情報可視化

LX7: 表の配置

数理・計算科学系

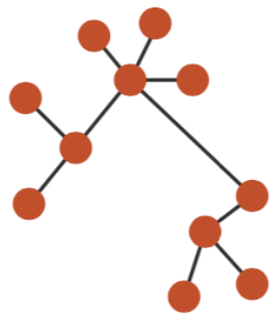
脇田 建

Arrange Networks and Trees

Node–Link Diagrams

Connection Marks

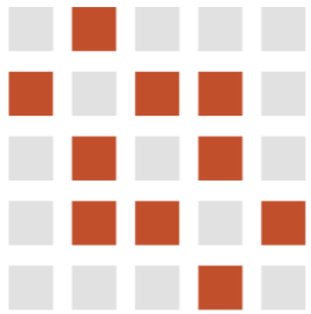
✔ NETWORKS ✔ TREES



Adjacency Matrix

Derived Table

✔ NETWORKS ✔ TREES



Enclosure

Containment Marks

✖ NETWORKS ✔ TREES

Figure 9.1. Design choices for arranging networks.

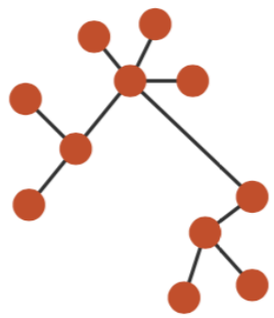
Connection:

Link marks

Arrange Networks and Trees

Node–Link Diagrams
Connection Marks

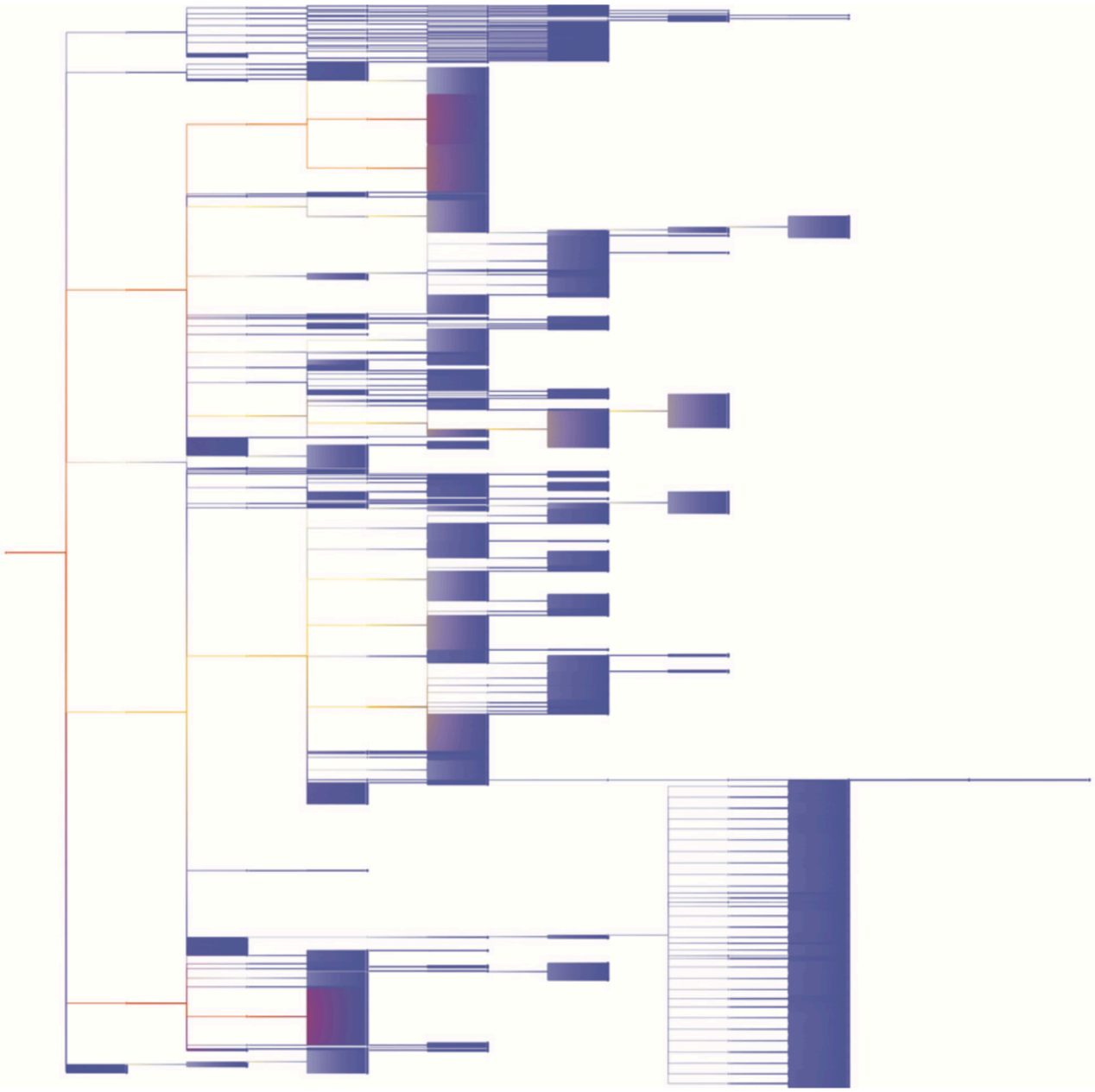
✔ NETWORKS ✔ TREES



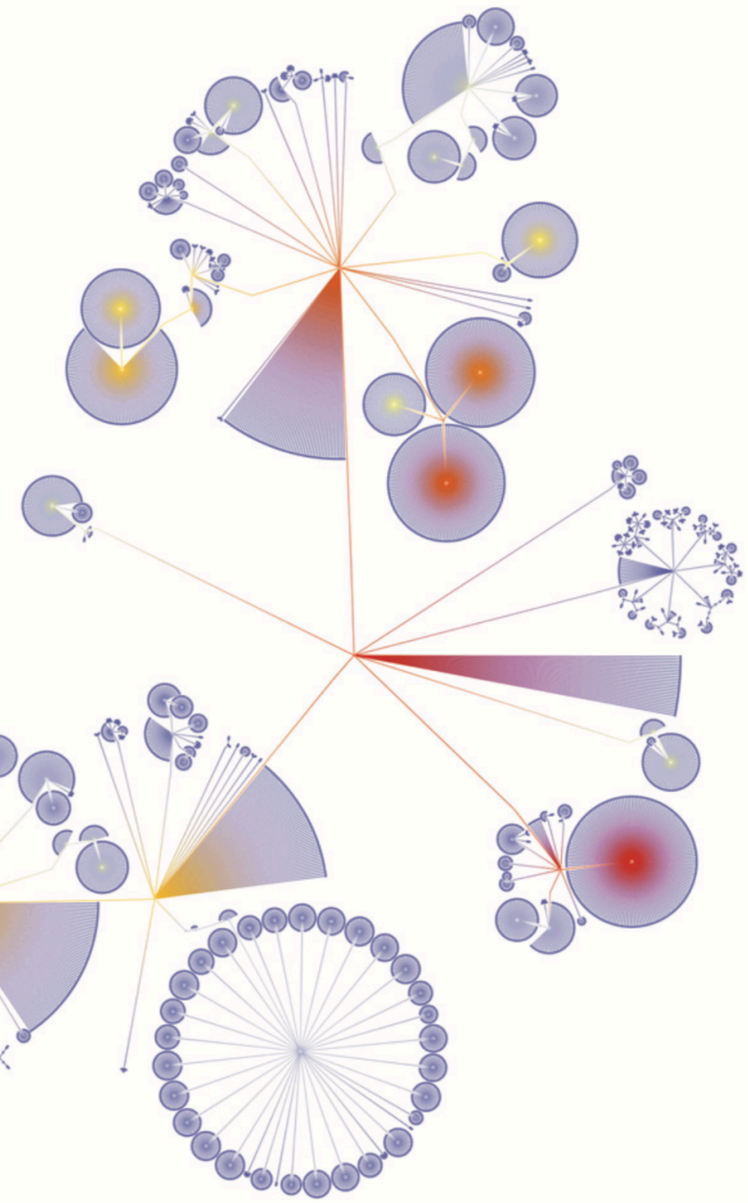
(a) (b)

