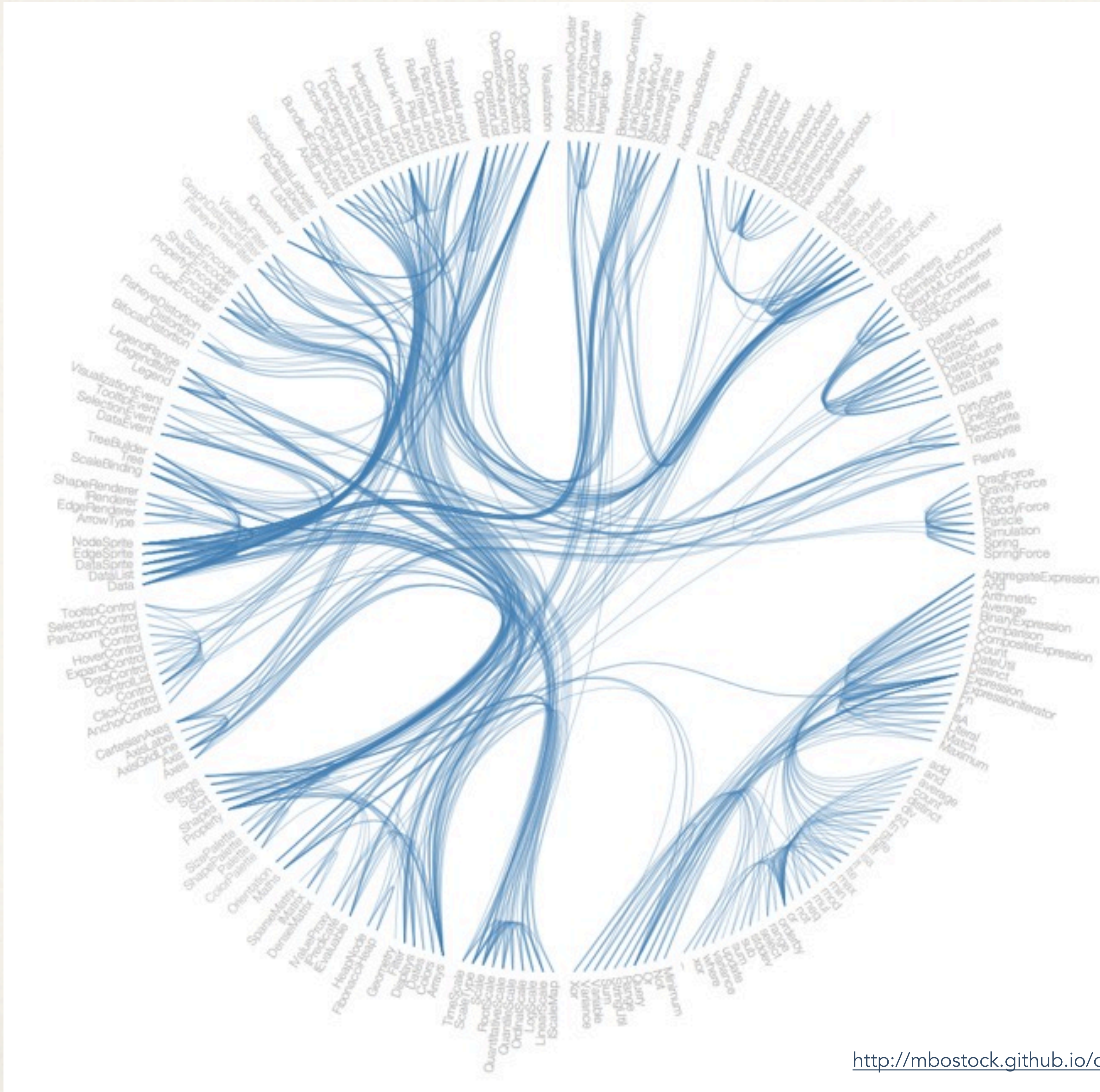
http://bl.ocks.org/mbostock/4600693

Circular layout



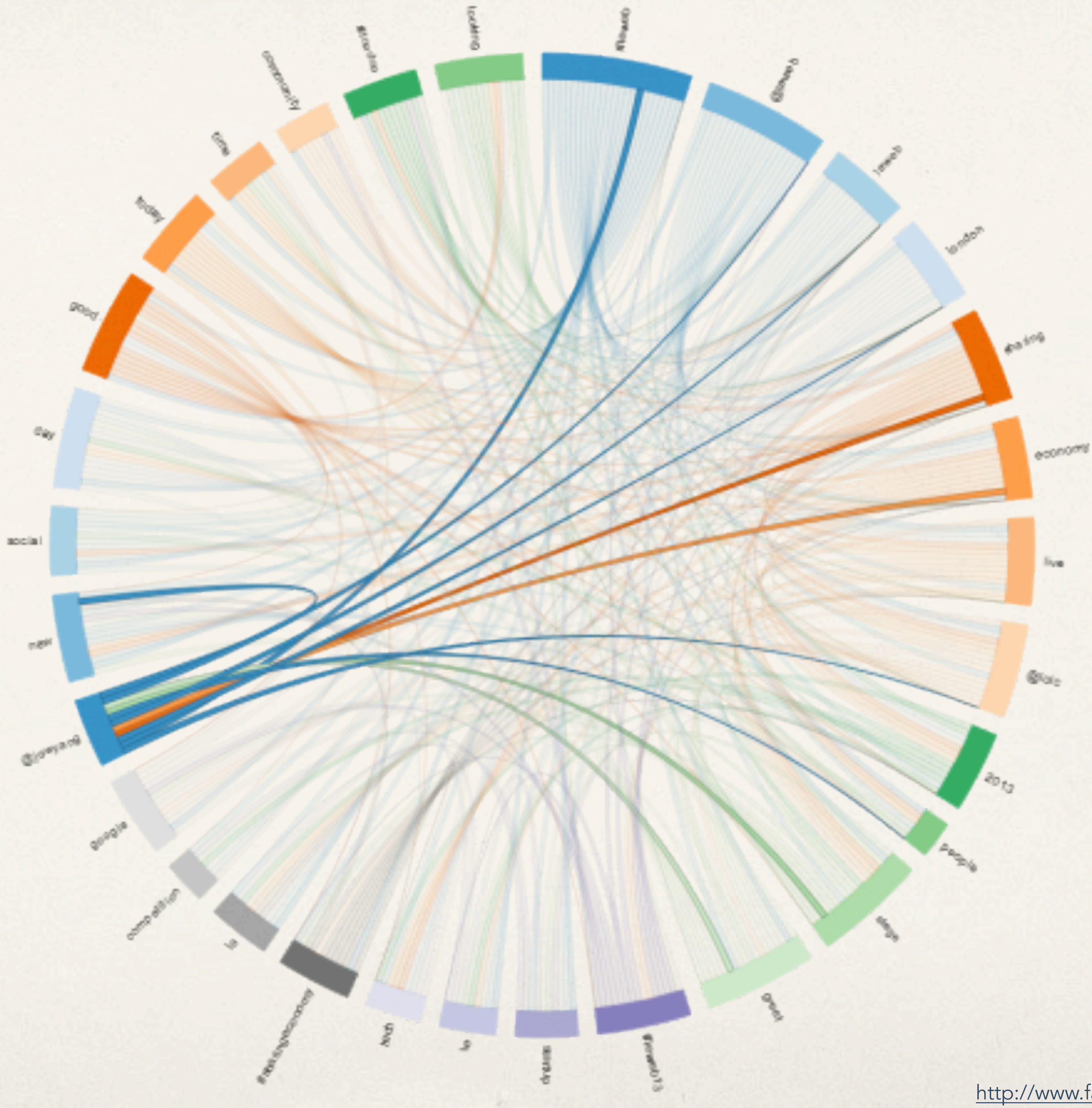
http://www.perceptualedge.com/blog/?p=680

