Visualization & Visual Analytics 1

Angus Forbes

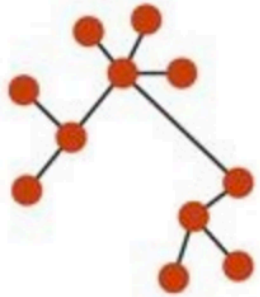
creativecoding.evl.uic.edu/courses/cs424

Arrange Networks and Trees

Node–Link Diagrams

Connection Marks

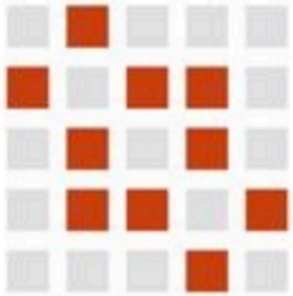
✔ NETWORKS ✔ TREES



Adjacency Matrix

Derived Table

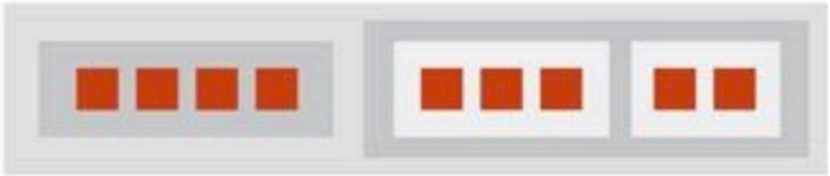
✔ NETWORKS ✔ TREES



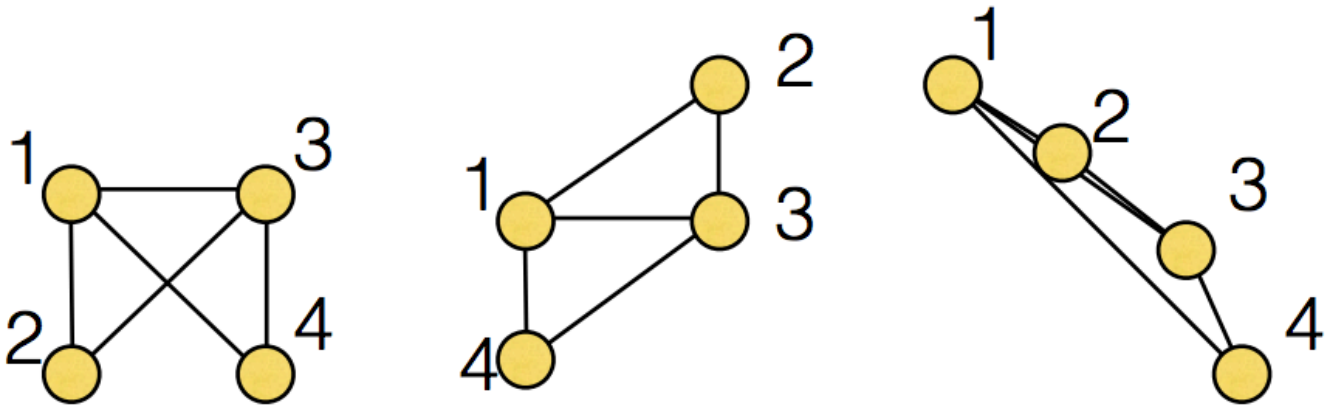
Enclosure

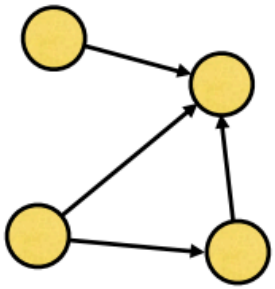
Containment Marks

✖ NETWORKS ✔ TREES

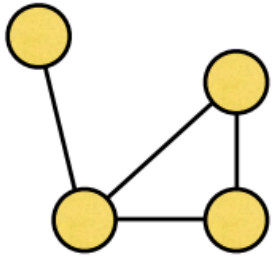


- A graph G consists of a collection of vertices (or nodes) V and a set of edges E, consisting of vertex pairs.
- An edge e_{xy} = (x,y) connects two vertices x and y.
- for example: V={1,2,3,4}, E={(1,2),(1,3),(2,3),(3,4),(4,1)}

