Pushing the Scale of Radial Graph Drawing

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

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

Consider effects on radial layout!
**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

**Focus + Context**
- Rings’ radius scale with log function
- Eventually clustering takes over anyway

**Pan and Zoom**
- Transition ~= pan?

**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

**Label Rendering**
- Lots of OpenGL font libraries…
  - FTGL
- Pixmaps (AntiAliased):
  - Look great at all scales
  - Expensive

**Results**