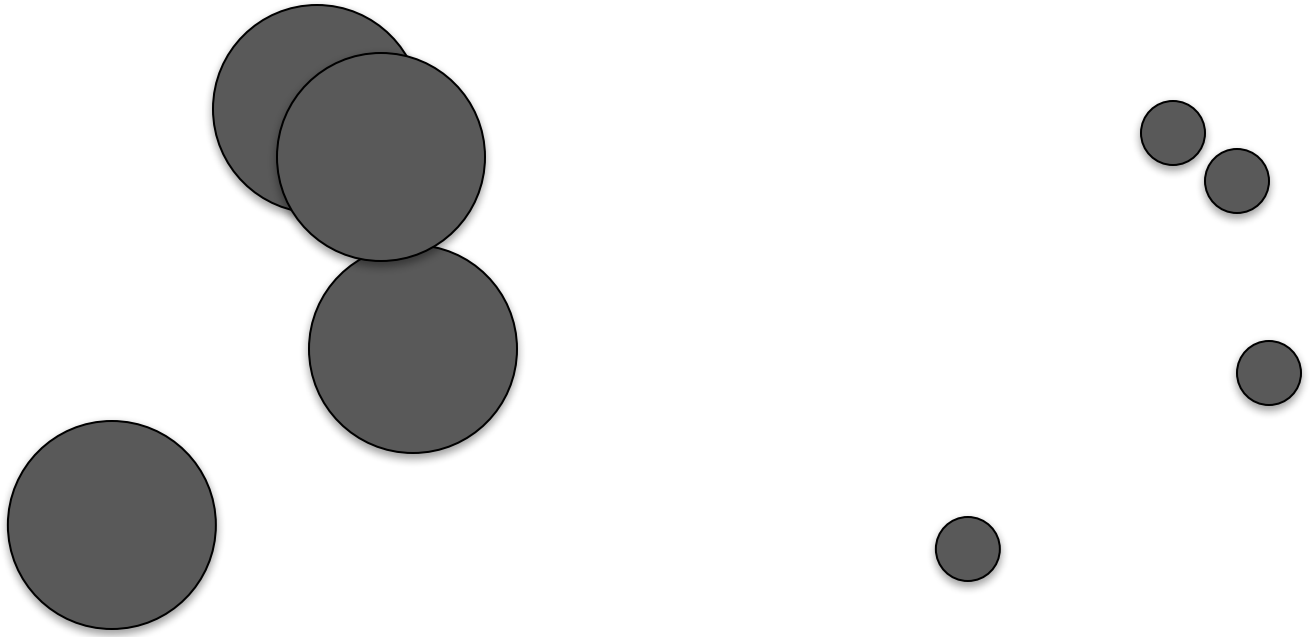
Occlusion and Depth