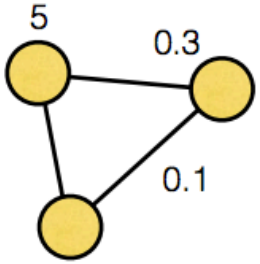




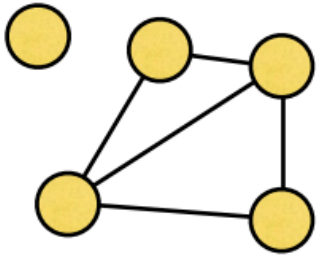
A directed graph



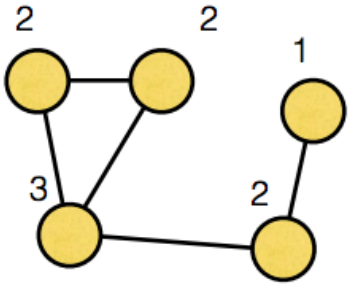
An undirected graph



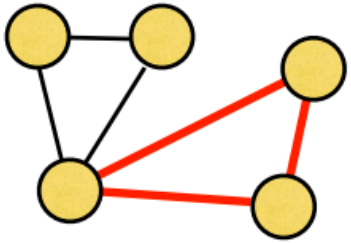
Weighted



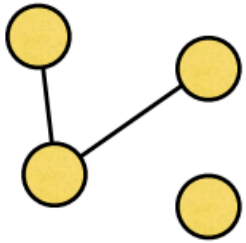
Unconnected



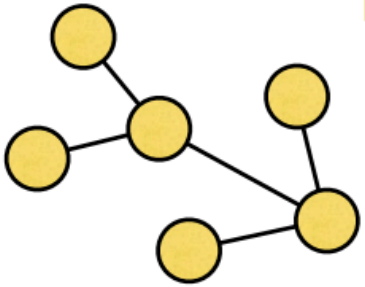
Node degrees



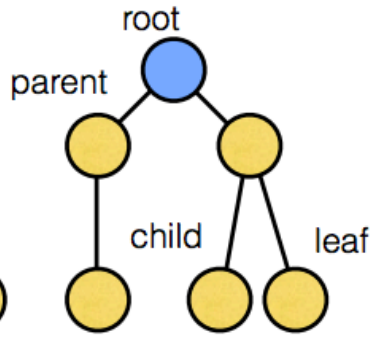
A **cycle**



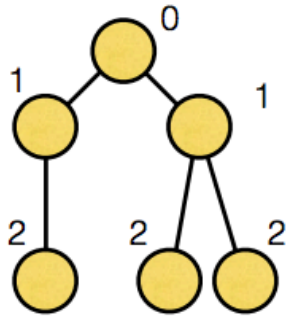
An acyclic graph



A connected acyclic graph, a.k.a. a **tree**

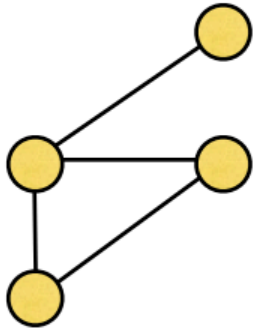


A rooted tree or hierarchy

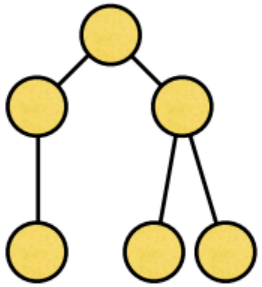


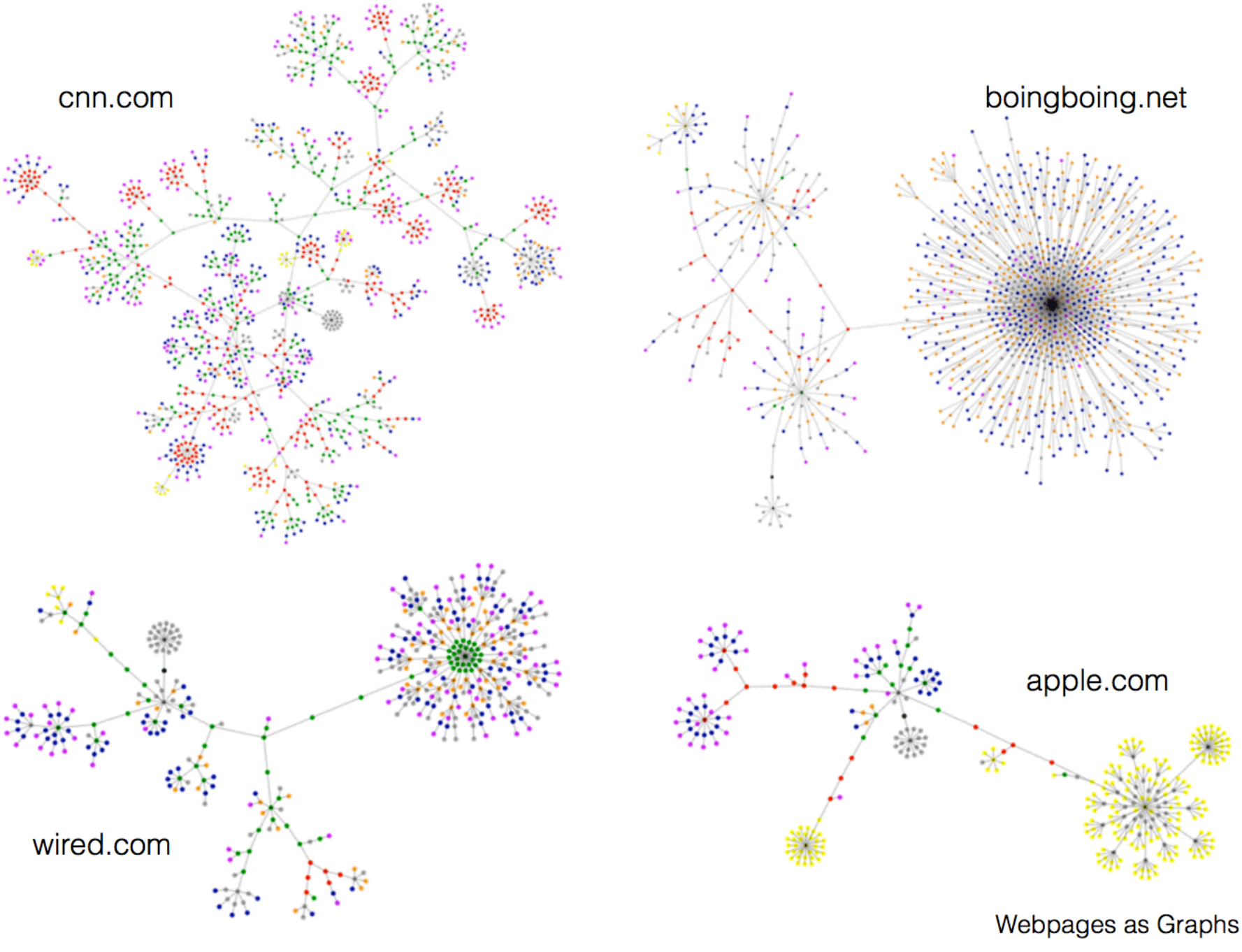
Node depths

- Graphs
  - Model relations amount data
  - Have nodes and edges

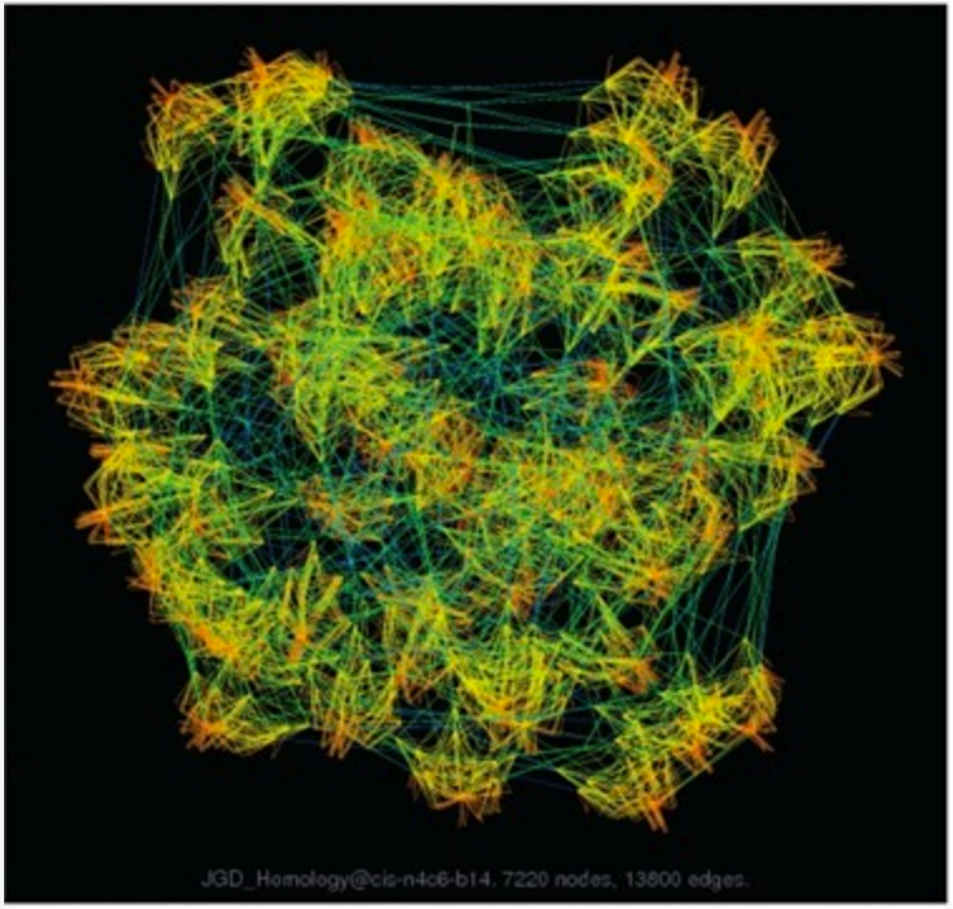


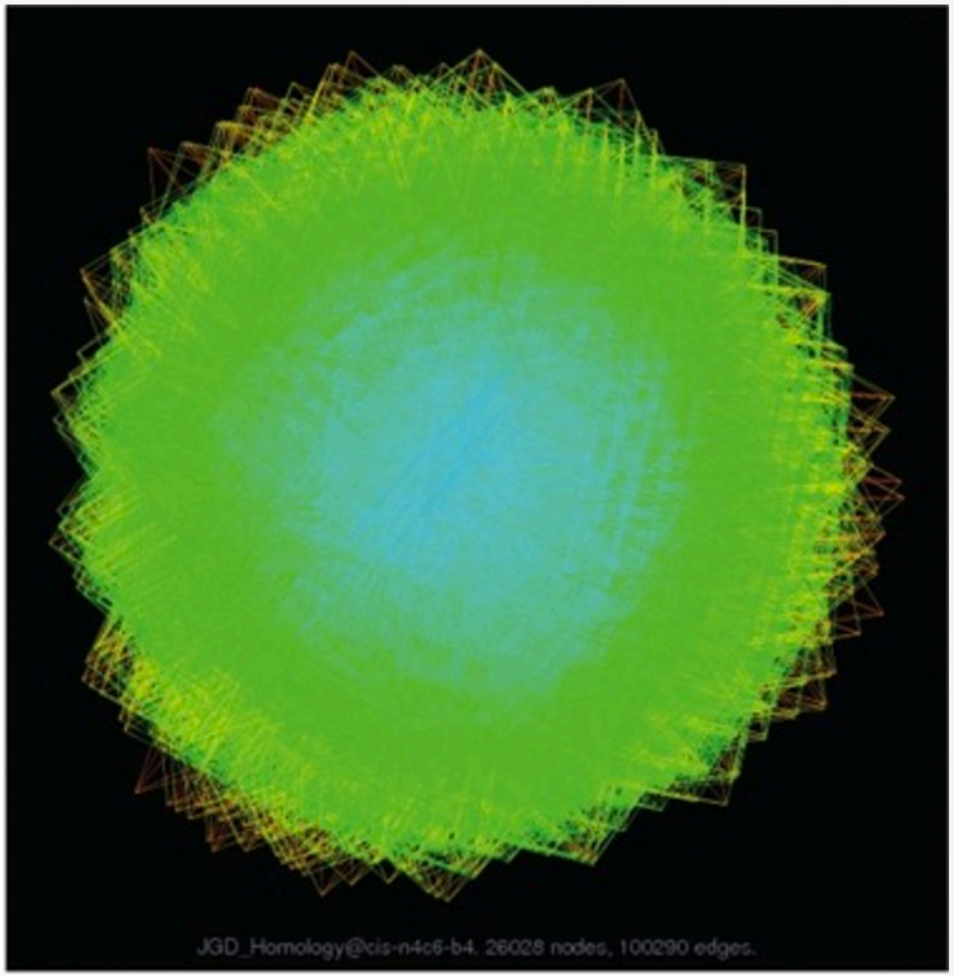
- Trees
  - Graphs with hierarchical structure
    - A connected graph with N-1 edges
  - Nodes referred to as parents and children

