
Information Visualization

Some Examples

- Hans Rosling – [Developing World](#) (2006)
 - Hans Rosling ([2007](#))
 - Smart Money [Market Map](#)
 - [Visual Complexity](#)
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The Challenge

- Huge quantities of data
 - How to know what questions to ask?
 - Identify
 - Trends
 - Patterns
 - Outliers

 - Goals
 - Communication
 - Discovery
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Information Visualization

- Provide tools that present data in a way to help people understand and gain insight from it
- Cliches
 - “Seeing is believing”
 - “A picture is worth a thousand words”

“The use of computer-supported, interactive, visual representations of abstract data to amplify cognition.”

Information Visualization

- Information Visualization
 - Items, entities, things which do not have a direct physical correspondence
 - Examples: baseball statistics, stock trends, connections between criminals, car attributes...

- Scientific Visualization
 - Primarily relates to and represents something physical or geometric
 - Examples
 - Air flow over a wing
 - Stresses on a girder
 - Weather over Pennsylvania

Key Attributes

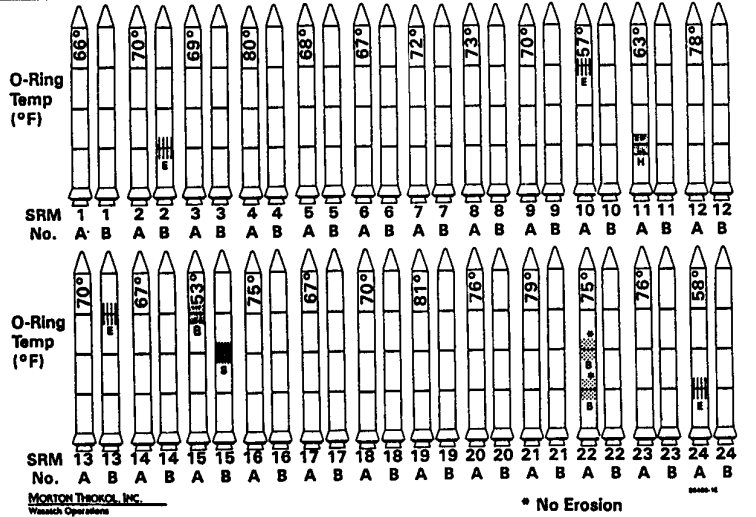
- Scale
 - Challenge often arises when data sets become very large

- Interactivity
 - Want to show multiple perspectives on the data

- Tasks
 - Want to support specific tasks
not just to create a cool demo
 - Support discovery, decision making, explanation

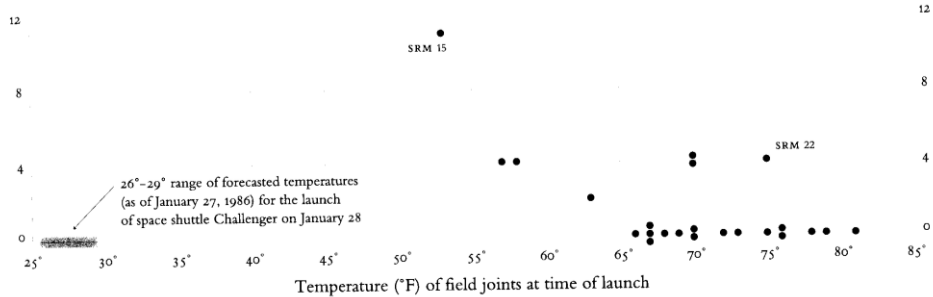
What's the Big Deal?

History of O-Ring Damage in Field Joints (Cont)



INFORMATION ON THIS PAGE WAS PREPARED TO SUPPORT AN ORAL PRESENTATION AND CANNOT BE CONSIDERED COMPLETE WITHOUT THE ORAL DISCUSSION

O-ring damage index, each launch



Presentation is everything!

“First” Visualization Success Story



Illustration of John Snow's deduction that a cholera epidemic was caused by a bad water pump, circa 1854.

Dots indicate location of deaths.

