Tree Visualization: Layered Diagrams and Treemaps

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Why we need Trees?

Hierarchies

- used in File System and web sites.

Branching Processes

- used in Genealogy and lineages.

Decision Processes

- used in Decision Trees and tournaments.

Tree Visualization

- Determining the spatial arrangements of nodes and links.
- To effectively represent the hierarchy,connectivity and partitions.

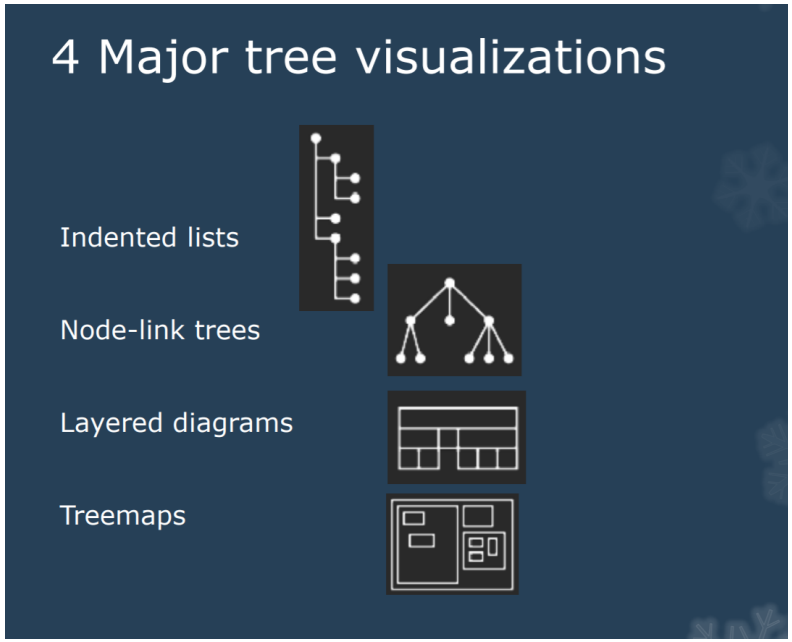


Figure: Tree Visualization have 2 Major Representations: a)Node-link (1,2) b)Space-Filling (3,4)

Advantages of Space-Filling Representation over Node-link

Potential Problem with Node-link

1. For top-down, width of fan-out uses up horizontal real estate very quickly.
   - At level n, there are 2n nodes.
2. Tree might grow a lot along one particular branch.

Space-Filling Representation

1. Each item occupies an area.
2. Children are contained under parent, They use the property of enclosure/containment to show parenthood.

Layered Diagrams

1. Signify tree structure using
   - Layering
   - Adjacency
   - Alignment
2. Involves recursive subdivision of space.
3. examples: Sunburst and icicle.

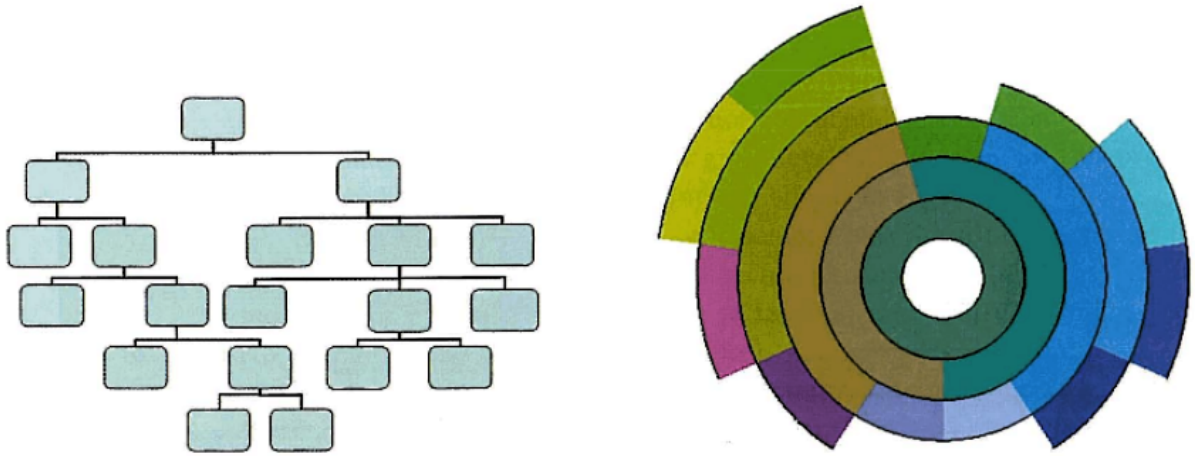


Figure 8.4. A sample hierarchy and the corresponding sunburst display.

Layered Diagrams Contd...

Sunburst

- Radial space-filling hierarchy visualizations.
- Root of the hierarchy in the center of the display and use nested rings to convey the layers of the hierarchy.
- Ring is divided based on the number of nodes at that level.

Icicle

- Layered "icicle" diagrams that use alignment/adjacency..
- so called because it resembles a row of icicles hanging from the eaves of a house.

