

Visual Analytics

Visual Representation 1

Important Dates

- 08/31: Examples due
- 09/12: *Guest talk: Prof. Ribarsky*
- 09/12: Dataset, task due
- 09/21&26: *Paper presentations*
- 09/28: First visualization design due
- 10/3: *Design review*
- 10/12: *Mid-term*
- 10/17: Final design due

Important Dates

- 10/31: *Guest talk*
- 11/2: *Guest talk*
- 11/16: Implementation due
- 11/28: Write-up, presentation due
- 12/5: *Final presentations*
- 12/8-12/15: *Final exam*

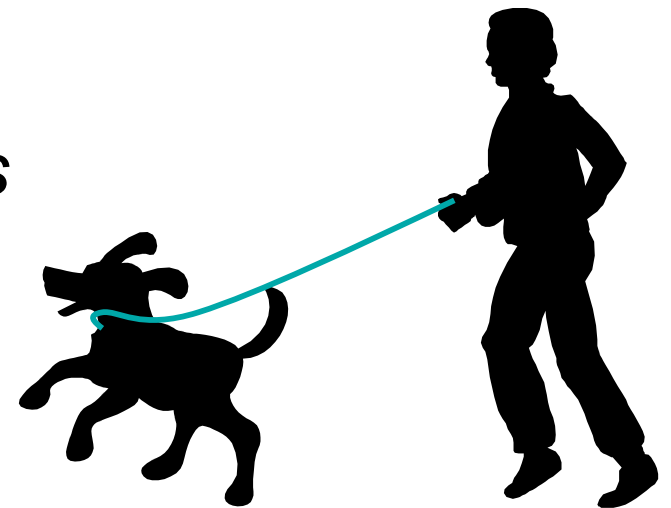
Points

- Examples: 5
- Dataset, task: 10
- Paper presentation: 10
- First design: 5
- Mid-term: 15
- Final design: 10
- Implementation: 15
- Write-up, Presentation: 10
- Exam: 20

Visual Representation

- How do you visually represent
 - data?
 - text?

*As the man walks the cavorting dog, thoughts arrive unbidden of the previous spring, so unlike this one, in which walking was marching and dogs were baleful sentinels outside unjust halls.
(Marti Hearst, May 2006)*

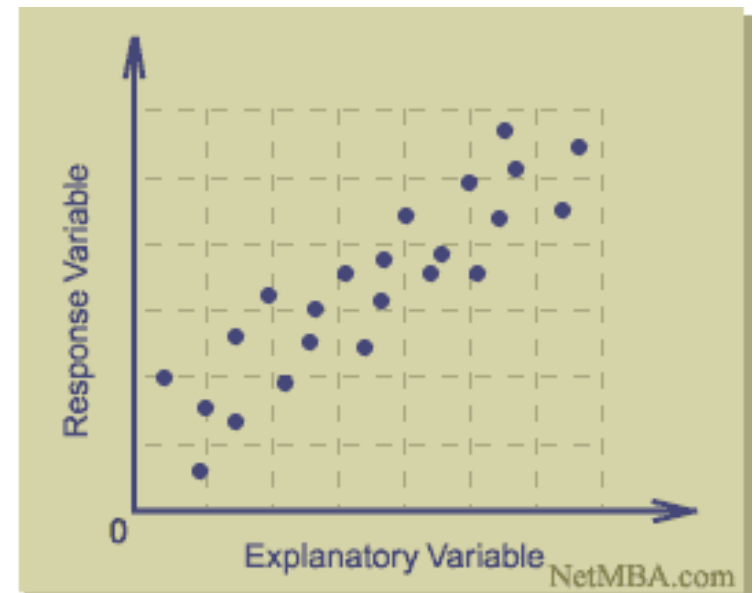


Visual Representation

- Representation by
 - Imitation?
 - Sensory likeness?
 - Abstraction?
- Specific vs. general techniques
- 2D vs. 3D
- Visual metaphors
- Amount of knowledge required

