Space/Order

Lecture 8 CPSC 533C, Fall 2005

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5 Oct 2005

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.

Space and Order

Trellis

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

VisDB

- choice of spacefilling pixel pattern

small multiples

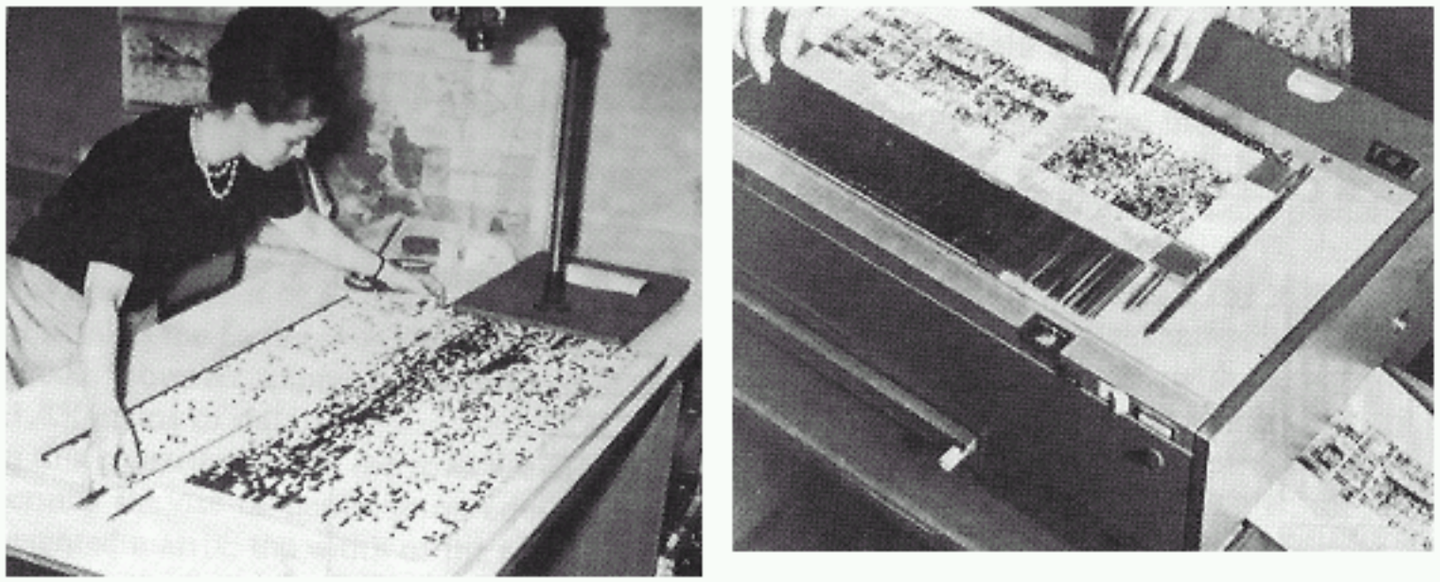
- side by side better than comparing to memory

narratives of space and time

- using spatial position to encode temporal data
- derived spaces

Reordering: Bertin

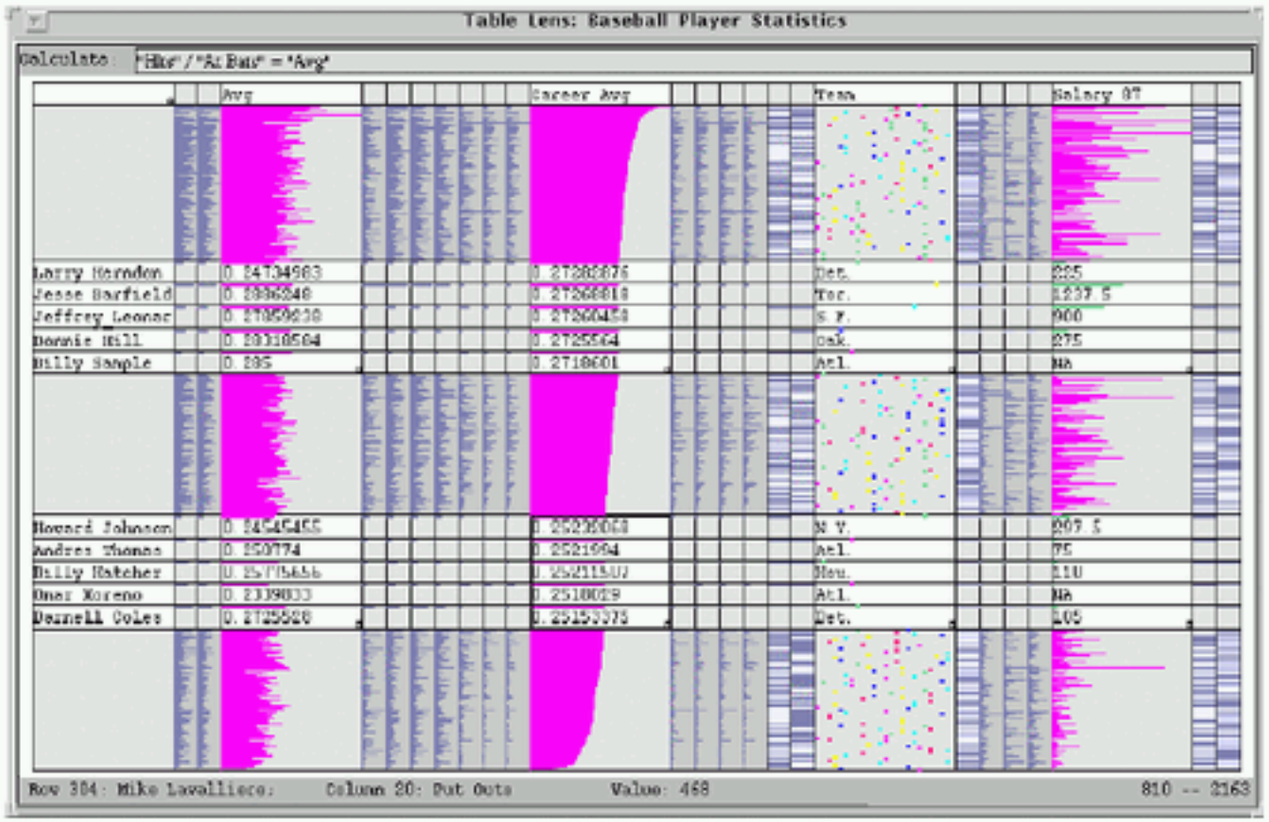
reorderable matrices – manually!



