

# Animated Exploration of Dynamic Graphs with Radial Layout

Authors

Ka-Ping Yee, Danyel Fisher, Rachna Dhamija, Marti Hearst

University of California, Berkeley



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Ketan Mane

## Animated Radial Layout Viz.

- ❖ Introduction
- ❖ Methods
- ❖ Animation technique
- ❖ Application
- ❖ Conclusion

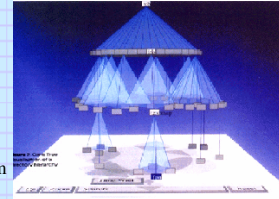


### Animated Radial Layout Viz.:

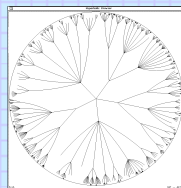
- ❖ Presence of interactive data visualization provides a new insight in the data exploration process

- ❖ Different layout algorithms:

- ❖ Cone Tree
  - ❖ Hyperbolic Tree
  - ❖ Radial Layout
  - ❖ H3 System
- } Hierarchical data format
- : Hierarchical/Generic Layout Algorithm
- : Generic Layout Algorithm



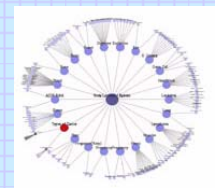
Cone Tree Layout



Radial Layout



H3 Layout (3D Hyperbolic)

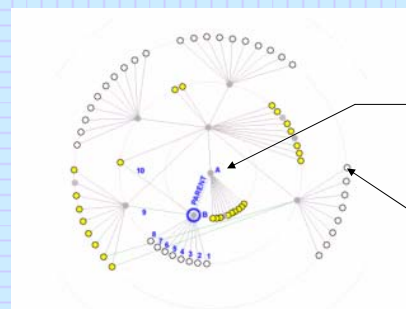


Hyperbolic Layout

### Animated Radial Layout Viz.:

- ❖ Radial Layout:

- ❖ Layout of information on concentric circles
- ❖ The graphics get re-arranged around the focus node
- ❖ Papers' Approach : - to apply animation technique during the re-arrangement

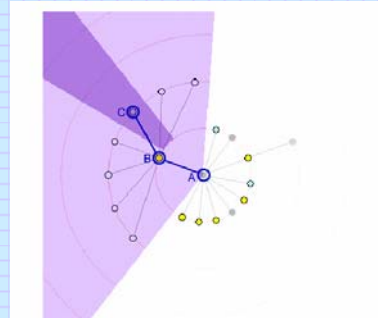


Focal Node

Node on the concentric circle

### Animated Radial Layout Viz.:

- ❖ Methods:  
{ data comprises of : parent-child relationship and non-tree neighbors }
- ❖ Radial Layout:
  - ❖ Selected node acts as a “focus node” and moves to the center of the layout
  - ❖ Breadth-first transversal performed to determine the parent-child relationships from the focus node
  - ❖ Same-level child nodes arranged in consecutive outer concentric circles from parent
  - ❖ Node angular position is a function of sector of the ring of the node
  - ❖ Child nodes of the parent nodes are arranged within this sector area



### Animated Radial Layout Viz.:

- ❖ Methods:
  - ❖ Space Allocation:
    - ❖ Content quantity determine the size of the nodes  
e.g.: - #transactions, #queries
    - ❖ Accounted for issues on node overlapping:  
- by calculating the angular width :  
$$\text{Angular width of a node} = \frac{\text{diameter of the node}}{\text{distance from the focus node}}$$
    - ❖ Choice of final angular width =  
$$\max(\text{angular width of node, total angular width of child sub trees})$$
    - ❖ Accommodate for addition/deletion of nodes with minimal layout restructuring



## Animated Radial Layout Viz.:

### ❖ Animation Techniques:

Aim: To maintaining consistency in layout and content for user during refocus

- ❖ By providing a smooth transition for relocating the selected node at the center
- ❖ Unique in maintaining the uniformity in layout – other nodes arranged in relation to other nodes
- ❖ Supports data with tree structures and associated cross-linking data (non-tree neighbors)