Circular graph + hierarchical edge bundling



http://mbostock.github.io/d3/talk/20111116/bundle.html

Chord diagram

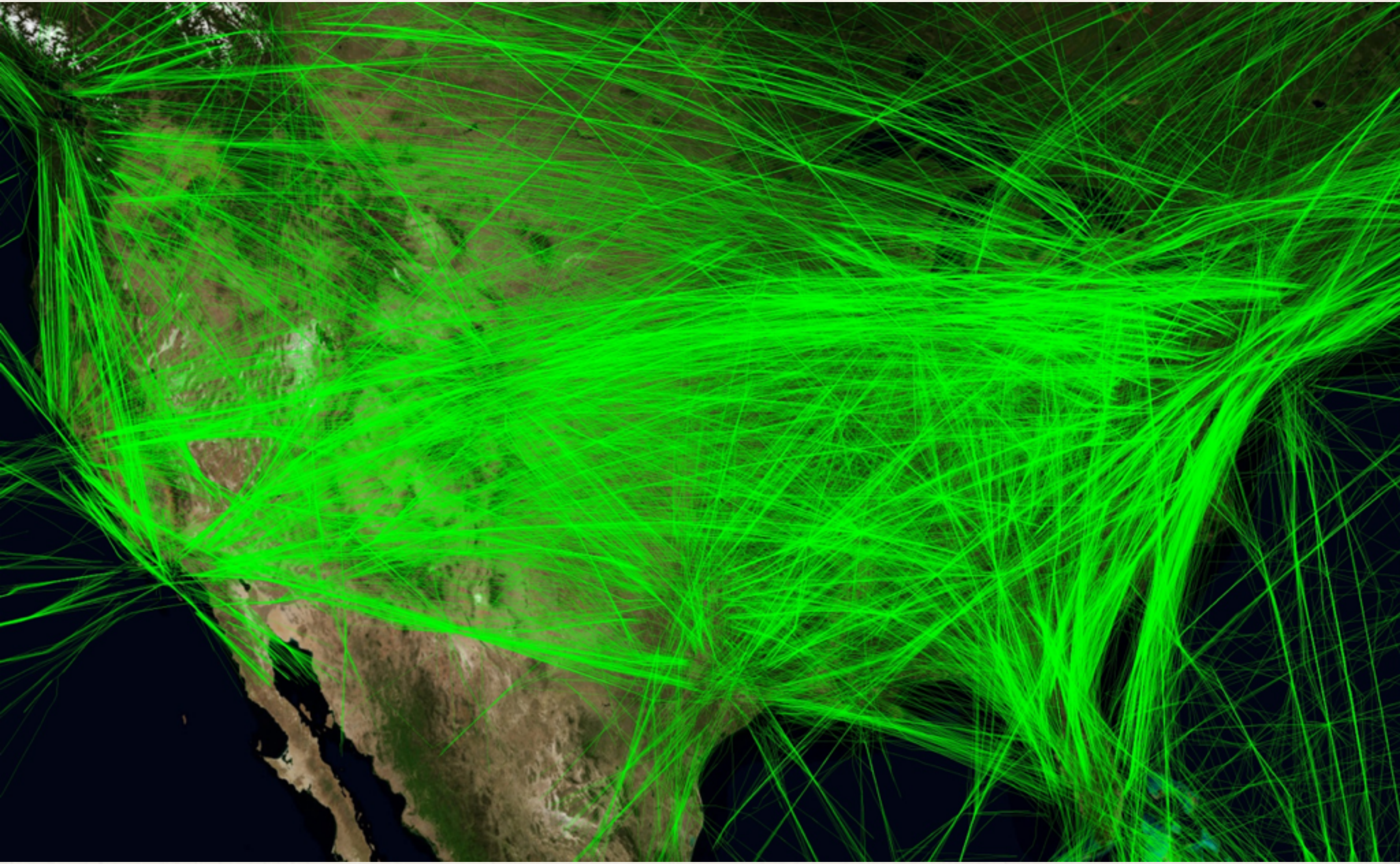


http://www.facegroup.com/tag/influencers

http://bost.ocks.org/mike/uberdata/

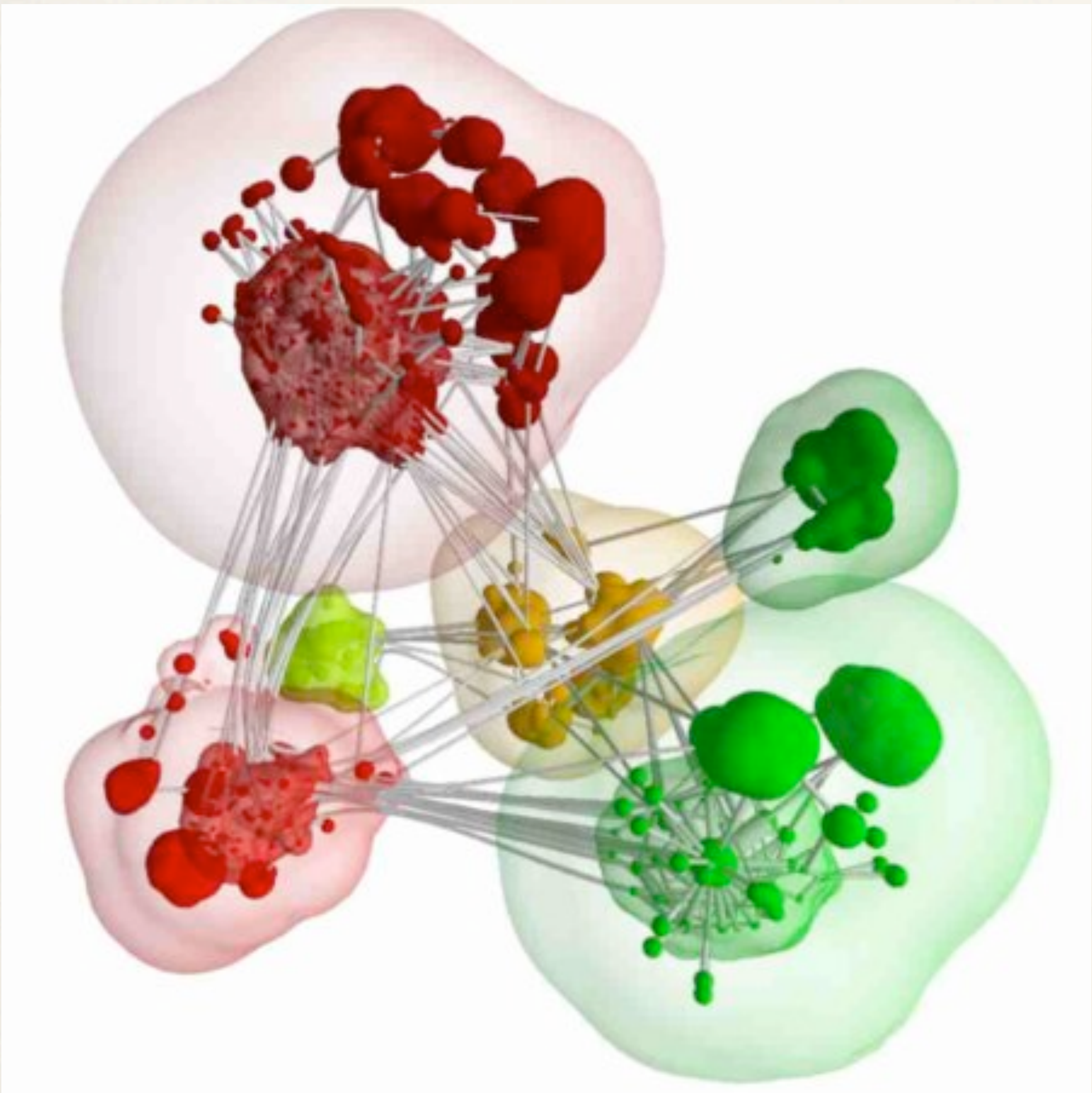
Source: Uber Blog.

