

Graph visualization in d3.js

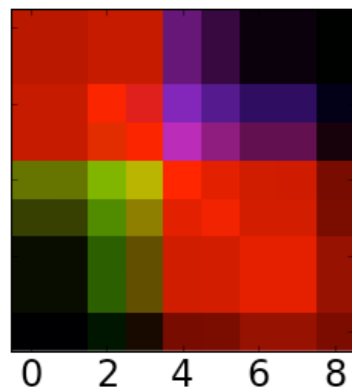
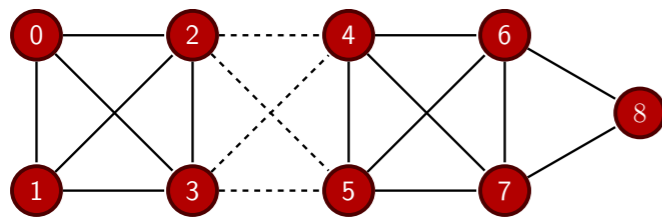
Piotr Migdał

`d3.bayarea().meetup().date('30-09-2013')`

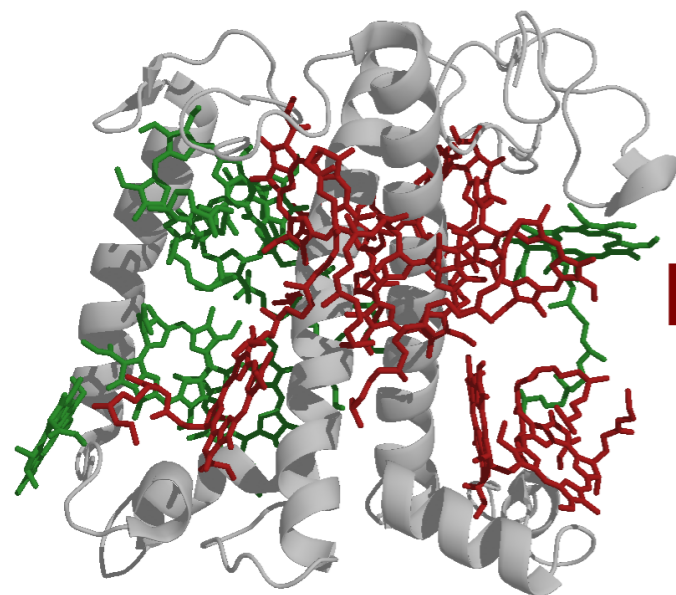
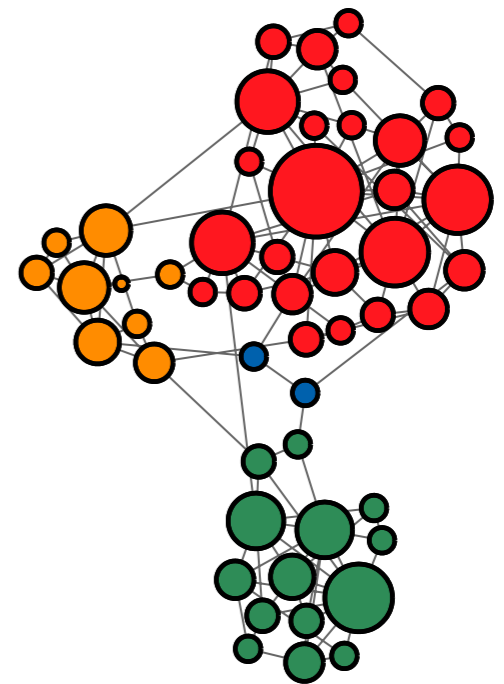


COMPASS

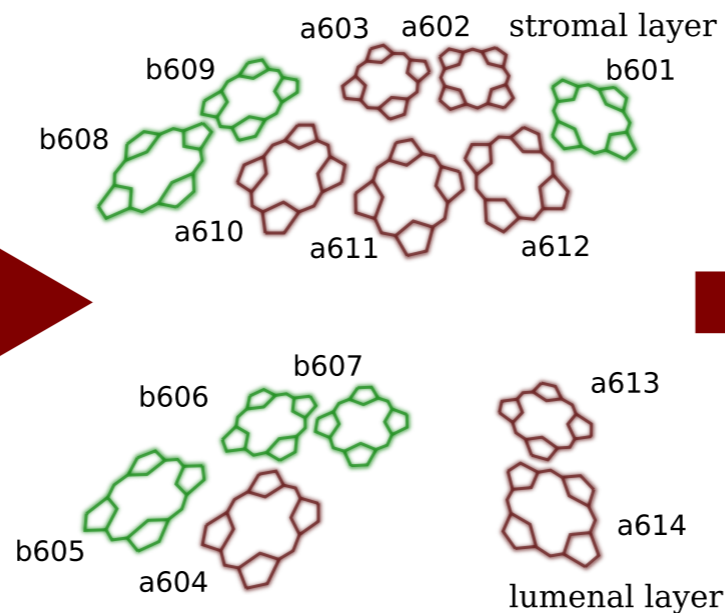
at my PhD...



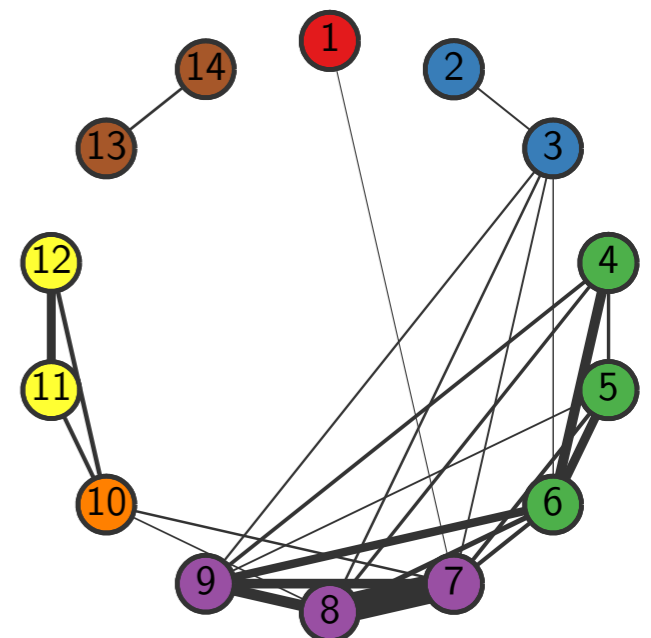
quantum community detection



Functional
Representation



Network
Representation



now a data science intern at:

C  MPASS

(here!)