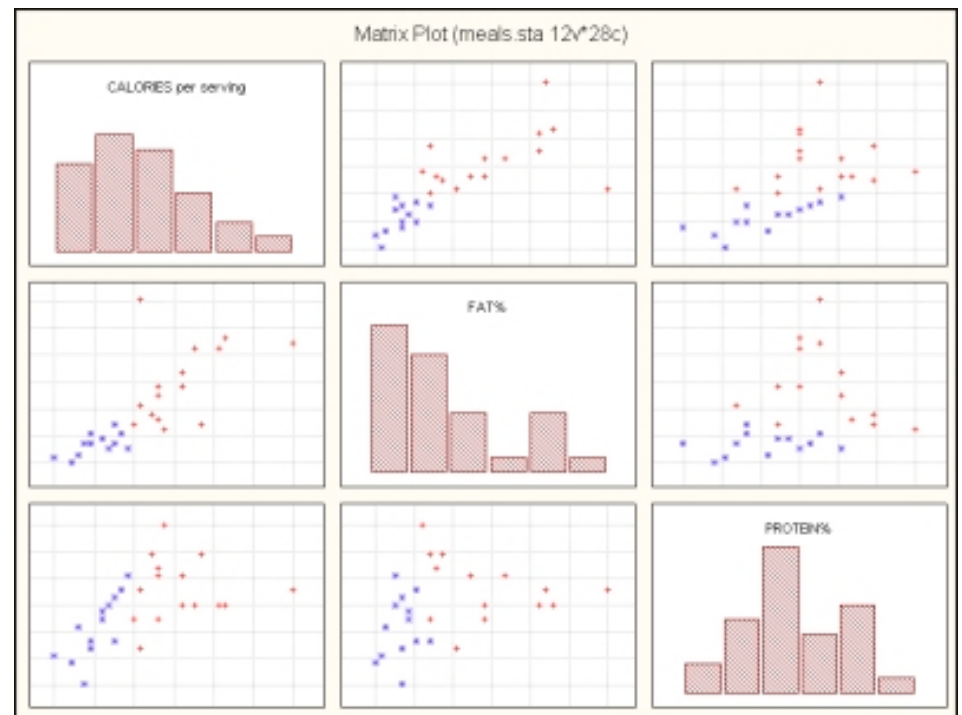
Scatterplot

- Two data axes on plane
- One point per data sample
- Find
 - Accumulation
 - Correlations
 - Trends
- Problem: overplotting



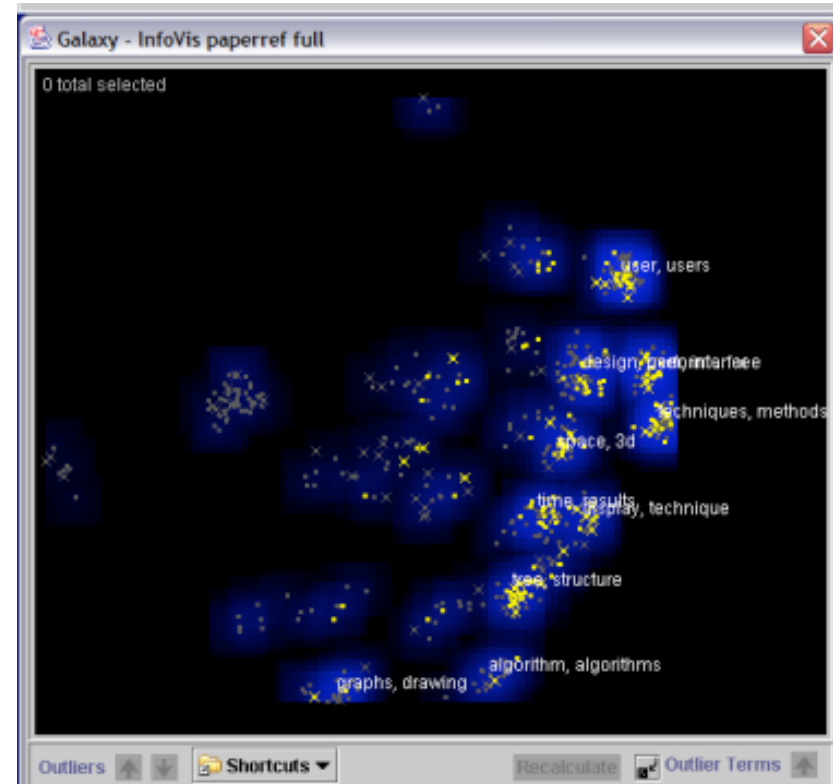
Scatterplot Matrix

- Matrix arrangement for scatterplots
- $n*(n-1)/2$ plots for n dimensions
- Diagonal often used for histograms
- Quick overview
- Little detail
- Combined with brushing



IN-SPIRE

- Effectively scatterplot of document similarities
- Requires extensive preprocessing
- Versatility of scatterplot
- Made useful by interaction

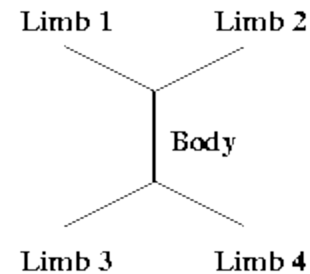
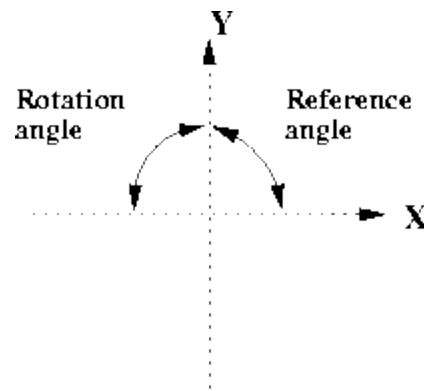


Glyphs

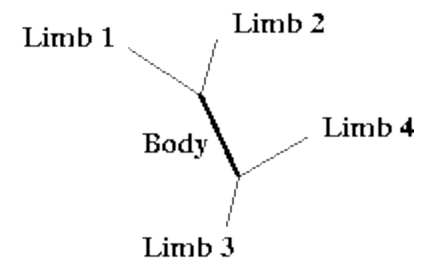
- Objects whose features represent data
 - Length
 - Angle
 - Color
 - Shape, etc.
- Often based on metaphors
- Different from icons
 - Icons are signals, glyphs show data

Glyphs/Stick Figures

- Glyphs consisting only of lines
- Data encoded in lengths and angles
- Very effective with large numbers



