Quality of visualizations

Visual analysis of measurement data

László Gönczy (gonczy@mit.bme.hu)

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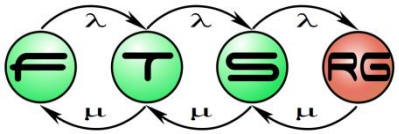
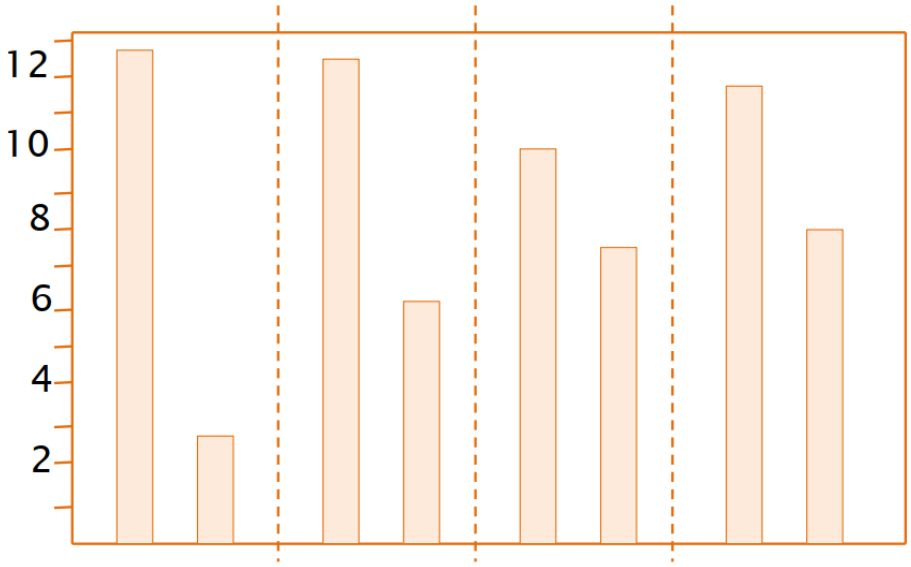
Budapesti Műszaki és Gazdaságtudományi Egyetem
Hibatűrő Rendszerek Kutatócsoport

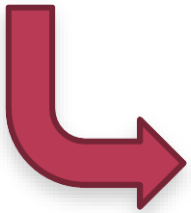


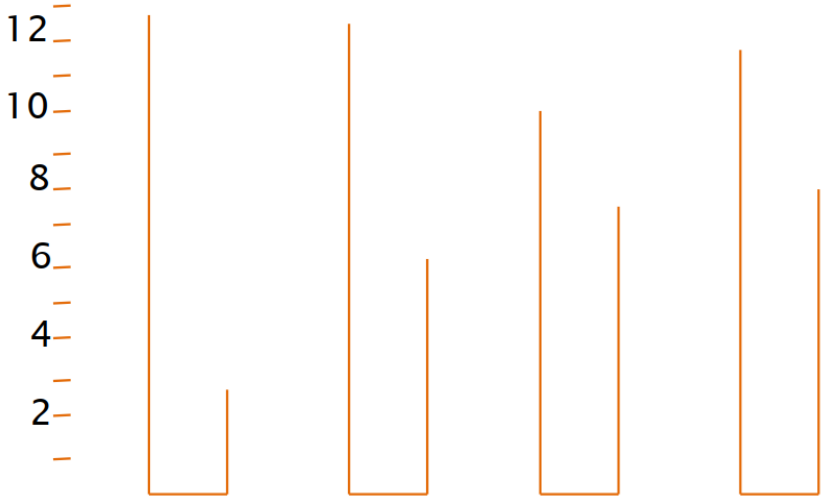
How to make good quality plots?

- Tufte, Edward R. *The visual display of quantitative information*. Vol. 2. Cheshire, CT: Graphics press, 2001.
- Above all else show data. (?)
- Maximize the data-ink ratio.
- Erase non-data-ink.
- Erase redundant data-ink.
- Revise and edit.