Graphs in d3.js | 01

```
<!DOCTYPE html>
<meta charset="utf-8">
<style>

.node {
  stroke: #fff;
  stroke-width: 1.5px;
}

.link {
  stroke: #999;
  stroke-opacity: .6;
}

</style>
<body>
```

```
<script src="http://d3js.org/d3.v3.min.js"></script>
<script>

var width = 960,
    height = 500;

var color = d3.scale.category20();

var force = d3.layout.force()
  .charge(-120)
  .linkDistance(30)
  .size([width, height]);

var svg = d3.select("body").append("svg")
  .attr("width", width)
  .attr("height", height);

d3.json("miserables.json", function(error, graph) {
  force
    .nodes(graph.nodes)
    .links(graph.links)
    .start();

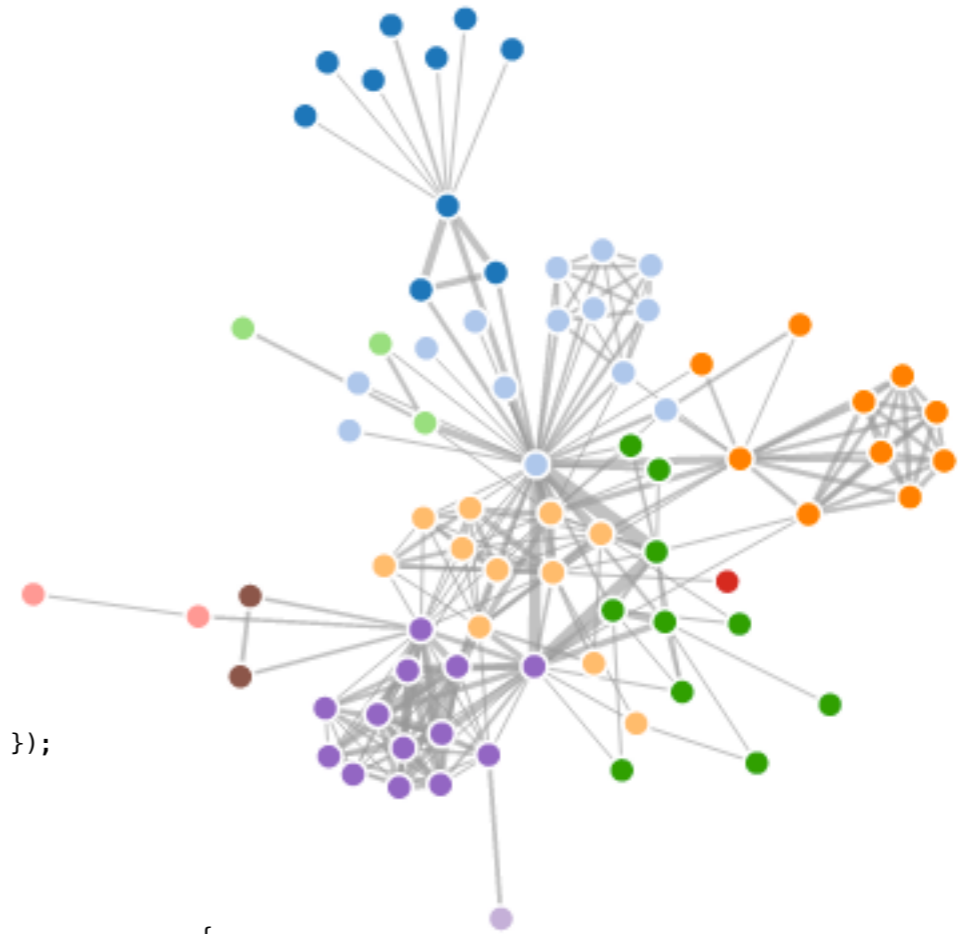
  var link = svg.selectAll(".link")
    .data(graph.links)
    .enter().append("line")
    .attr("class", "link")
    .style("stroke-width", function(d) { return Math.sqrt(d.value); });

  var node = svg.selectAll(".node")
    .data(graph.nodes)
    .enter().append("circle")
    .attr("class", "node")
    .attr("r", 5)
    .style("fill", function(d) { return color(d.group); })
    .call(force.drag);

  node.append("title")
    .text(function(d) { return d.name; });

  force.on("tick", function() {
    link.attr("x1", function(d) { return d.source.x; })
      .attr("y1", function(d) { return d.source.y; })
      .attr("x2", function(d) { return d.target.x; })
      .attr("y2", function(d) { return d.target.y; });

    node.attr("cx", function(d) { return d.x; })
      .attr("cy", function(d) { return d.y; });
  });
});
</script>
```



```
{
  "nodes": [
    {"name": "Myriel", "group": 1},
    {"name": "Labarre", "group": 2},
    {"name": "Valjean", "group": 2},
    {"name": "Marguerite", "group": 3},
    ...
  ],
  "links": [
    {"source": 1, "target": 0, "value": 1},
    {"source": 2, "target": 0, "value": 8},
    {"source": 3, "target": 0, "value": 10},
    {"source": 3, "target": 2, "value": 6},
    ...
  ]
}
```

<http://bl.ocks.org/mbostock/4062045>

Why?
What?
How?

Size (and force)

- Constant
- Area = counts
- Selected...

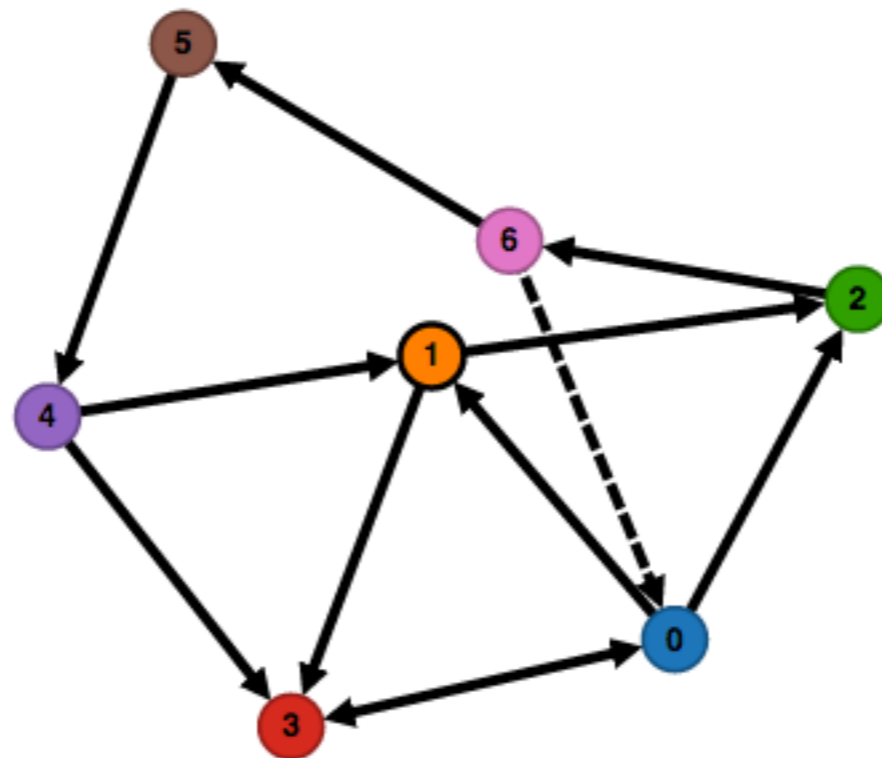
nodes

```
.attr("r", function (d) {  
    return Math.sqrt(d.count);  
});
```