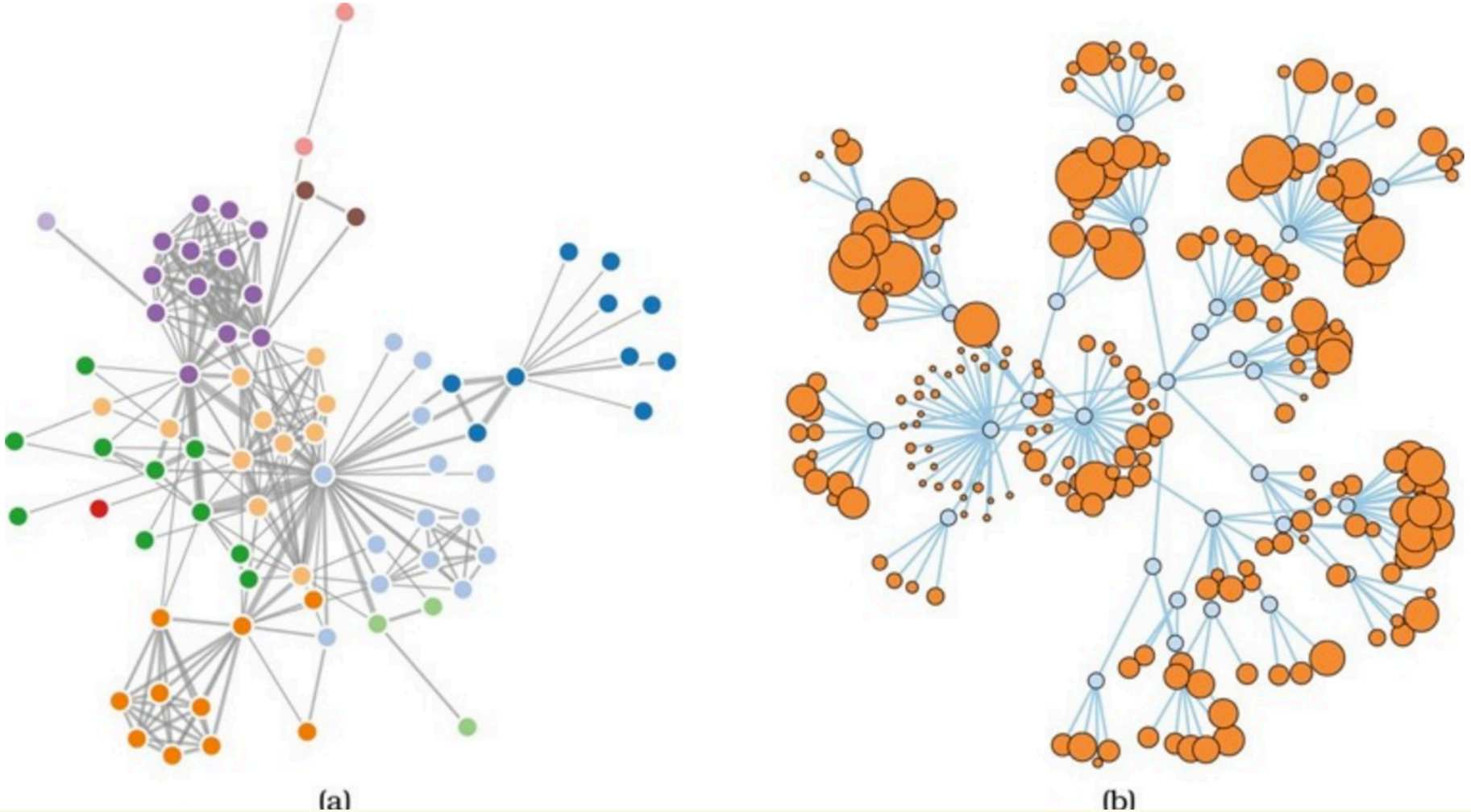




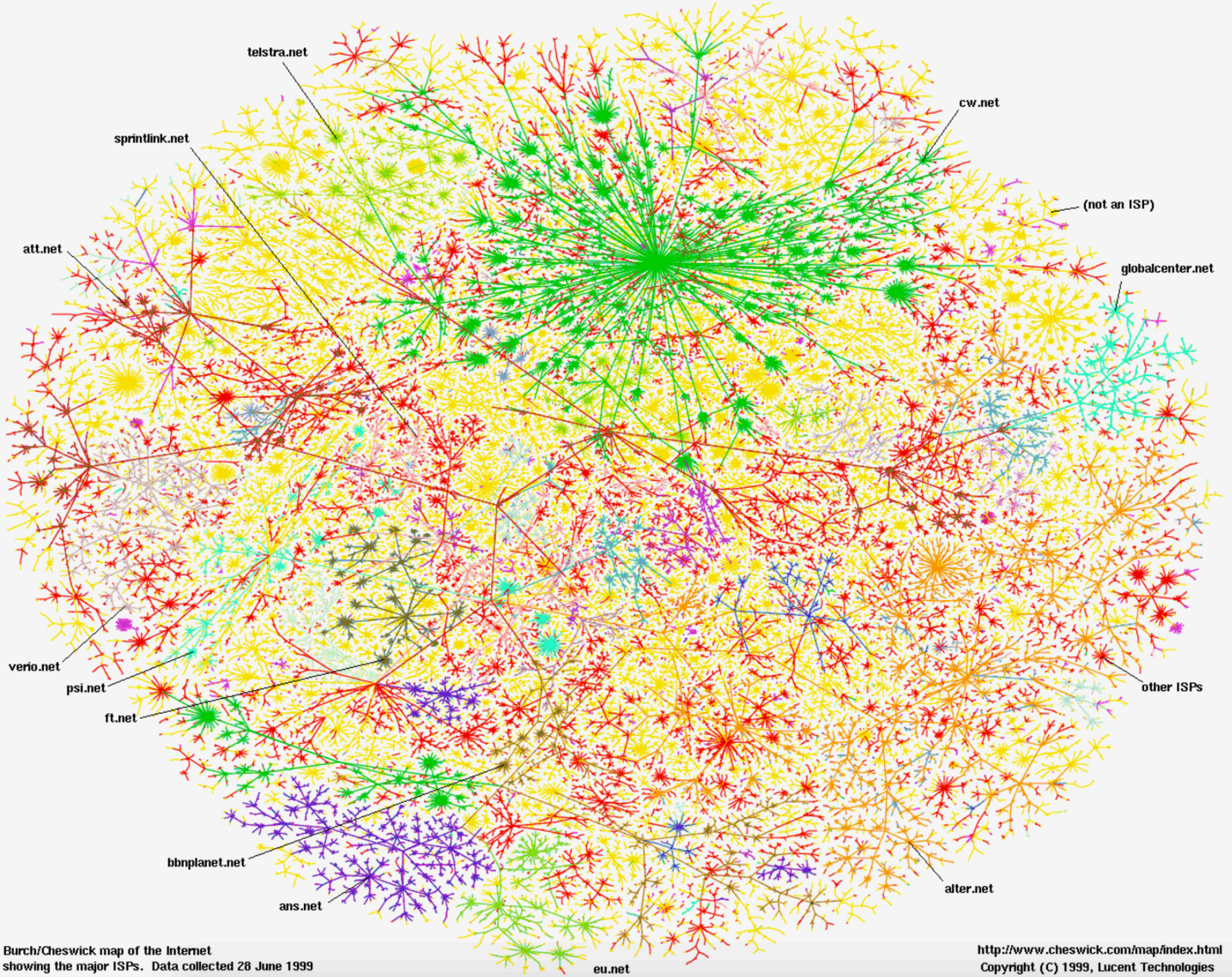
Webpages as Graphs


JGD_Homology@cis-n4c6-b14. 7220 nodes, 13800 edges.


JGD_Homology@cis-n4c6-b4. 26028 nodes, 100290 edges.