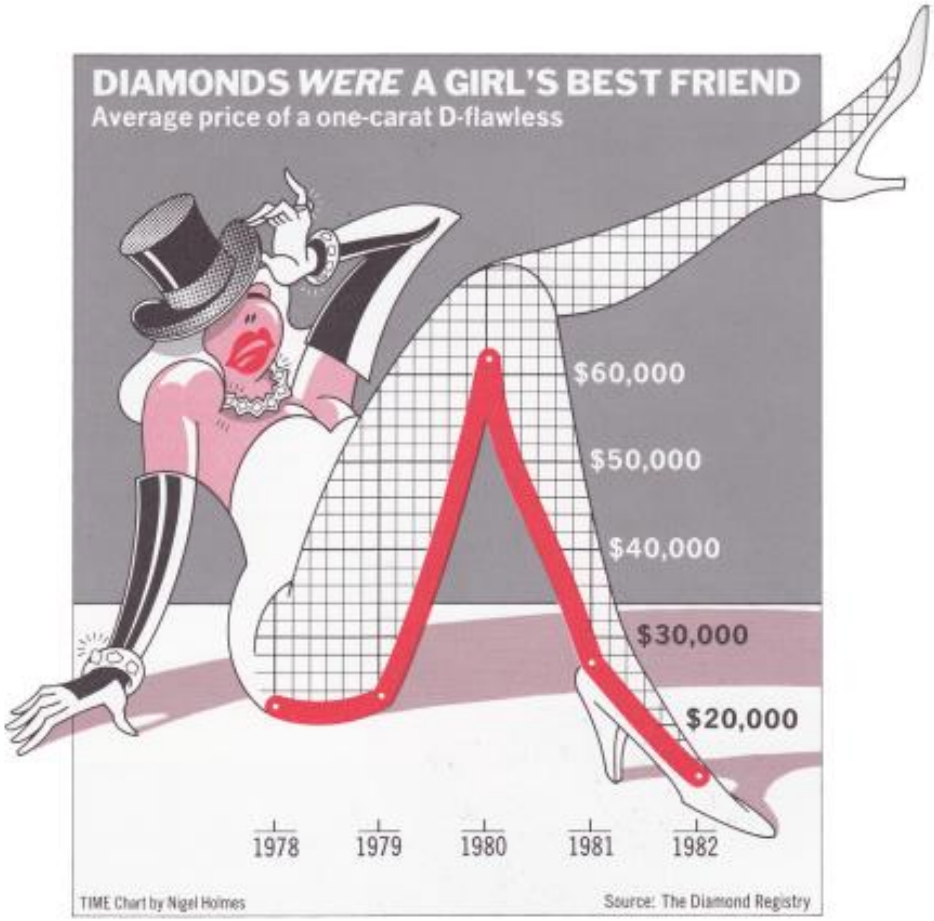
Data-ink example





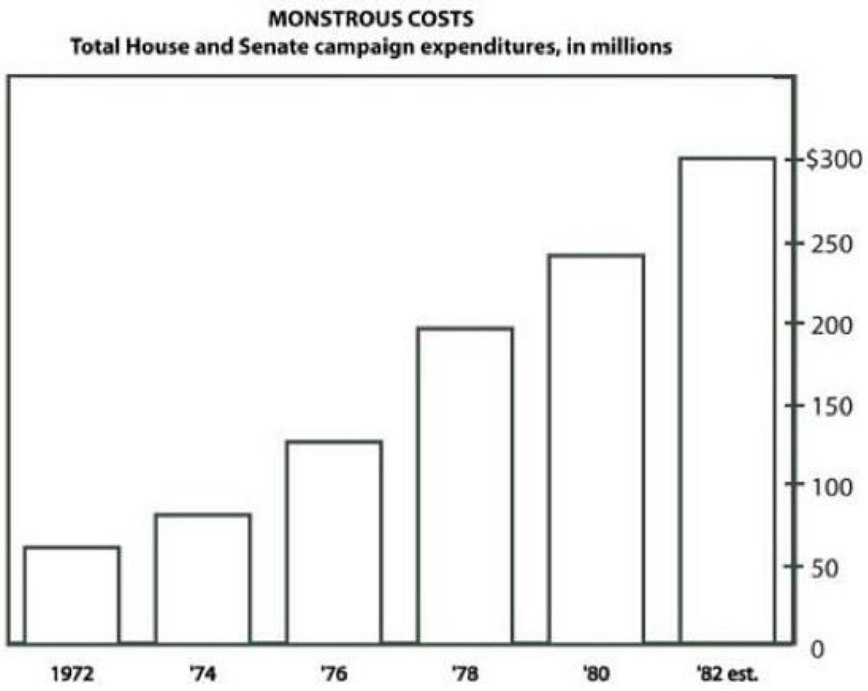


Criticism: chartjunk?