Geographic

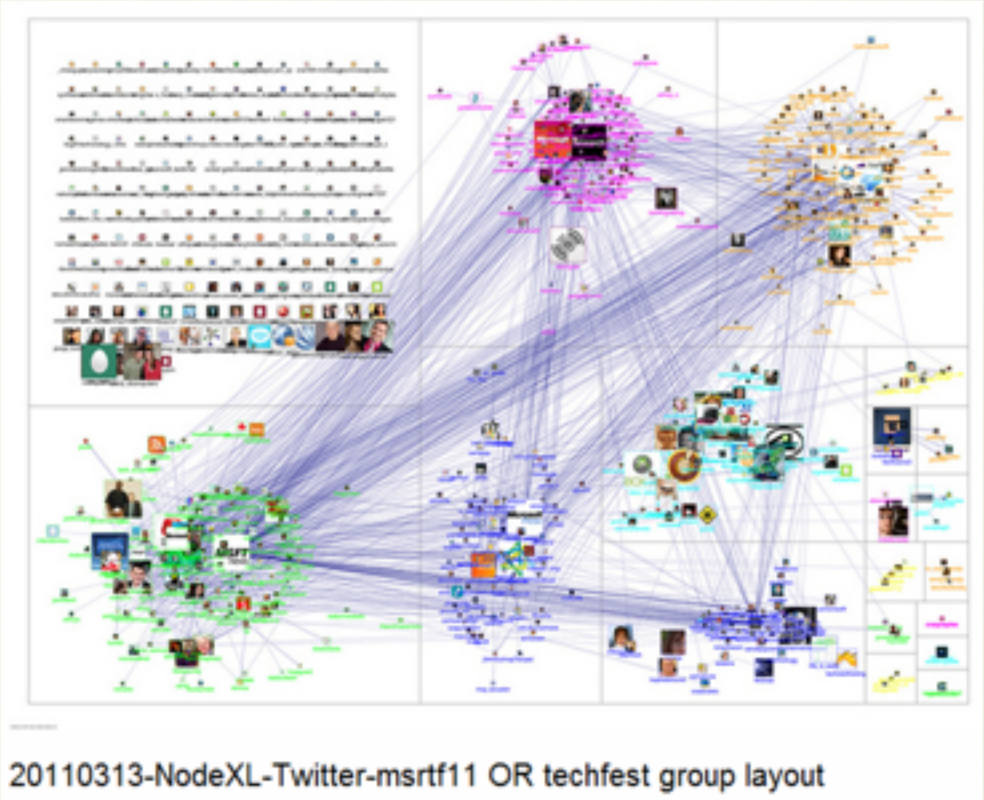


https://www.metabunk.org/threads/visualizing-flight-paths-above-30-000-feet.812/

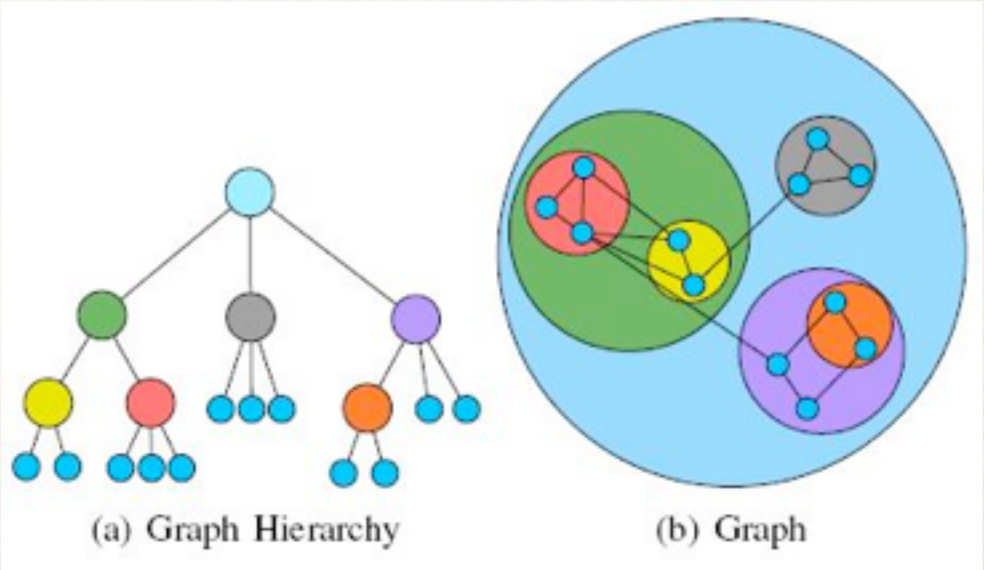
Clustered graph layout



Balzer and Deussen, "Level of Detail Visualization of Clustered Graph Layouts"