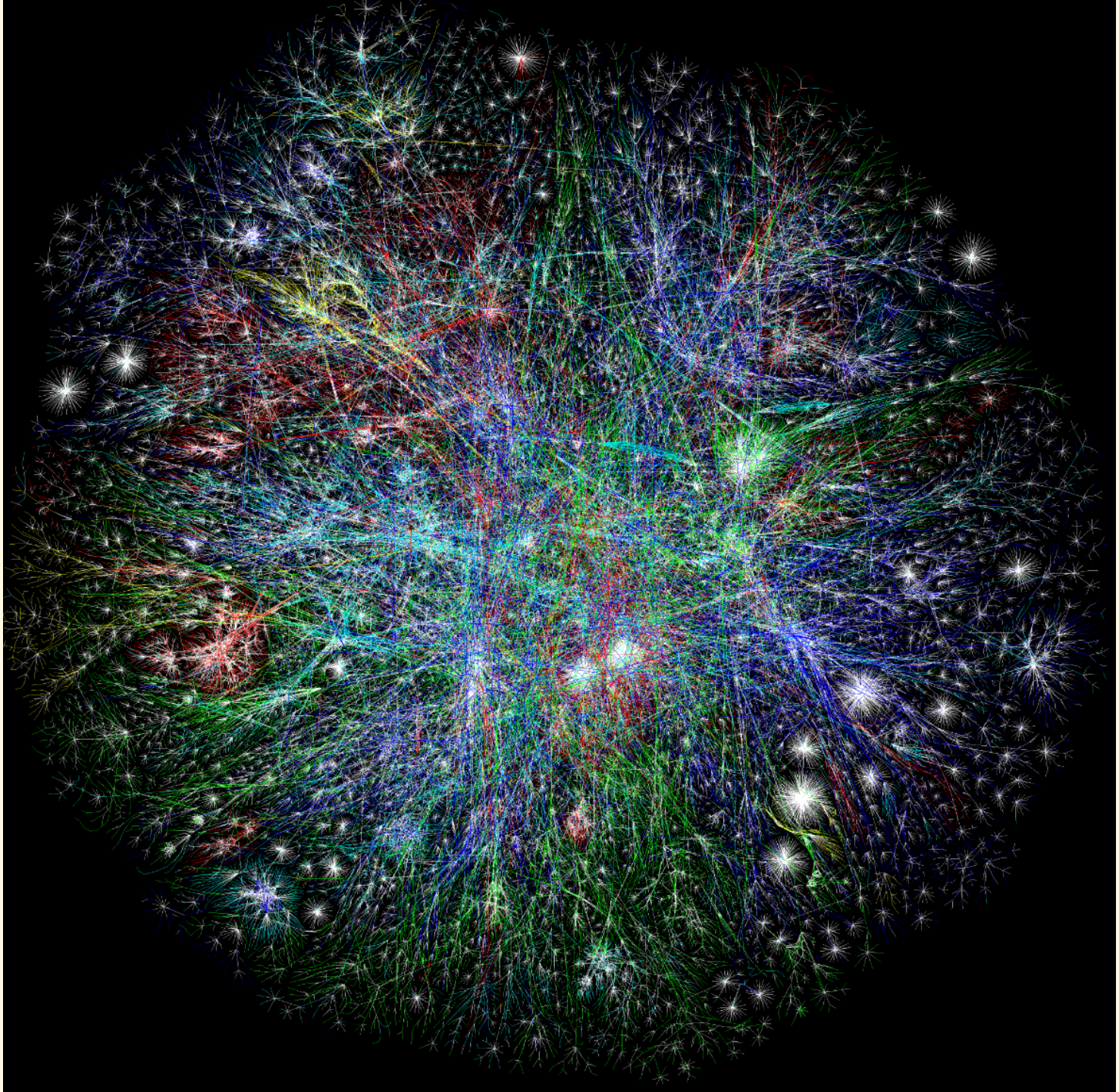


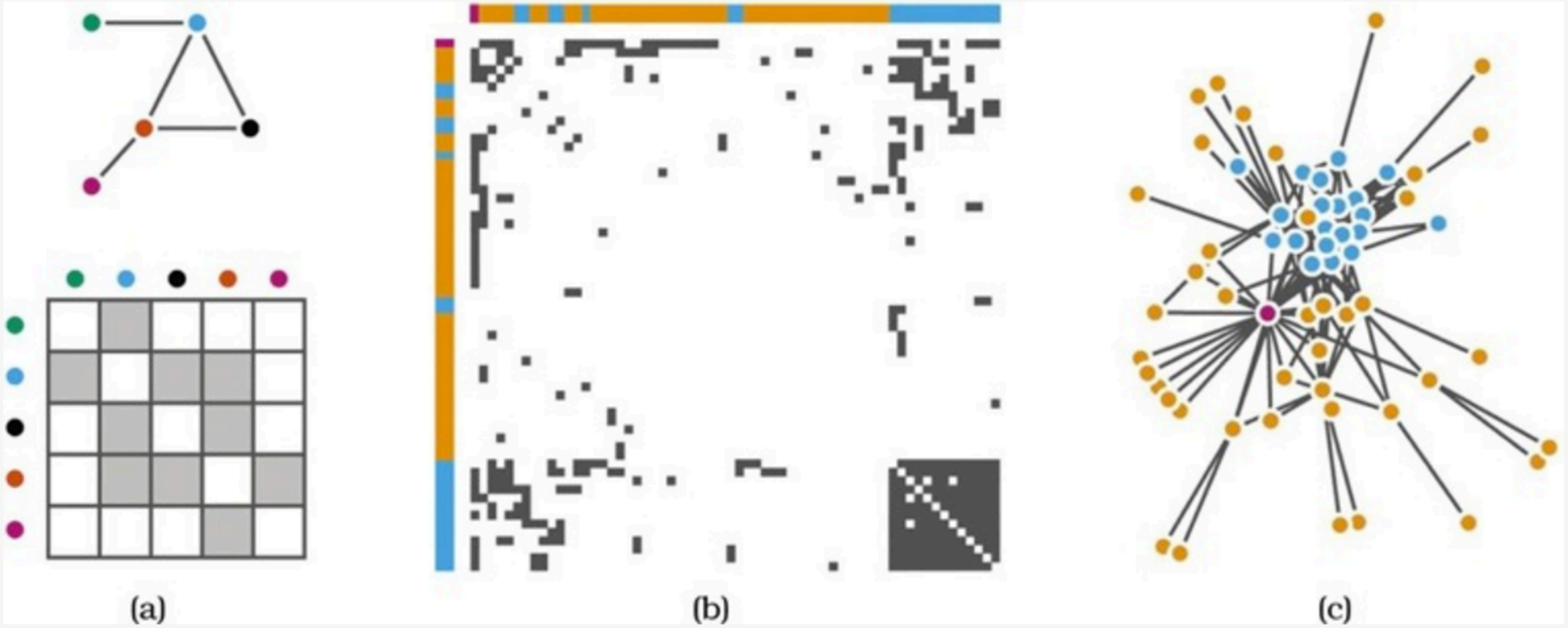
(a) (b)



Burch/Cheswick map of the Internet
showing the major ISPs. Data collected 28 June 1999

http://www.cheswick.com/map/index.html

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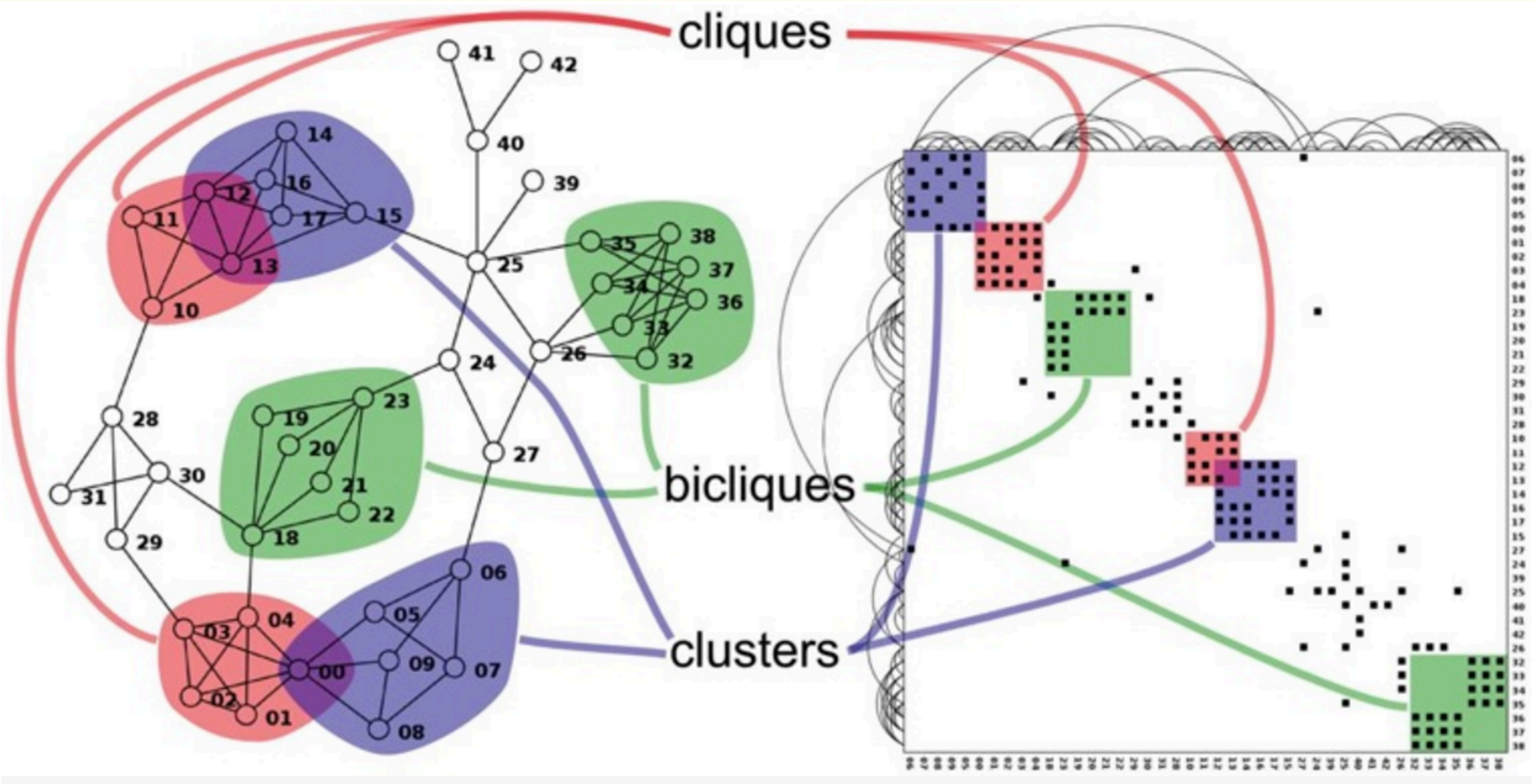
cliques
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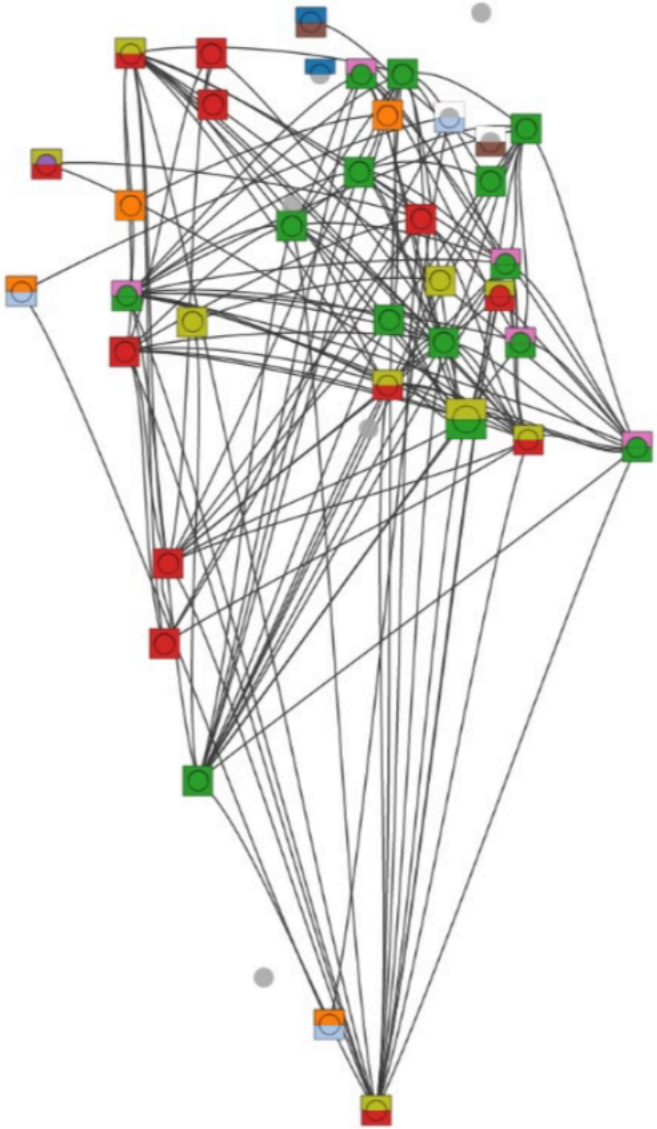