Figure 9.2. Node–link layouts of small trees. (a) Triangular vertical for tiny tree. From [Buchheim et al. 02, Figure 2d]. (b) Spline radial layout for small tree. From http://mbostock.github.com/d3/ex/tree.html.

https://observablehq.com/@d3/radial-tidy-tree

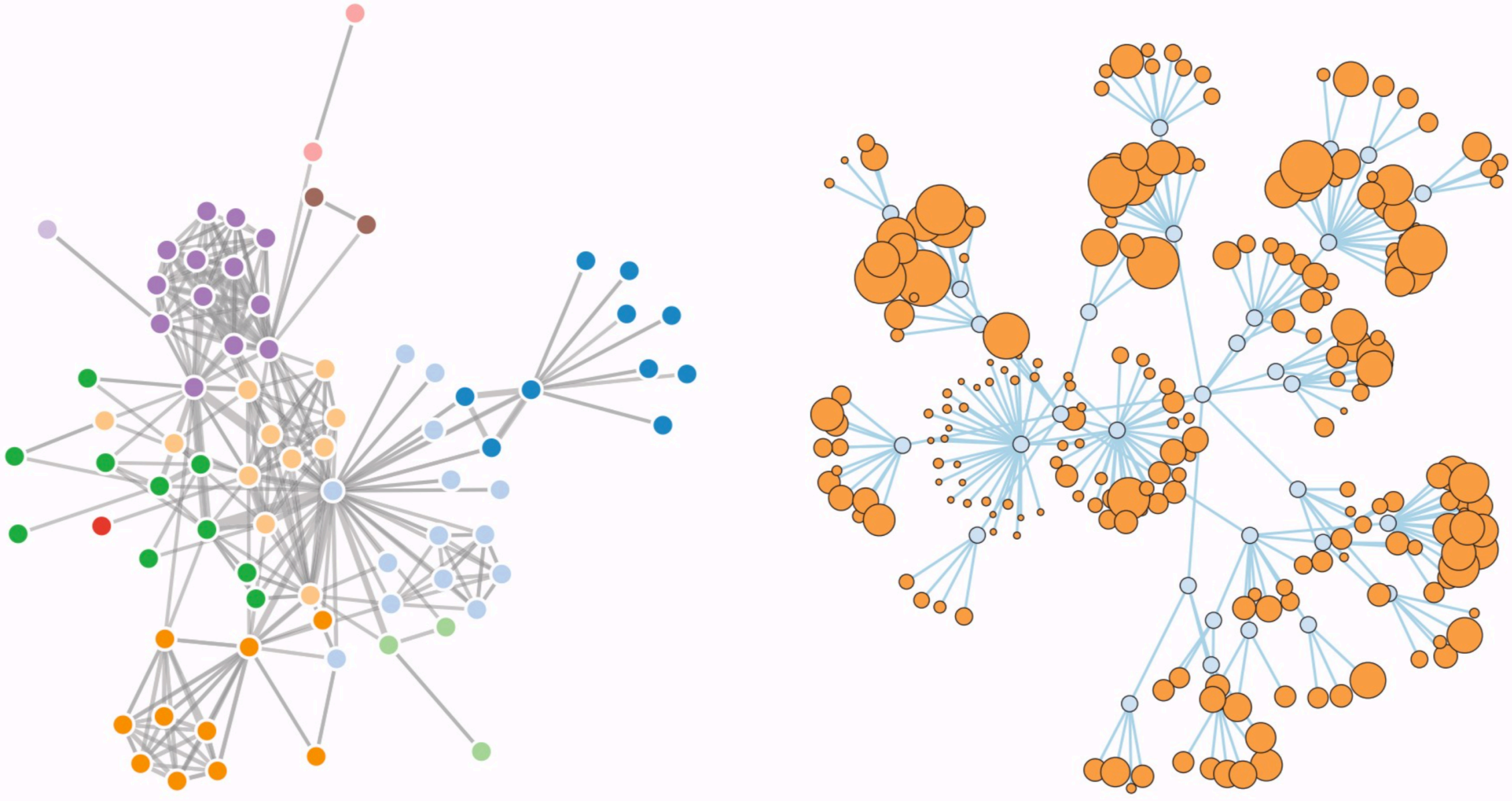


(a)



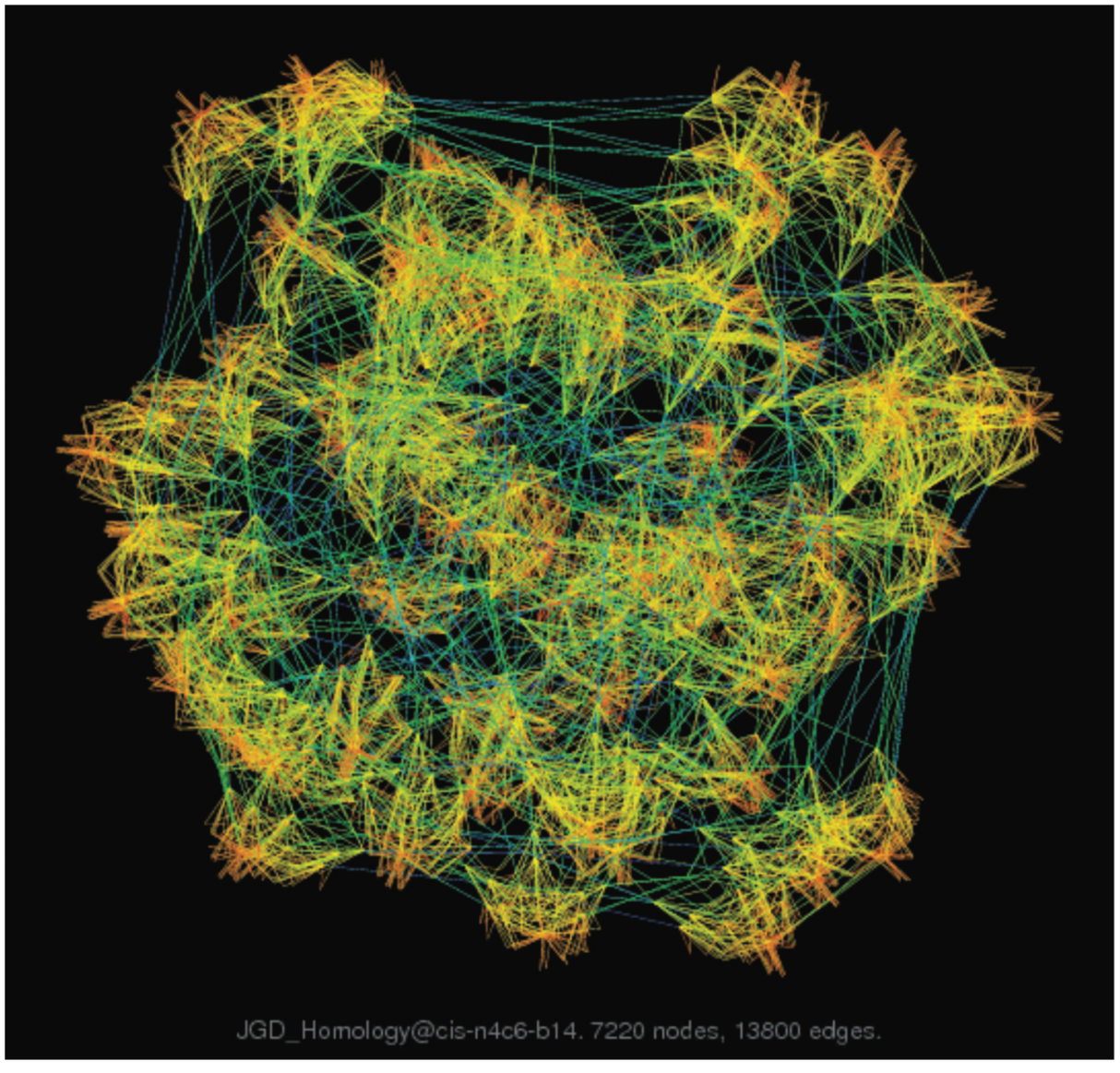
(b)