Theoretical icon



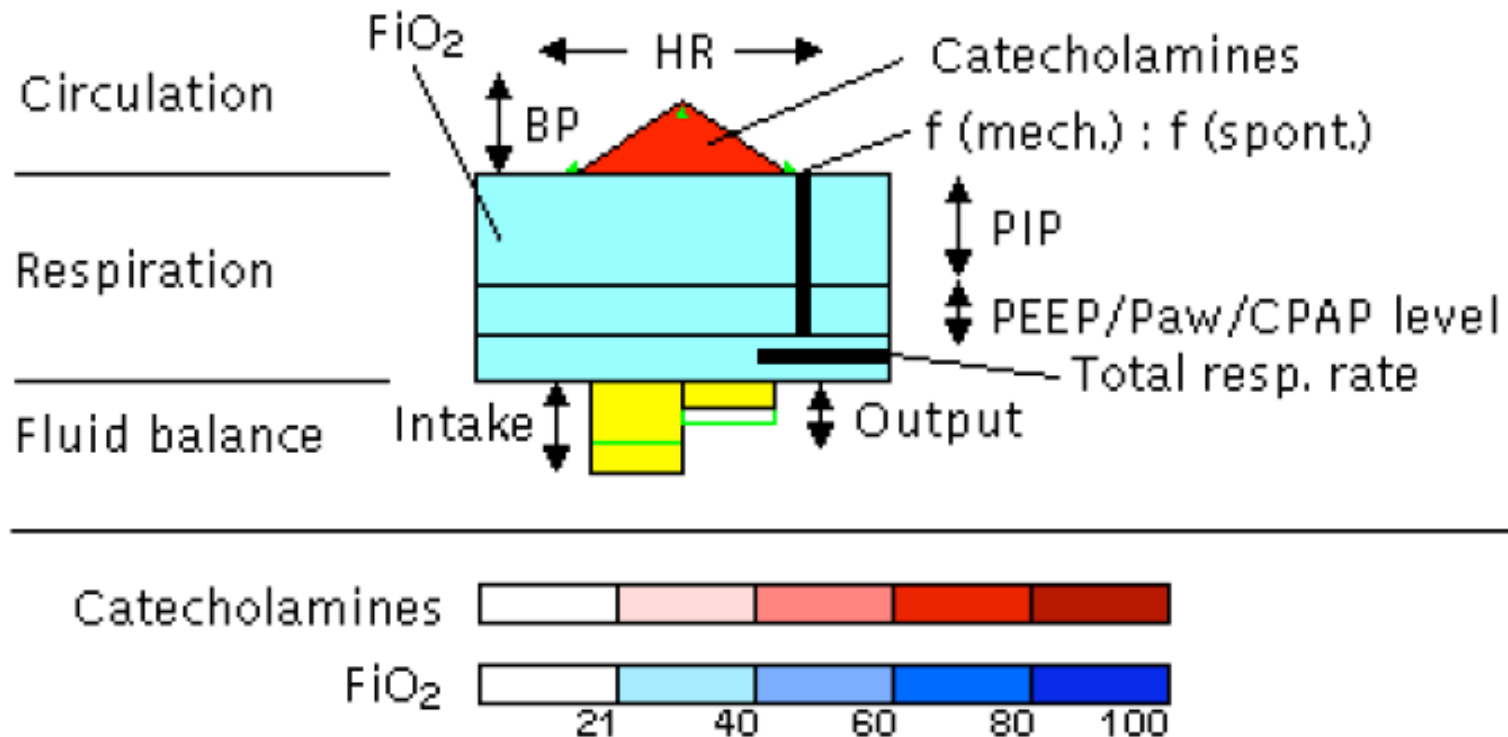
Sample icon

Visual Analytics

<http://www.viscenter.uncc.edu/courses/visanalytics.html>