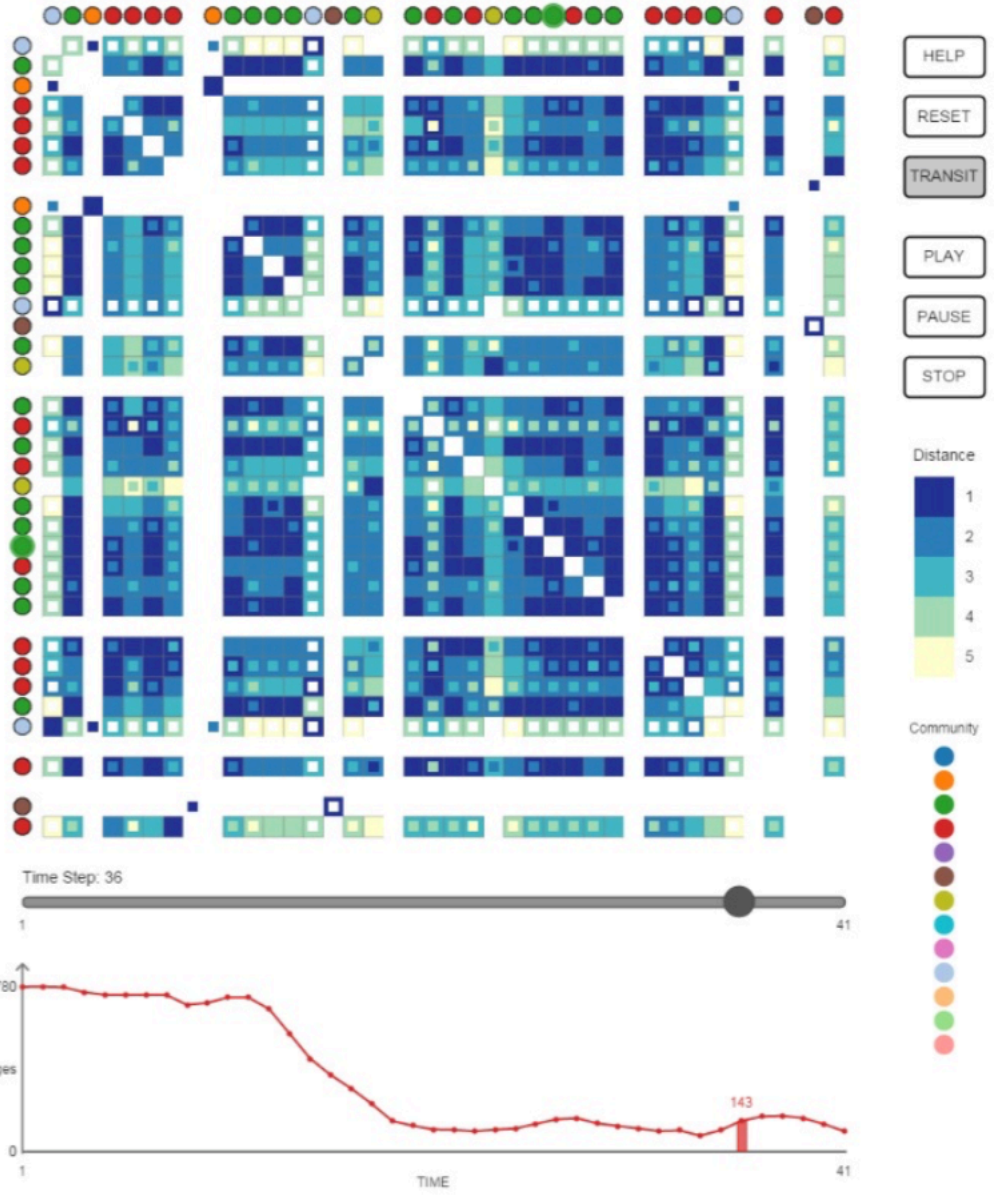
HELP
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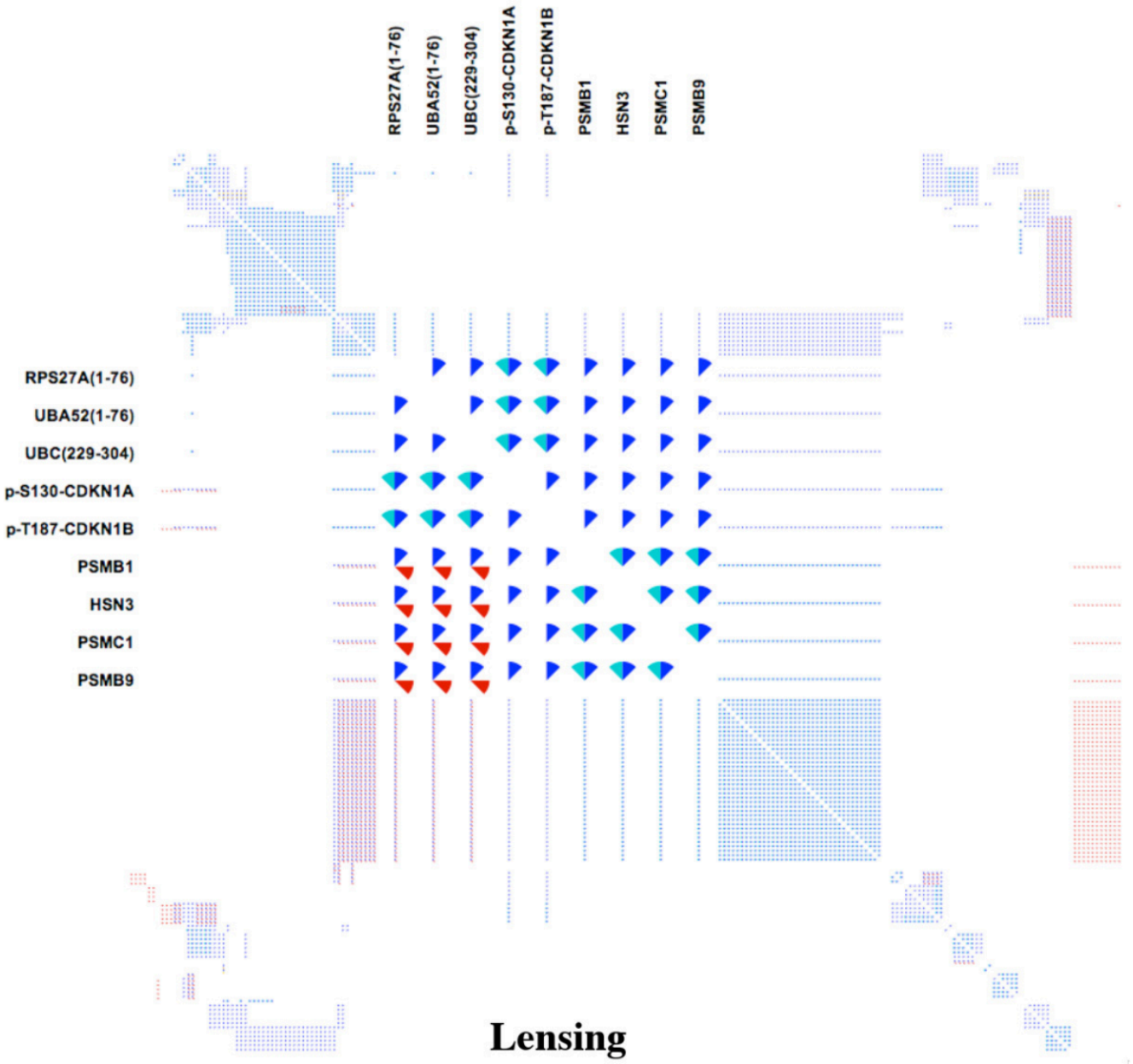


Figure 3 Matrix view of different protein orderings and lensing (last panel) in the *Rb-E2F* pathway.