force

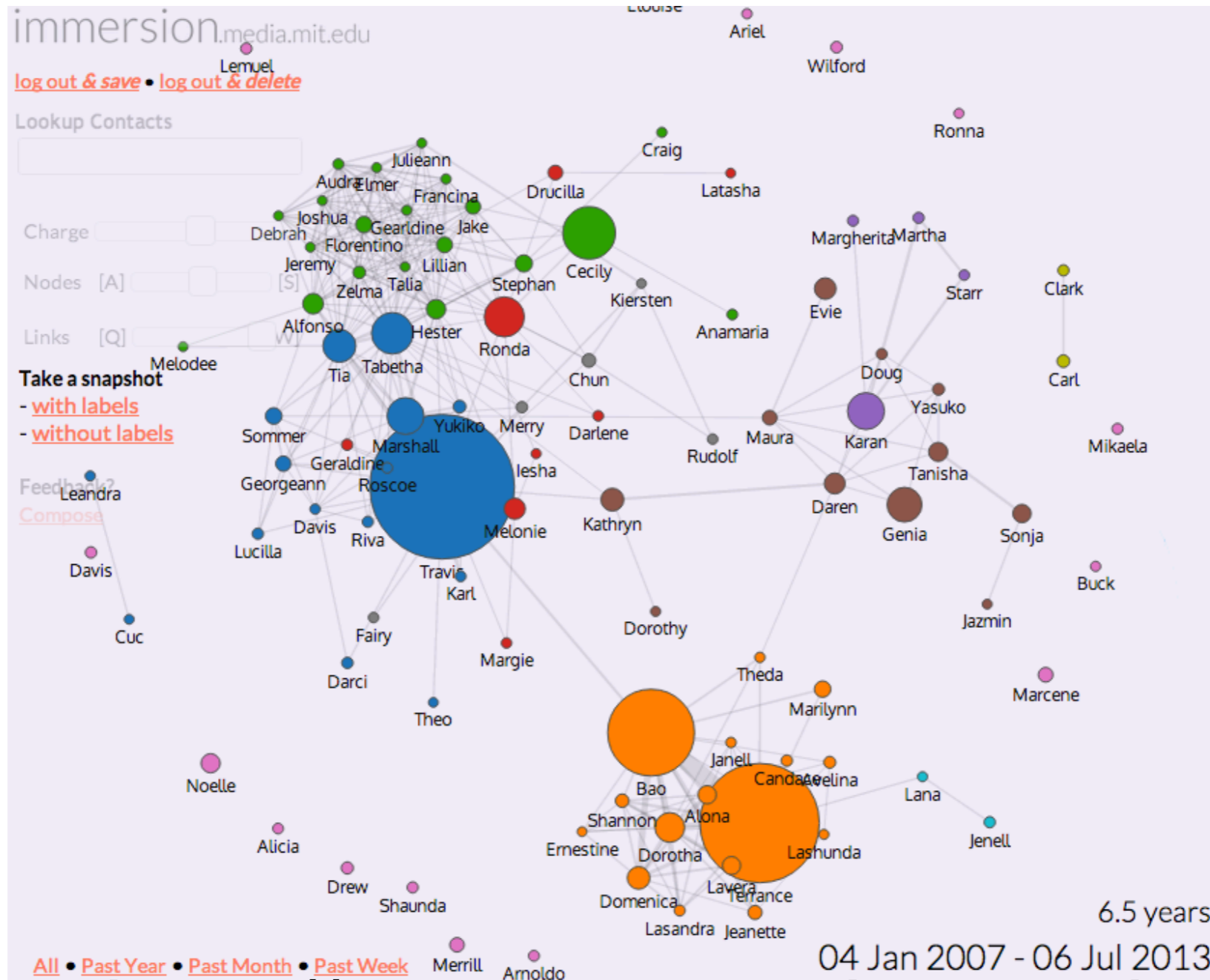
```
.charge(function (d) {  
    return - Math.sqrt(d.count);  
});
```

Color for: every node



<http://bl.ocks.org/rkirsling/5001347>

Color for: community



<https://immersion.media.mit.edu>

nice introduction to community detection:

<http://digitalinterface.blogspot.it/2013/05/community-detection-in-graphs.html>

Color for: distance

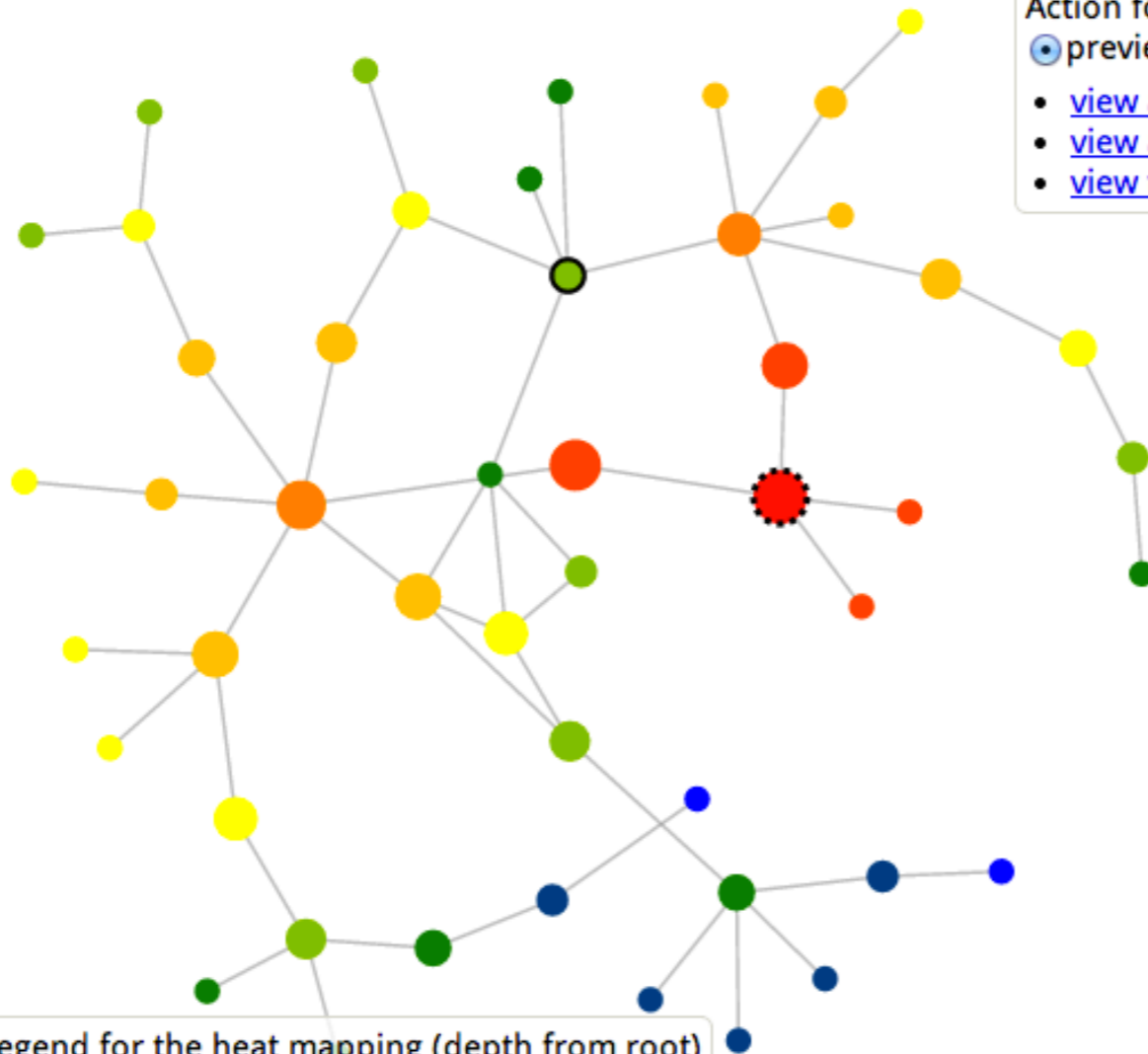
Use the mouse, Luke

Tag 01J8 ([show tag](#), [view clustered](#), [view collapsible](#))

Action for tooltip:

☒ preview tag ☐ only tag information ☐ none

- [view as heatmap \(depth\)](#)
- [view as heatmap \(height\)](#)
- [view types](#)



Legend for the heat mapping (depth from root)