Figure 9.3. Two layouts of a 5161-node tree. (a) Rectangular horizontal node–link layout. (b) BubbleTree node–link layout.

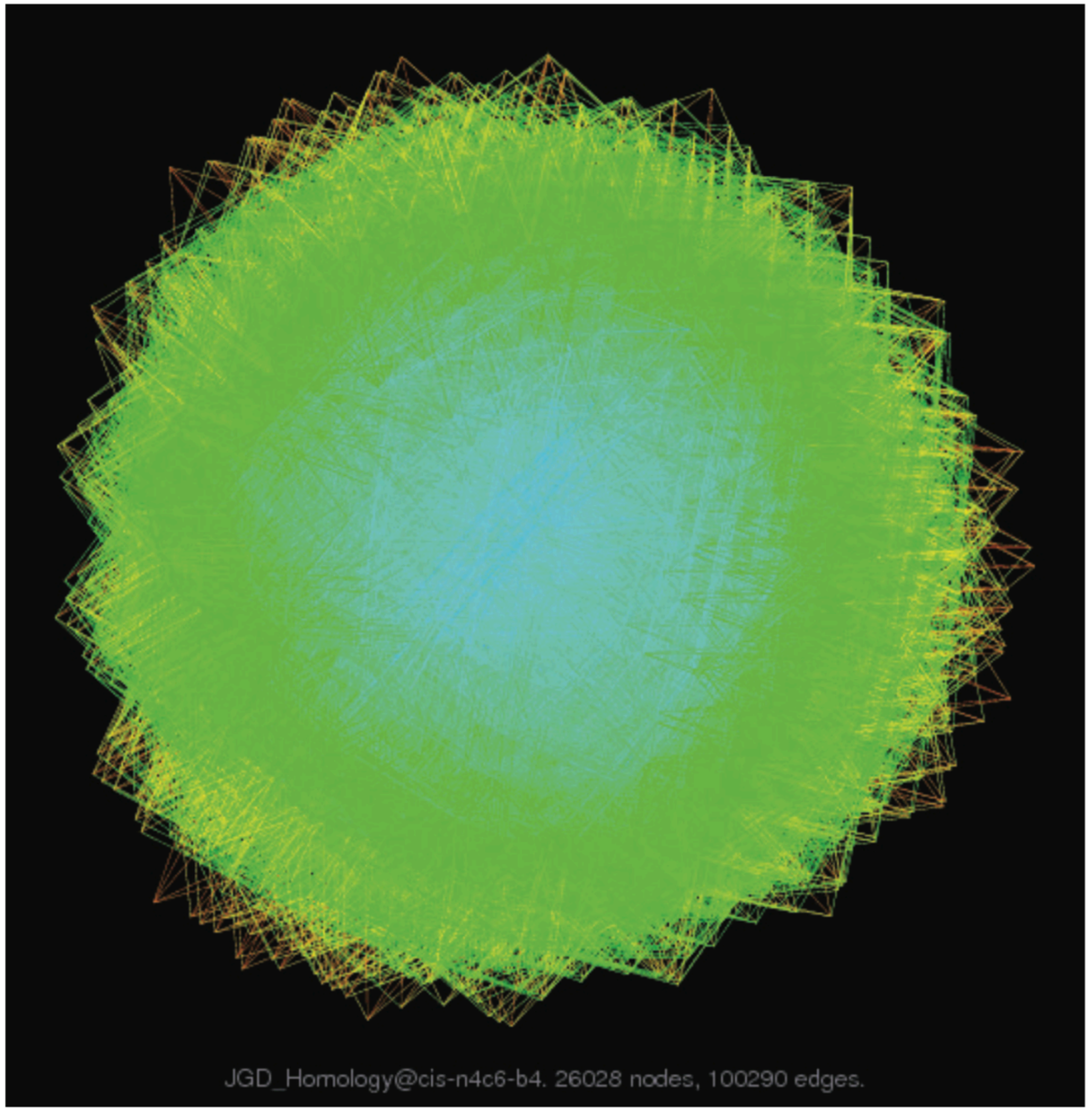


(a) (b)

Figure 9.4. Node–link layouts of small networks. (a) Force-directed placement of small network of 75 nodes, with size coding for link attributes. (b) Larger network, with size coding for node attributes. From http://bl.ocks.org/mbostock/4062045 and http://bl.ocks.org/1062288.



(a)



(b)

Figure 9.5. Multilevel graph drawing with sfdp [Hu 05]. (a) Cluster structure is visible for a large network of 7220 nodes and 13,800 edges. (b) A huge graph of 26,028 nodes and 100,290 edges is a "hairball" without much visible structure. From [Hu 14].