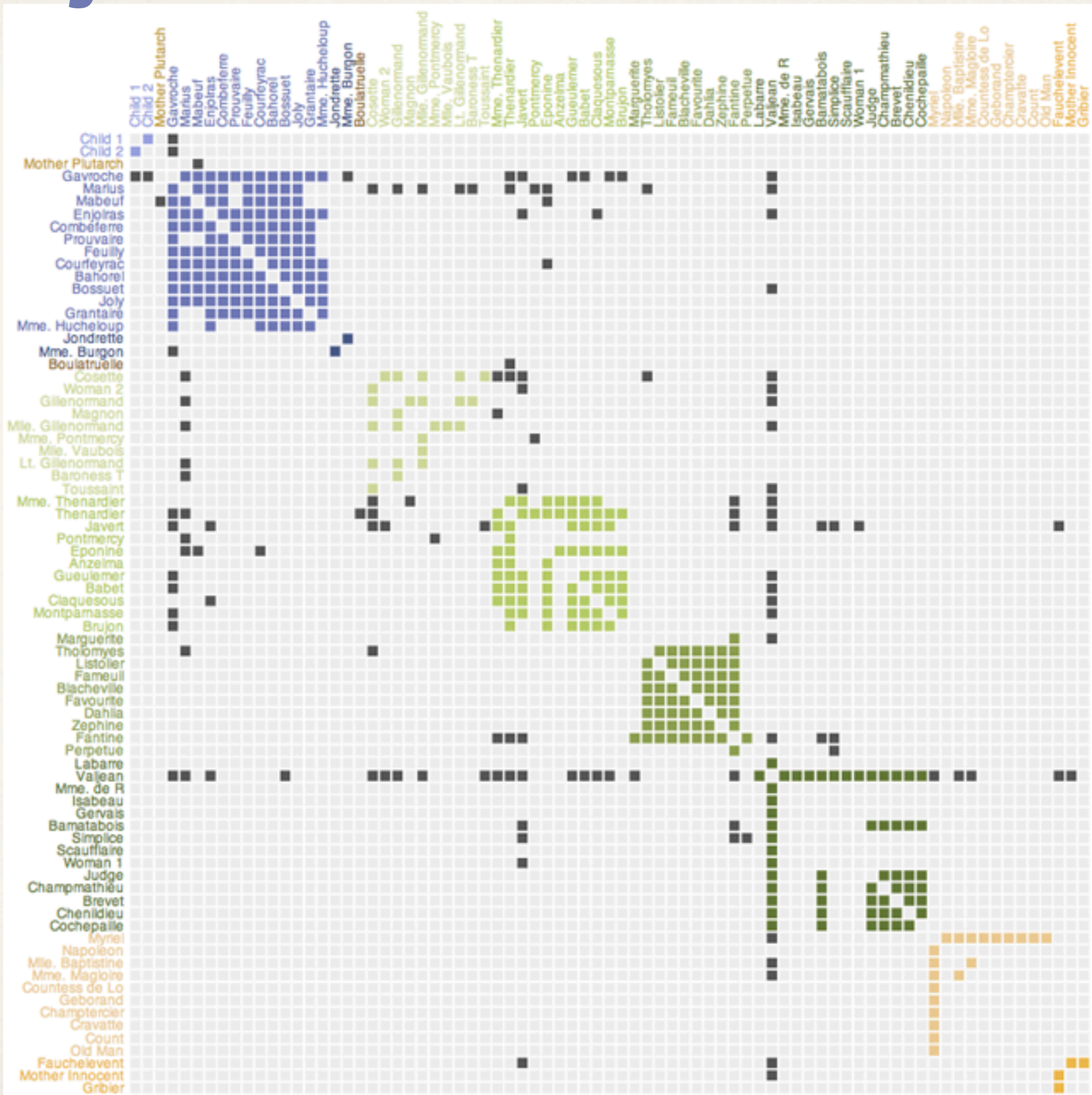


http://research.microsoft.com/en-us/projects/nodexl/



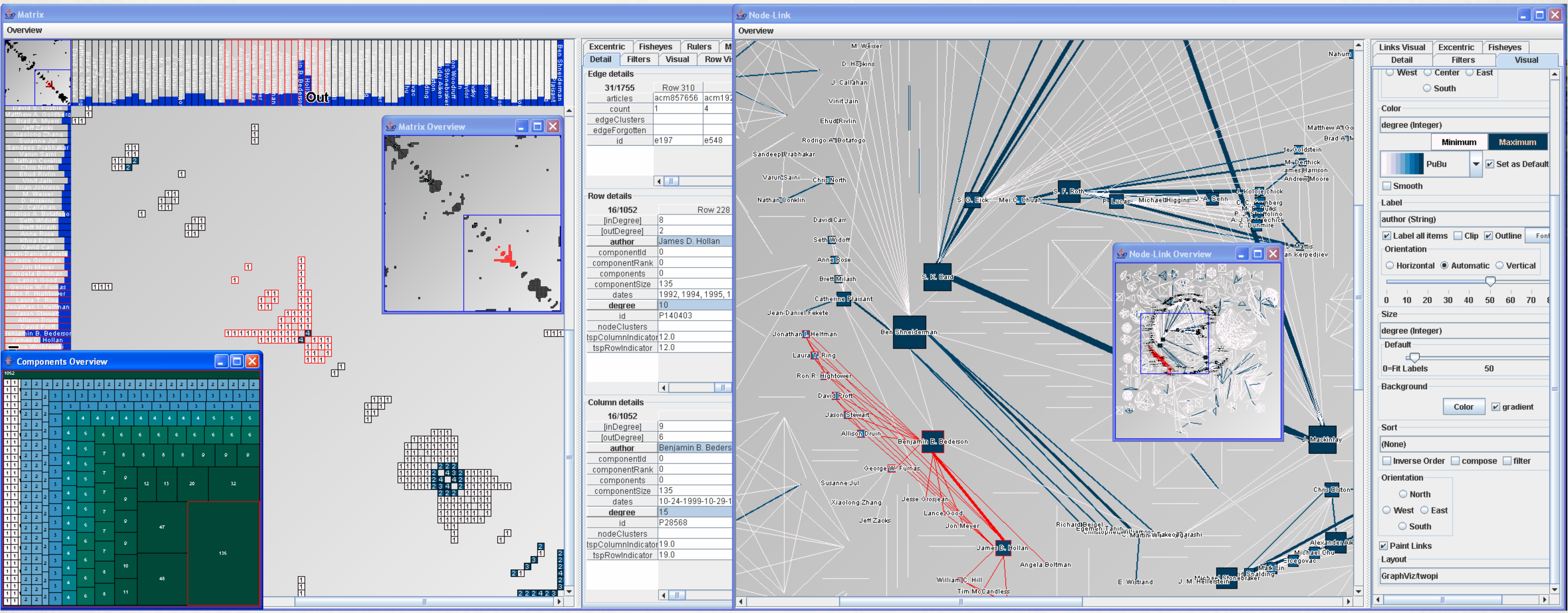
http://www.personal.psu.edu/lug129/blogs/serendipity/graph-drawing/

Adjacency matrix



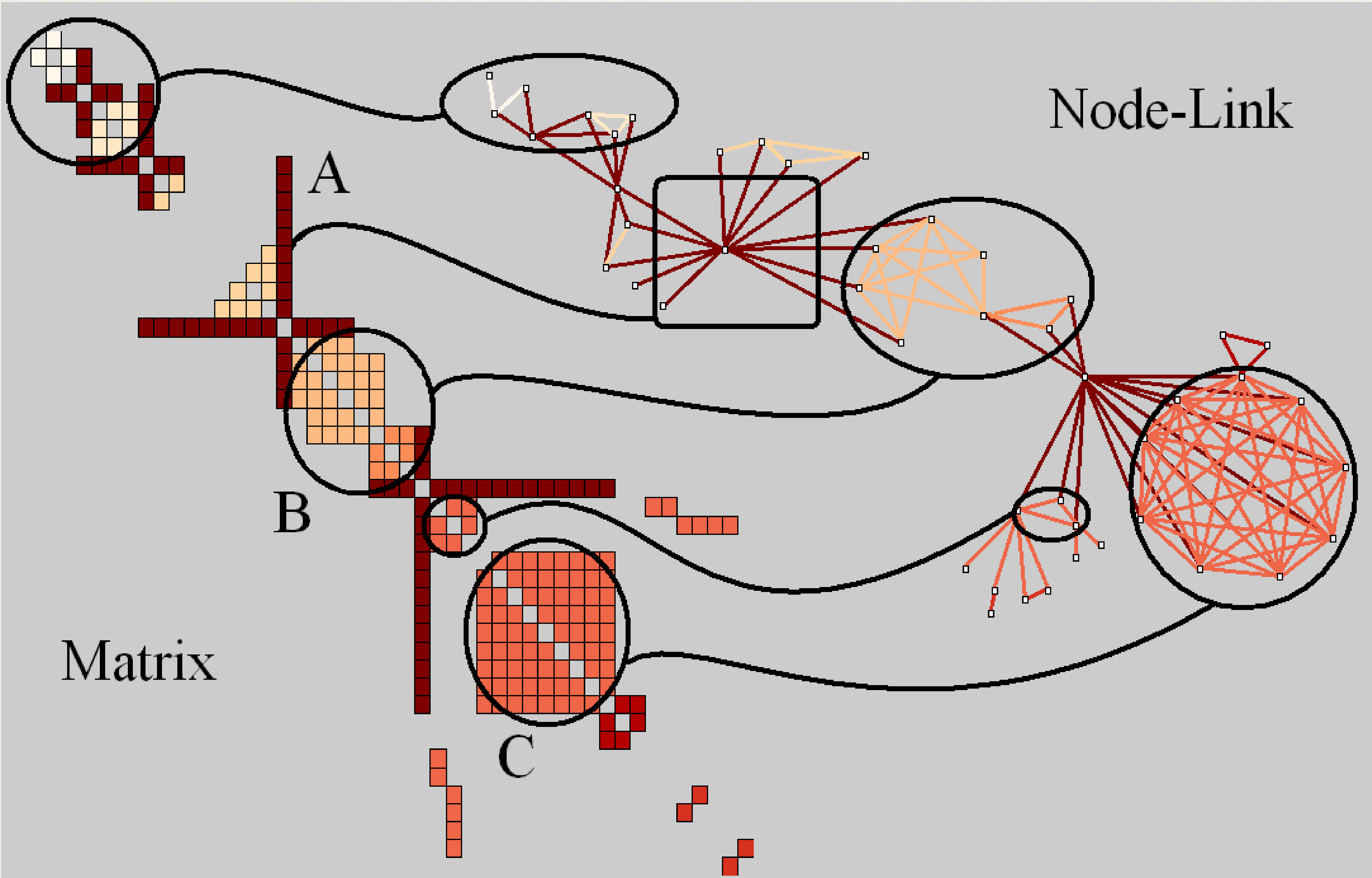
http://hci.stanford.edu/jheer/files/zoo/

MatrixExplorer



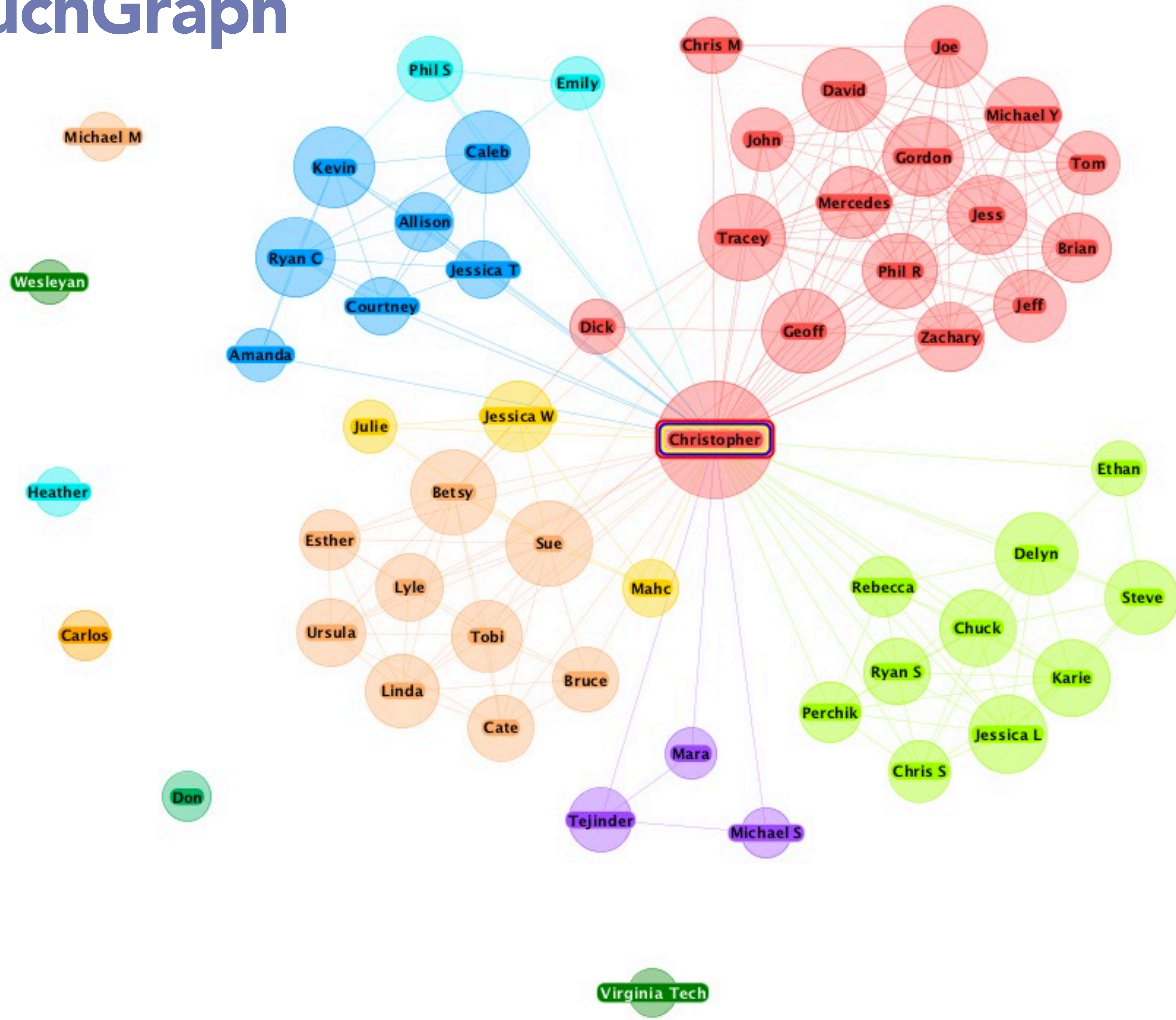
Henry and Fekete, "MatrixExplorer: a Dual-Representation System to Explore Social Networks"