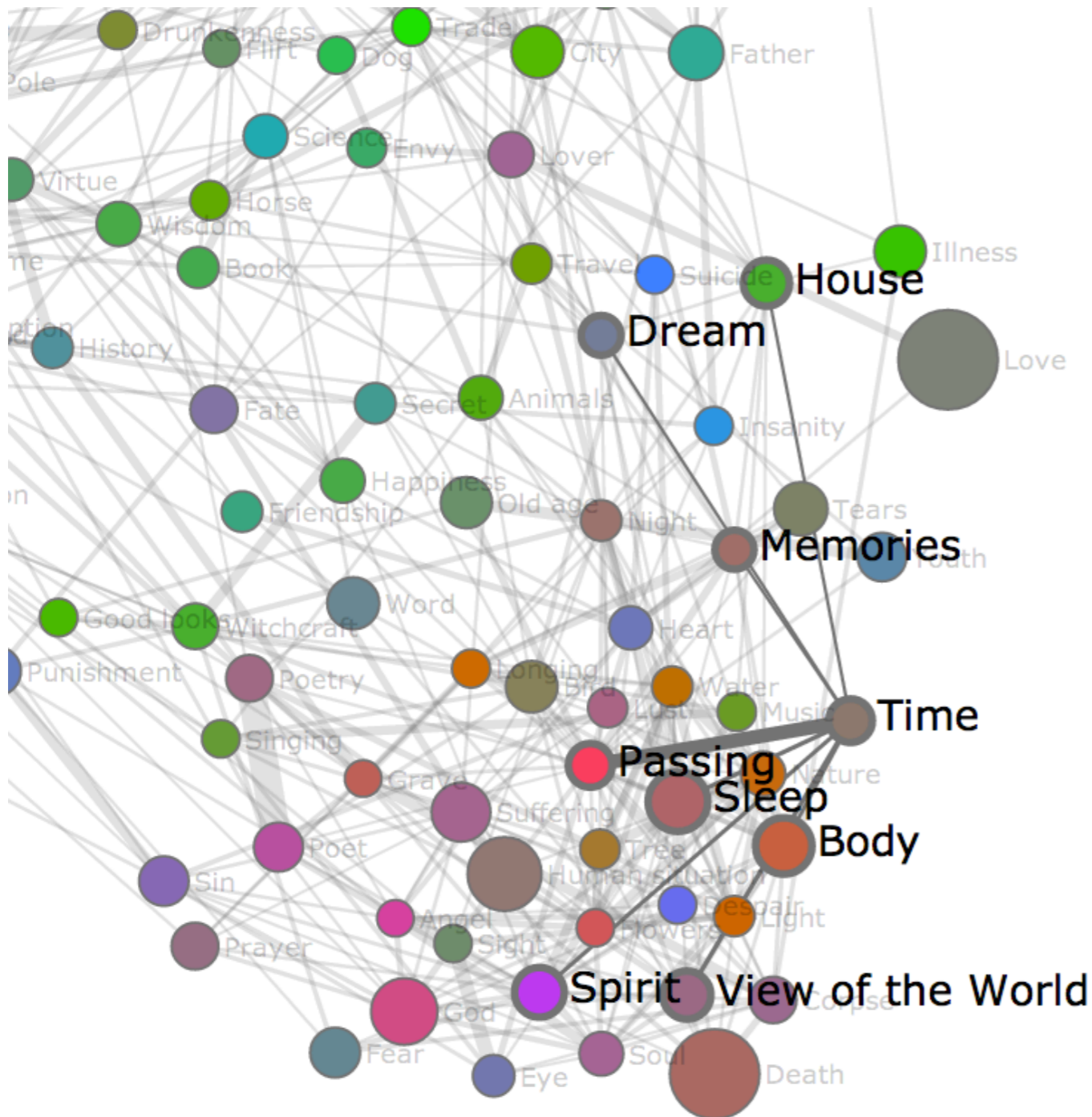
root node ● ● ● ● ● ● children

○ this tag has a name

⊙ root

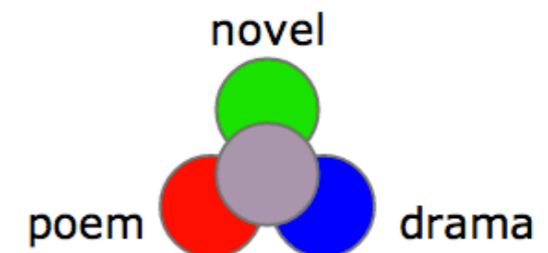
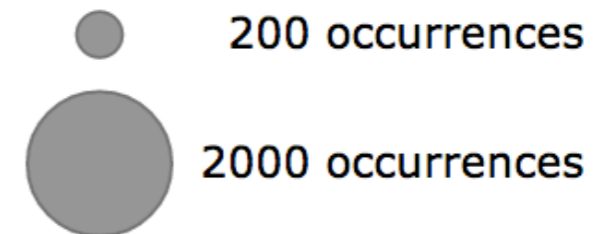
<http://stacks.math.columbia.edu/tag/01J8/graph/force>

Color for: node properties

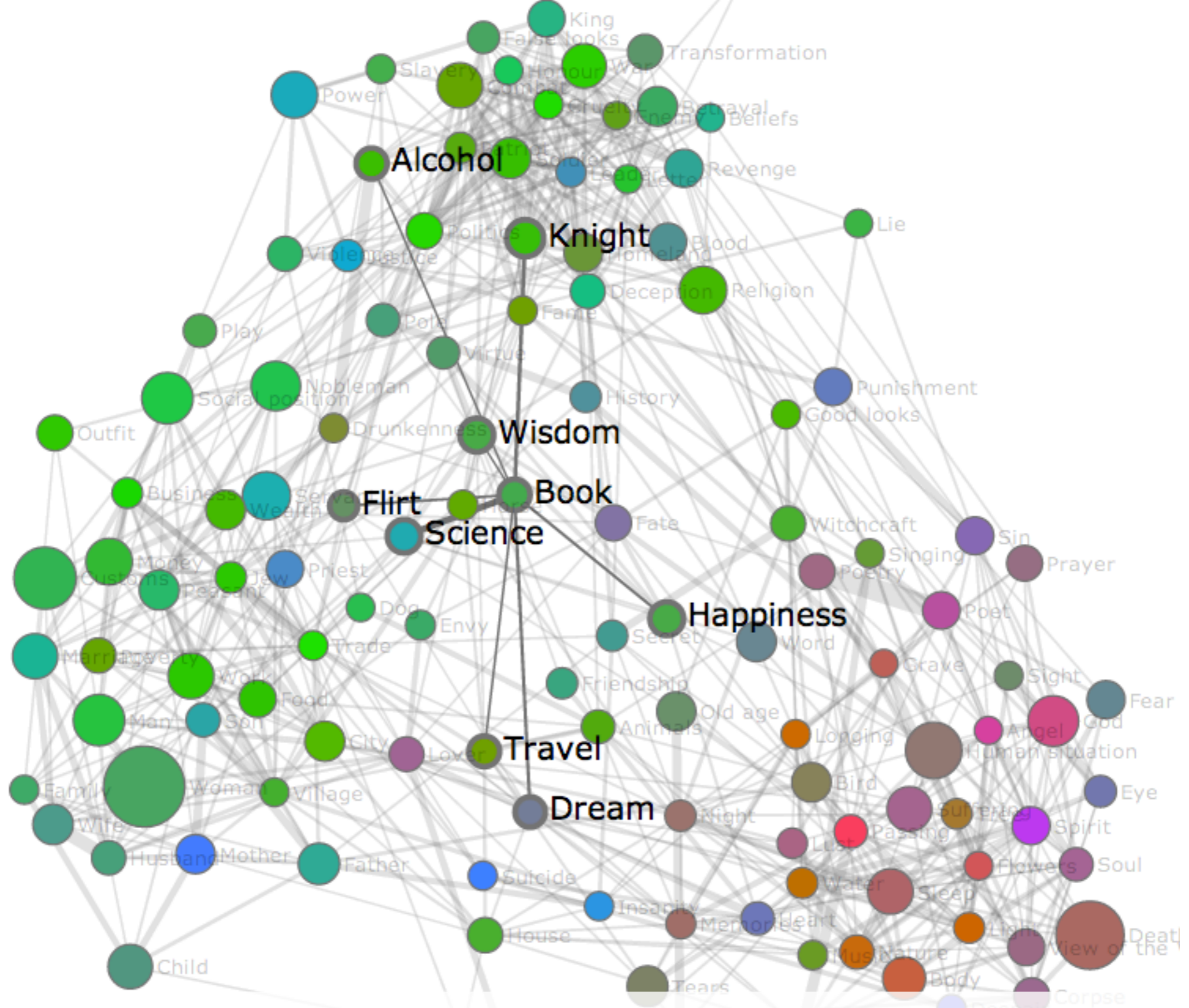


link = frequent co-occurrence

double click to open a theme



CC BY Piotr Migdał (2013)