http://nigelholmes.com/

Criticism: chartjunk?

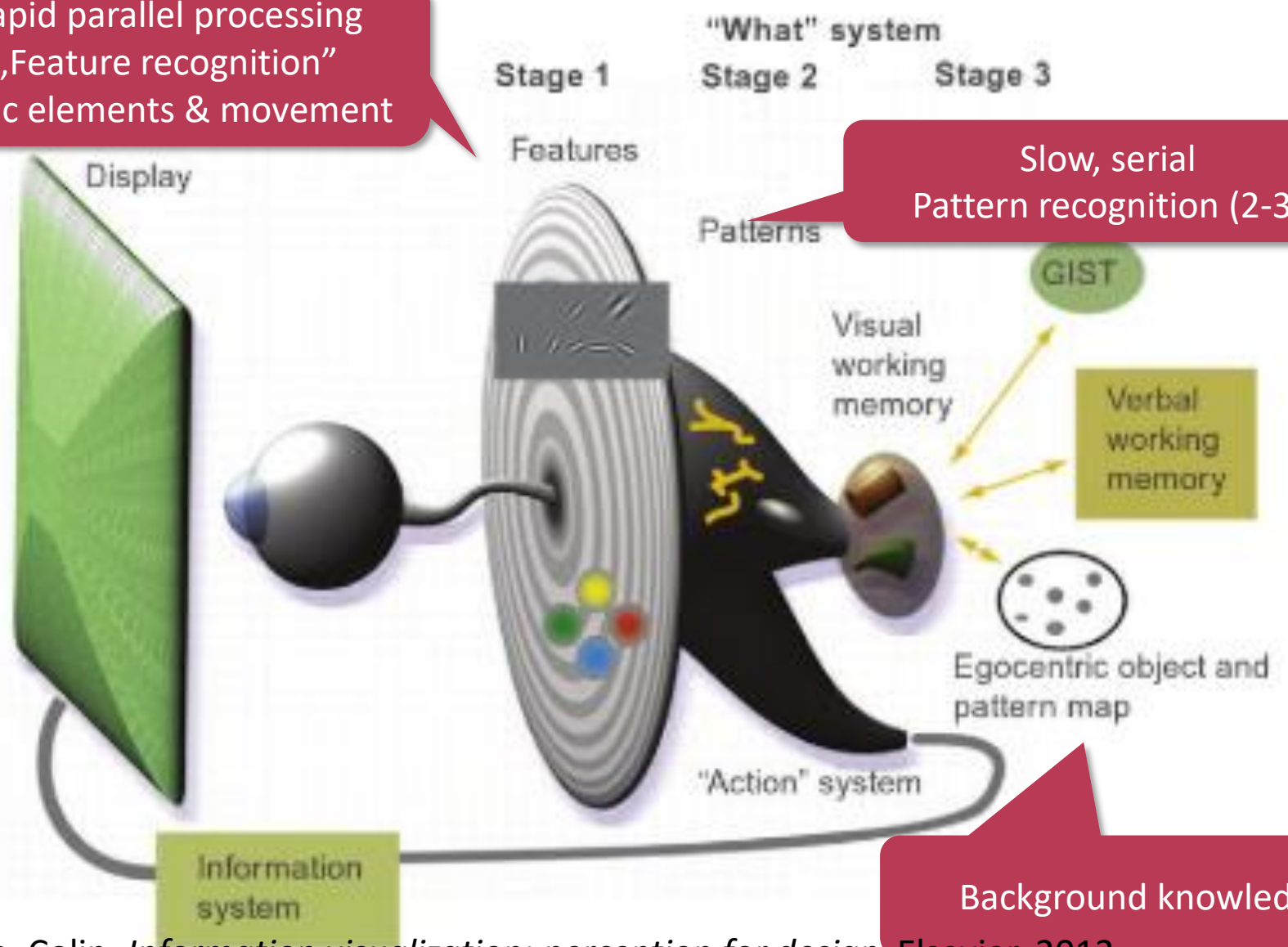


Scott Bateman, Regan L. Mandryk, Carl Gutwin, Aaron Genest, David McDine, Christopher Brooks, Useful Junk? The Effects of Visual Embellishment on Comprehension and Memorability of Charts. *ACM Conference on Human Factors in Computing Systems* (CHI), 2010.

http://nigelholmes.com/

Reminder: the way we think

Rapid parallel processing
„Feature recognition”