MatrixExplorer



Henry and Fekete, "MatrixExplorer: a Dual-Representation System to Explore Social Networks"

TouchGraph



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Kevin
Allison
Ryan C
Jessica T
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Courtney
Amanda
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Betsy
Esther
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Delyn
Lyle
Mahc
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Steve
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Ursula
Tobi
Carlos
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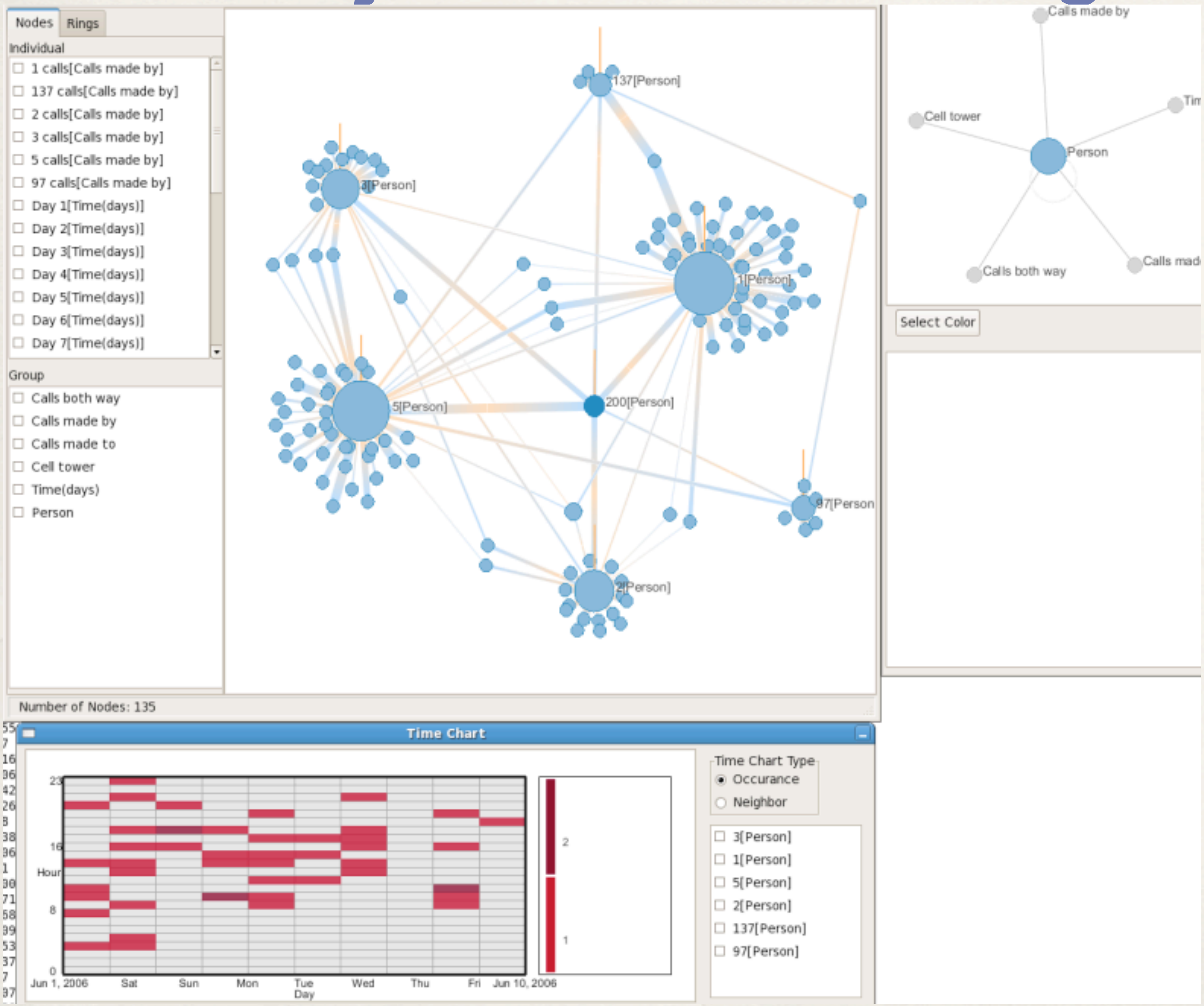
Tejinder
Michael S
Virginia Tech