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

Reordering: Table Lens

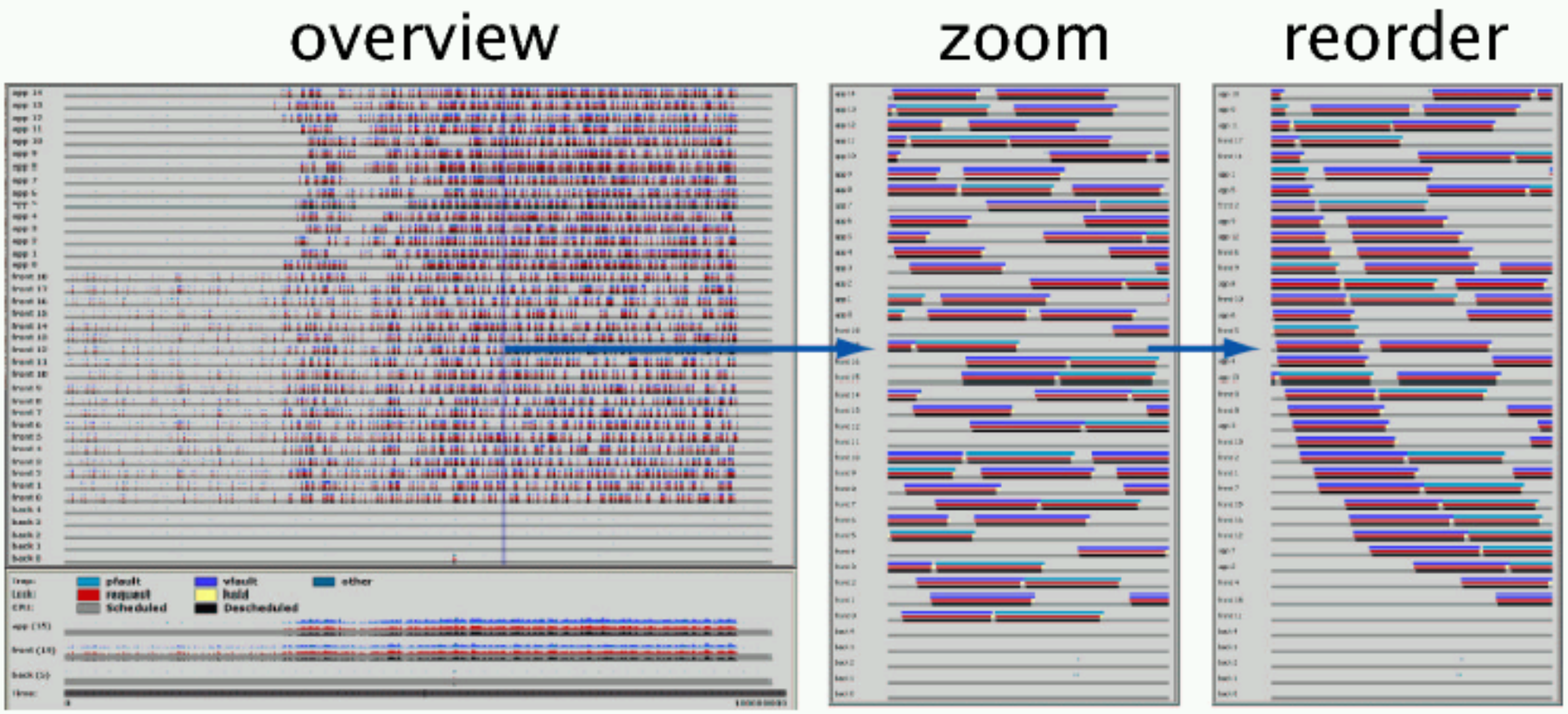
select column to sort
demos available at www.tablelens.com