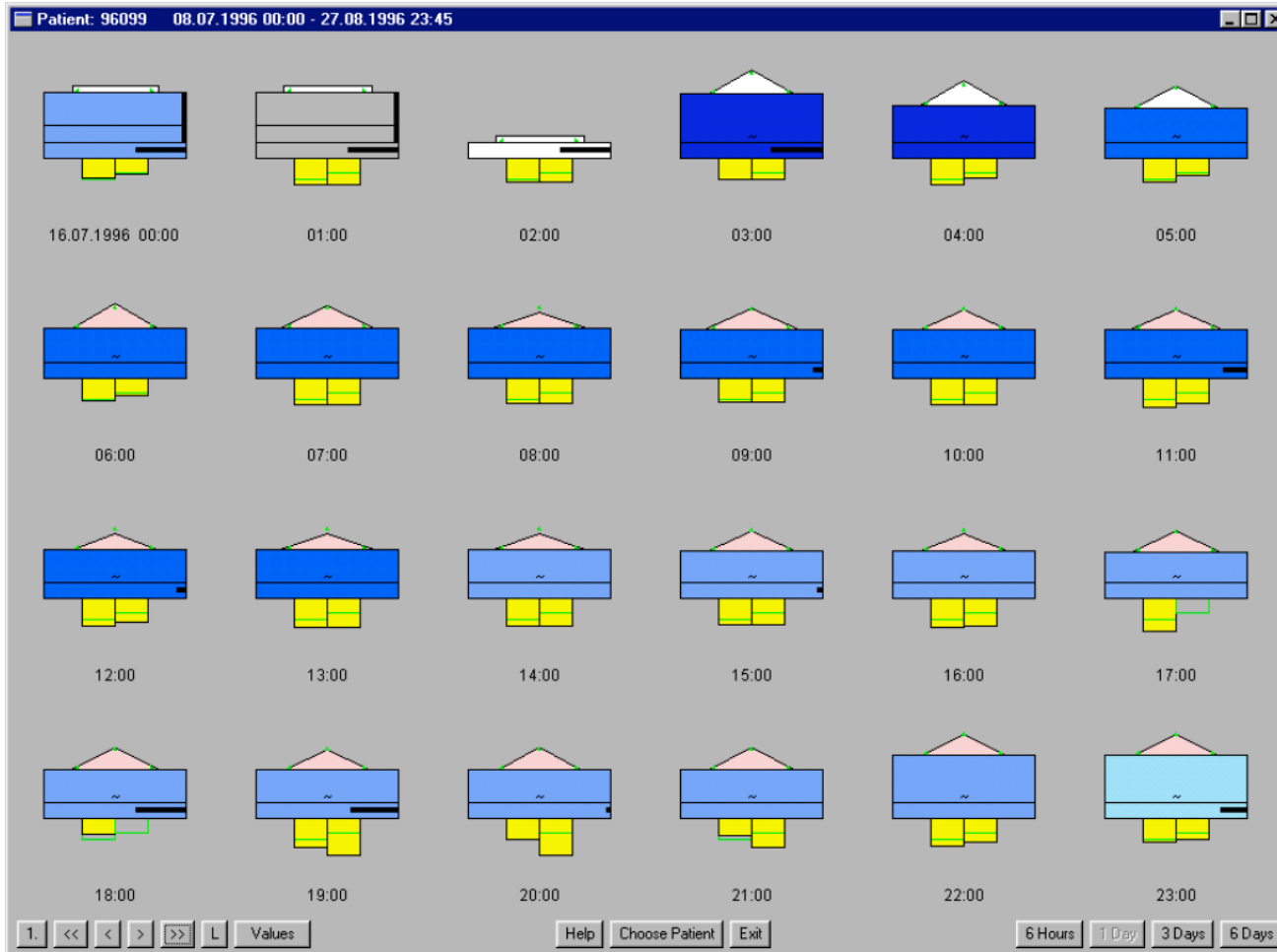
VIE-VISU

- Glyph for showing ICU data



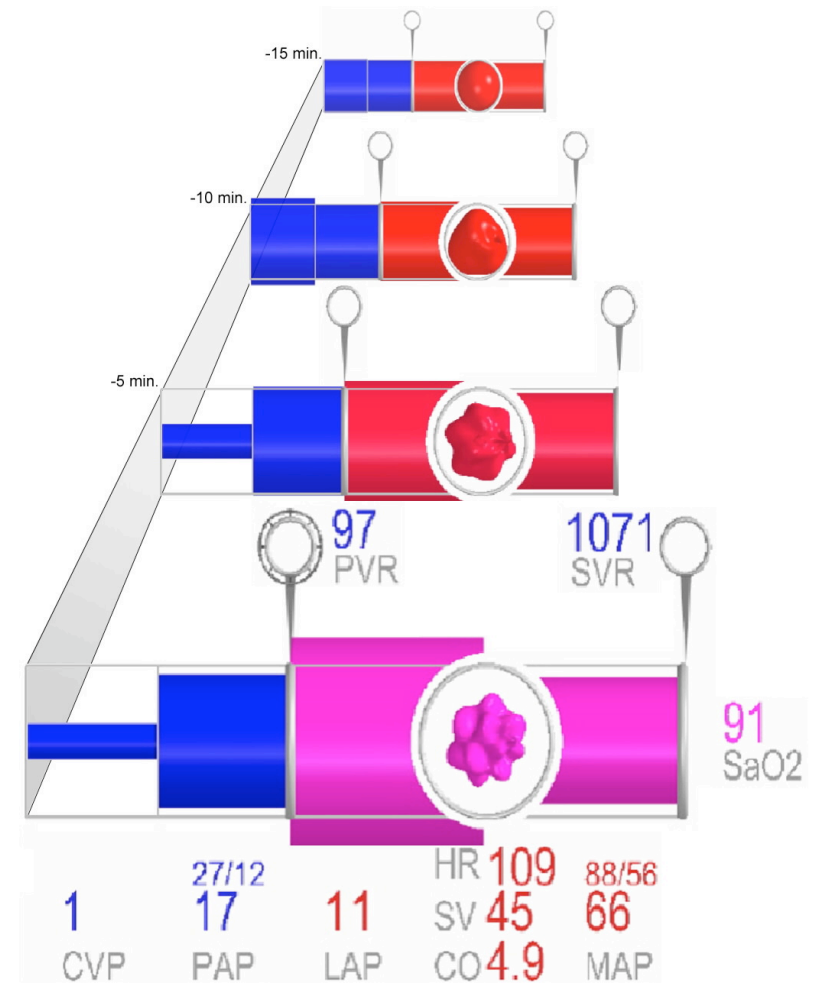
Horn, Popow, Unterasinger

Glyphs Over Time