Matrix View

Adjacency Matrix

Derived Table

✔ NETWORKS ✔ TREES

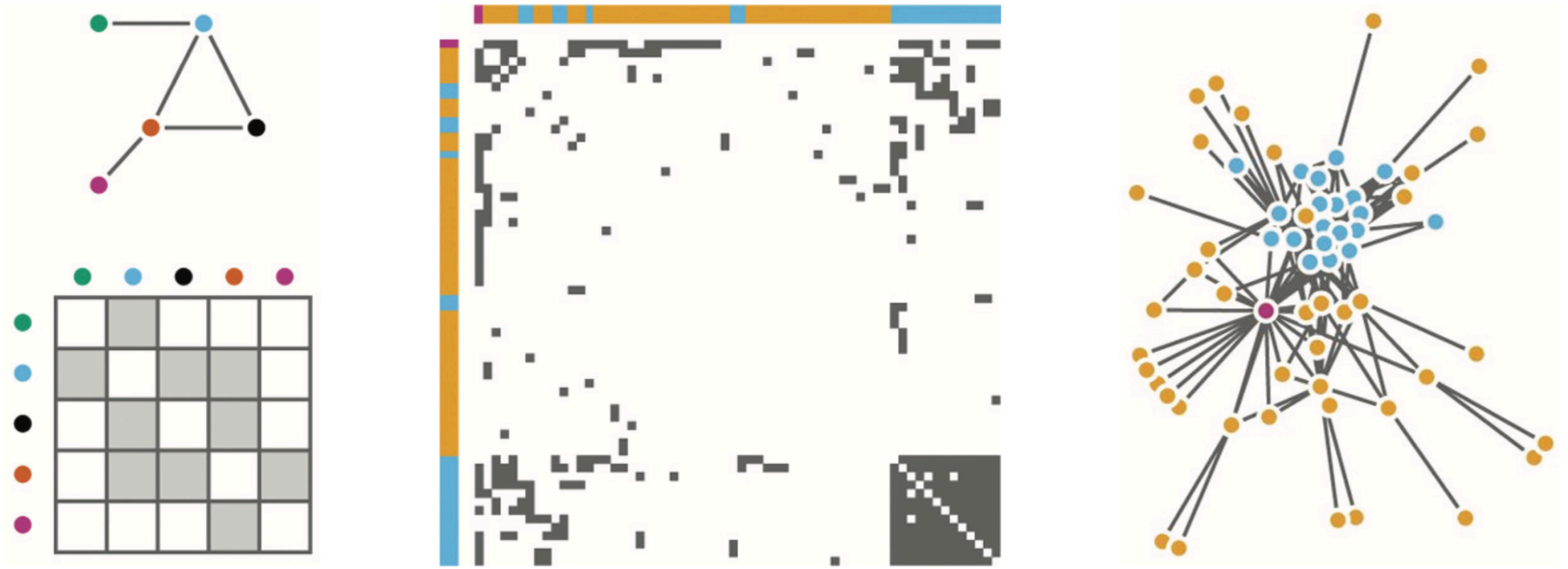


Figure 9.6. Comparing node–link matrix and matrix views of a network. (a) Node–link and matrix views of small network. (b) Matrix view of larger network. (c) Node–link view of larger network. From [Gehlenborg and Wong 12, Figures 1 and 2].

Connection vs Matrix

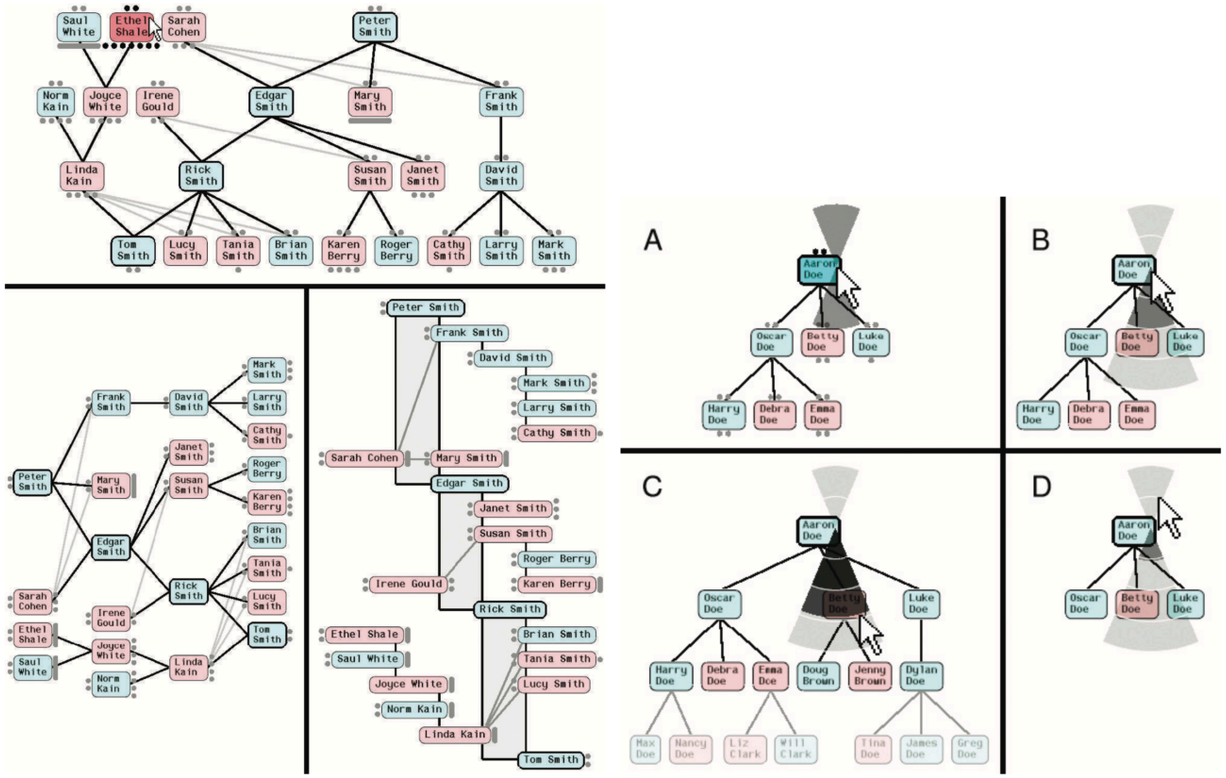


Figure 4.6. Genealogical graphs. (a) Three layouts for the dual-tree: classical node–link top-to-bottom at the top, classical left-to-right on the left, and the new indented outline algorithm on the right. (b) Widget for subtree collapsing and expanding with ballistic drags. From [McGuffin and Balakrishnan 05, Figures 13 and 14].

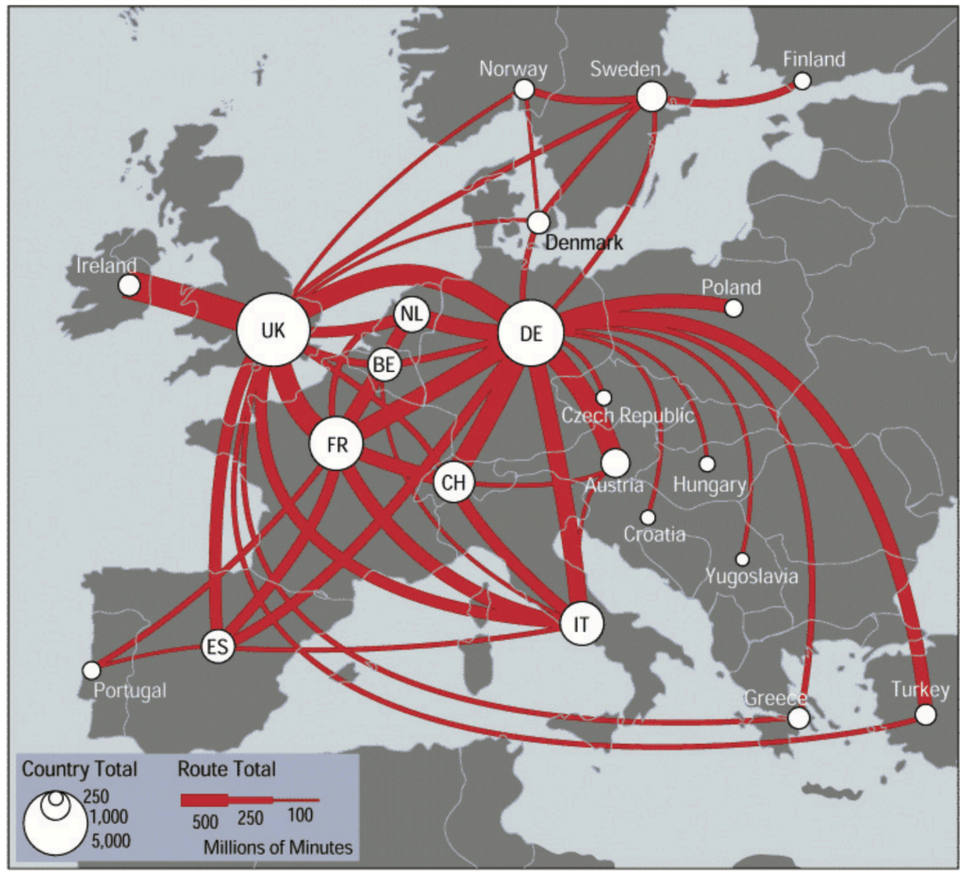


Figure 5.9. Linewidth has a limited number of discriminable bins.