Basic elements & movement



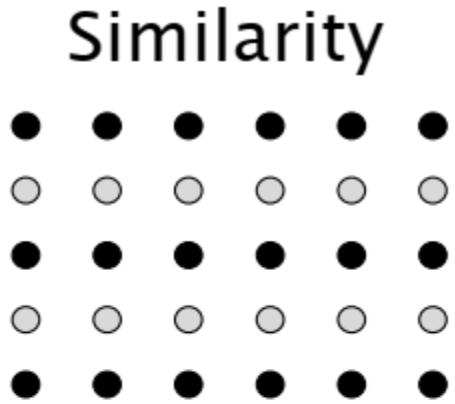
Slow, serial
Pattern recognition (2-3)

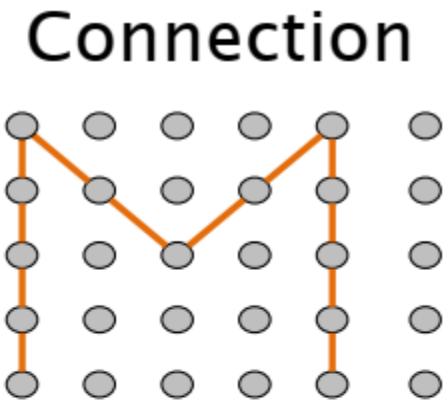
Background knowledge

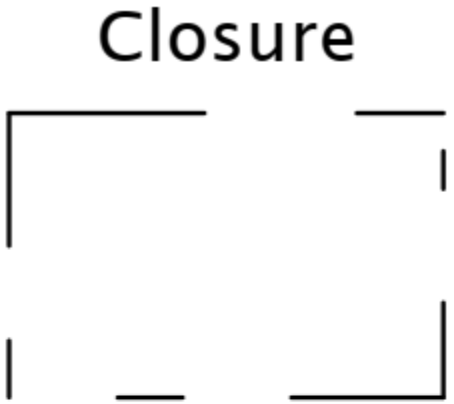
Ware, Colin. *Information visualization: perception for design*. Elsevier, 2012.

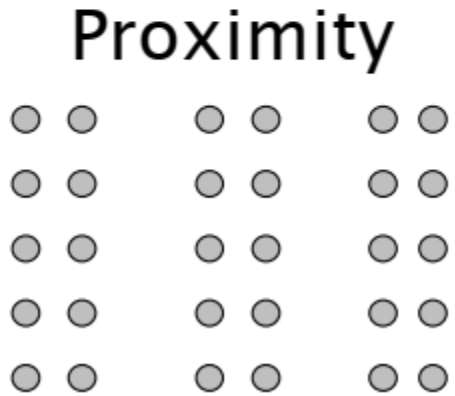
„Gestalt” principles

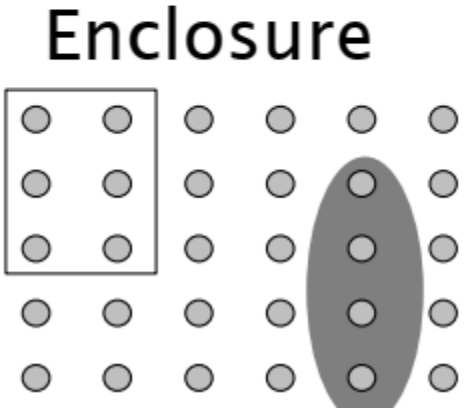
- Utilize the way humans perceive information

