Dynamic Graph Layout

- static radial layouts: known algorithms
- dynamic: little previous work
- requires: high-frequency updates, centering

minimize visual changes
stay true to current dataset structure

[video]

Animated Radial Layouts

nice abstraction, work by authors
ghosting, hiding, grouping
Animation
polar interpolation

maintain neighbor order

More Dynamic Graphs
[video]
Dynamic Drawing of Clustered Graphs
Yaniv Frishman, Ayelet Tal
InfoVis 2004 Video Proceedings

SpaceTree
focus+context tree
- animated transitions

semantic zooming
[demo]

Treemaps
containment not connection
difficulties reading

Cushion Treemaps
show structure with shading
- scale parameter controls global vs. local

Cushion Treemaps
application
- SequoiaView, Windows app
- hard drive usage
- http://www.win.tue.nl/sequoiaview/
Small-World Networks
high clustering, small path length
- vs. random uniform distribution

examples
- social networks
- movie actors
- Web
- software reverse engineering

multiscale small-world networks
- exploit these properties for better layout

Strength Metric
strength: contribution to neighborhood cohesion
calculate for each edge based on
- edge’s POV partition of graph: one, other, both

Strength via Cycles
3-cycles through (u,v) + 4-cycles through (u,v)

Cycles: Cohesion Measure
3-cycles through u/v
- blue + 2 red edges == yellow nodes in both

all other 3-cycles don’t contain blue u/v edge
- magenta edges impossible
- back, red/green, red/black, etc
Cycles: Cohesion Measure

4-cycles through u/v
- blue + 2 red + 1 green
- blue + 2 red + 1 cyan

s(AB) = existing edges between sets
all possible edges between sets

Strength

4-cycles [green edges]
- one-both, other-both, one-other
- s(M(u),W(u,v)) + s(M(v),W(u,v)) + s(M(u),M(v))

4-cycles [cyan edges]
- both-both
- s(W(u,v))

3-cycles [yellow nodes in both]
- |W(u,v)| / (|M(u)| + |M(v)| + |W(u,v)|)

Hierarchical Decomposition

remove low-strength edges
maximal disconnected subgraphs
quotient graph: subgraph = higher-level node

Nested Quotient Graphs

Clustering Quality Metric

automatically determine how many clusters
Critique

pros
- exploit structure of data
- hierarchical structure shown visually
- automatically determine number of clusters
- nifty math

CONS
- information density could be better
- what if mental model doesn't match clustering
- metric?