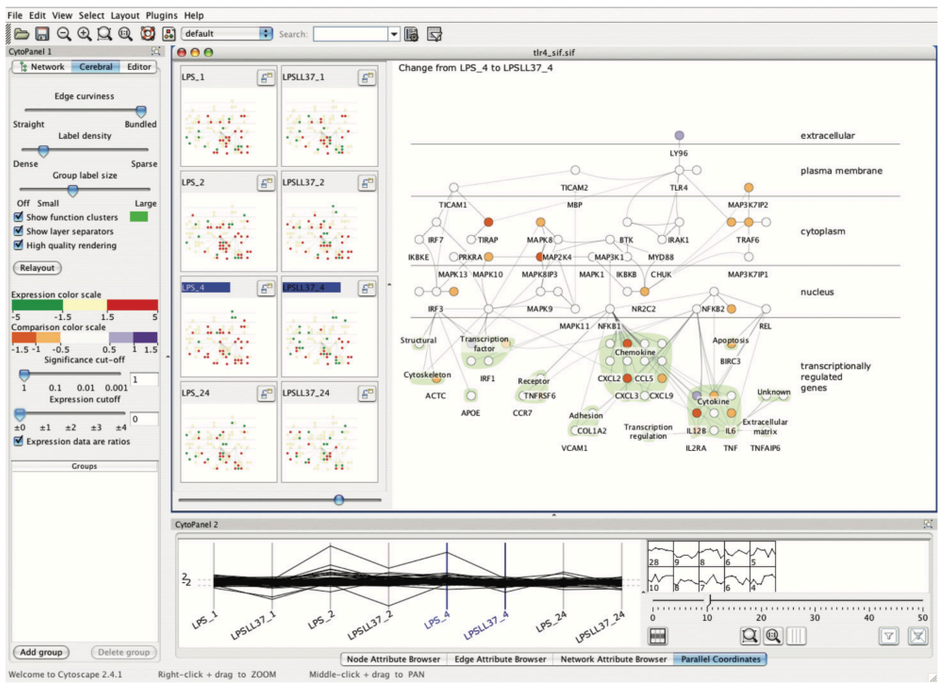


Figure 12.5. Cerebral uses small-multiple views to show the same base graph of gene interactions colored according to microarray measurements made at different times. The coloring in the main view uses the derived attribute of the difference in values between the two chosen views. From [Barsky et al. 08, Figure 2].

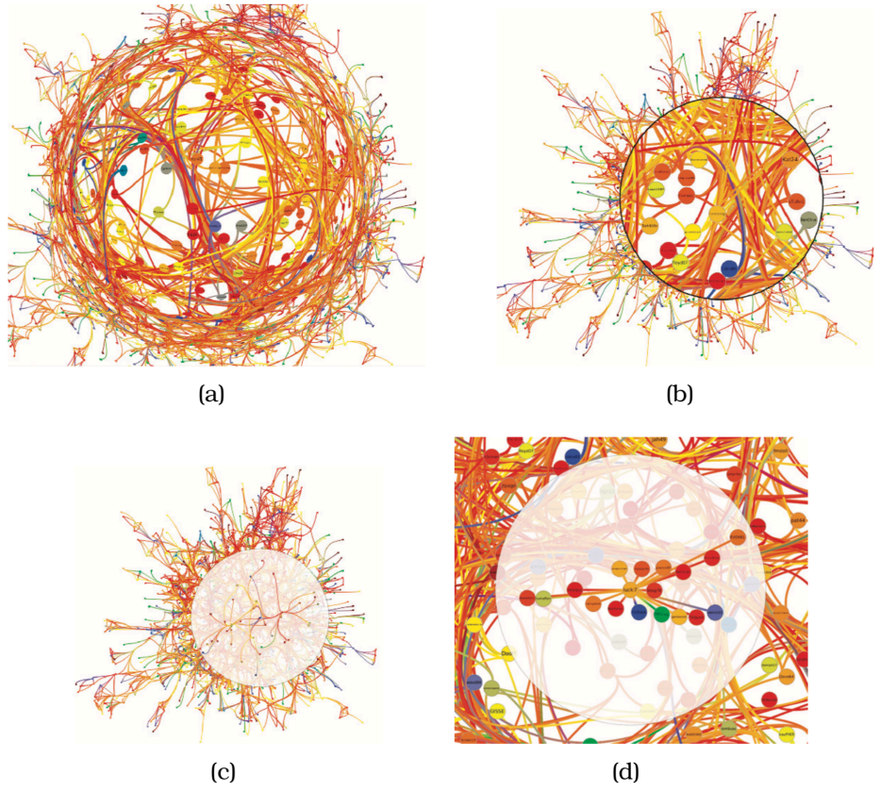


Figure 14.10. Four approaches to graph exploration. (a) Fisheye lens. (b) Magnifying lens. (c) Neighborhood highlighting with layering. (d) Neighborhood highlighting with both layering and Bring and Go interaction. From [Lambert et al. 10, Figures 2a, 2b, 3b, and 4b].

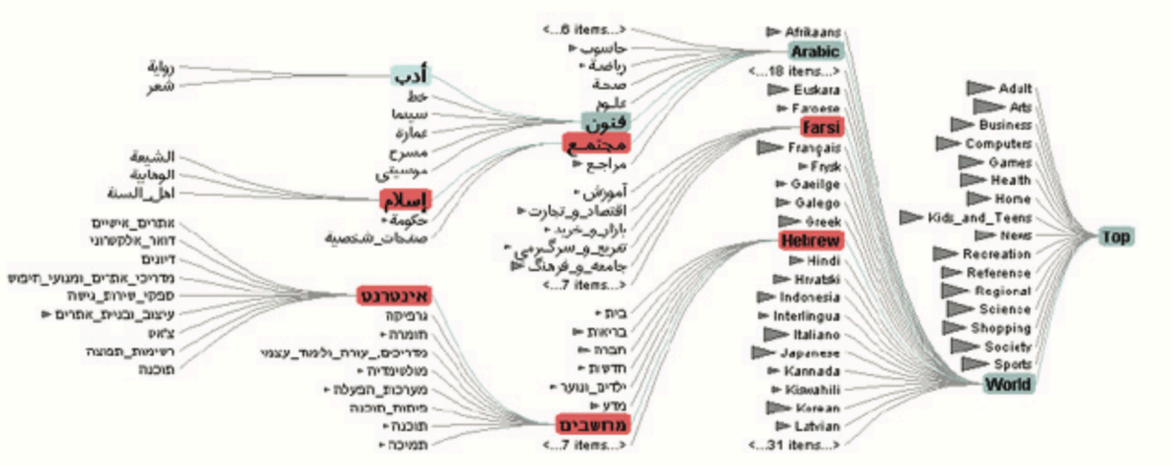


Figure 14.2. DOITrees Revisited uses elision to show multiple focus nodes within context in a 600,000 node tree. From [Heer and Card 04, Figure 1].