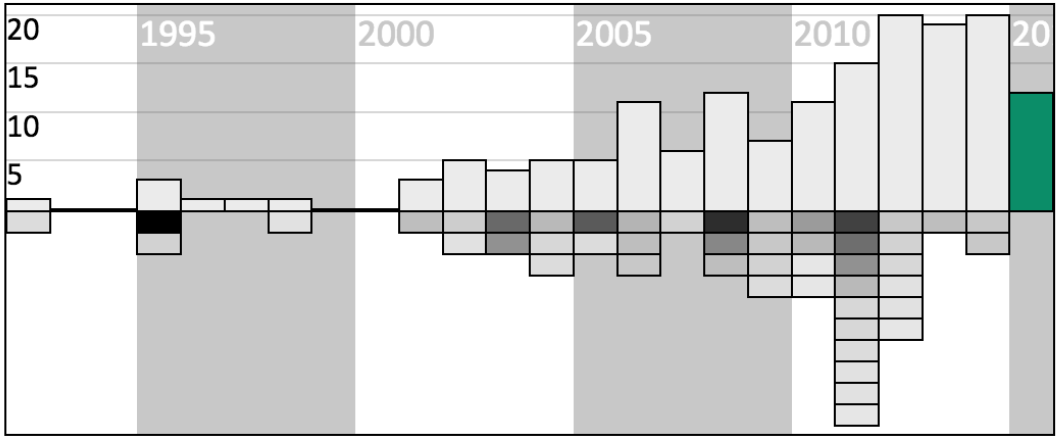
Dynamic Graph Visualization

Digital library for publication **The State of the Art in Visualizing Dynamic Graphs**

Selectors 2015 clear search

Timeline

publications per year



#citations per publication 1 45 min #citations - 5 +

Keywords

filter ... min - 1 +

type: technique 71 application 55 evaluation 36

time: animation 94 timeline 80 generic 15

paradigm: node-link 135 matrix 15 generic 14 list 2

evaluation: case_study 103 user_study 25 survey 16 none 11

expert 10 algorithmic 8 theoretical 2

162 publications

sorted by selector agreement and publication k

1. Archambault2015Animation Informatio

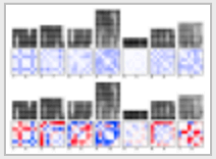
Can animation support the visualisation

Archambault, Daniel Purchase, Helen C

Abstract: *Animation and small multiples are m graphs. Animations present an interactive mov smoothly interpolated as the graph evolves. No from the data set. Small multiples presen...* ▶

type:evaluation time:animation time:timelin evaluation:user_study application:generic juxt

select similar cited by this 13



2. Bach2015Small CGF (2015)

Small MultiPiles: Piling Time to Explore Networks

Bach, Benjamin Henry-Riche, Nathalie Dwyer, Tim Grabowski, Thomas

Abstract: *We introduce MultiPiles, a visualizati networks. MultiPiles is based on the physical ar representing a single temporal snapshot. Comm networks use techniques such as: flipp...* ▶

type:technique time:animation time:timeline application:biology animated_timeline weig

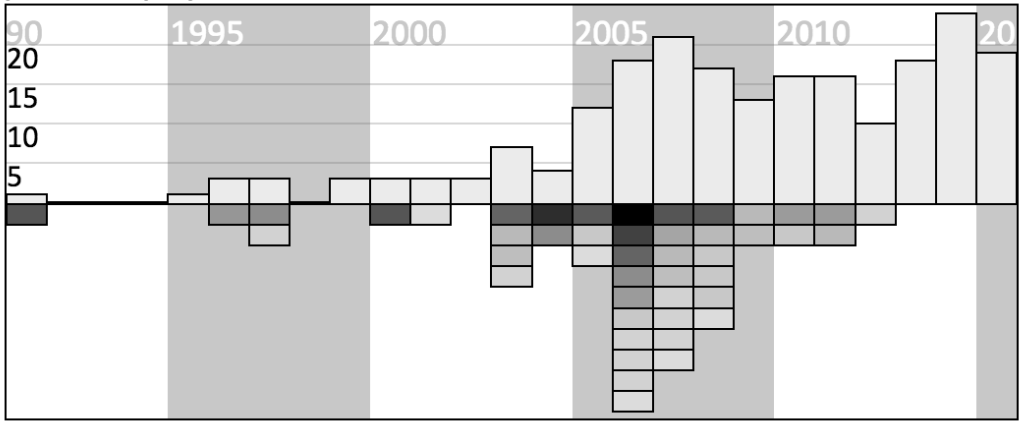
Visualizing Group Structures in Graphs - Bibliography

Digital library for publication **The State of the Art in Visualizing Group Structures in Graphs** select

Selectors clear

▾ **Timeline**

publications per year



citations 1 28 min - 5 +

▾ **Keywords** filter ... min - 1 +

paper_type: technique 111 technique_layout 51 application 45 evaluation 8

graph_vis: node-link 198 matrix 18 generic 6

group_type: vertex-based 196 edge-based 26

group_overlap: disjoint 165 overlapping_crisp 51 overlapping_fuzzy 1

search ...

215 publications sorted by selector agreement and publication ...

1. Abello2004Compound-Fisheye GD '04 (2005)

Visualizing Large Graphs with Compound-Fish

Abello, James Kobourov, Stephen G. Yusufov, Roman

Abstract: *Compound-fisheye views are introduced as interaction with large graphs. The method relies on a and a generalization of the traditional fisheye view, to of the cluster tree.*

paper_type:technique graph_vis:node-link group_type group_structure:hierarchical edge-group_vis:none group juxtaposed_vis:separate superimposed_vis:! embedded_v group_origin:generic evaluation:none application:gener aggregation multiple_coordinated_views navig

select similar cited by this 3 citing this 7

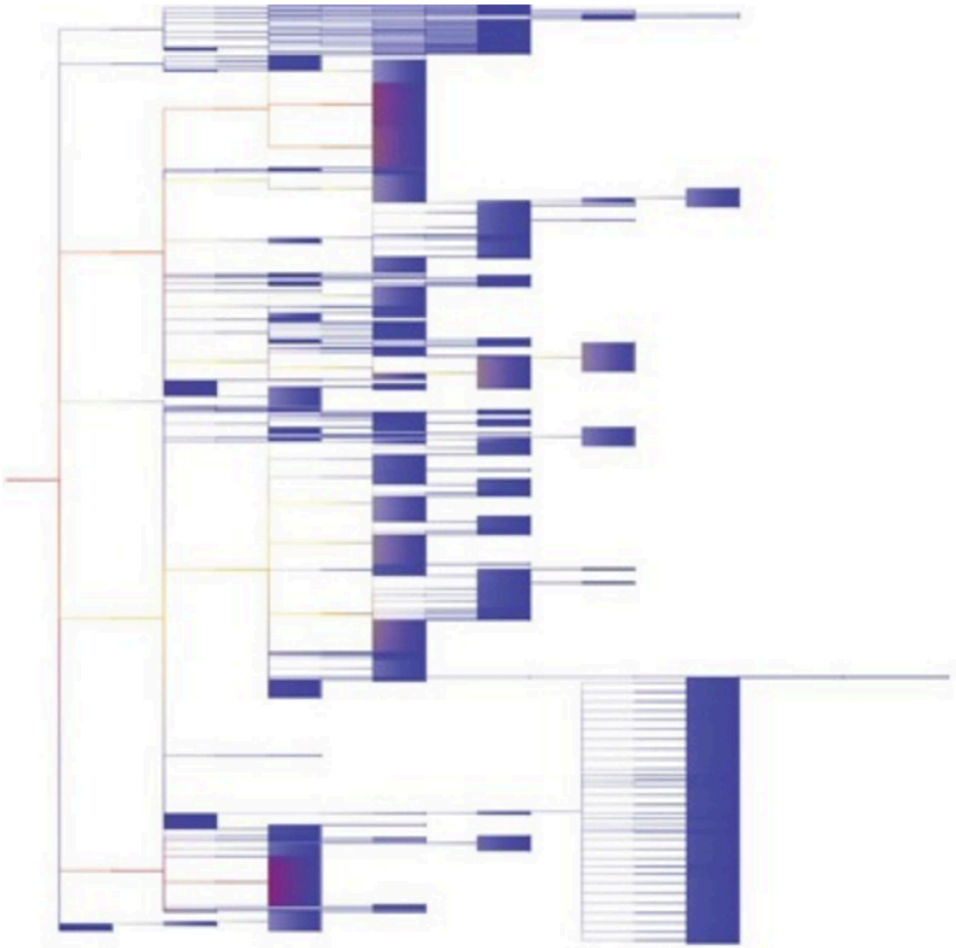
2. Abello2006ASK-GraphView [Article] (2006)

ASK-GraphView: A Large Scale Graph Visualiz

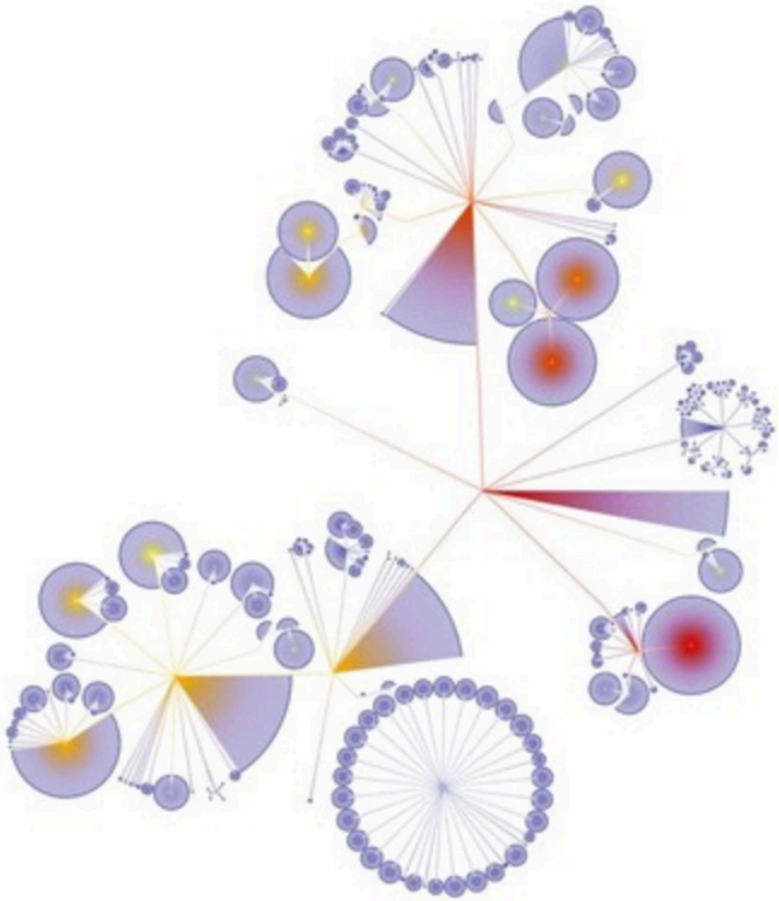
Abello, James van Ham, Frank Krishnan, Neeraj