Case Study: VAST 2008 Challenge

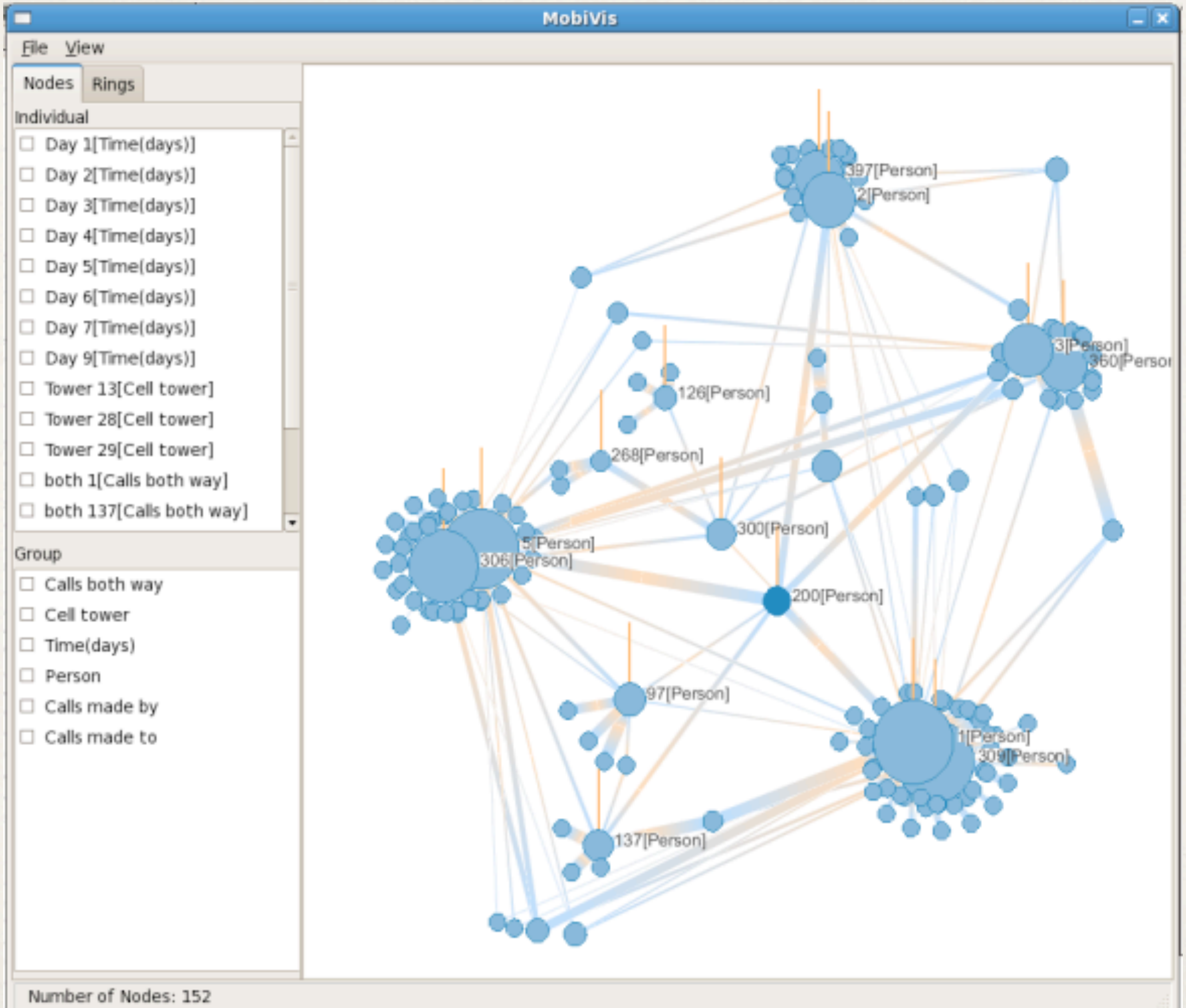


Correa et al.

Case Study: VAST 2008 Challenge

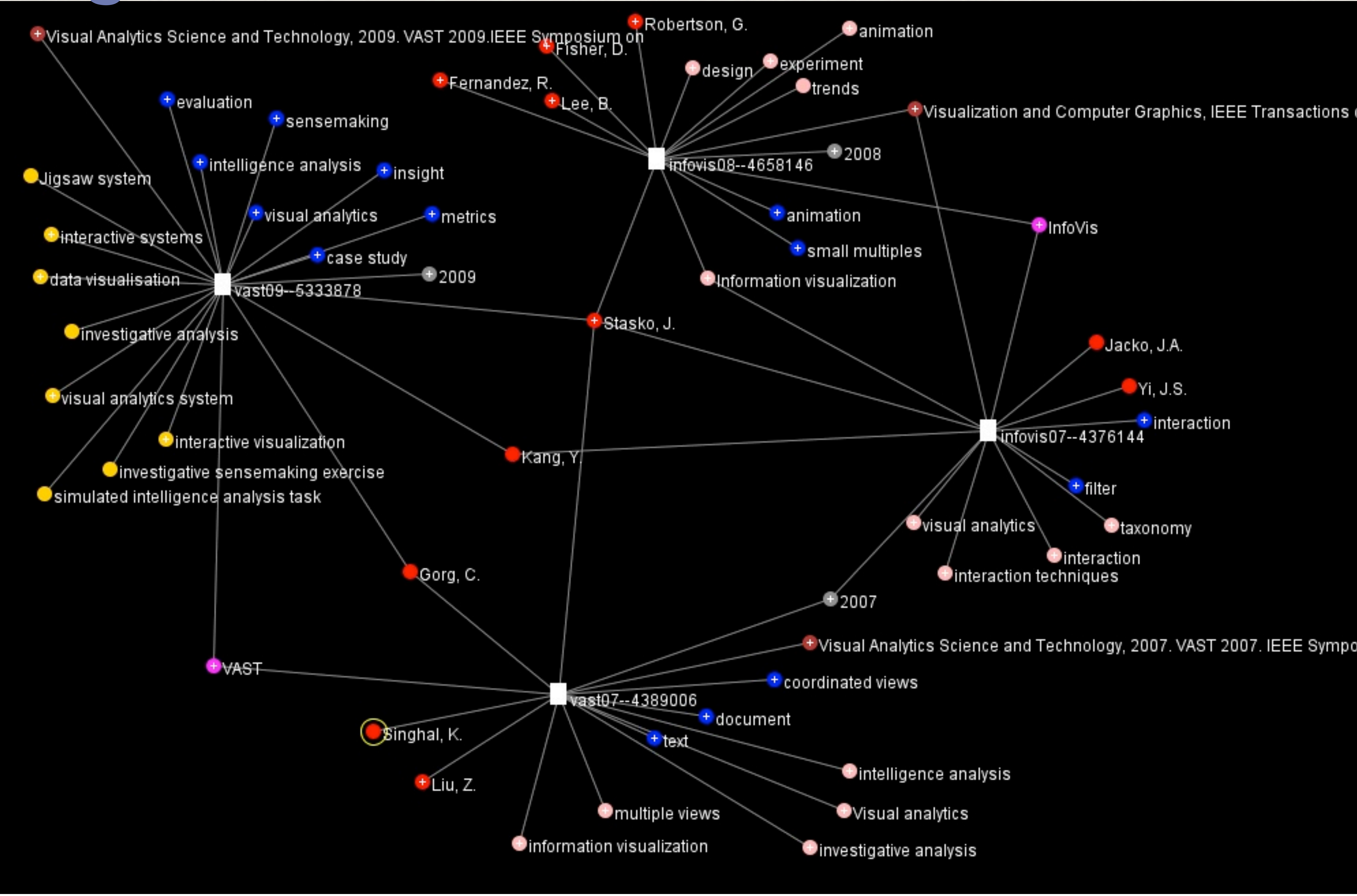
Correa et al.

Case Study: VAST 2008 Challenge



Correa et al.