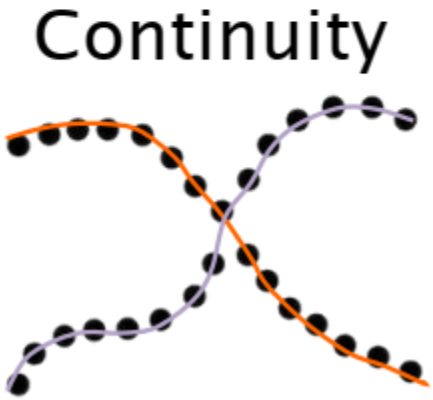






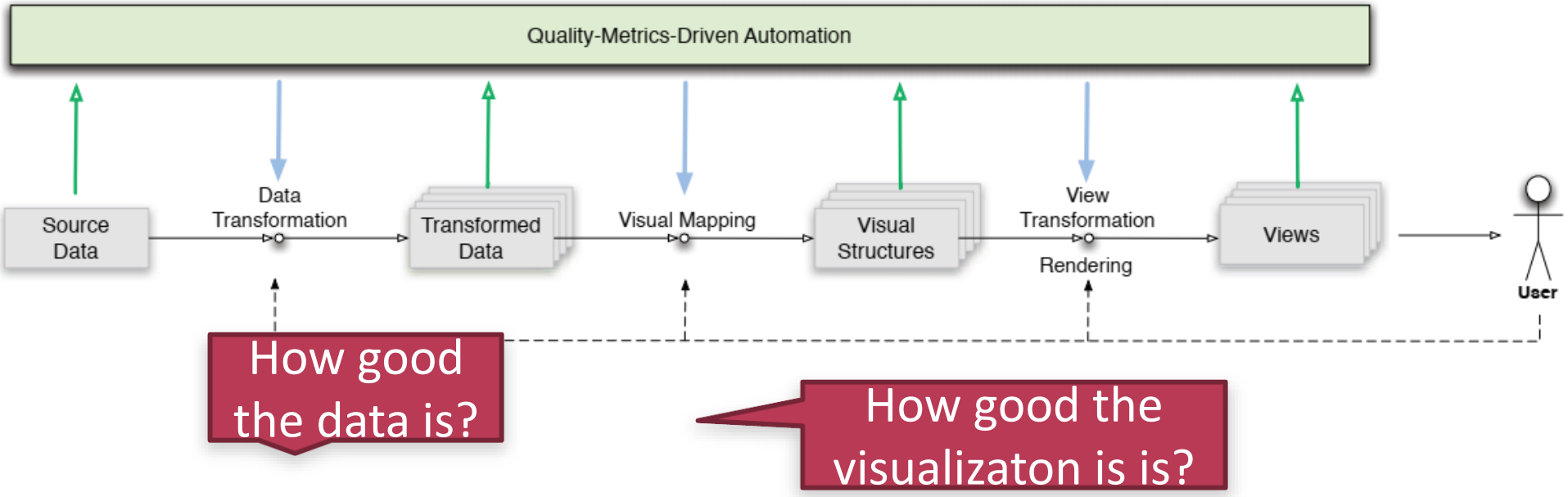






Figs: Data Visualization by Marco Torchiano, Politecnico di Torino
https://www.slideshare.net/marcotorchiano/data-visualization-88524048