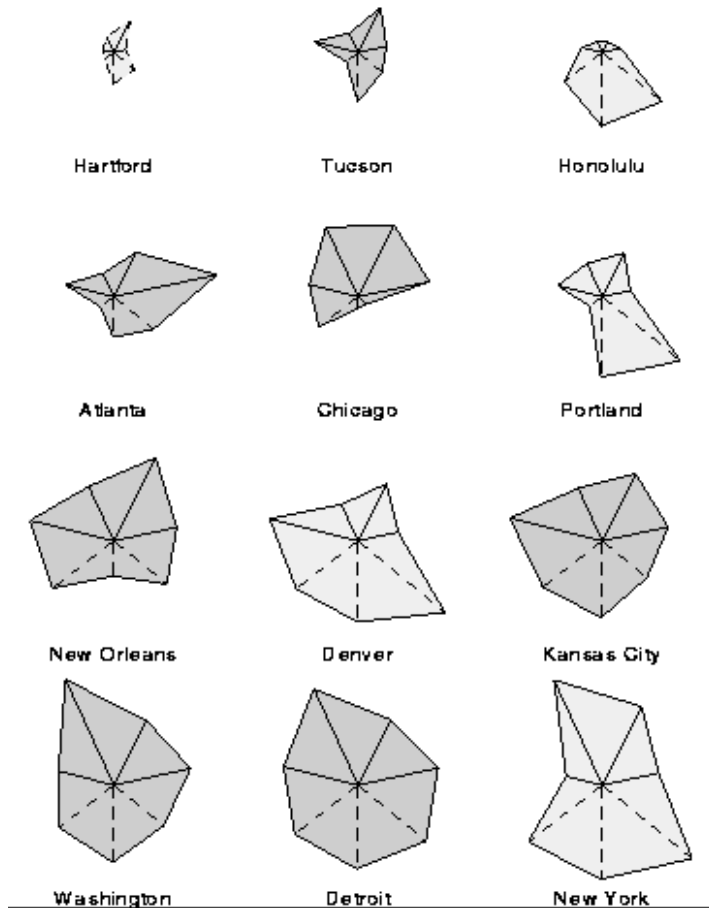


Temporal Data in ICU

- Show data on monitors
- Good
 - Red/blue, round
- Bad
 - Purple, crumpled
- Good overview of patient status