Abstract: *We describe ASK-GraphView, a node-link-ba allows clustering and interactive navigation of large g edges. The system uses a scalable architecture and a clustering algorithms to construct ...* ▶

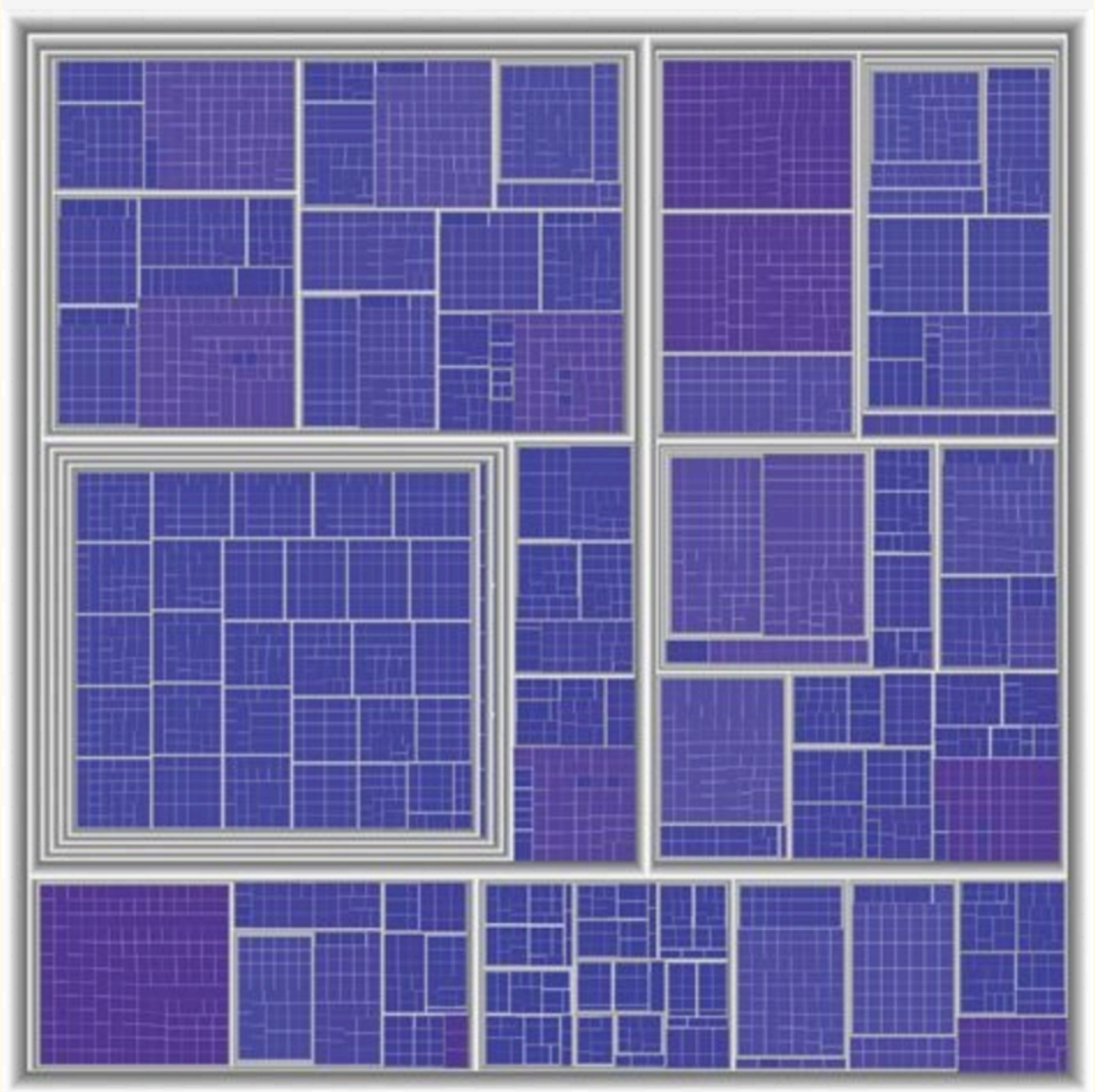
paper_type:technique graph_vis:node-link group_type



(a)



(b)



to cite this site?

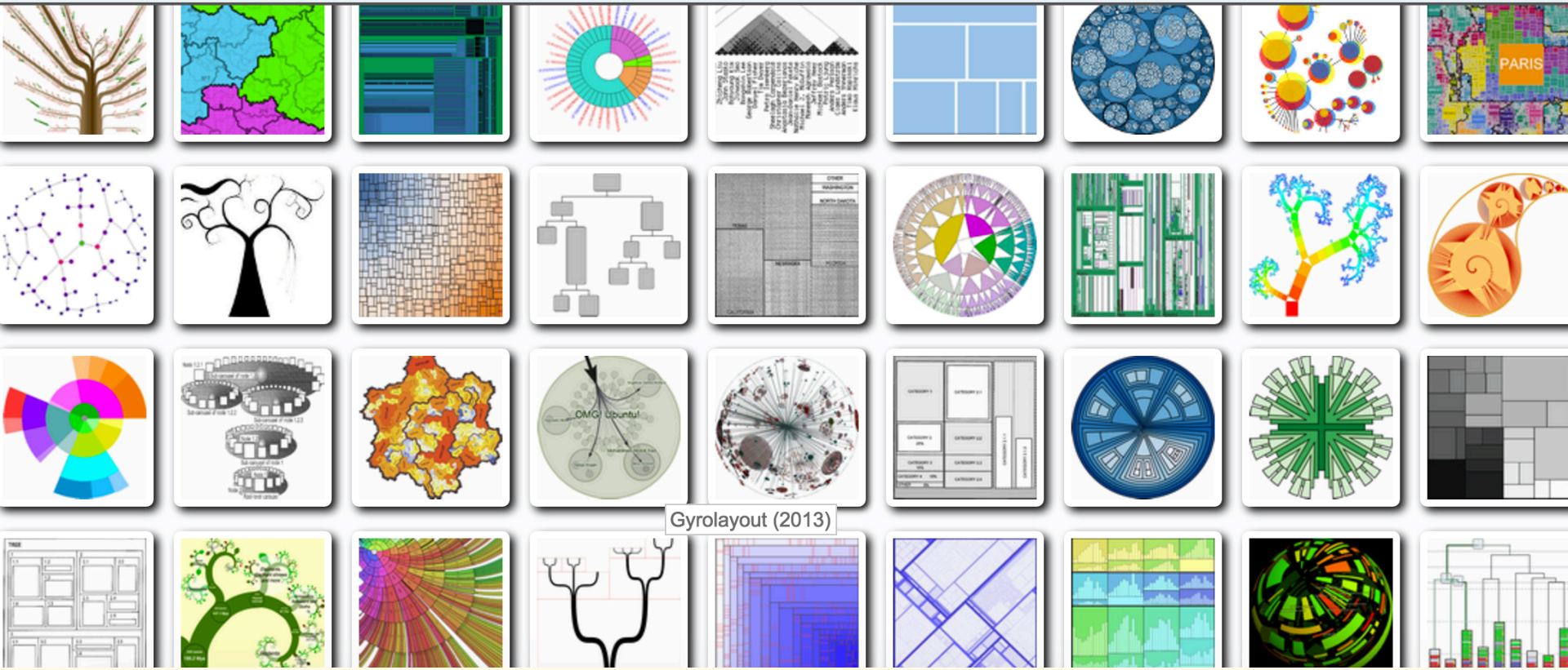
t other surveys!

treevis.net - A Visual Bibliography of Tree Visualization 2.0 by Hans-Jörg Schulz