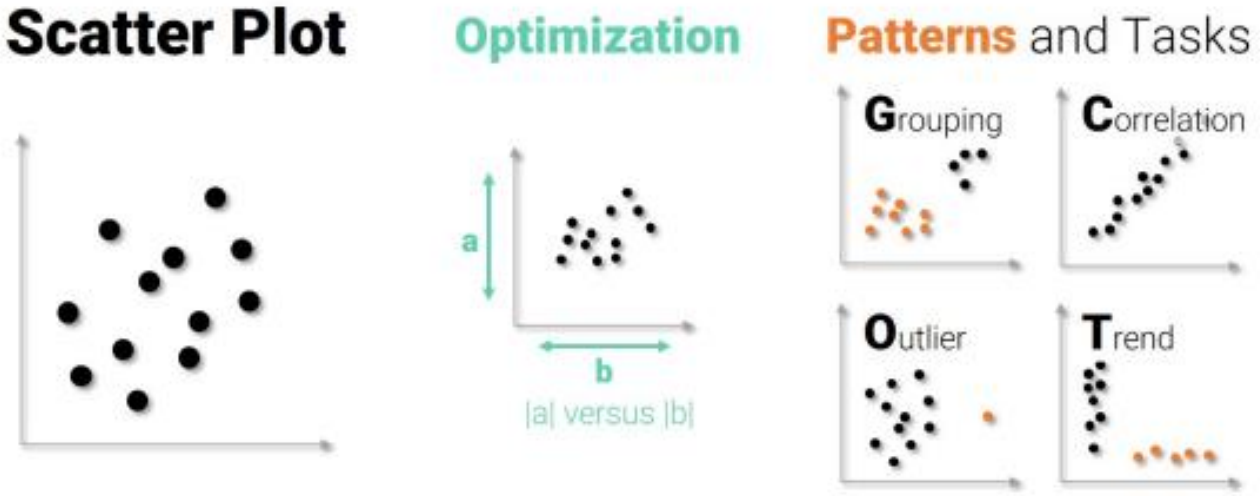
Quality metrics in general



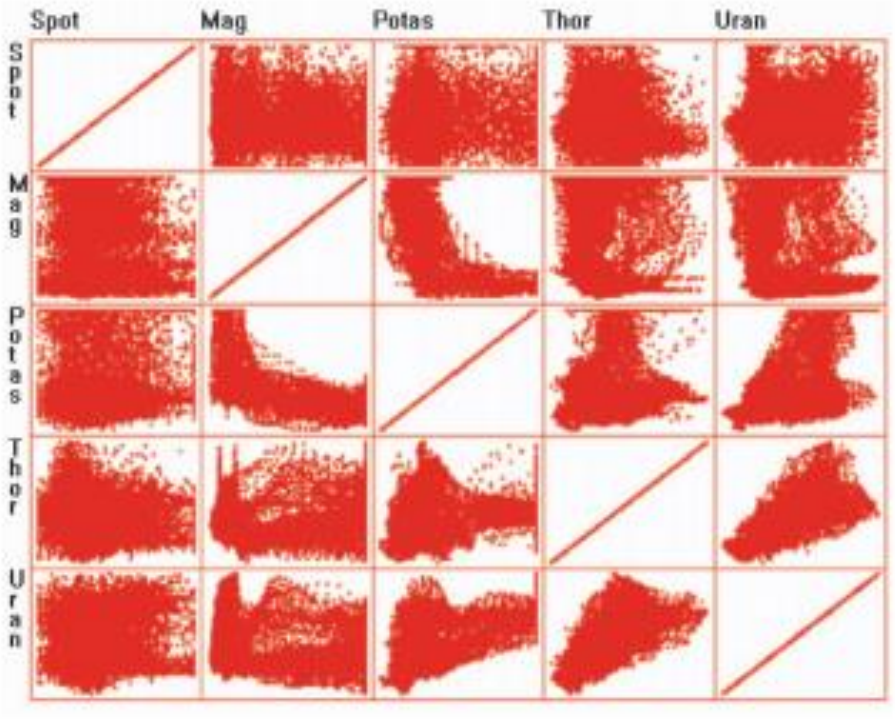
Goal of visualization

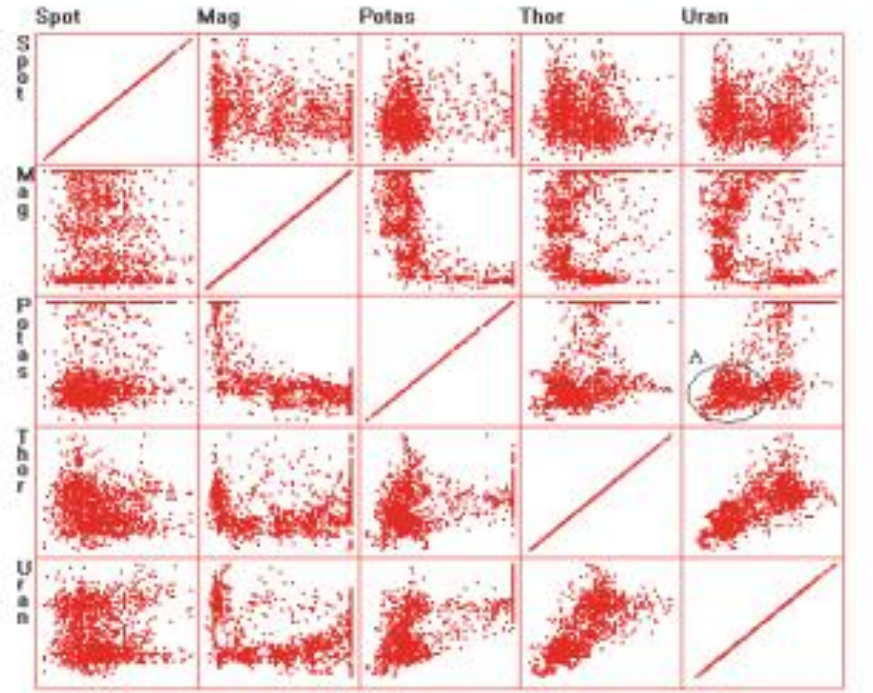
- Find and analyse…
- Correlation
- Trends
- Groups/clusters
- Outliers

Example: scatter plot