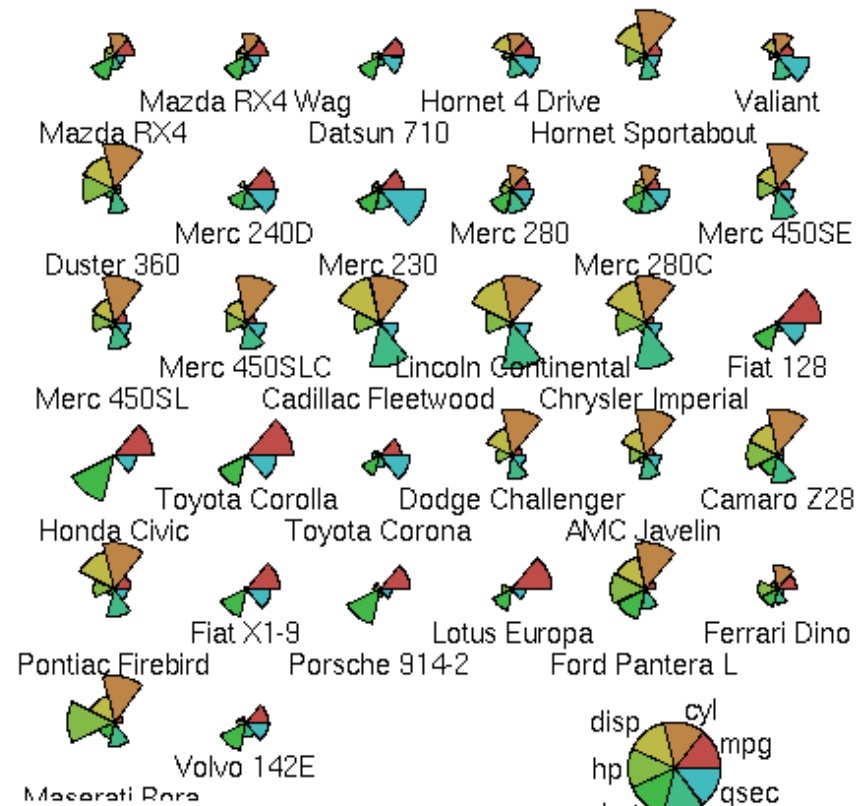
Star Plot/Glyph



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<http://www.isr.yorku.ca/>

Motor Vehicle Profiles



<http://www.togaware.com/VisualAnalytics>

<http://www.viscenter.uncc.edu/courses/visanalytics.html>

Glyphs

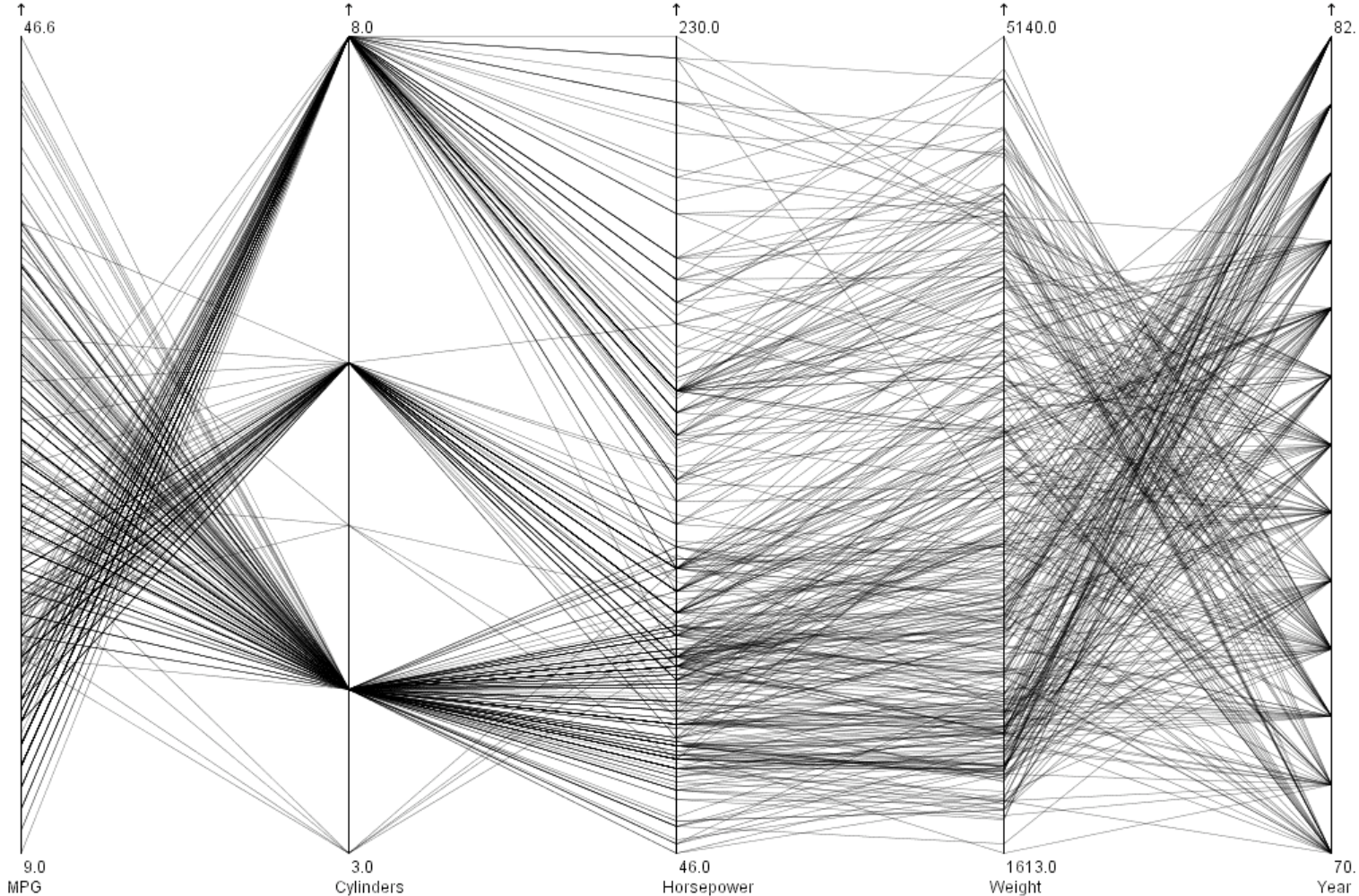
- Advantages
 - Easy to tell multidimensional differences
 - Find complex patterns in time series data
 - Can be based on metaphor
- Disadvantages
 - Individual values hard to read
 - Require legend
 - Limited number of dimensions
 - Dimensions/directions not equal

Parallel Coordinates

- Coordinate axes parallel instead of orthogonal
- Used in Statistics
- InfoVis adds interaction, large data sets
- Alfred Inselberg, 1987

18	8	130	3504	12
15	8	165	3693	11,5
18	8	150	3436	11
16	8	150	3433	12
17	8	140	3449	10,5
15	8	198	4341	10
14	8	220	4354	9
14	8	215	4312	8,5
14	8	225	4425	10
15	8	190	3850	8,5
15	8	170	3563	10
14	8	160	3609	8
15	8	150	3761	9,5
14	8	225	3086	10