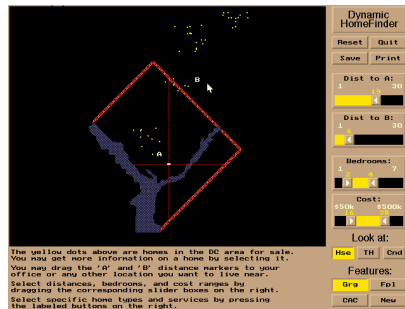
From Visual Explanations by Edward Tufte, Graphics Press, 1997

Slide from [Marti Hearst](#)

First modern “Info Vis” HomeFinder

Visual Information-Seeking Mantra
Shneiderman

“Overview first,
Zoom and Filter
Details on Demand”



The yellow dots above are homes in the DC area for sale. You may get more information on a home by selecting it. You may drag the 'A' and 'B' distance markers to your office or any other location you want to live near. Select distances, bedrooms, and cost ranges by dragging the corresponding slider boxes on the right. Select specific home types and services by pressing the labeled buttons on the right.

HCIL
Univ. Maryland
1992

[Video](#)

Hierarchies (Trees)

- Definition
 - Data repository in which cases are related to subcases
- Pervasive
 - Family histories, ancestries
 - File/directory systems on computers
 - Organization charts
 - Animal kingdom: Phylum, ..., genus, ...
 - Object-oriented software classes
 - ...

Trees

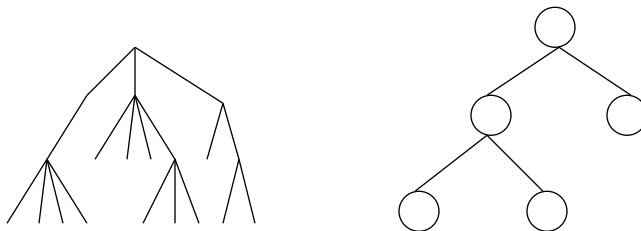
- Two main representation schemes
 - Node-link
 - Space-filling
- Approaches to scale:
 - Complex representation
 - Navigation
 - Elide (don't show) some nodes
 - Show nodes at different sizes

Tasks

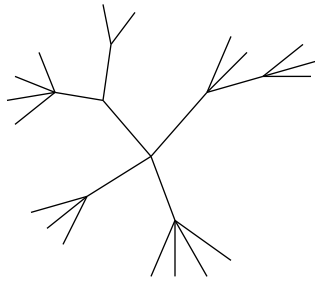
- Help understand node characteristics or tree structure?
- Some kinds of tasks:
 - Find a node
 - Revisit node
 - List node ancestors
 - Understand local topology
 - Understand global topology

Node-Link Diagrams

- Root at top, leaves at bottom is very common



Why Put Root at Top?



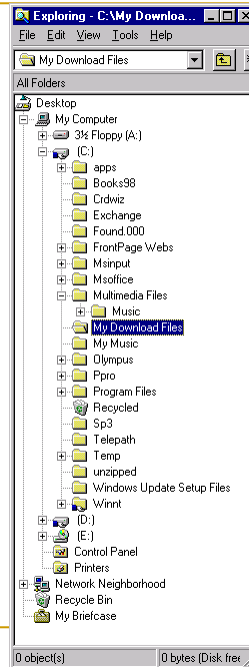
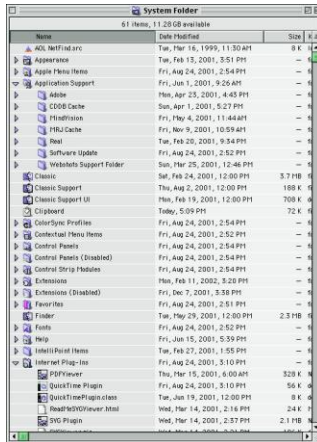
Root can be at center with levels growing outward too

Can any node be the root?

Examples

Good for?

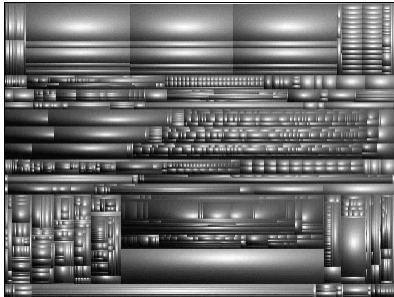
Bad for?



Variation: Cushion Treemap

Add shading and texture to help convey structure of hierarchy

Van Wijk '99



Questions

- What tasks are best supported by each vis?
- Can multidimensional data per node be portrayed?
- How does the visualization scale?
- Can users quickly understand the representation?

Doing More

- Visualize your data: [Many Eyes](#)
 - Make your own – toolkits:
 - [Piccolo](#) – Low-level structured graphics toolkit with zooming (Java, C#)
 - [Prefuse](#) – Higher level, many visualizations included (Java, Flash)
 - [The InfoVis Toolkit](#) – More sophisticated and flexible, but more “techy”.
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