Jigsaw



Visual Analytics Science and Technology, 2009. VAST 2009.IEEE Symposium on
Robertson, G.
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animation
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Visualization and Computer Graphics, IEEE Transactions
evaluation
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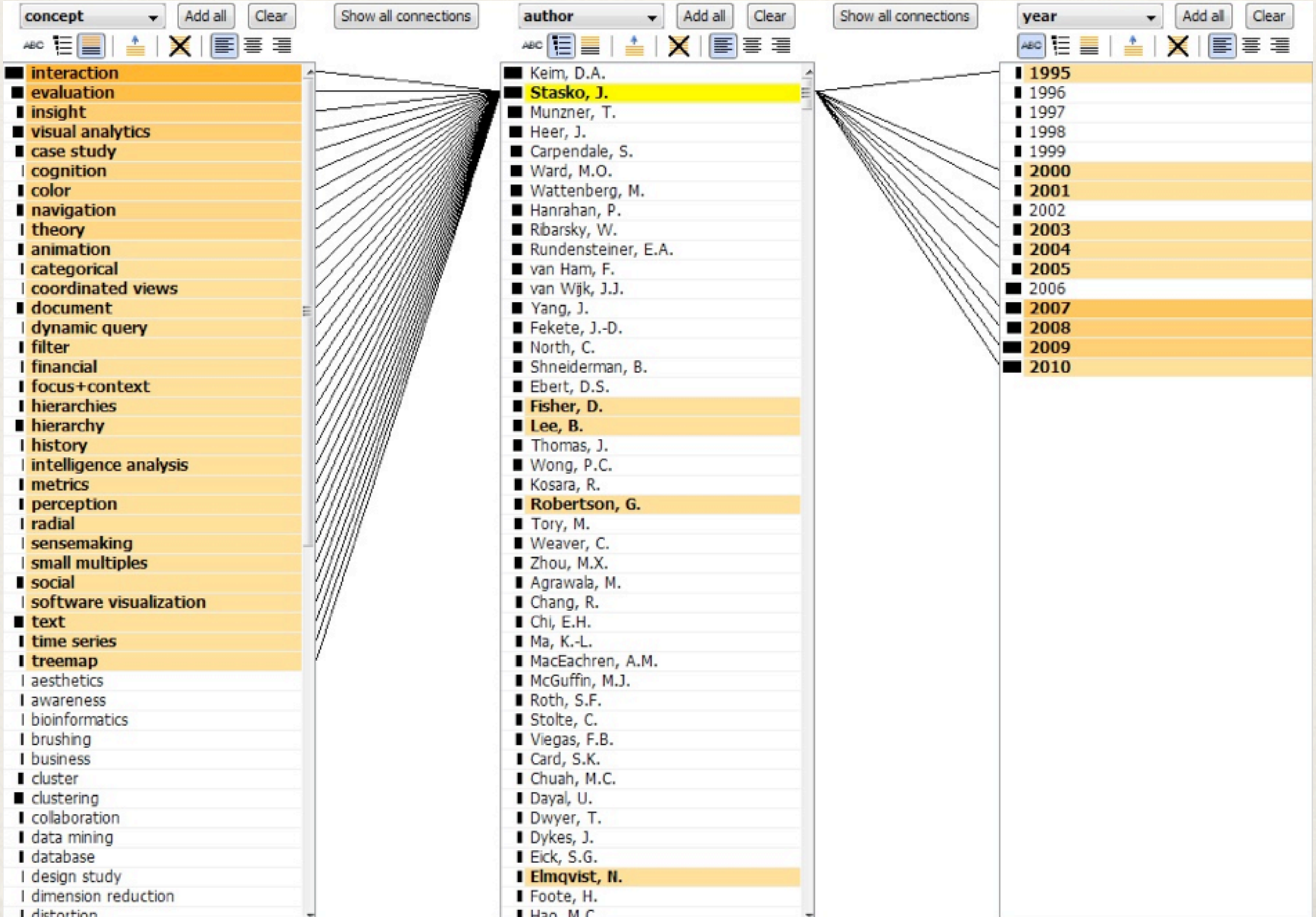
Jigsaw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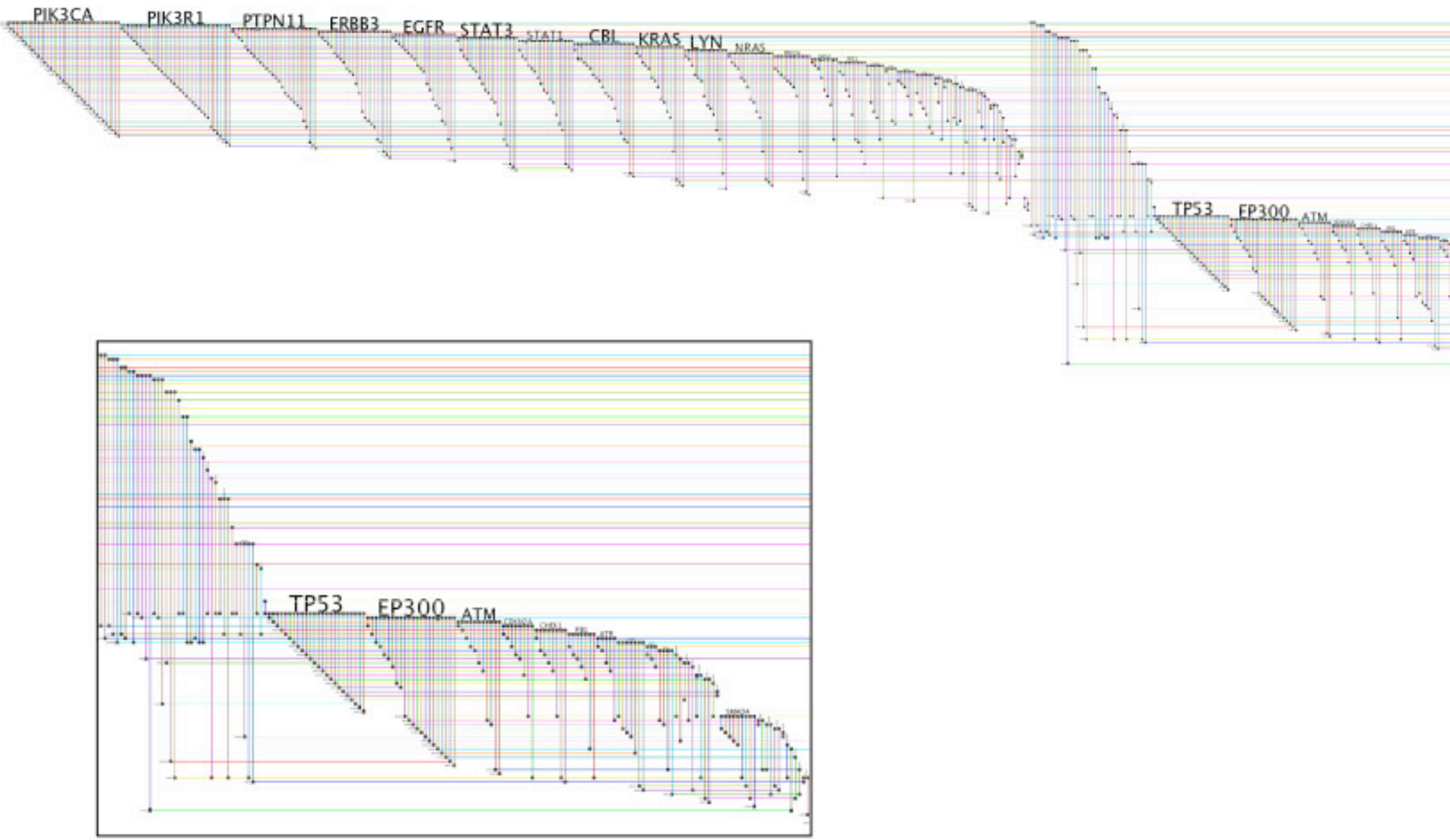
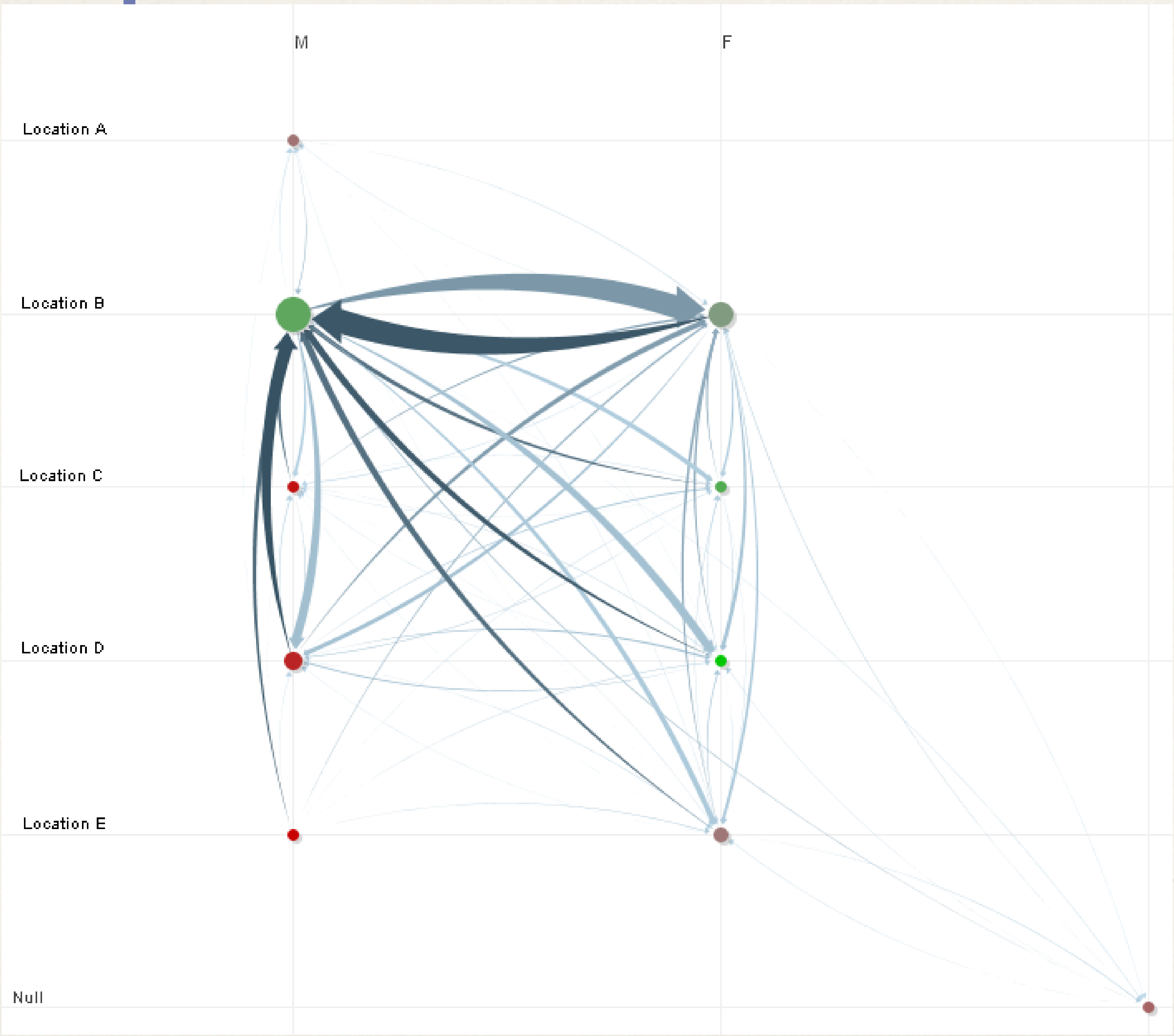
Biofabric