we'll discuss focus+context aspects later

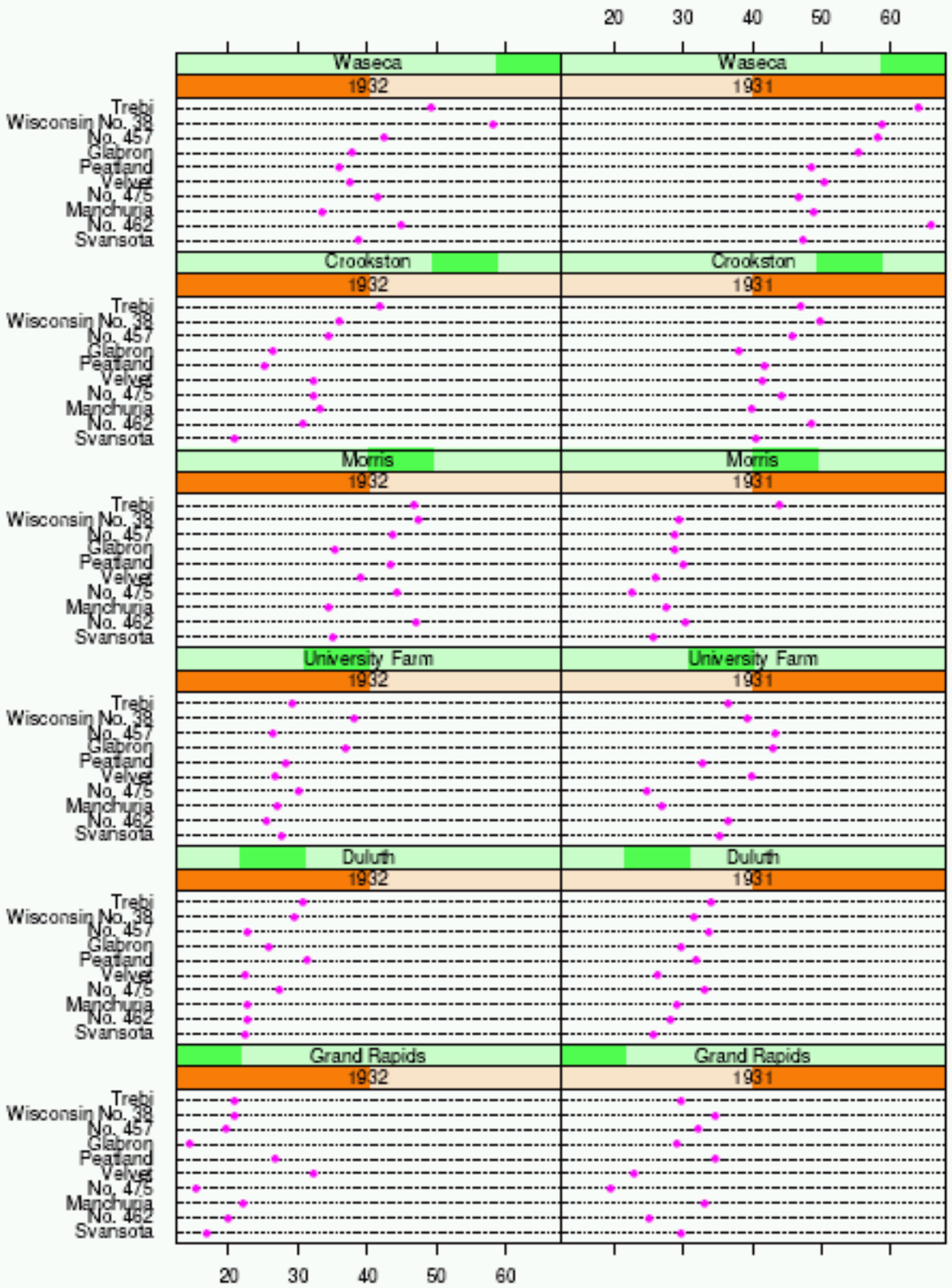
Interactive Ordering: Rivet

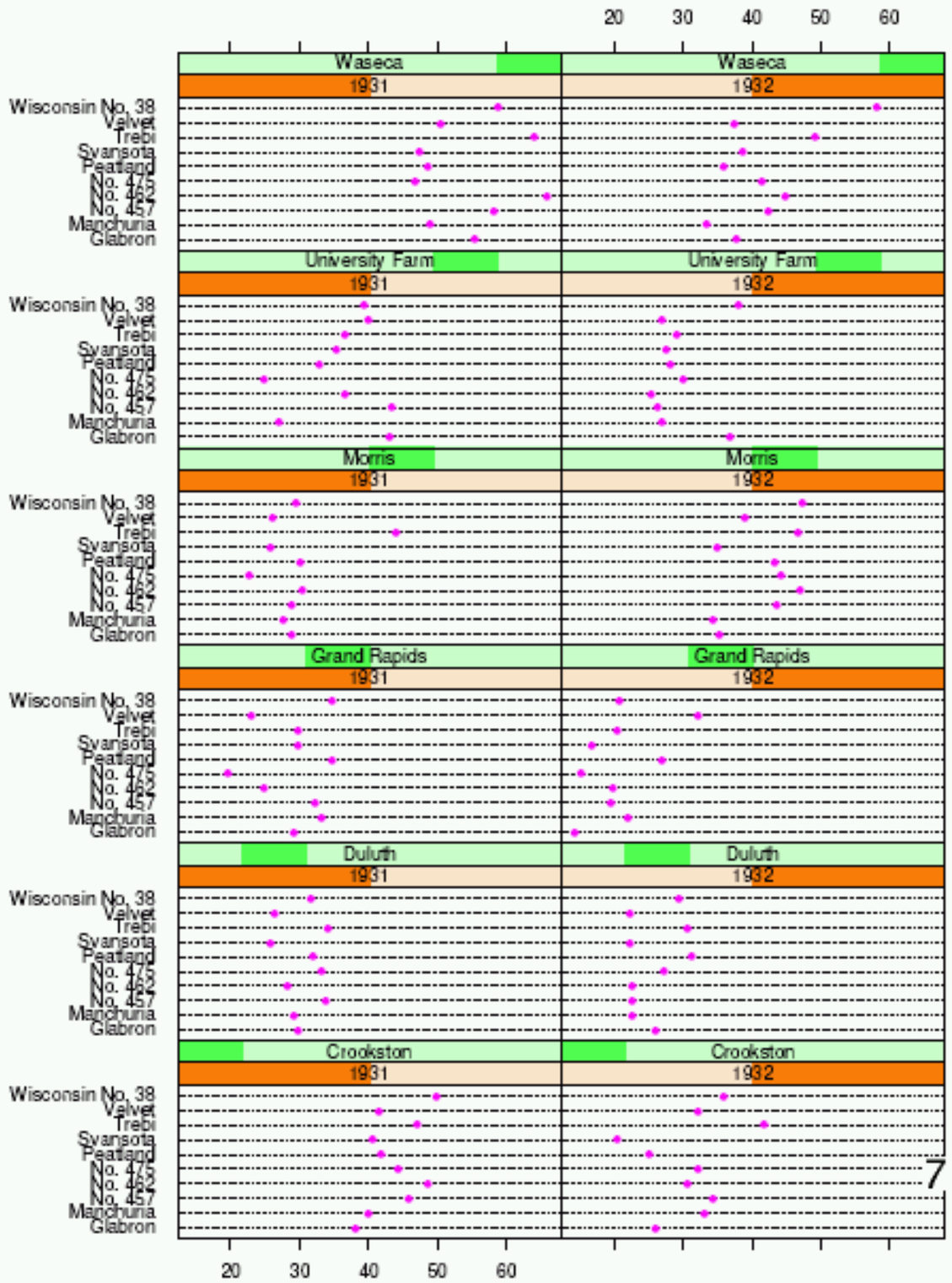
performance analysis of parallel system



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

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