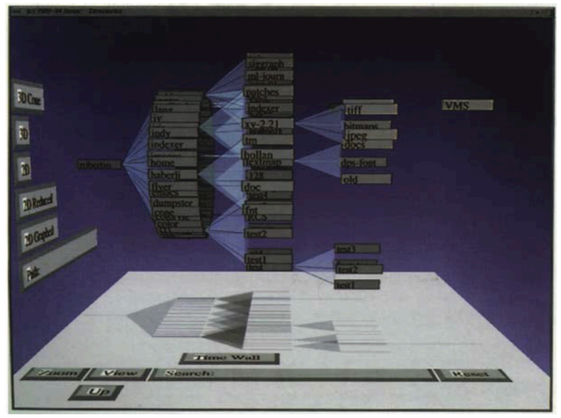
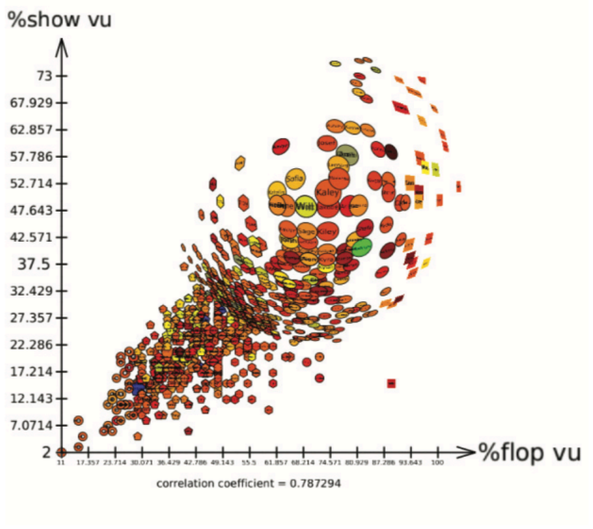
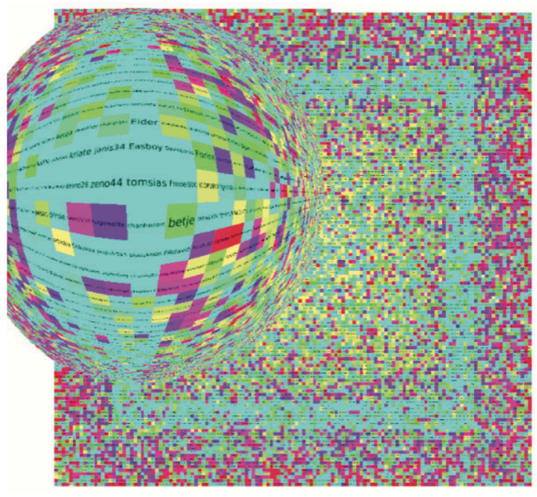


Figure 14.4. The Cone Tree system used 3D perspective for focus+context, providing a global distortion region with a single focus point, and using standard geometric navigation for interaction. From [Card and Mackinlay 99, Figure 10].



(a)



(b)

Figure 14.5. Focus+context with interactive fisheye lens, with poker player dataset. (a) Scatterplot showing correlation between two strategies. (b) Dense matrix view showing correlation between a specific complex strategy and the player's winning rate, encoded by color.

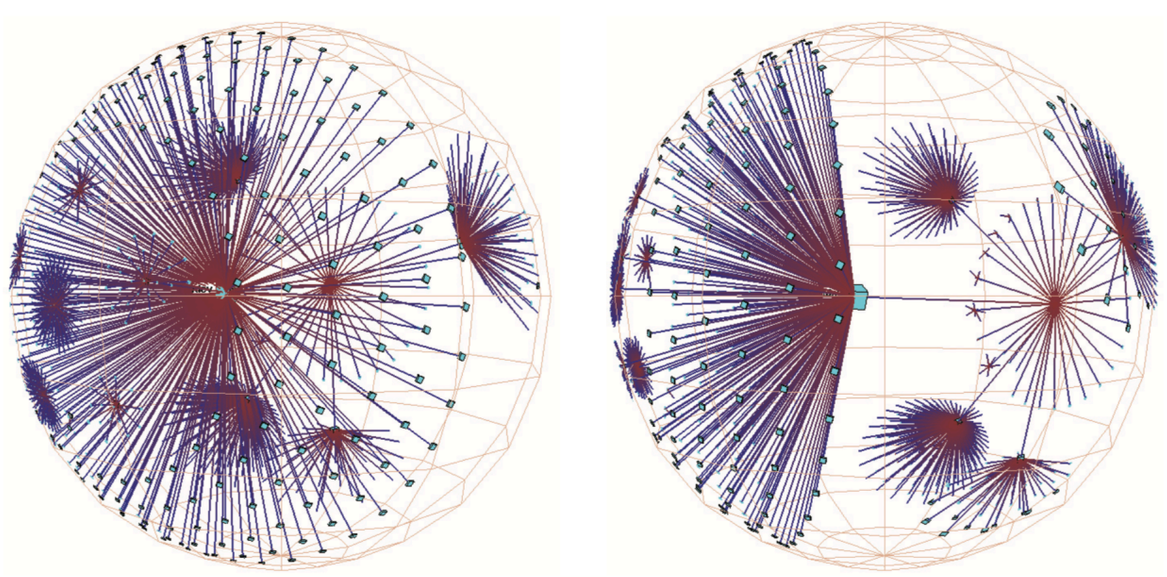


Figure 14.6. Animated transition showing navigation through 3D hyperbolic geometry for a file system tree laid out with the H3 idiom, where the first three frames show hyperbolic translation changing the focus point and the last three show standard 3D rotation spinning the structure around. From [Munzner 98, Figure 3].