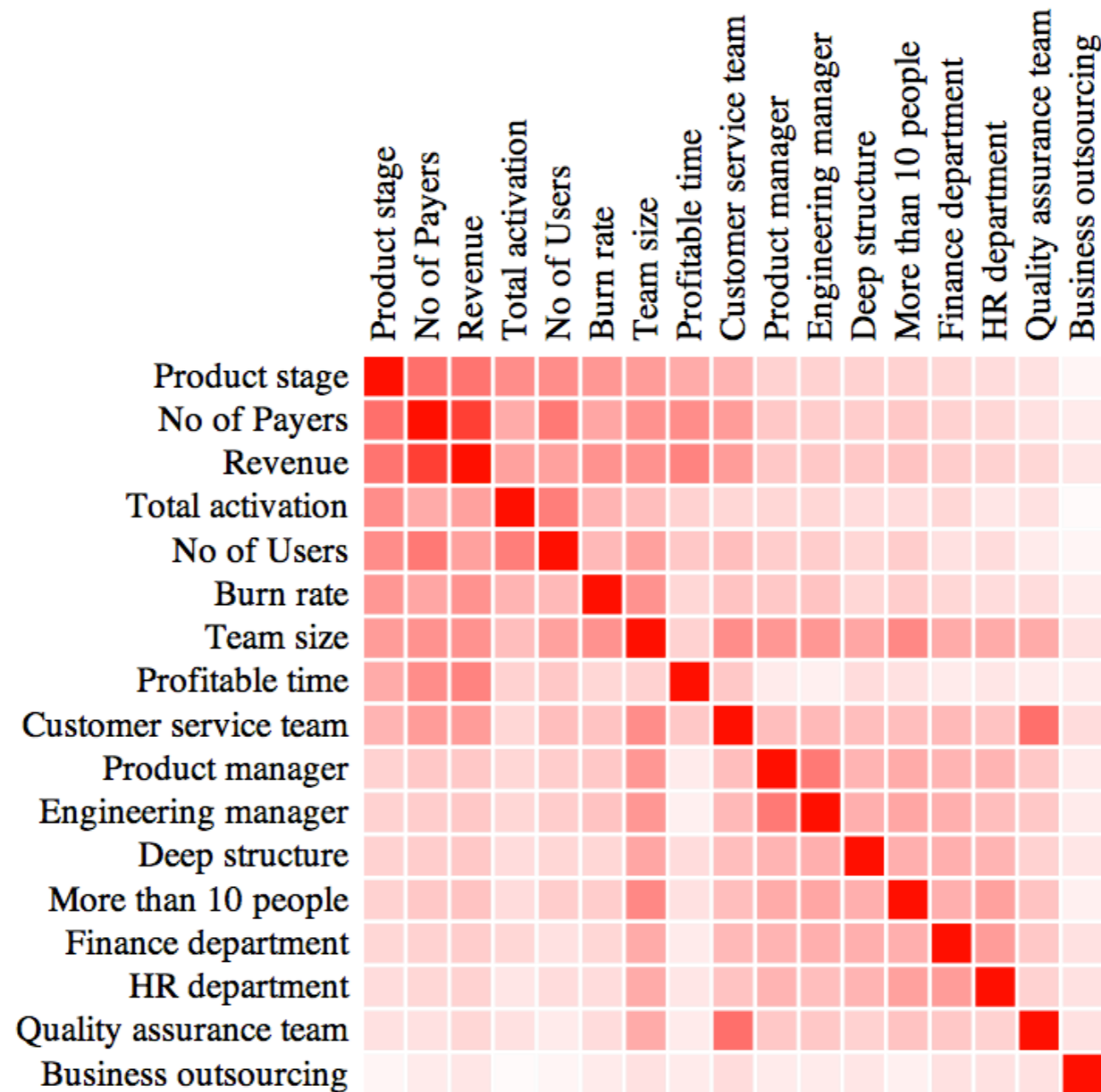


[http://stared.github.io/wizualizacja-wolnych-lektur/
polish_books_themes.html](http://stared.github.io/wizualizacja-wolnych-lektur/polish_books_themes.html)

And what if graph
structure is less
obvious?

(for example, co-occurrences)

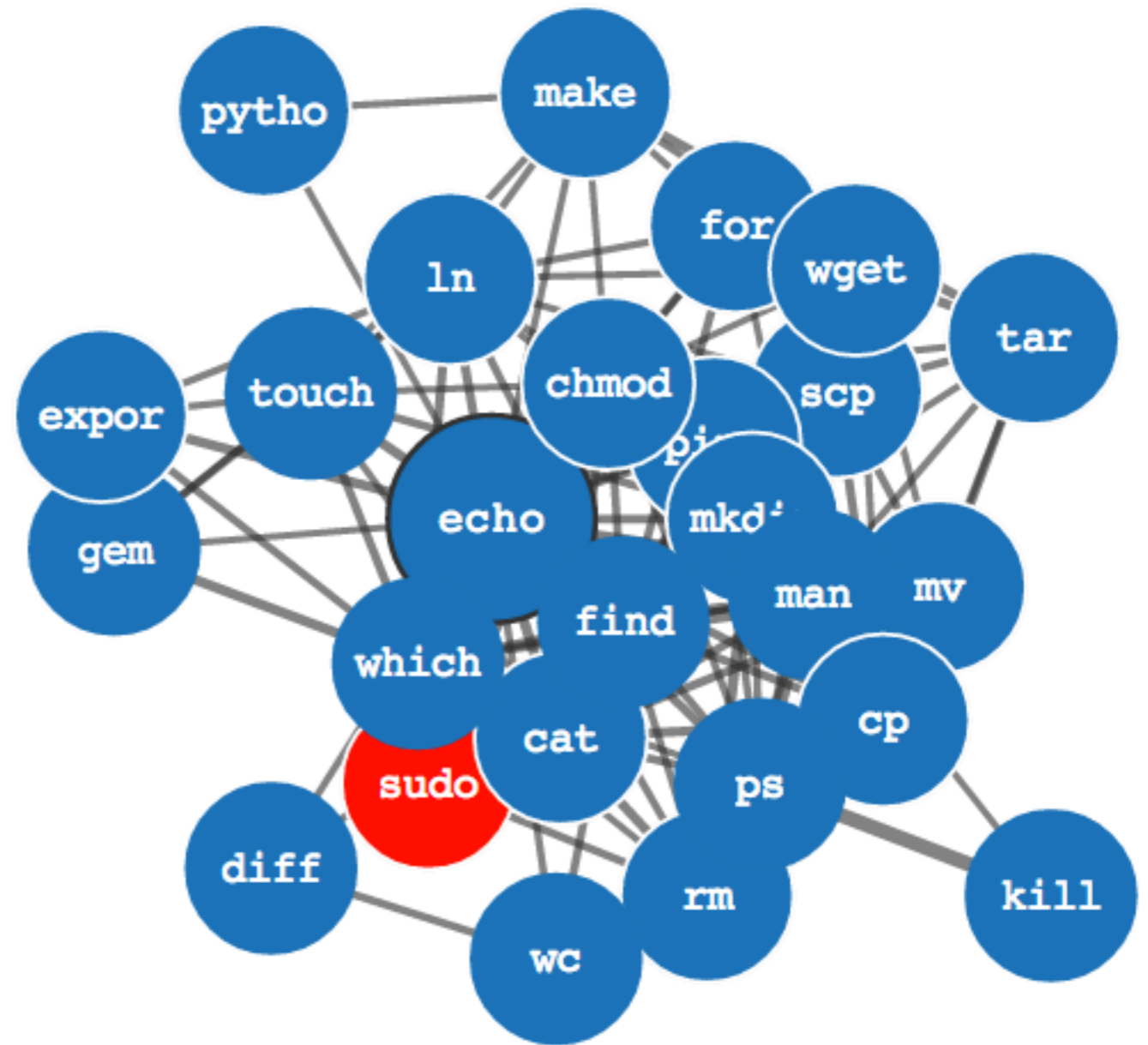
Correlation Explorer



<http://compassinc.github.io/correlation-explorer/>

UNIX command survey

163 git
95 cd
59 ls
49 python
25 pyserv
13 vim
13 ipython
8 up2
8 ipyinline
8 grunt
6 npm
5 pip
5 cp
4 rm
4 mongod
3 mkdir
3 highlight