Example Parallel Coordinates

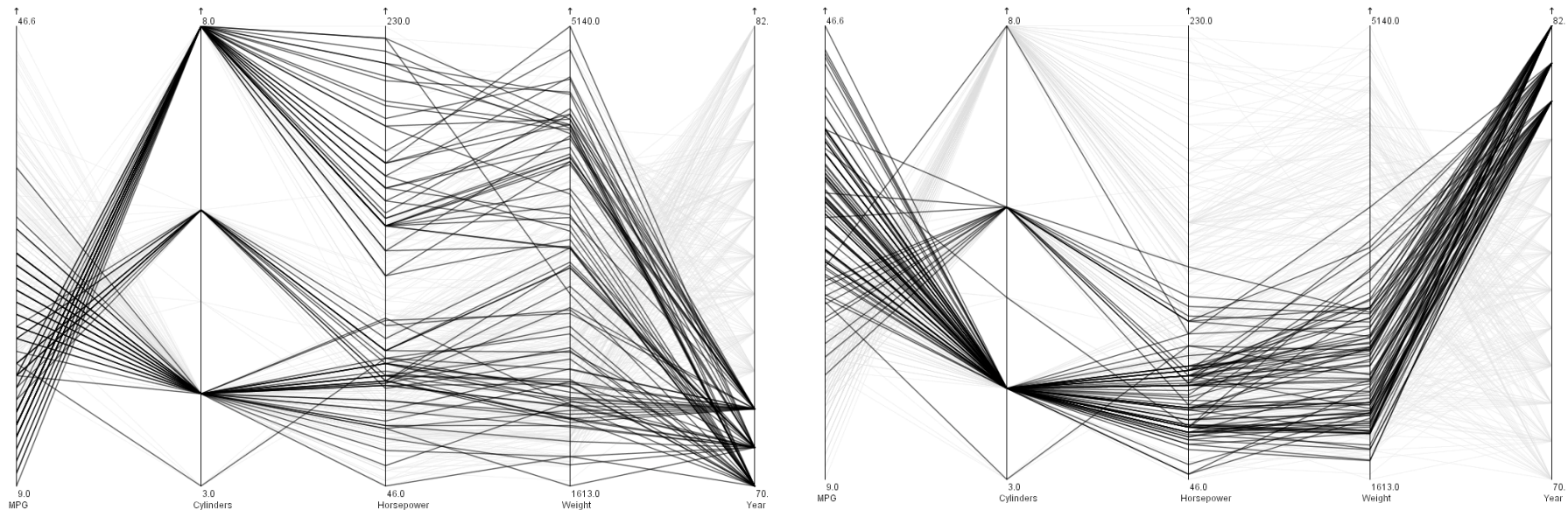


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Brushing and Parallel Coordinates

- Brushing: Coloring of Data Points
- Left years 1970-72, right 1980-82
- Changes in weight, mileage, cylinders



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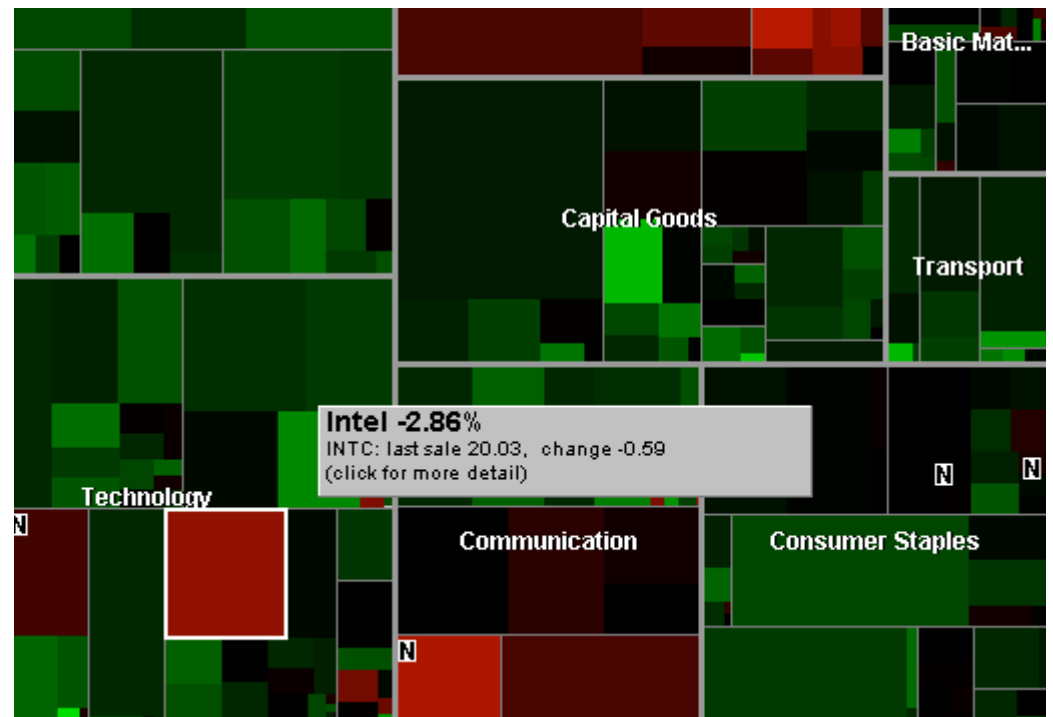
Spiral for Temporal Data

- Data about sick leave in German state over one year
- Number of days per revolution
- Pattern obvious when correct number of days



