

Space/Order

Lecture 8 CPSC 533C, Fall 2004
Tamara Munzner

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Reading

The Visual Design and Control of Trellis Display
R. A. Becker, W. S. Cleveland, and M. J. Shyu
Journal of Computational and Statistical Graphics, 5:123-155. (1996).
<http://cm.bell-labs.com/stat/doc/trellis.jcgs.col.ps>

Envisioning Information. Edward Tufte. Graphics Press, 1990.
Chapter 4: Small Multiples, Chapter 6: Narratives of Space and Time

VisDB: Database Exploration using Multidimensional Visualization,
Daniel A. Keim and Hans-Peter Kriegel, IEEE CG&A, 1994
<http://www.dbs.informatik.uni-muenchen.de/dbs/projekt/papers/visdb.ps>

More Reading

The Table Lens: Merging Graphical and Symbolic Representations in an Interactive Focus +
Context Visualization for Tabular Information
Ramana Rao and Stuart K. Card, SIGCHI '94, pp. 318-322.
<http://citeseer.ist.psu.edu/545353.html>

The Elements of Graphing Data, William S. Cleveland, Hobart Press 1994.

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Space and Order

Trellis

- find order automatically: main-effects
- dot plots, matrices of small multiples

VisDB

- choice of spacefilling pixel pattern

small multiples

- side by side better than comparing to memory

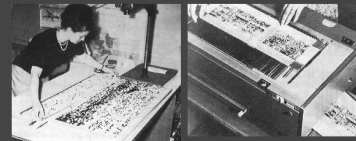
narratives of space and time

- using spatial position to encode temporal data
- derived spaces

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Reordering: Bertin

reorderable matrices – manually!

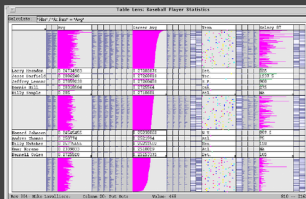


[Bertin, Graphics and Graphic Information Processing, p 34]

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Reordering: Table Lens

select column to sort
demos available at www.tablelens.com

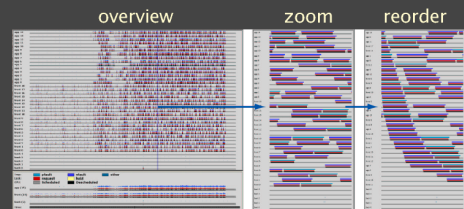


we'll discuss focus+context aspects later

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Interactive Ordering: Rivet

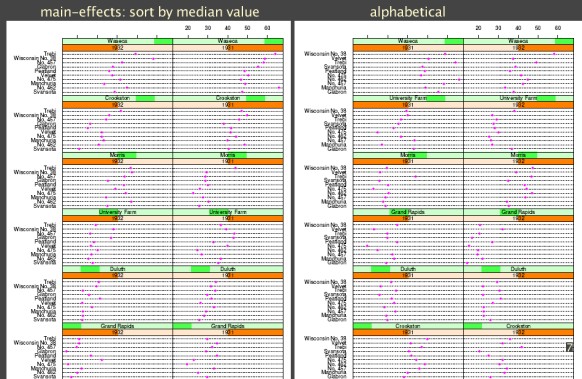
performance analysis of parallel system



[Bosch, Performance Analysis and Visualization of Parallel Systems Using SimOS and Rivet: A Case Study, HPCA6, 2000.
graphics.stanford.edu/papers/rivet_3rgus/]

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Automatic Ordering Support: Trellis



Statistically-Based Techniques

derived spaces

partial residuals

- differencing taking means into account

conditioning intervals

equal count algorithm

- shingles (overlapping windows) not bins

banking to 45 degrees

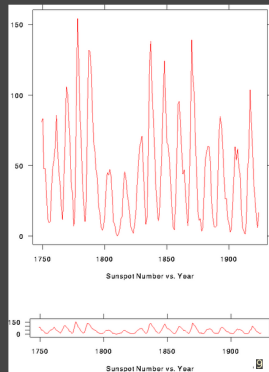
- take psychophysics into account

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Banking to 45 Degrees

principle: most accurate judgement at 45 degrees

pick aspect ratio (height/width) accordingly



[www.research.att.com/~rab/trellis/sunspot.html]

Spacefilling Pixels: VisDB

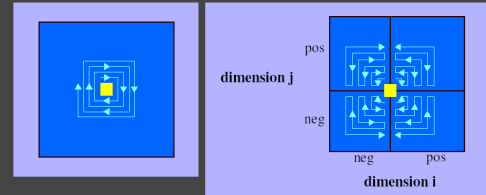
how to draw pixels?