<http://jvns.ca/projects/unix-command-survey/graph.html>

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- 4 votes

2 answers

80 views

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[zoom](#)
[cgcontext](#)

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- 7 votes

4 answers

291 views

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[web-crawler](#)
[crawler](#)
[crawling](#)

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- 3 votes

5 answers

268 views

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[jquery](#)
[html](#)
[css](#)
[table](#)

12h ago [Dawson](#) 2,454
- 3 votes

2 answers

114 views

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[java](#)
[php](#)
[tree](#)
[populate](#)
[mptt](#)

oct 19 at 19:38 [W. Kristianto](#) 1,378
- 10 votes

6 answers

7 kviews

+50 [HTML5 Table cell padding - different in browsers](#)

[css](#)
[table](#)
[html5](#)
[cross-browser](#)
[padding](#)

1d ago [Mayeenul Islam](#) 53
- 1 vote

2 answers

92 views

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[iis7](#)

19m ago [woodysan](#) 76

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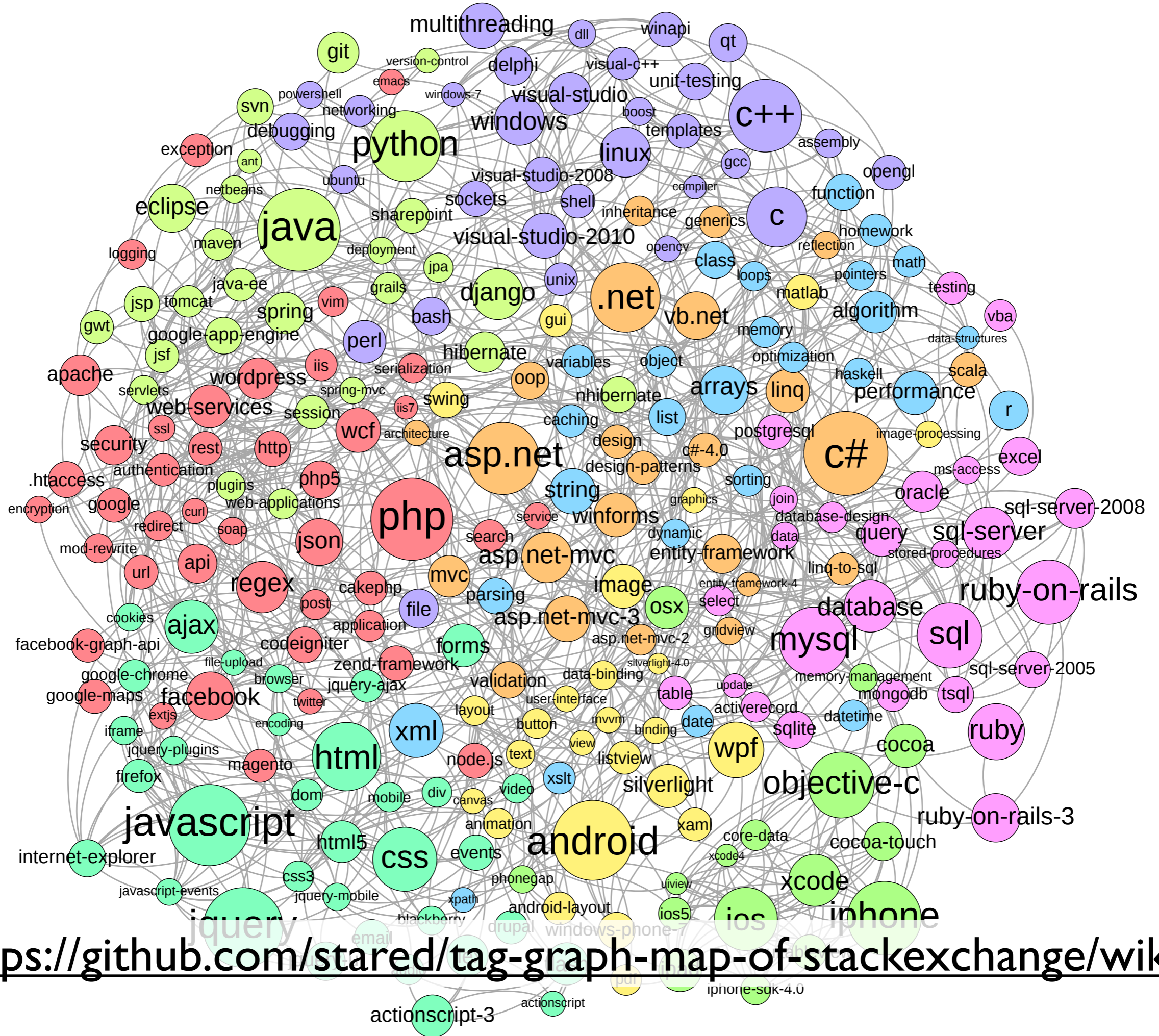
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Ignored Tags

 [Add](#)

[tag subscriptions »](#)