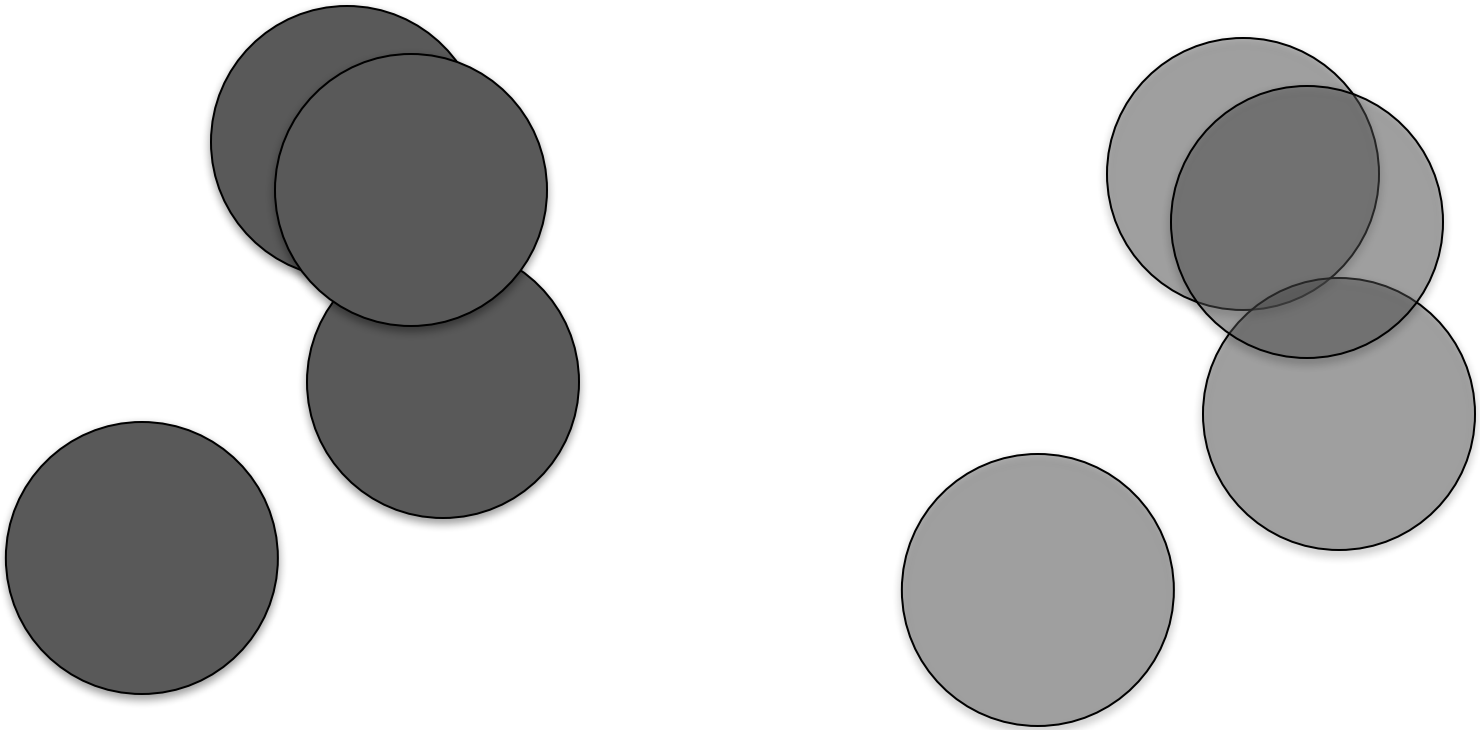
What's hiding?