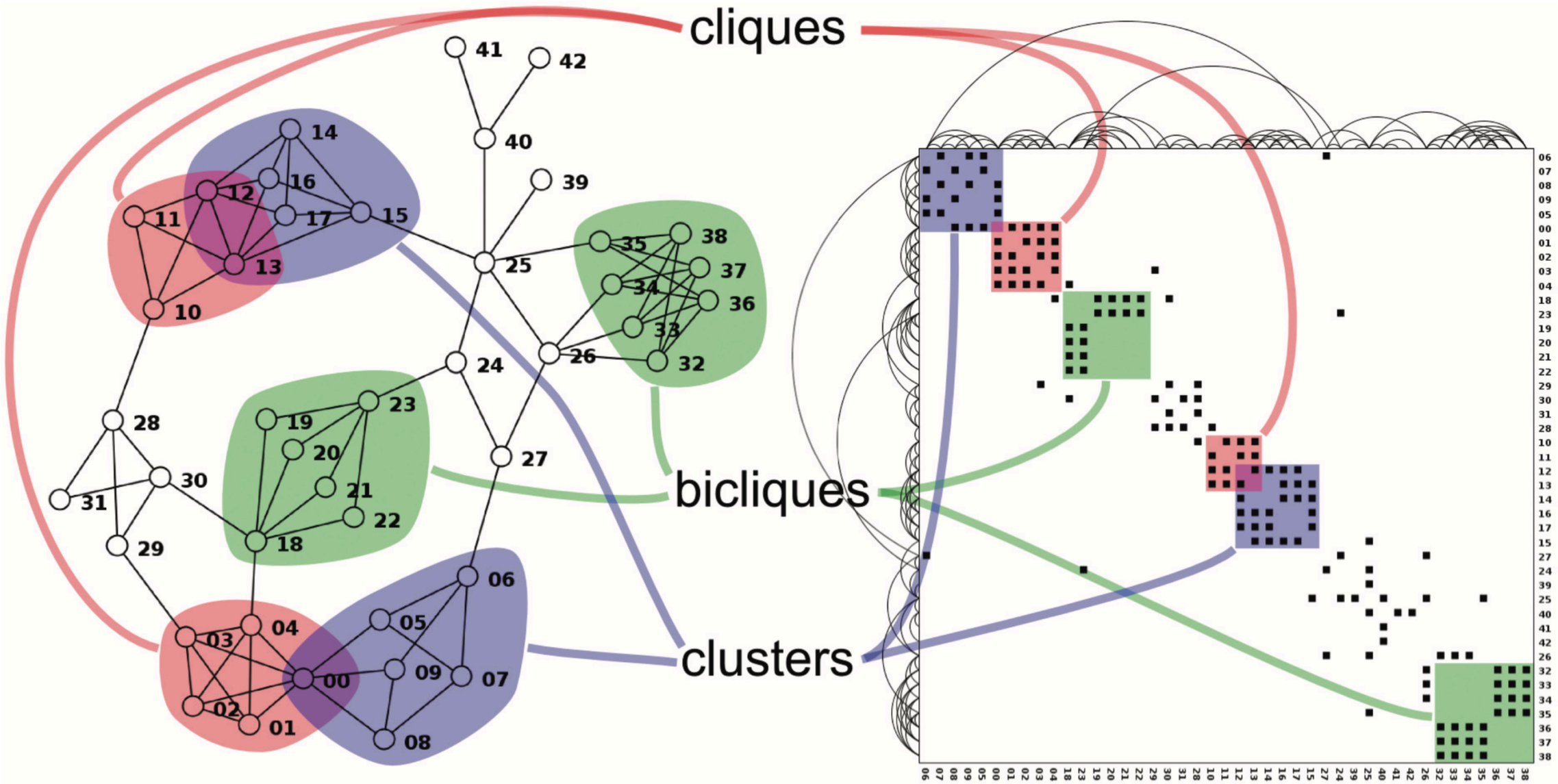


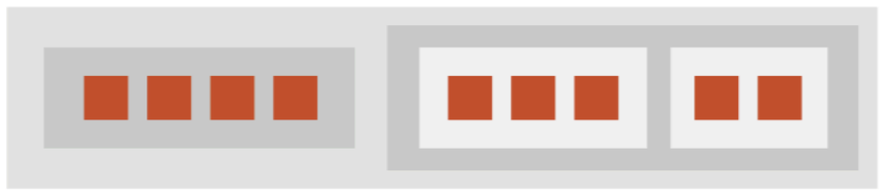
Figure 9.7. Characteristic patterns in matrix views and node–link views: both can show cliques and clusters clearly. From [McGuffin 12, Figure 6].

Containment:
Hierarchy Marks

Enclosure

Containment Marks

✕ NETWORKS ✓ TREES



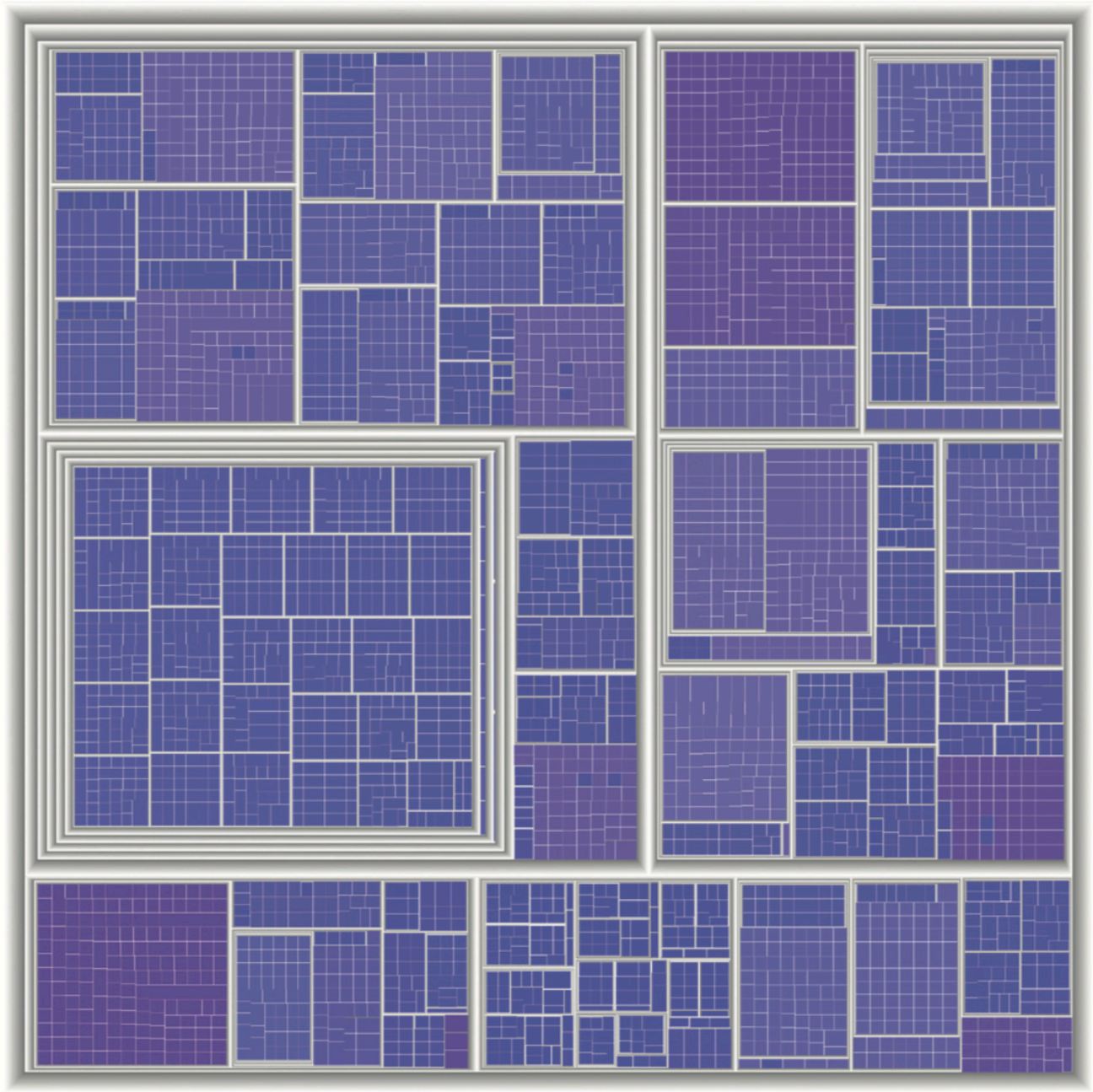


Figure 9.8. Treemap layout showing hierarchical structure with containment rather than connection, in contrast to the node–link diagrams of the same 5161-node tree in Figure 9.3.

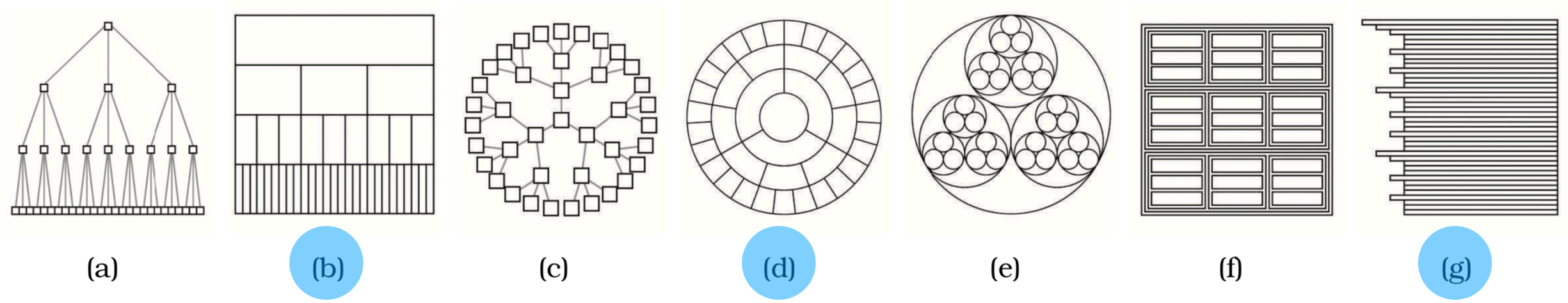


Figure 9.9. Seven visual encoding idioms showing the same tree dataset, using different combinations of visual channels. (a) Rectilinear vertical node–link, using connection to show link relationships, with vertical spatial position showing tree depth and horizontal spatial position showing sibling order. (b) Icicle, with vertical spatial position and size showing tree depth, and horizontal spatial position showing link relationships and sibling order. (c) Radial node–link, using connection to show link relationships, with radial depth spatial position showing tree depth and radial angular position showing sibling order. (d) Concentric circles, with radial depth spatial position and size showing tree depth and radial angular spatial position showing link relationships and sibling order. (e) Nested circles, using radial containment, with nesting level and size showing tree depth. (f) Treemap, using rectilinear containment, with nesting level and size showing tree depth. (g) Indented outline, with horizontal spatial position showing tree depth and link relationships and vertical spatial position showing sibling order. From [McGuffin and Robert 10, Figure 1].