Layered Diagrams: Sunburst and Icicle

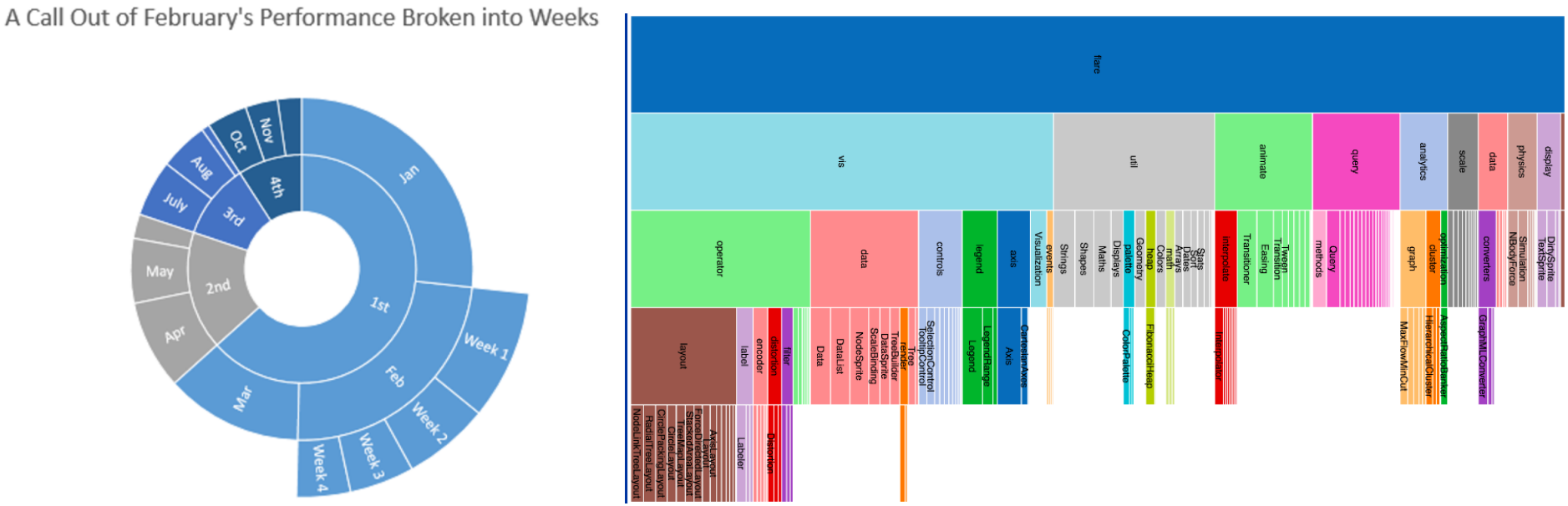


Figure: Layered Diagrams: Sunburst and icicle.

Treemaps

A diagram representing hierarchical data in the form of nested rectangles, the area of each corresponding to its numerical value.

- Children are drawn inside their parent.
- Alternate horizontal and vertical slicing at each successive level based on the populations of the sub-trees at a given level.
- Use area to encode other variable of data items.

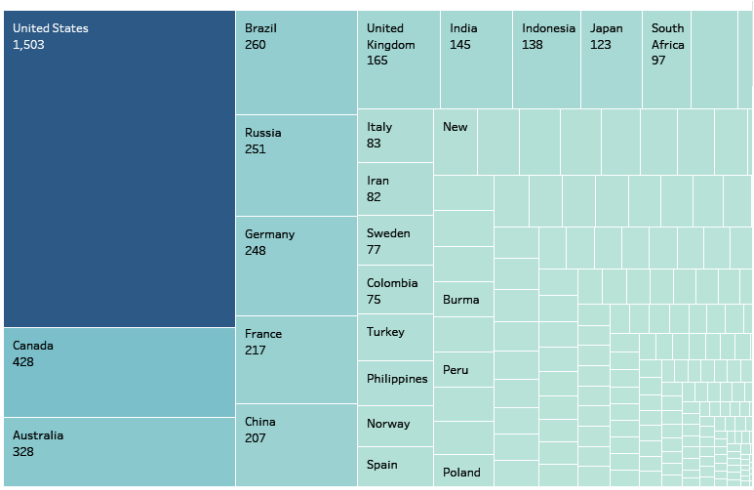
Benefits:

- Provides a single view of entire tree.
- Easier to spot large/small nodes.

Problems:

- Difficult to accurately read depth.

Treemaps Contd...



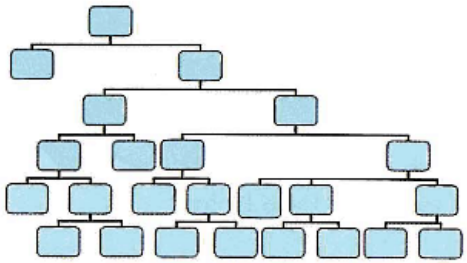


Figure 8.2. A sample hierarchy and the corresponding treemap display.

Figure: a) Showing Number of Airports across a Country. b) Hierarchy and corresponding treemap display.

Applications of Space-filling Representation

Layered Diagrams

- Company hierarchy, it can also break data down by time periods, creating a historical hierarchy.
- Various branches of an organization can be represented by designated hues, with different levels often taking on varying shades of the same color family.

Treemaps

- Can use Treemap idea for a variety of domains like Basketball statistics,Stock Market.
- See how U.S. presidential candidates compare with previous Presidents.

Conclusion

Layered Diagrams

- Layered give full picture of the hierarchy unlike treemaps, which assign most screen space to conveying the terminal nodes, radial techniques also show the intermediate nodes.
- Layered adds the dimension of depth to each parent branch missing in Treemaps.

Treemaps

- Treemaps, by their rectangular nature, are better suited for comparison among hierarchical levels.
- Treemaps are optimized to show lots of data, because it stretches to within its bounding box.