Abstractions on scatter plots



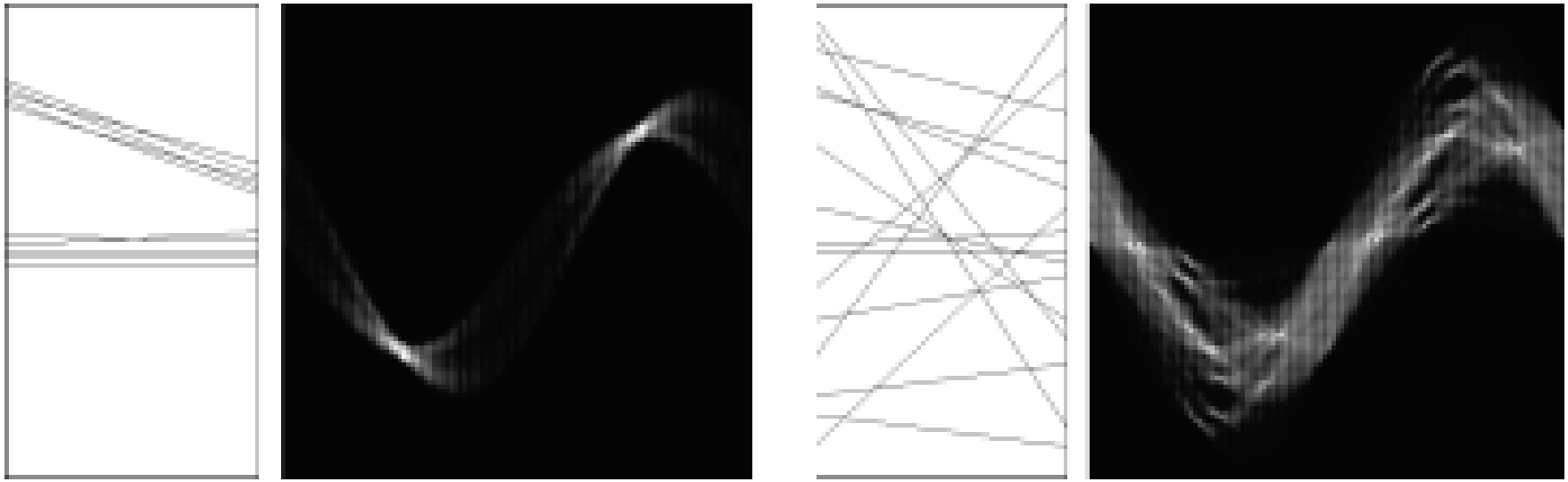


Q. Cui, M. Ward, E. Rundensteiner, and J. Yang.
Measuring data abstraction quality in multiresolution visualizations.
IEEE Trans. on Visualization and Computer Graphics, 12:709–716, 2006