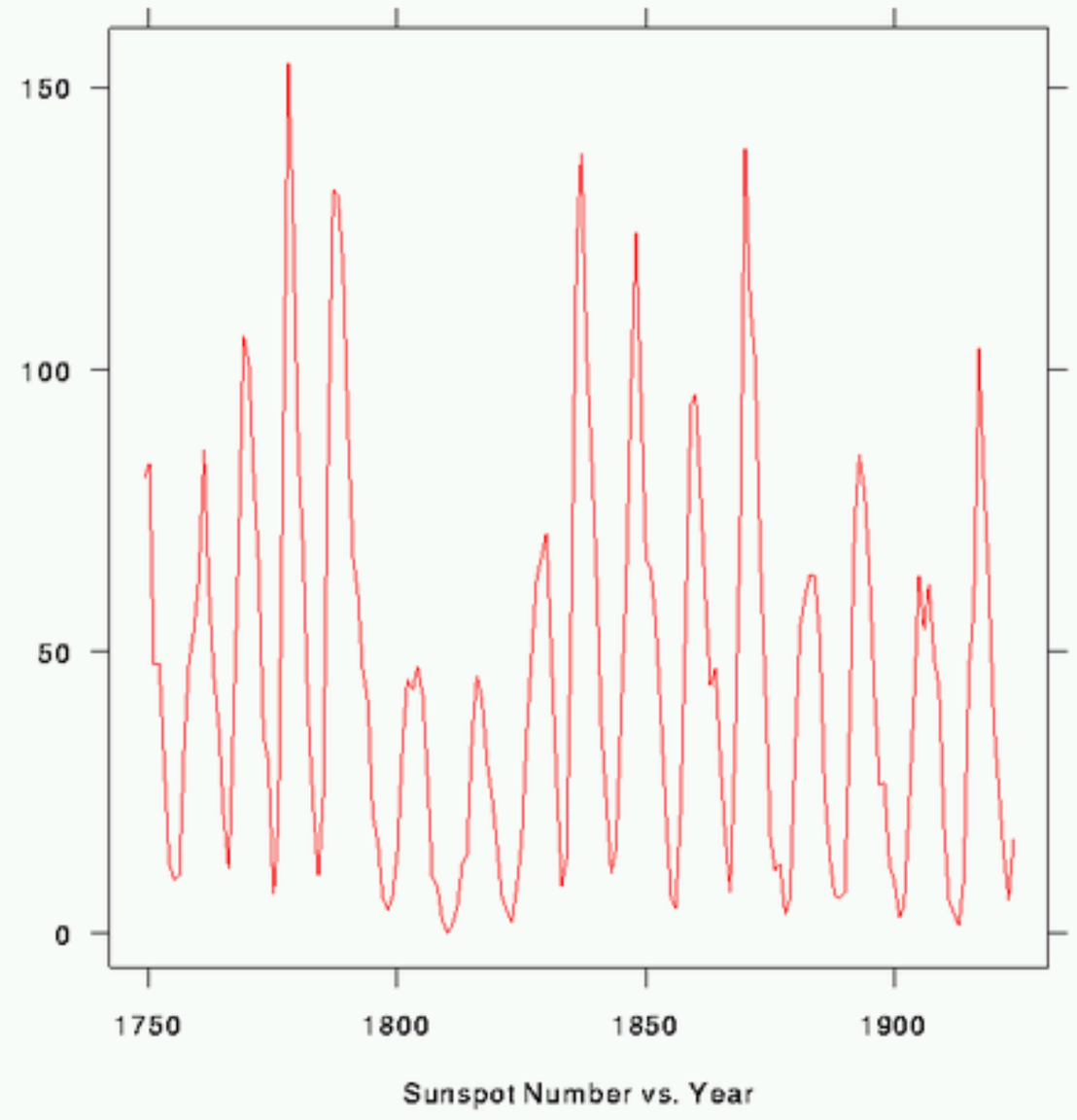
banking to 45 degrees

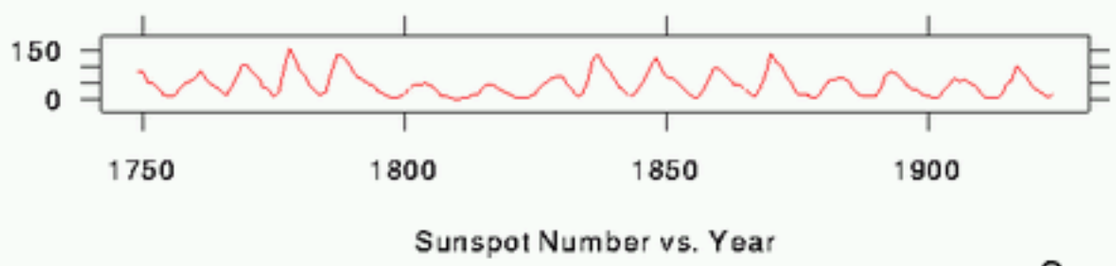
- take psychophysics into account

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]

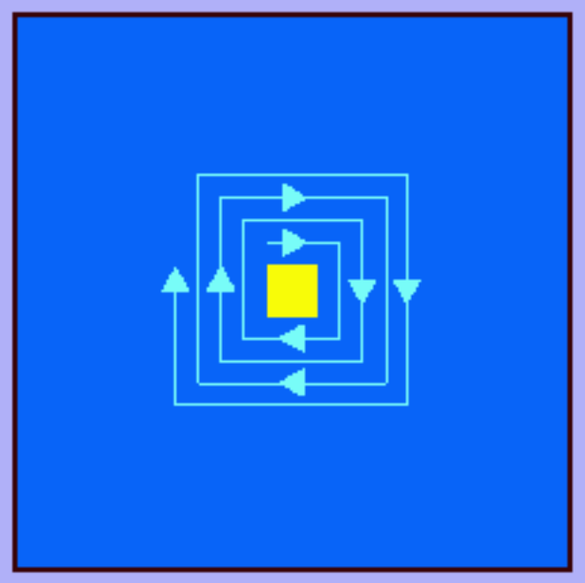
Spacefilling Pixels: VisDB

how to draw pixels?