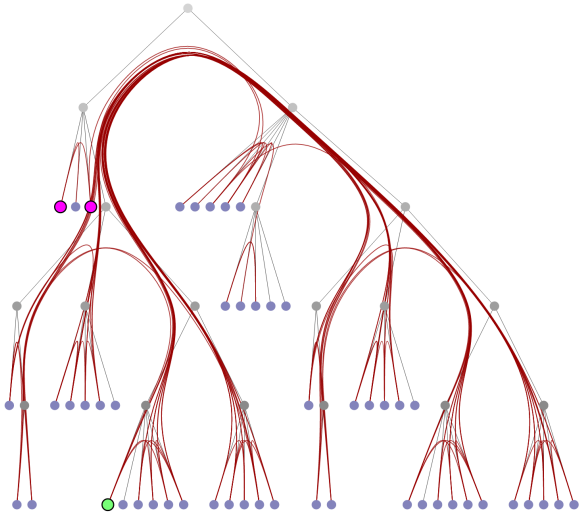
v.04

Dimensionality | Representation | Alignment | Fulltext Search | Techniques Shown

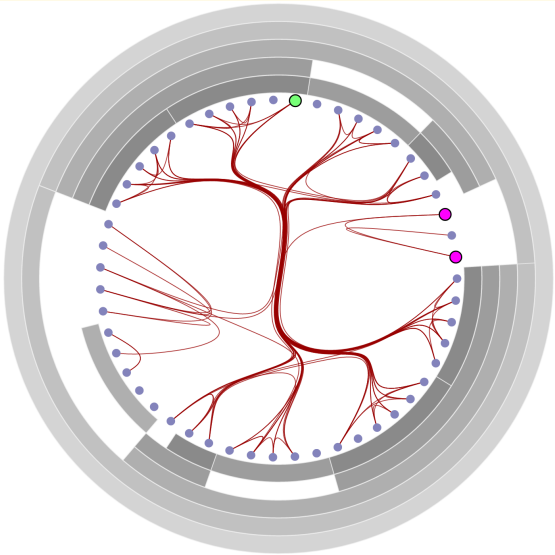
All | All | All | 292



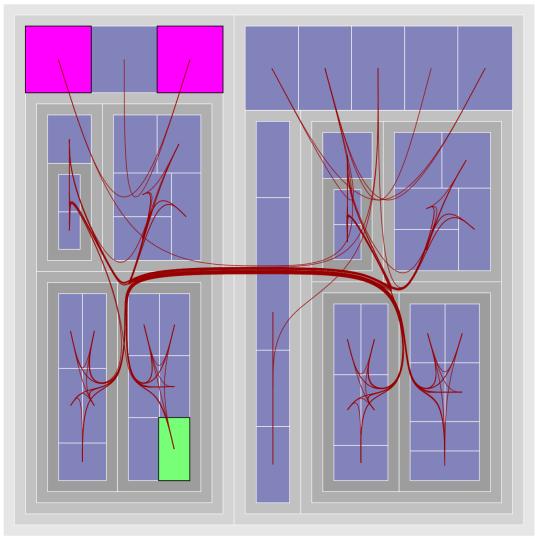
Gyrolayout (2013)



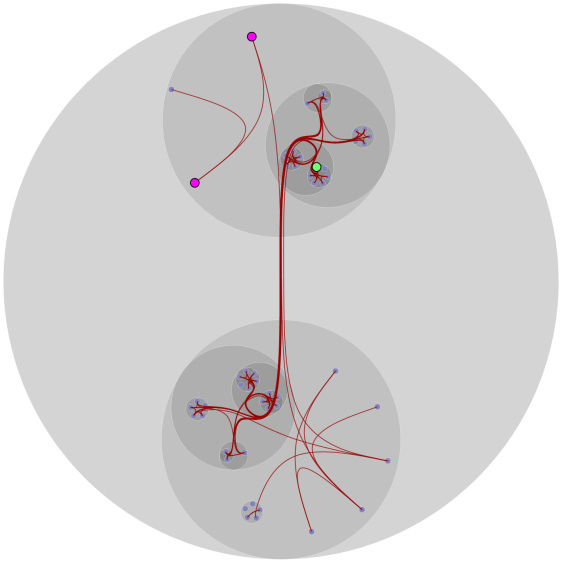
Classical



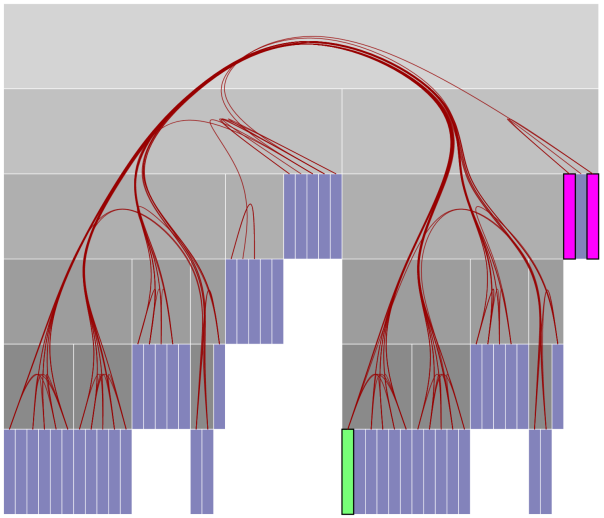
Inverted Radial



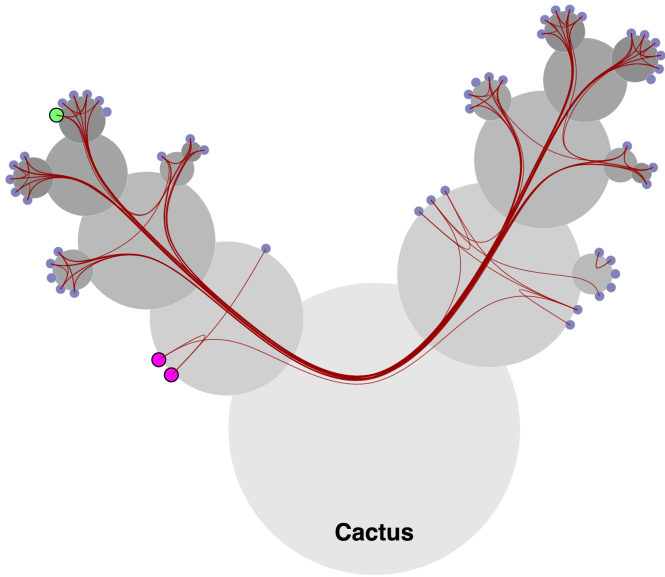
Treemap



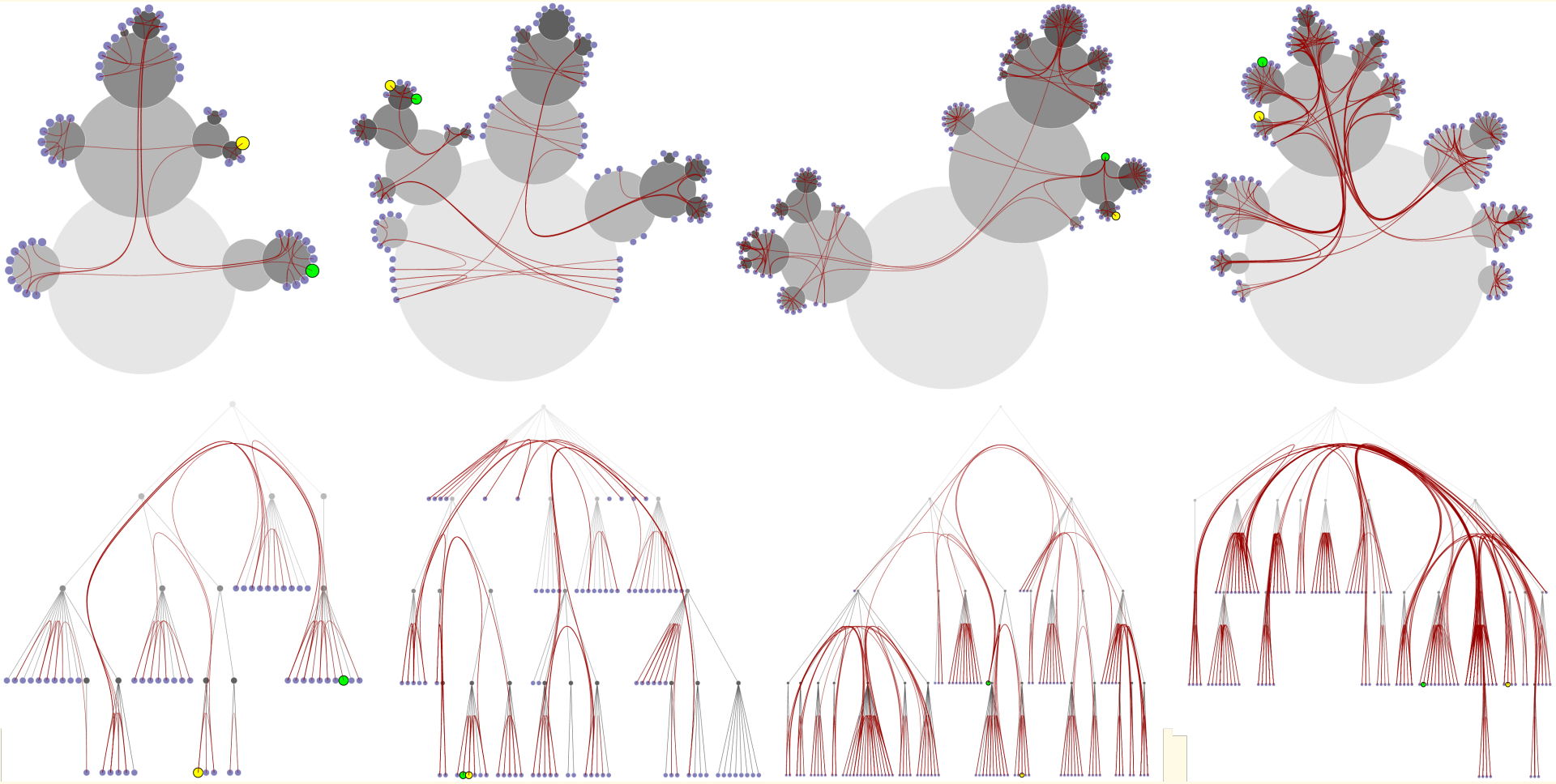
Ballon



Icicle



Cactus



Critique

Inter-group discussions

- Do you understand what visualization tasks will be enabled?
- Do you think that this is an appropriate visualization technique? If so, why? If not, why not?
- What do you like about it or not like about it?
- What parts of the visualization might be confusing?
- If you had to grade it, what grade would you give it? How could the group improve their grade?
- Do you have any suggestions for the group? How would you implement the technique if you were given this dataset?

Homework:

- Thursday: Coding assignment is due by class (3:30pm)

- Tuesday: Read Munzner, Chapters 9 & 10 (quiz during Tuesday's class)

- Optional: Munzner, Chapters 7 & 8 (especially if you are using map data or table data)