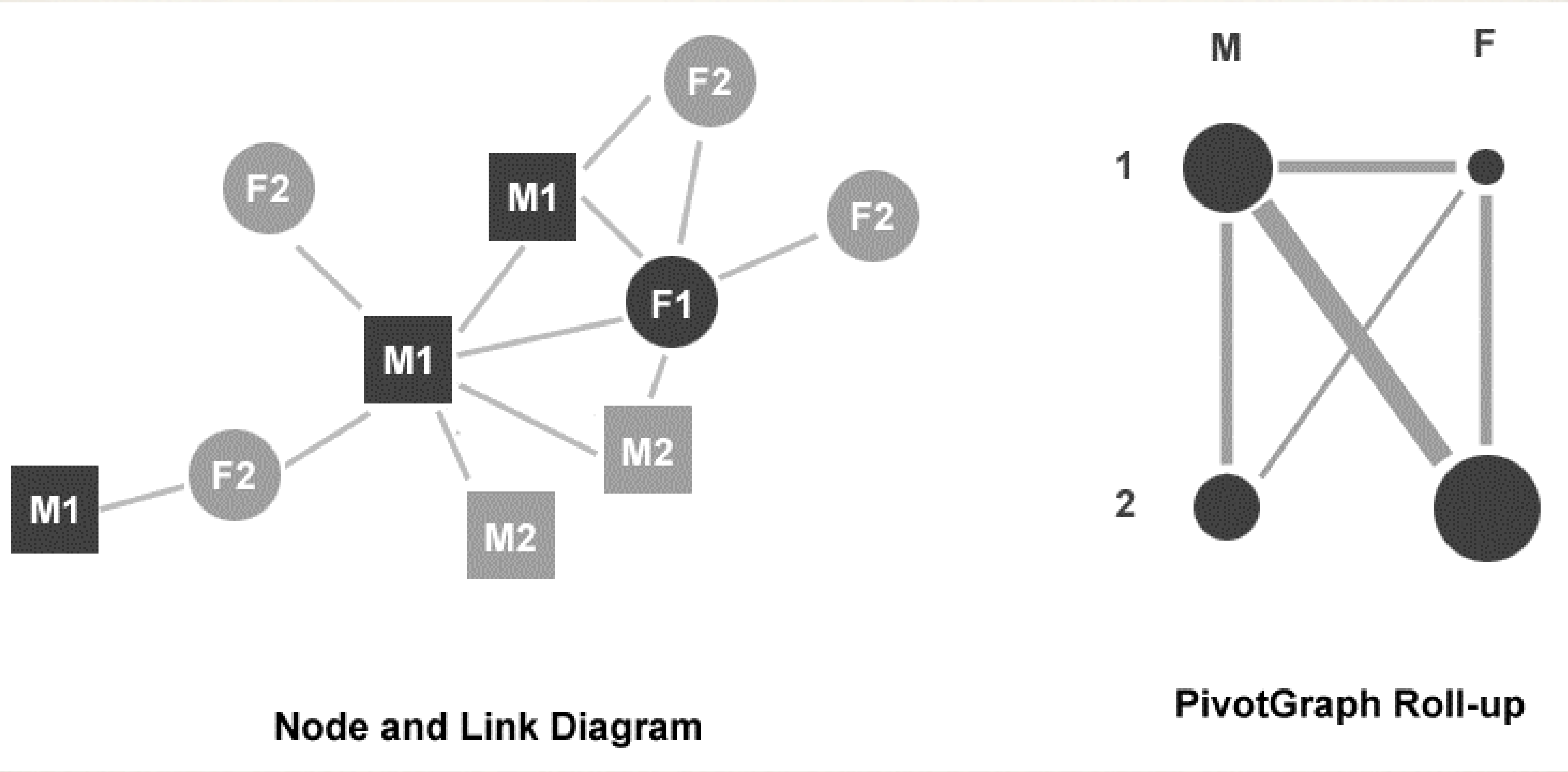
Longabaugh, "Combing the hairball with BioFabric: a new approach for visualization of large networks"

PivotGraph



Wattenberg, "Visual Exploration of Multivariate Graphs"

PivotGraph



Wattenberg, "Visual Exploration of Multivariate Graphs"

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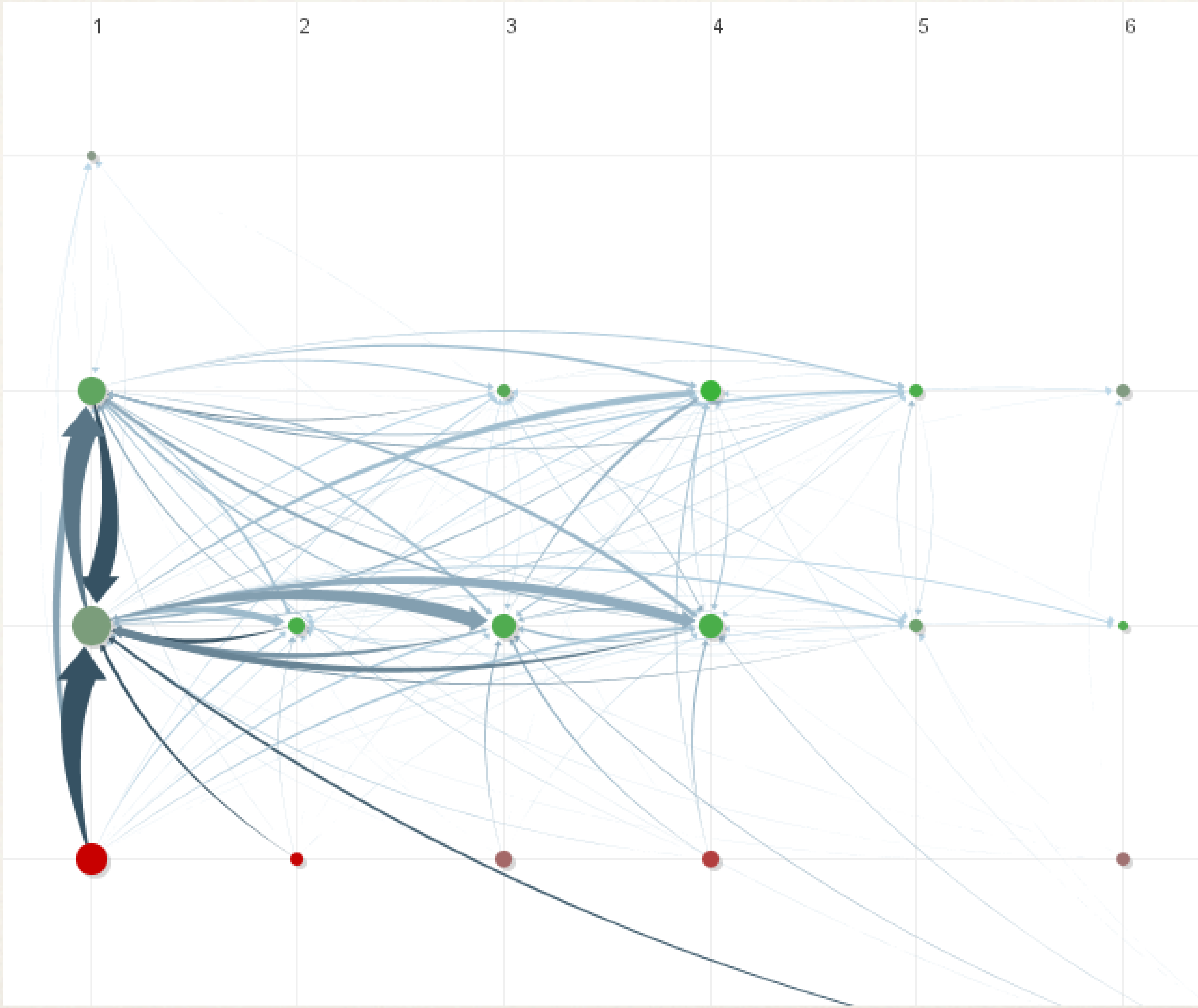

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