親子関係がリンクも包含もされていない表現

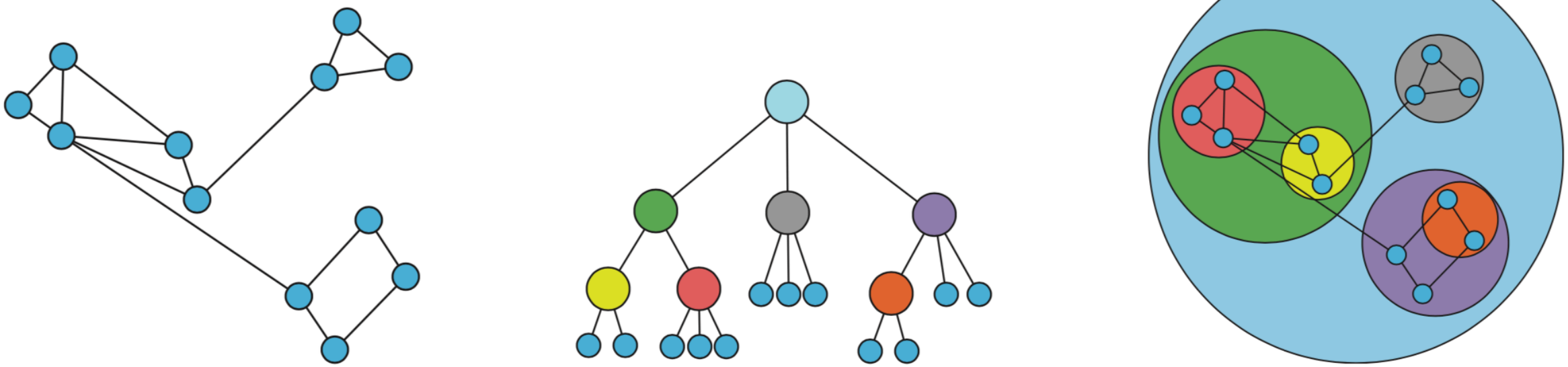


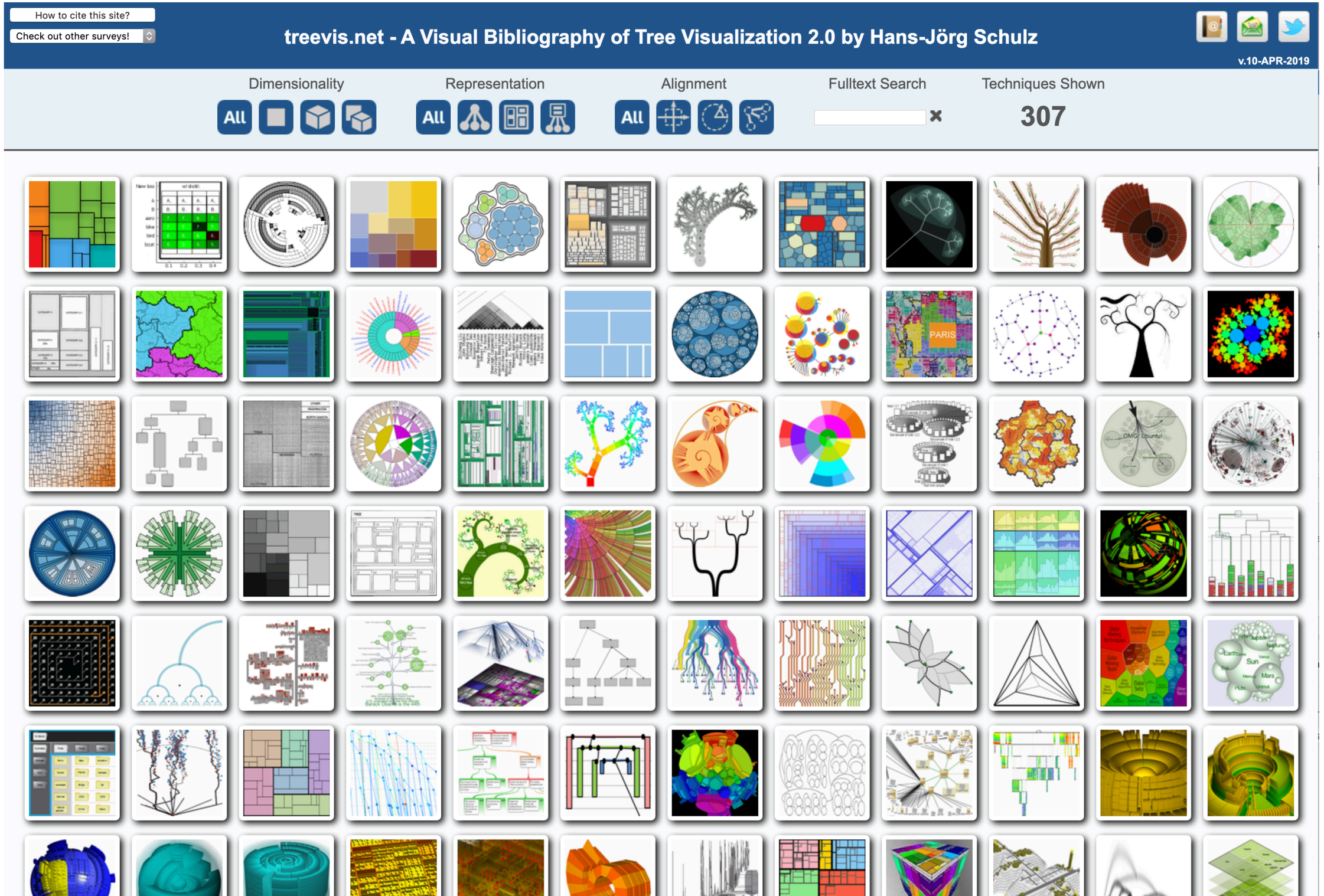
Figure 9.10. GrouseFlocks uses containment to show graph hierarchy structure. (a) Original graph. (b) Cluster hierarchy built atop the graph, shown with a node–link layout. (c) Network encoded using connection, with hierarchy encoded using containment. From [Archambault et al. 08, Figure 3].

参考文献

- tamara09.bib — 15の文献へのリンク
  https://www.dropbox.com/s/bjmvp7k0085391y/tamara09.bib?dl=0

- treevis.net

treevis.net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treevis.net - A Visual Bibliography of Tree Visualization 2.0 by Hans-Jörg Schulz
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Dimensionality
Representation
Alignment
Fulltext Search
Techniques Shown
All
All
All
307
PARIS
OMG Ubuntu!
Earth
Sun
Mars
Pluto
Uranus
Venus
Neptune
Data Mining Technologies
Data Mining Tools
Data Sets

例題

- treevis.net を用いて以下の技法について、Representation と Alignment を指定することで検索してみよう。
  - Radial 配置技法
  - Treemap 技法: このうち名称に Treemap を含まないものは何種類あるか
  - 植物的な配置技法の名前を列挙しなさい