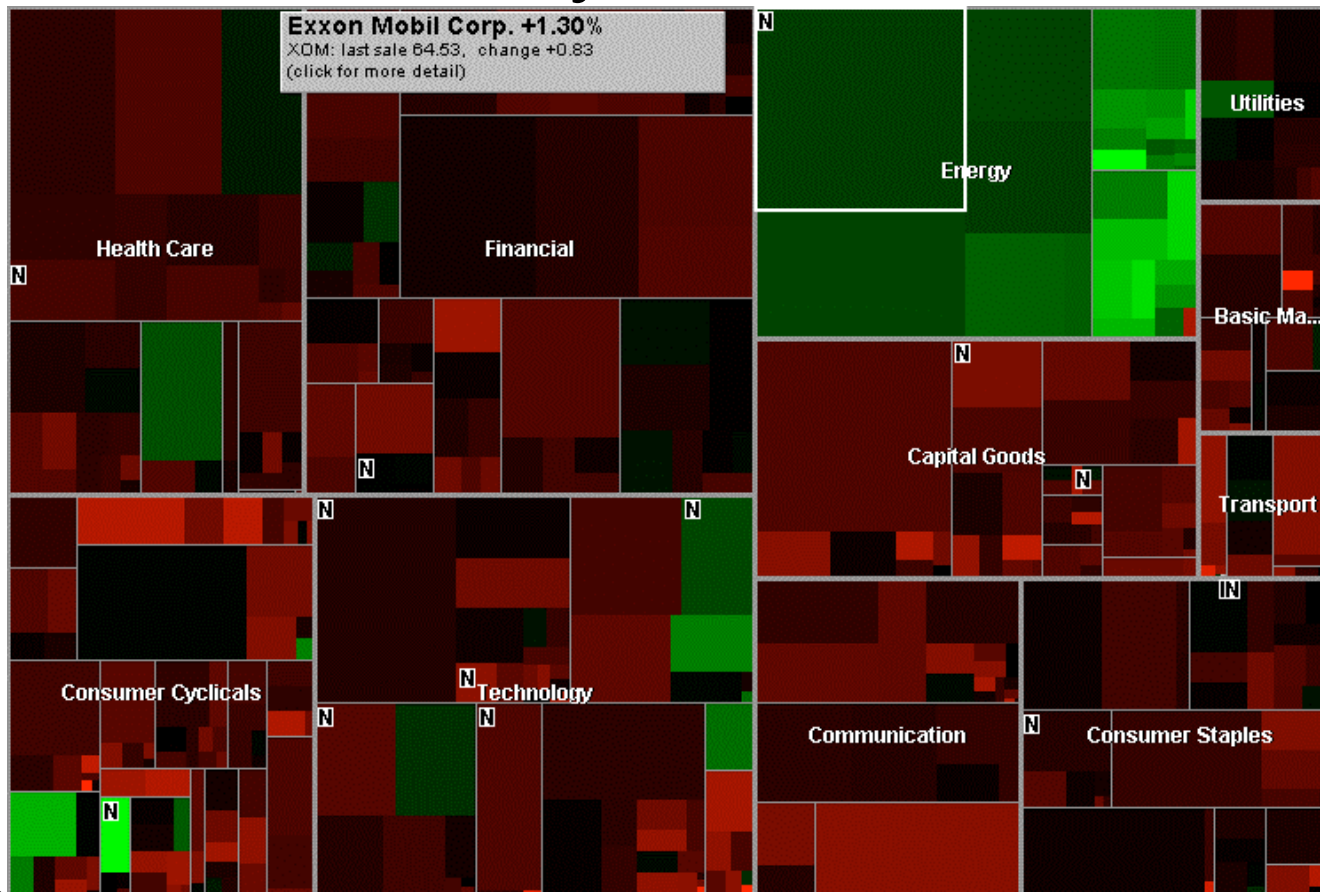
Treemap for Financial Data

- Hierarchical map of stock market
- Squarified treemaps
- Color shows trend
- Layout stable over time
- “Misuse” of treemap



Example: Map of the Market

- The market shortly after Hurricane Katrina



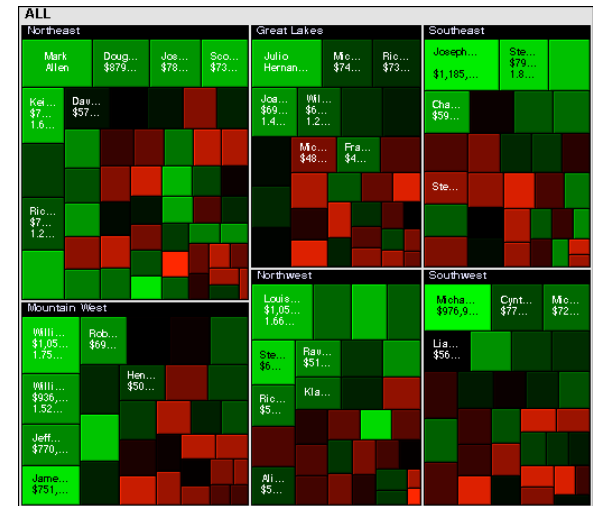
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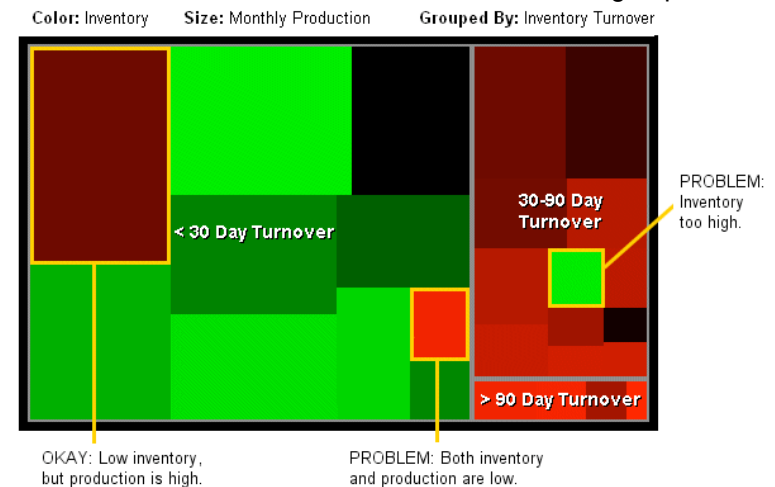
<http://www.viscenter.uncc.edu/courses/visanalytics.html>

Treemaps in the Real World

- “Treemap Industry”
 - Hive Group
 - Lab Escape
 - Etc.
- Versatile visualization metaphor
- Not restricted to trees
- The next bar chart?



hivegroup.com



labescape.com

Visual Analytics

<http://www.viscenter.uncc.edu/courses/visanalytics.html>

Representation

- Wide variety of possibilities
- Use develops over time
 - E.g., treemaps
- Type of representation depends on
 - Data
 - Task
 - Interaction
- Better understanding needed