<https://github.com/stared/tag-graph-map-of-stackexchange/wiki>

an edge between two tags when

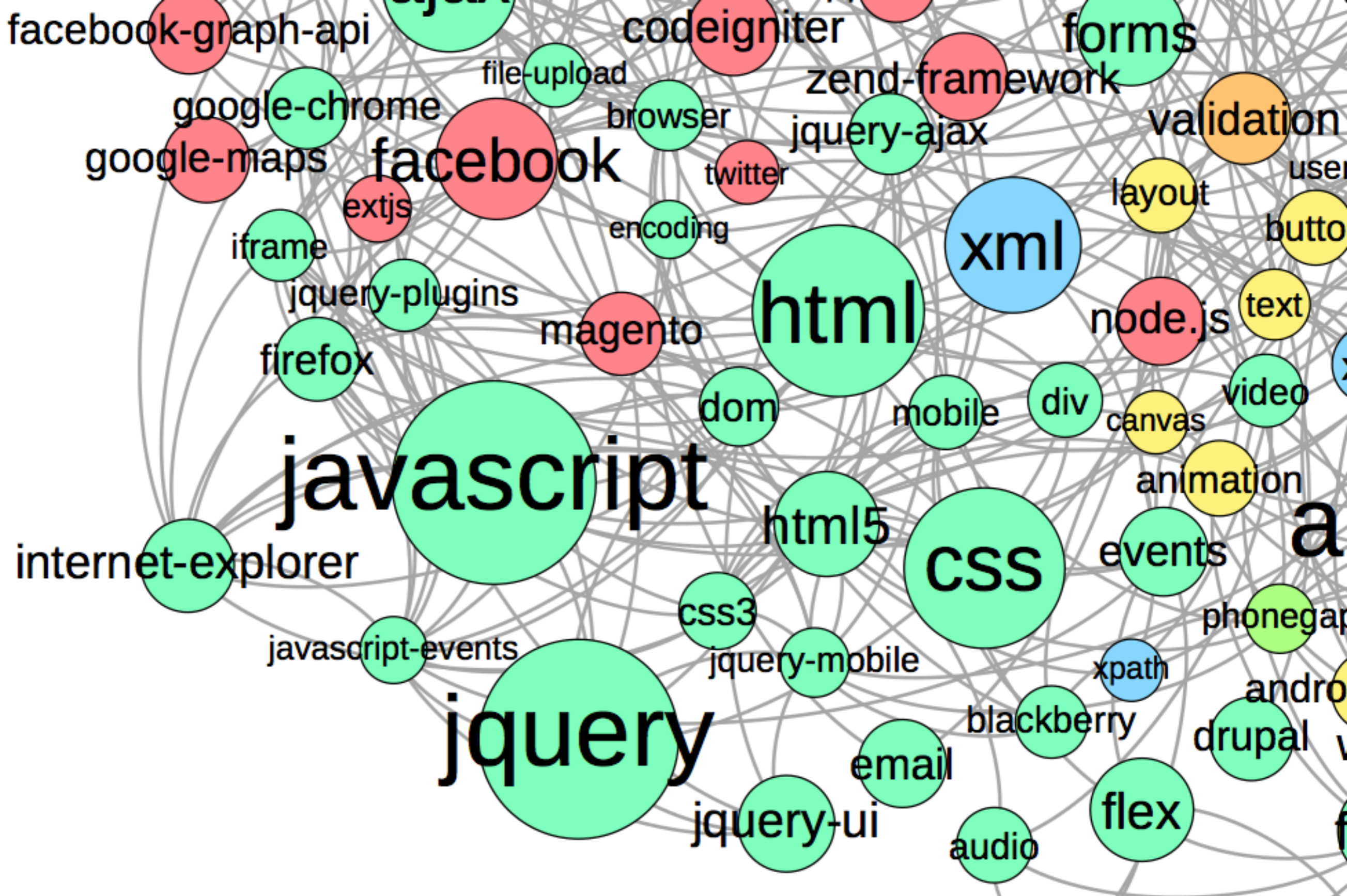
observed

$$\frac{P(\text{tag1 and tag2})}{P(\text{tag1})P(\text{tag2})} \geq 4$$

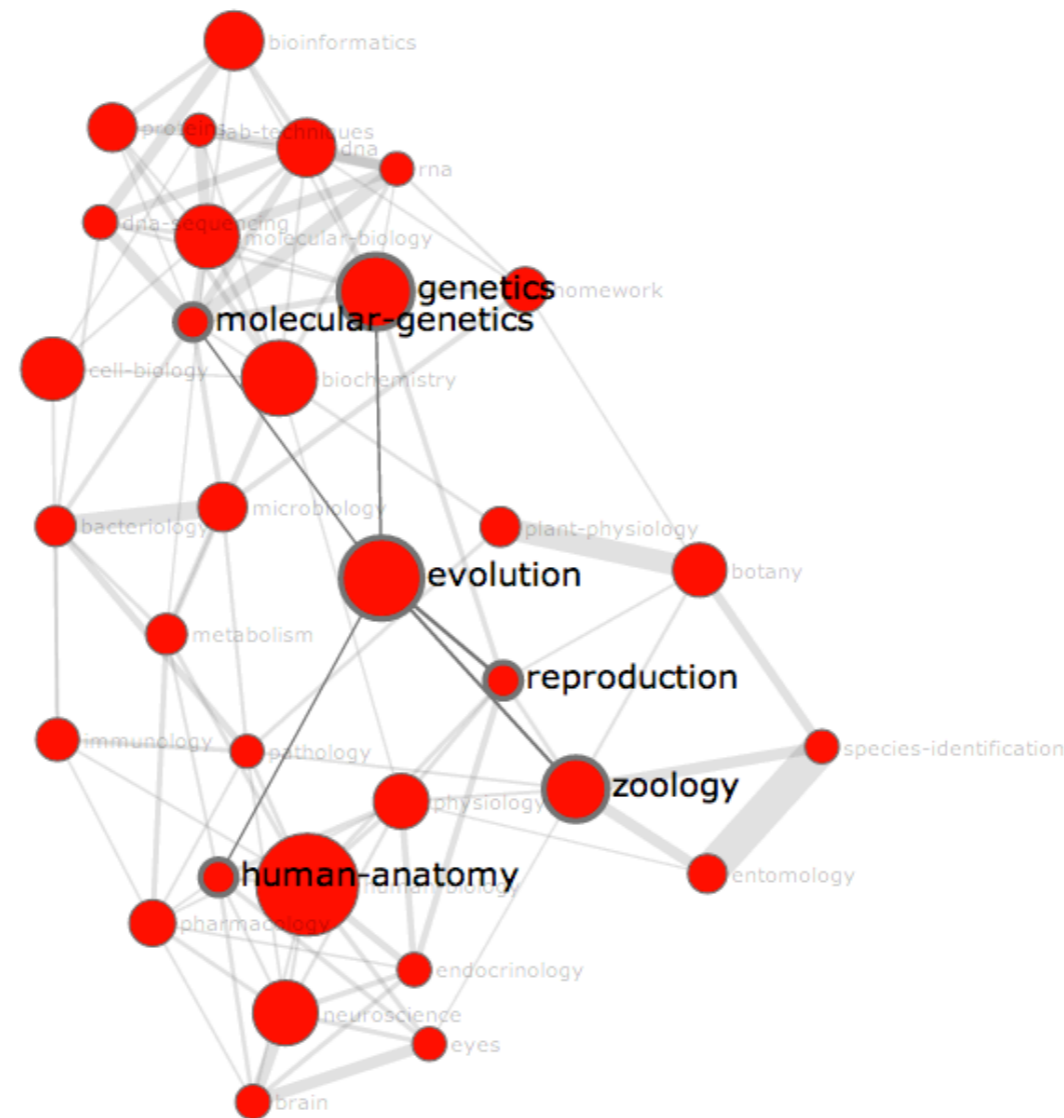
expected

(for tags occurring independently)

so called “observed to expected ratio”



but...



<http://stared.github.io/tagoverflow/>

(just a bit of patience, please :))

Graph checklist

- Nodes & edges
- Size & color
- Labels
- Force used wisely
- Non-overlapping
- Interaction
- Zoom / highlighting

Math cheat sheet

nodes

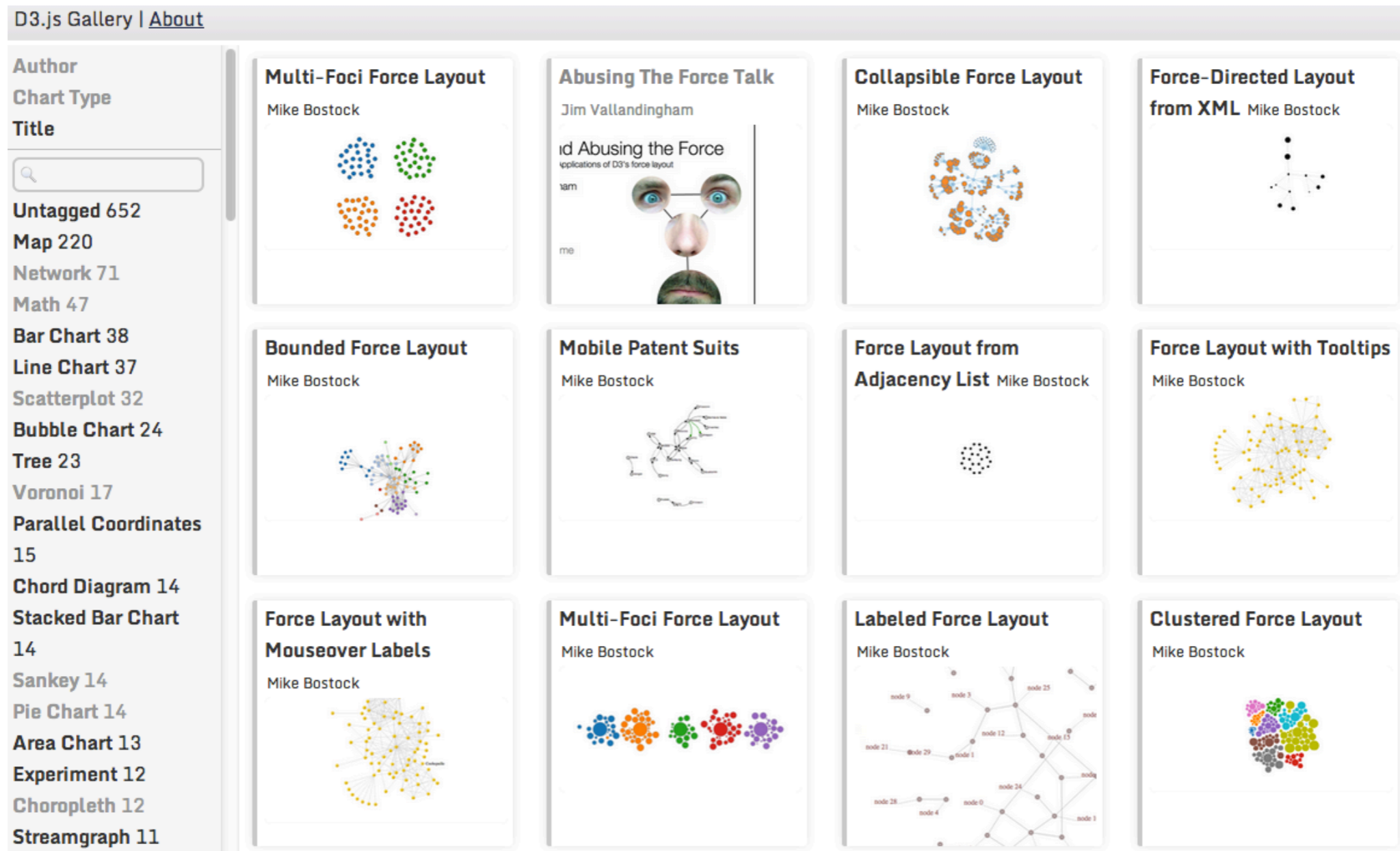
```
.attr("r", function (d) {  
    return Math.sqrt(d.count);  
});
```