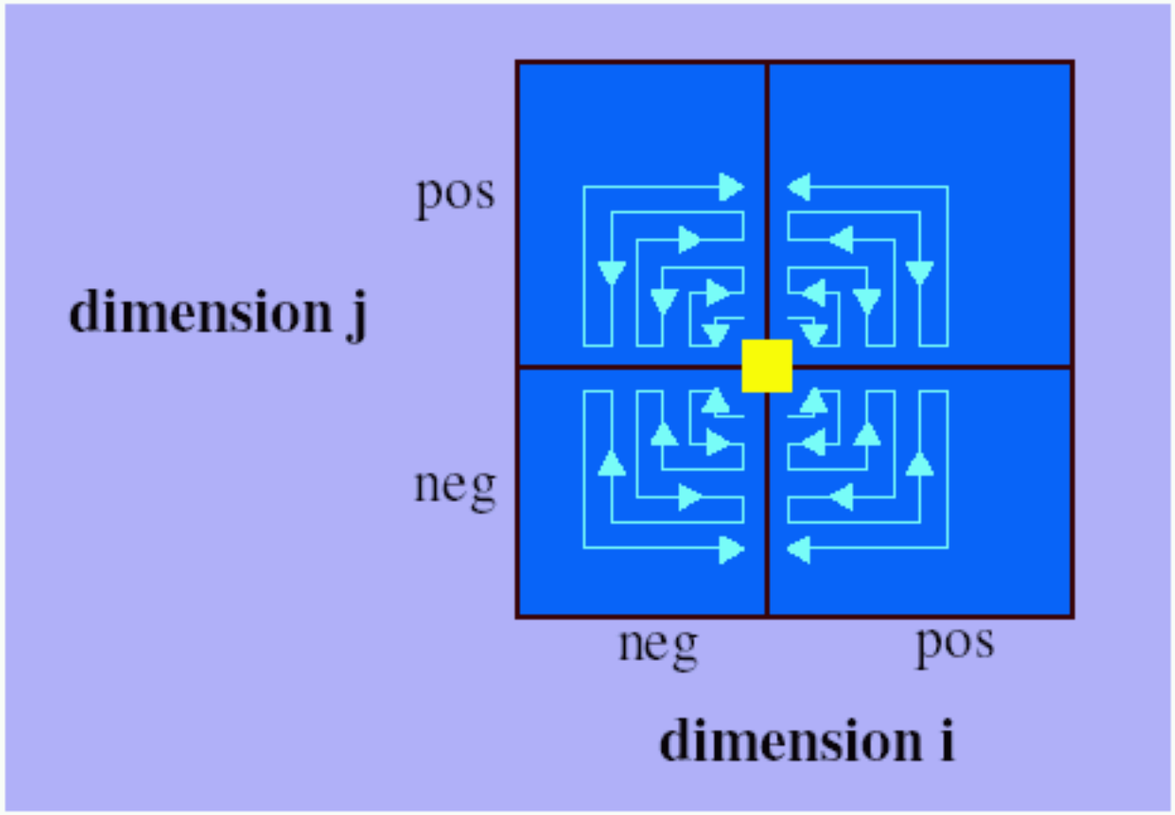
- sort, color by relevance

local ordering

spiral

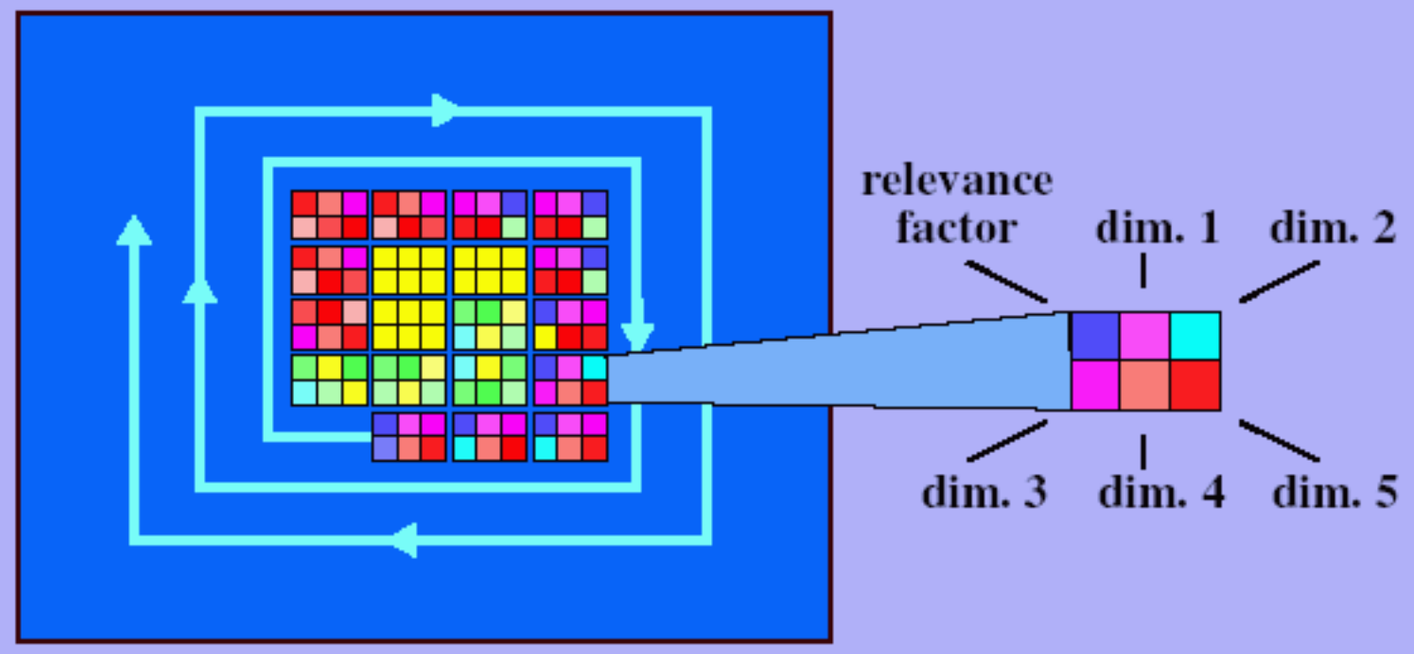


2D

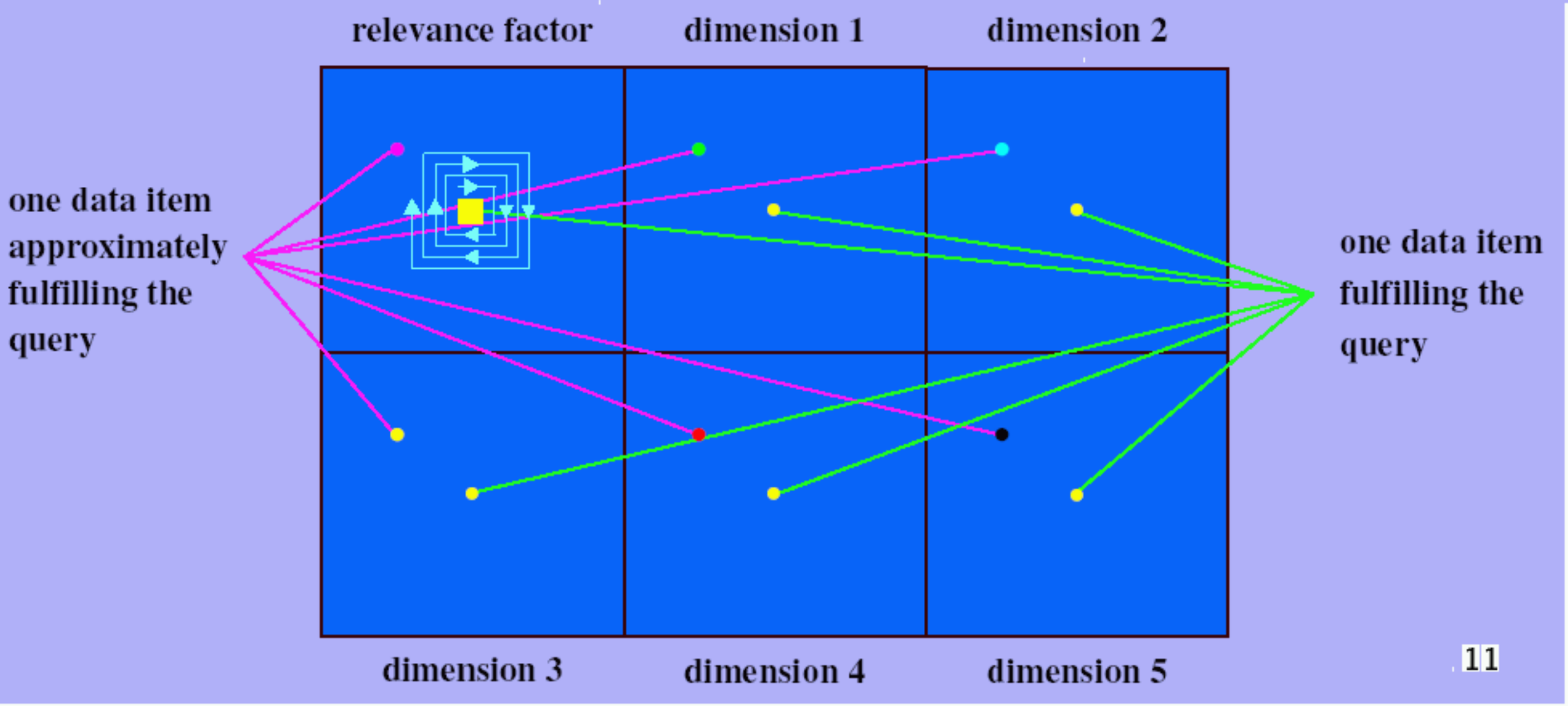


VisDB Windows

group dimensions

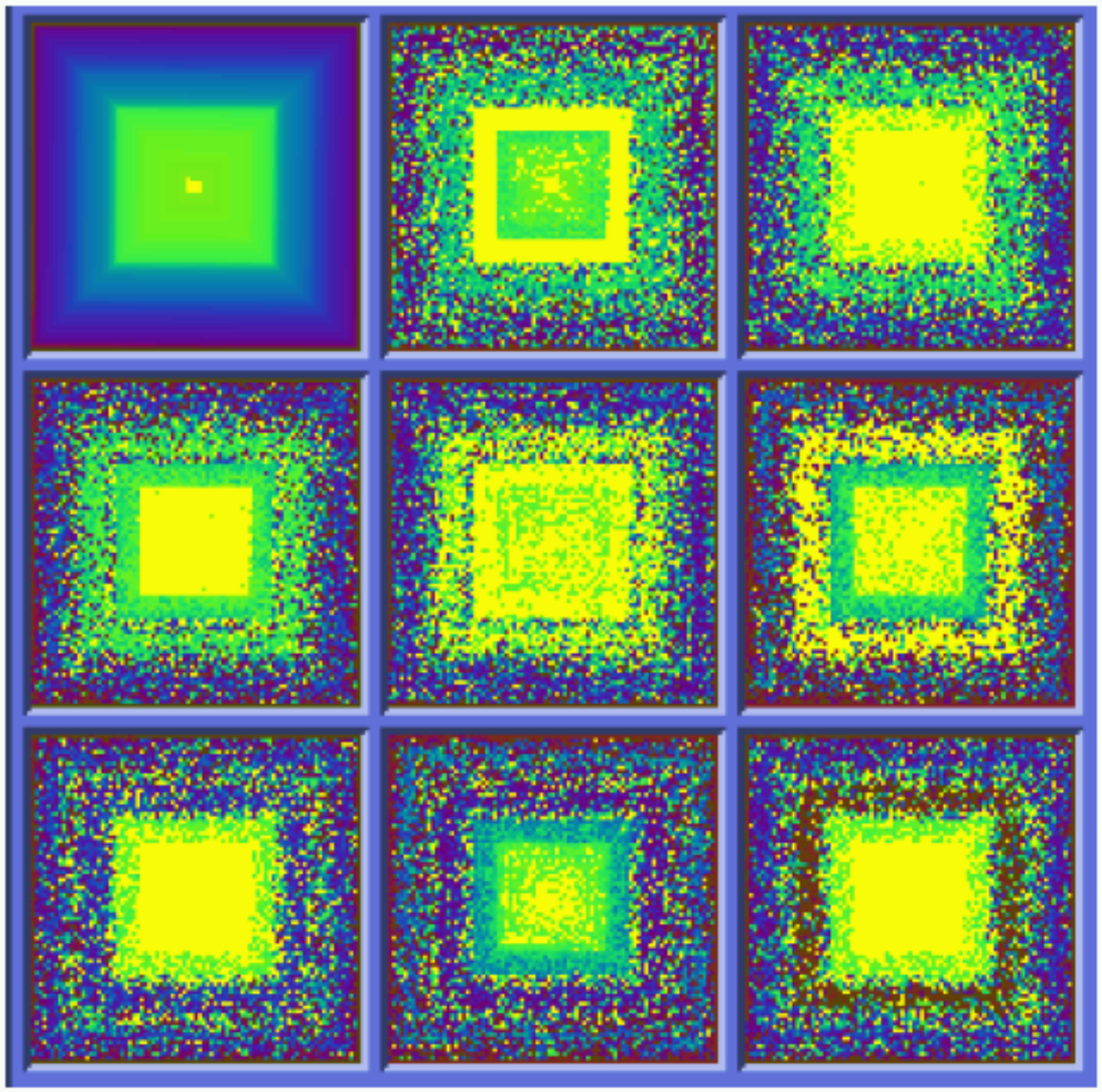