Measures for similarity

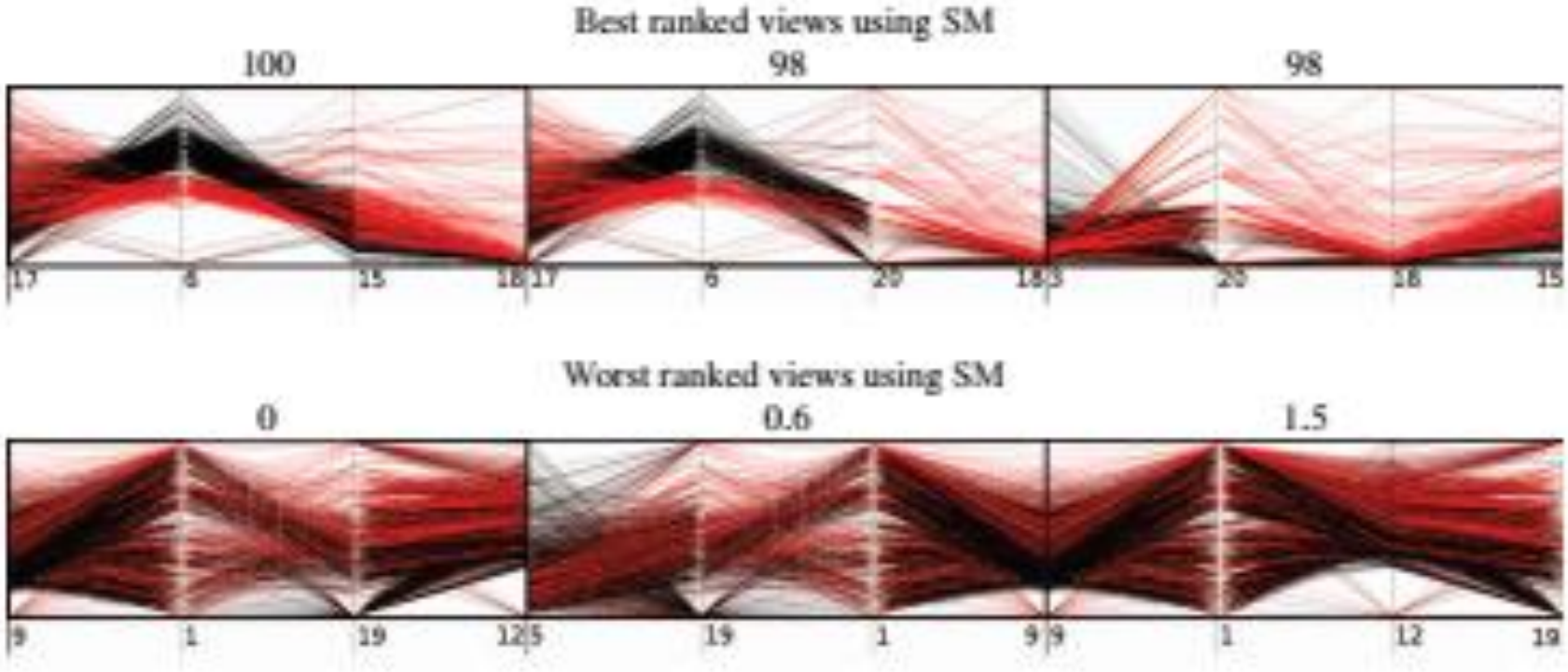
- Histogram Diffence Measure
- Nearest Neighbor Measure
- Abstraction vs Information Loss

Example: parallel coordinates



A. Tatu et al. Combining automated analysis and visualization techniques for effective exploration of high-dimensional data. In *Proc. IEEE Symp. Visual Analytics Science and Technology (VAST)*, 2009.

Example: PC



A. Tatu et al. Combining automated analysis and visualization techniques for effective exploration of high-dimensional data. In *Proc. IEEE Symp. Visual Analytics Science and Technology (VAST)*, 2009.

Example: Parallel coordinates