force

```
.charge(function (d) {  
    return - Math.sqrt(d.count);  
});
```

$$\frac{P(a \text{ and } b)}{P(a)P(b)} = \frac{\#(a \text{ and } b)\#\text{posts}}{\#a\#b}$$

Resources....



<http://biovisualize.github.io/d3visualization/>

Resources...

- <http://d3js.org>
- <http://www.d3noob.org/2013/03/what-is-force-layout-diagram-in-d3js.html>
- <http://flowingdata.com/2012/08/02/how-to-make-an-interactive-network-visualization/>

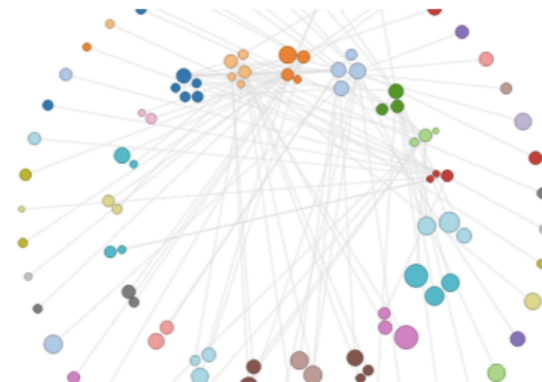
How to Make an Interactive Network Visualization

By JIM VALLANDINGHAM

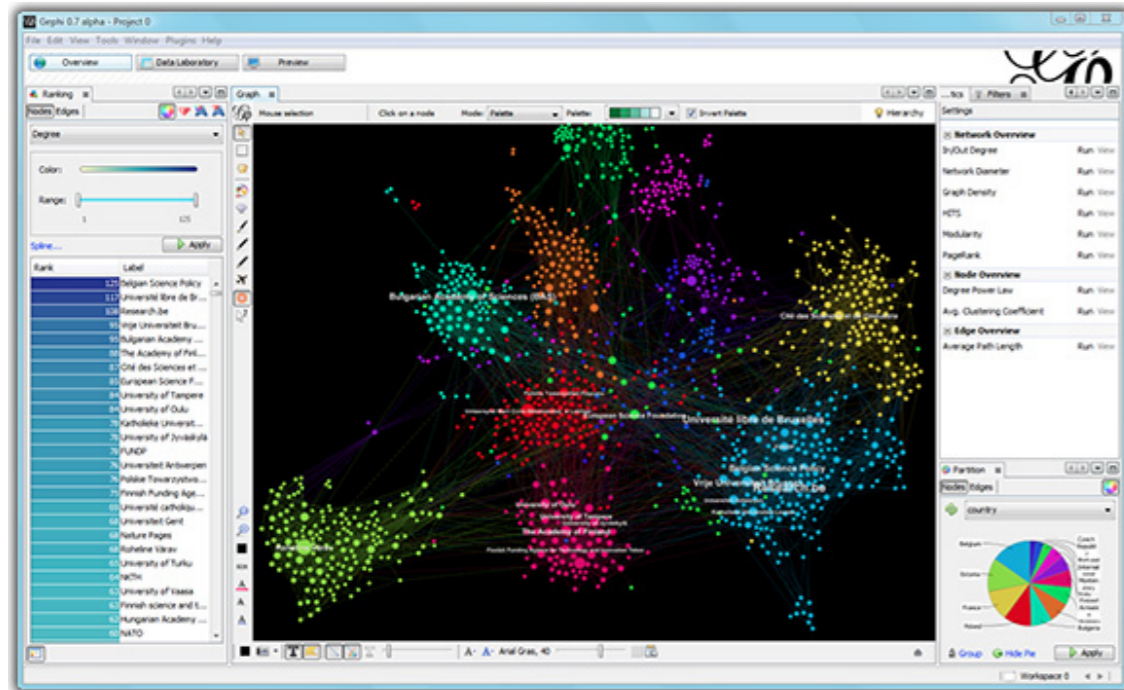
Interactive network visualizations make it easy to rearrange, filter, and explore your connected data. Learn how to make one using D3 and JavaScript.

Demo

Download Source

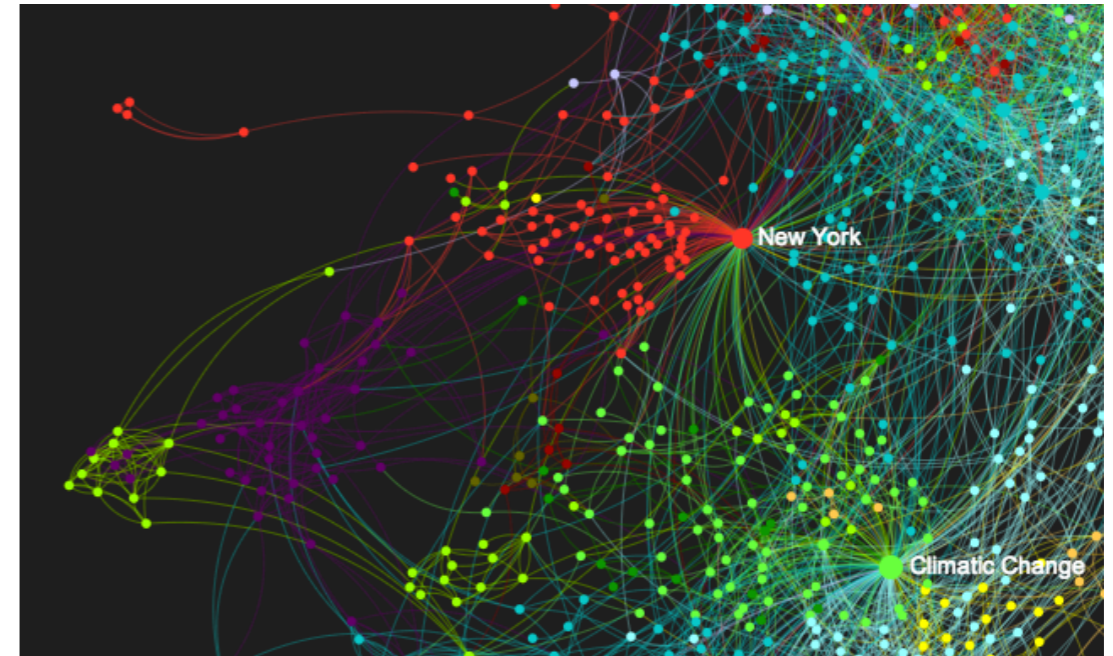


If not d3.js...



<http://gephi.org/>

- + numerical processing
- + 'photoshop for graphs'
- for static graphs



<http://sigmajs.org/>

- + nice for graphs
- not a penknife

Any questions?

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<http://migdal.wikidot.com>

BTW, a question:
any tricky way to avoid label overlapping?