separate dimensions

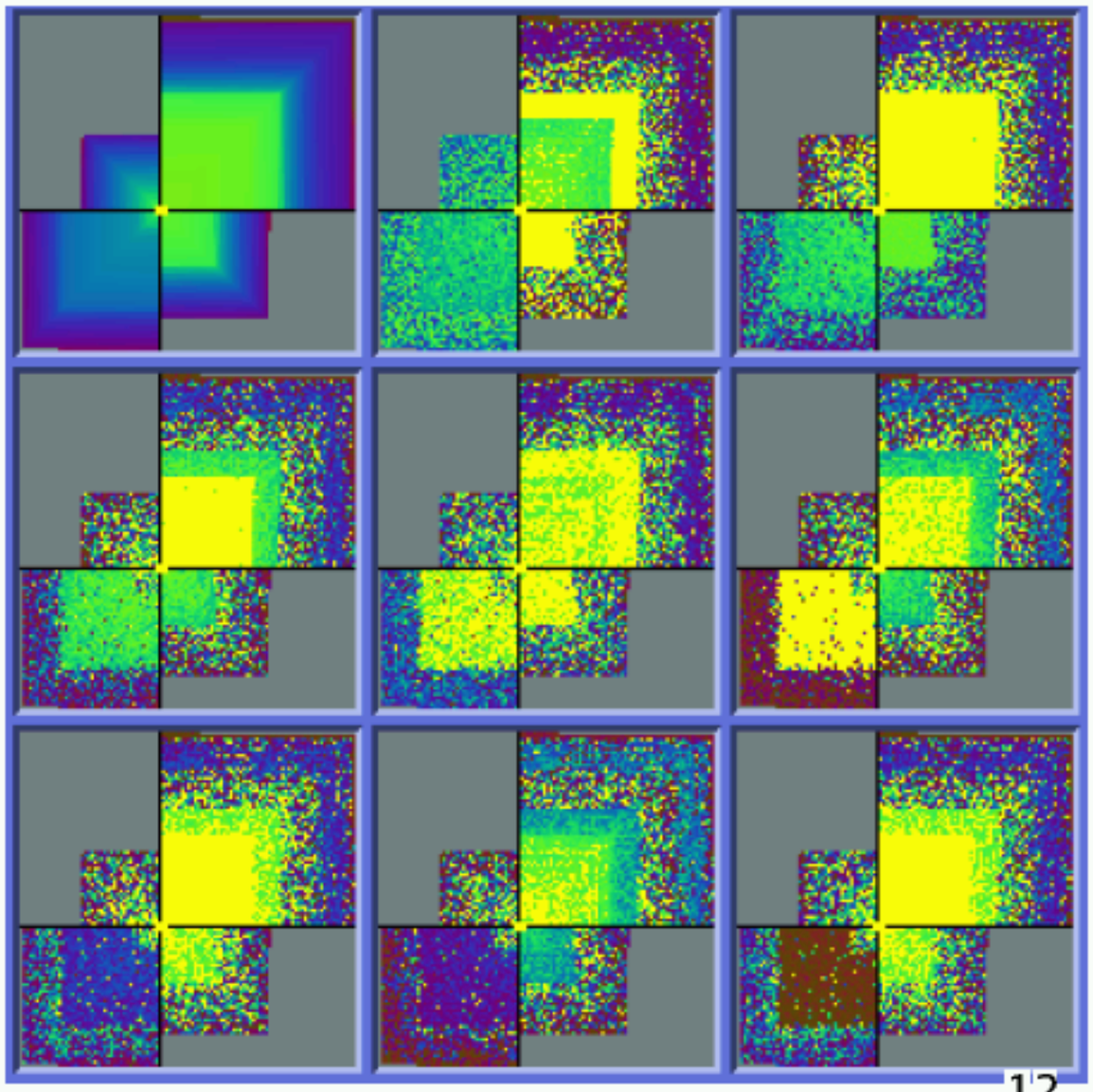


VisDB Results: Separate Dimensions

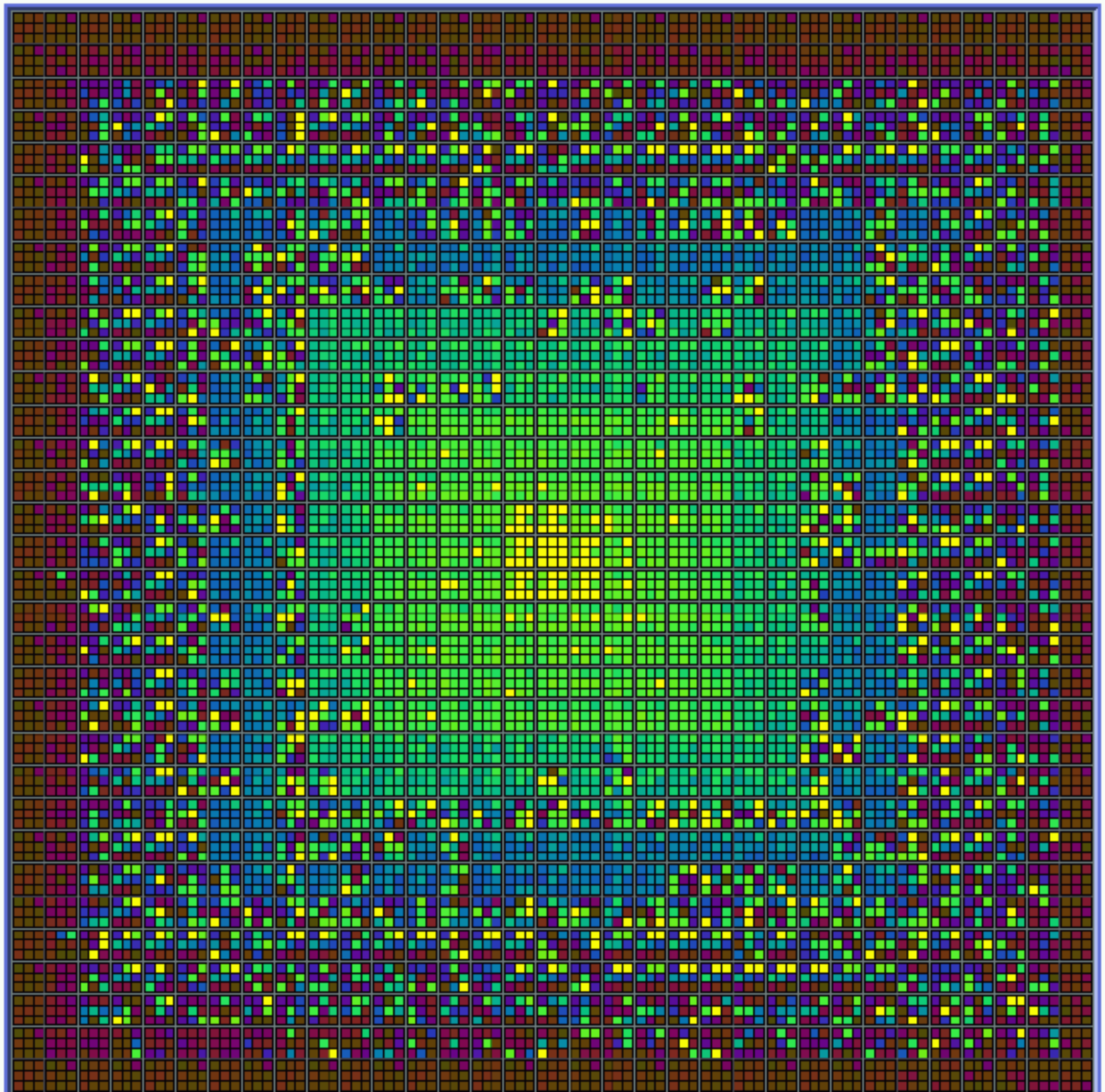
spiral



2D



VisDB Results: Grouped Dimensions



Space vs. Time: Showing Change

literal ⟷ abstract

time for time — space for time

animation: show time using temporal change

- good: show process

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

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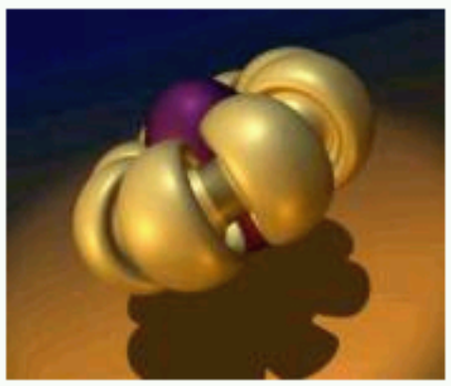