### ❖ Transition Paths:

- ❖ Use of rectangular co-ordinates for transition during layout, results in confusing animation and clustering of data points during rearrangement
- ❖ Exploited the polar co-ordinates for smooth animation
  - Arc motion
  - Movement on the existing circles periphery, if not changing the levels
  - Supports change in level by giving smooth spiral movement



Rectangular co-ordinates (left) v/s Polar co-ordinates (right) use in transition calculation

## Animated Radial Layout Viz.:

### ❖ Animation Techniques:

Two constraints were applied to maintain consistency

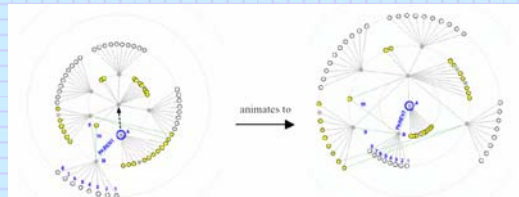
- ❖ Reduction in rotational time during transition phase
  - accomplished by maintaining the same direction for the edge connecting the focal node and its parent node

Fig (Right): Node A is selected to become the new focus. The orientation of edge AB is maintained



- ❖ Avoid edge cross-over condition among non-tree neighbor nodes
  - tracking connected node edges to the parent node and laying out by proceeding in clockwise direction
  - level integrity maintained

Fig (Right): Node A becomes the new focus. The ordering of node B's neighbors is preserved



## Animated Radial Layout Viz.:

### Animation Techniques:

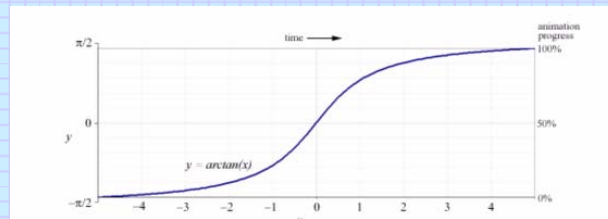
#### Animation Timing:

- use of arctangent function as compared to straight linear timing during transition

#### Features of Arctangent function (Graph) :

- Initial slow starts
- smooth acceleration in the center
- decelerate at the end

Smooth transition helps user to keep track of the nodes of interest



Arctangent function (Slow-in, slow-out animation timing)

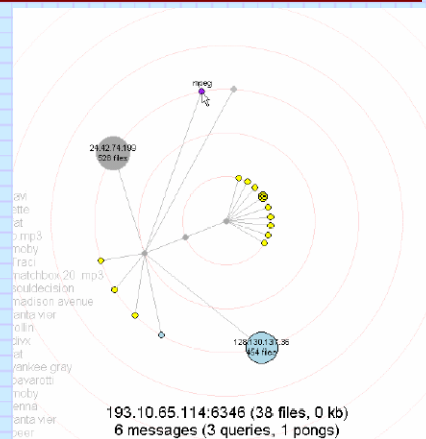
## Animated Radial Layout Viz.:

### Applications:

#### Gnutellavision: File-sharing Network

Previously visualization layout - static

- Dynamic animation features added:
- Status – through color feedback
- Operation capacity – through circle size
- Query – display of keyword above the circle
- Query origin and transition among network – through color-coding the receiving nodes and edges



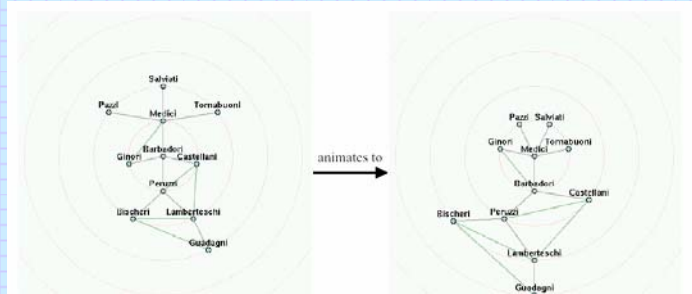
## Animated Radial Layout Viz.:

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Applications:

### Social Network:

- Provides an overview of the relationships between different nodes
- Helpful in quick interpretation of the social structure at a glance



## Animated Radial Layout Viz.:

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AVI movie

Conclusion:

The animation applied provided a user-friendly techniques for interactively exploring graphs in a focus-plus-context style

