Pushing the Scale of Radial Graph Drawing

Presentation by Cody Robson
Radial Graph Drawing Recap

• Radial placement lays out graph as a tree
• Focused node treated as root
• Radians of circles divided amongst children

Wills, NicheWorks – Interactive Visualization of Very Large Graphs
Journal of Computational and Graphical Statistics, Vol 8 No 2, 190-212
Animated Exploration of Dynamic Graphs with Radial Layout

Yee et al. Proc Info Vis 2001
My Goals

- Technique-driven
- Start with Yee et al.’s feature set
- Add extensions to aid with scaling
Features of Yee et al.

**Technique Features**

- Animated focus transitions
- Interpolating Polar Coordinates
- Slow-in Slow-out
- Graph Orientation Constraint
- Constrained Neighbor Ordering

**Data Features**

- Dynamic Node Addition/Subtraction
- Dynamic Node Sizes
Scaling of Yee et al.

• Nodes bunch up on wider rings
• Large Transitions are a mess
• Terrible at leaf nodes of trees
Polar Interpolation

Motivation: Avoid massive intersection

My extension: Dropping orientation at the origin
Slow in Slow out

Yee et al.: Arctangent position function

Me: Quadratic velocity function
Orientation Constraint

Motivation: Reduce rotational travel

Maintain direction of edge between new focus and parent
Consistent Neighbor Ordering

Easy: Node’s old tree children remain ordered

Harder: Node’s new tree children remain ordered
Extensions of Yee et al.

Two proposed extensions:
• Intermediate focus transitions
• Node aggregation
Transition Series

Focus walks along shortest path

- One / two / \( n \) node jump
- 33% / 50% node jump

Slow-in Slow-out for each transition!
Node Aggregation

Cluster nodes or sub trees?

SpaceTree’s *Triangular Preview*
- Should scale logarithmically
- Straight Lines for single-width paths

Consider effects on radial layout!
Radial Layout of Trees
Radial Layout of Trees
Radial Layout of Trees
My Extensions

• Fade-in / fade-out animation
• Focus + Context
• Pan and Zoom
• Aesthetics
Fade-in Fade-out

Clustering hides:
• Nodes
• Edges

Clustering creates:
• Triangular Previews

Slow-in Slow-out?
Focus + Context

Rings’ radius scale with log function

Eventually clustering takes over anyway
Pan and Zoom

Transition ~ pan?

van Wijk et al. Smooth and Efficient Zooming and Panning
Proc from InfoVis 2003 pages 21-30
Aesthetics

• Modern hardware: no excuse for quality compromises

• Rendering at all scales should be considered
Node Drawing

Imposter Rendering:
- Replace geometry with billboards
- Calculate normals exactly
- Use “real” lighting

Tarini et al. *QuteMol* IEEE Vis 2006
Label Rendering

Lots of OpenGL font libraries…

FTGL

Pixmaps (AntiAliased):
• Look great at all scales
• Expensive

Henry Maddock, ftgl.wiki.sourceforge.net
Results