[www.geom.uiuc.edu/docs/outreach/oi/evert.mpg] [www.astroshow.com/ccdpho/pluto.gif]

Space vs. Time: Showing Change

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time for time — space for time

animation: show time using temporal change

- good: show process
- good: compare by flipping between two things
- bad: compare between many things



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Space vs. Time: Showing Change

literal — abstract

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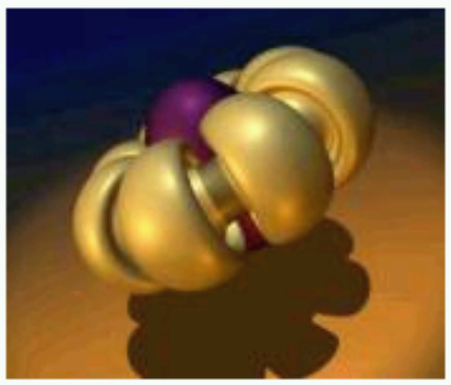
time for time — space for time

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]

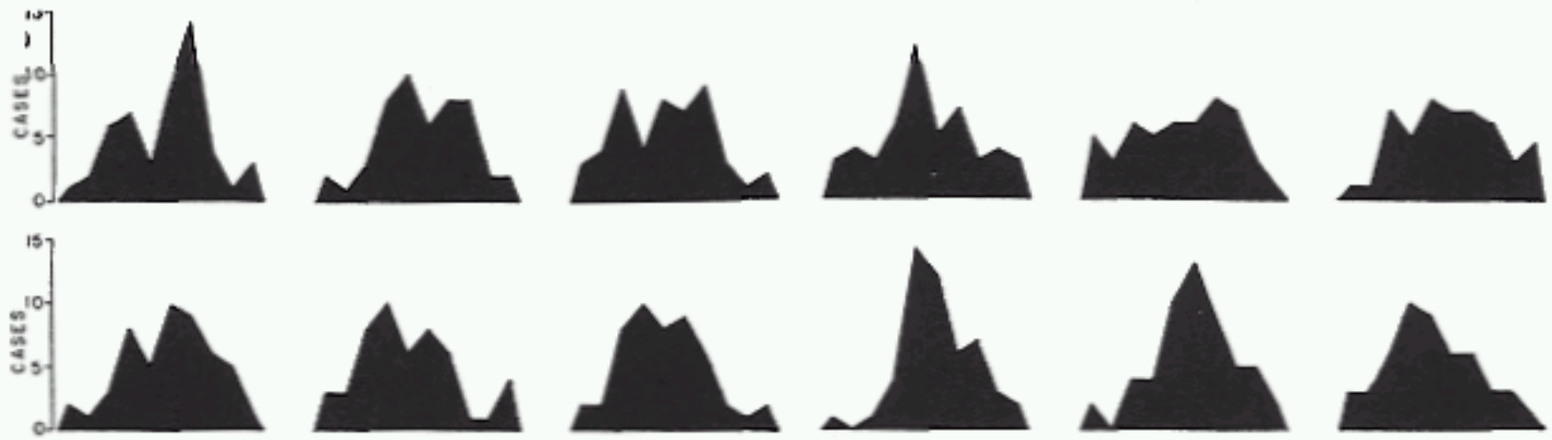
Space vs. Time: Showing Change

literal <----------> abstract

time for time — space for time

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



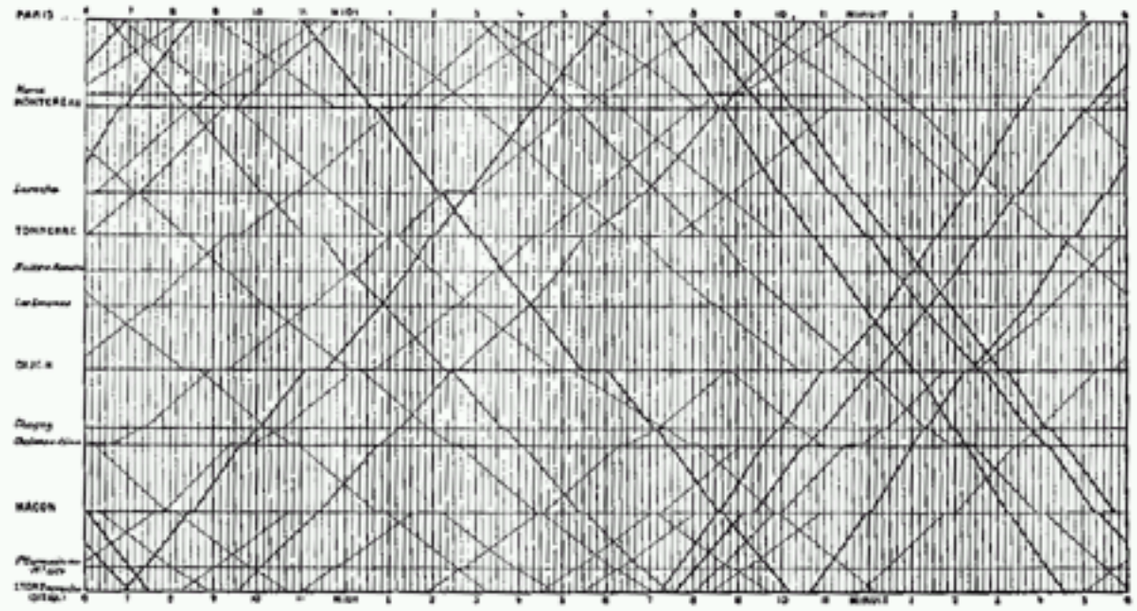
[Edward Tufte. The Visual Display of Quantitative Information, p 172]

Derived Spaces: Slope

narrative of space and time

Marey train schedule, 1885

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



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

Linked Derived Spaces

Feature Detection in Linked Derived Spaces

- [video]

infovis vs. scivis

Ordering

space for time

LifeLines

- [video]

Dynamic Timelines

- [video]

Ordering

time for time
space for space

Superscalar Processes

- [video]