- sort, color by relevance

local ordering

spiral

2D

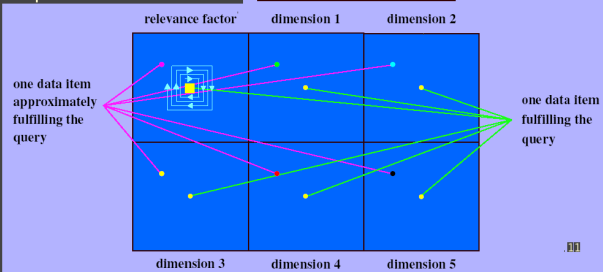


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VisDB Windows

group dimensions

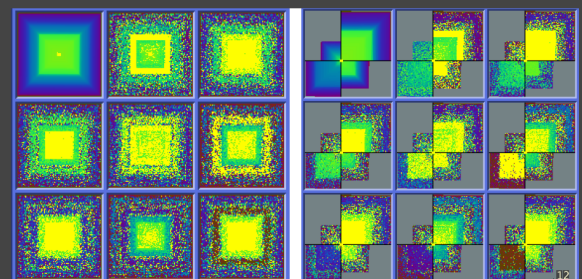
separate dimensions



VisDB Results: Separate Dimensions

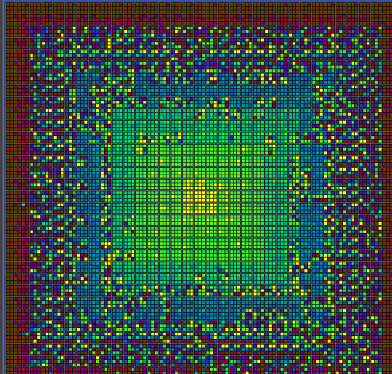
spiral

2D



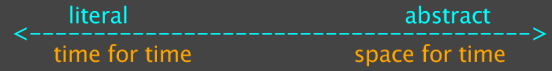
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VisDB Results: Grouped Dimensions

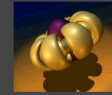


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Space vs. Time: Showing Change



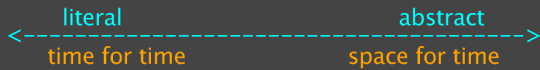
- animation: show time using temporal change
- good: show process



[www.geom.uiuc.edu/docs/outreach/oi/evert.mpg]

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Space vs. Time: Showing Change



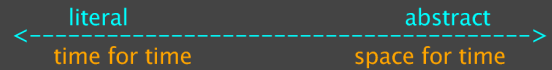
- animation: show time using temporal change
- good: show process
- good: compare by flipping between two things



[www.geom.uiuc.edu/docs/outreach/oi/evert.mpg] [www.astroshow.com/ccdpho/pluto.gif]

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Space vs. Time: Showing Change



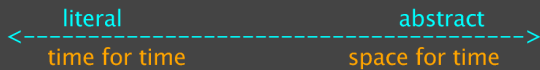
- animation: show time using temporal change
- good: show process
- good: compare by flipping between two things
- bad: compare between many things



[www.geom.uiuc.edu/docs/outreach/oi/evert.mpg] [www.astroshow.com/ccdpho/pluto.gif]

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Space vs. Time: Showing Change



- animation: show time using temporal change
- good: show process
- good: compare by flipping between two things
- bad: compare between many things
- interference from intermediate frames

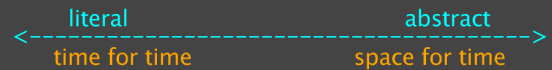


[www.geom.uiuc.edu/docs/outreach/oi/evert.mpg] [www.astroshow.com/ccdpho/pluto.gif]

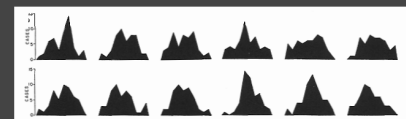


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Space vs. Time: Showing Change



- small multiples: show time using space
- overview: show each time step in array
- compare: side-by-side easier than temporal
- external cognition instead of internal memory
- general technique, not just for temporal changes



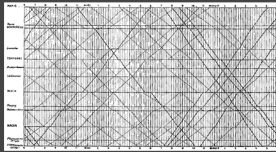
[Edward Tufte, The Visual Display of Quantitative Information, p 172]

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Derived Spaces: Slope

narrative of space and time
Marey train schedule, 1885

- horizontal line length: stop length
- slope: speed
- intersection: time/place of crossing



[Tuftes I p 31, www.nap.edu/html/hs_math/images/tl_f8.gif]

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Linked Derived Spaces

Feature Detection in Linked Derived Spaces
· [video]

infovis vs. scivis

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Ordering

space for time

LifeLines

- [video]

Dynamic Timelines

- [video]

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Ordering

time for time

space for space

Superscalar Processes

- [video]

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