Techniques for clutter reduction

Decrease Point Size



Opacity

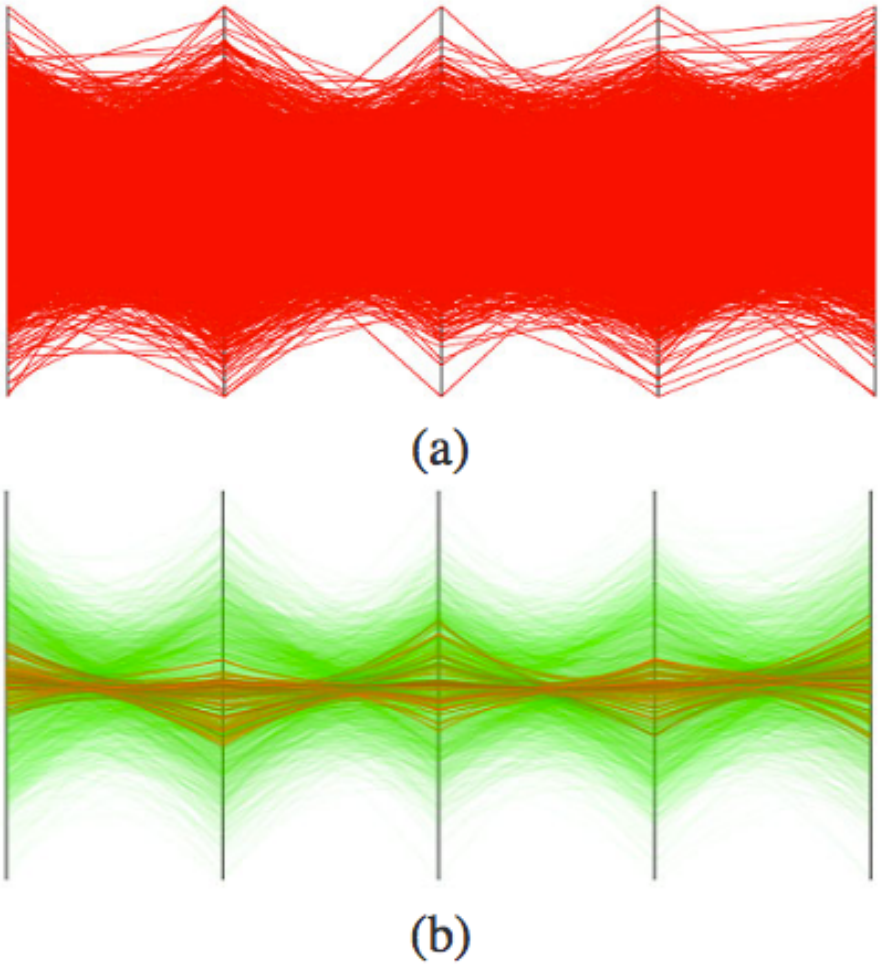


Sampling or Filtering

```
// Filters rows where x > 5
var result = dataReduction(data1, {
  filter: [
    { column: "x", min: 5 }
  ]
});
```

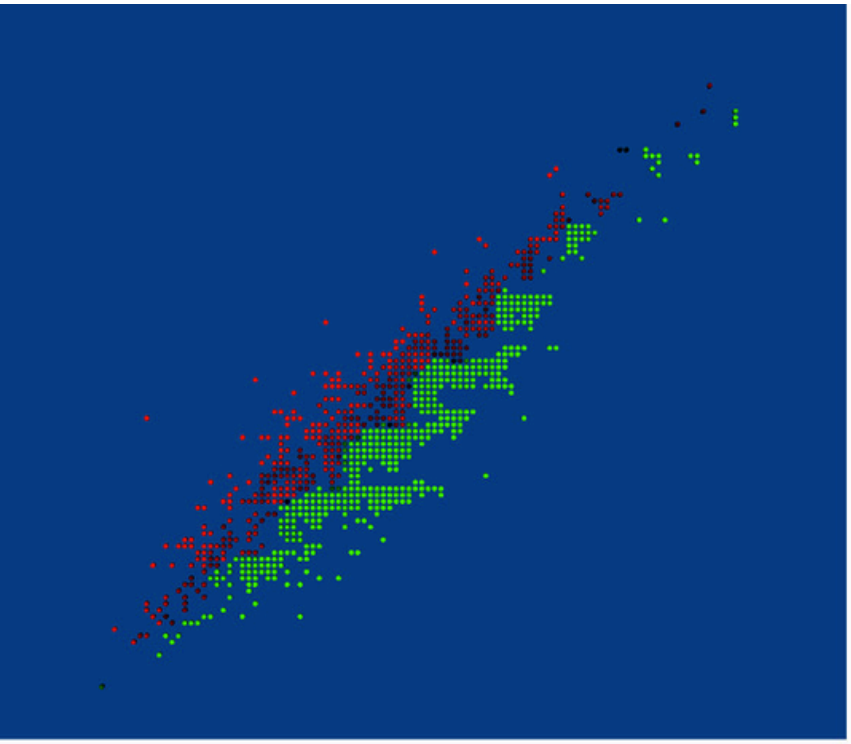
https://www.npmjs.com/package/data-reduction

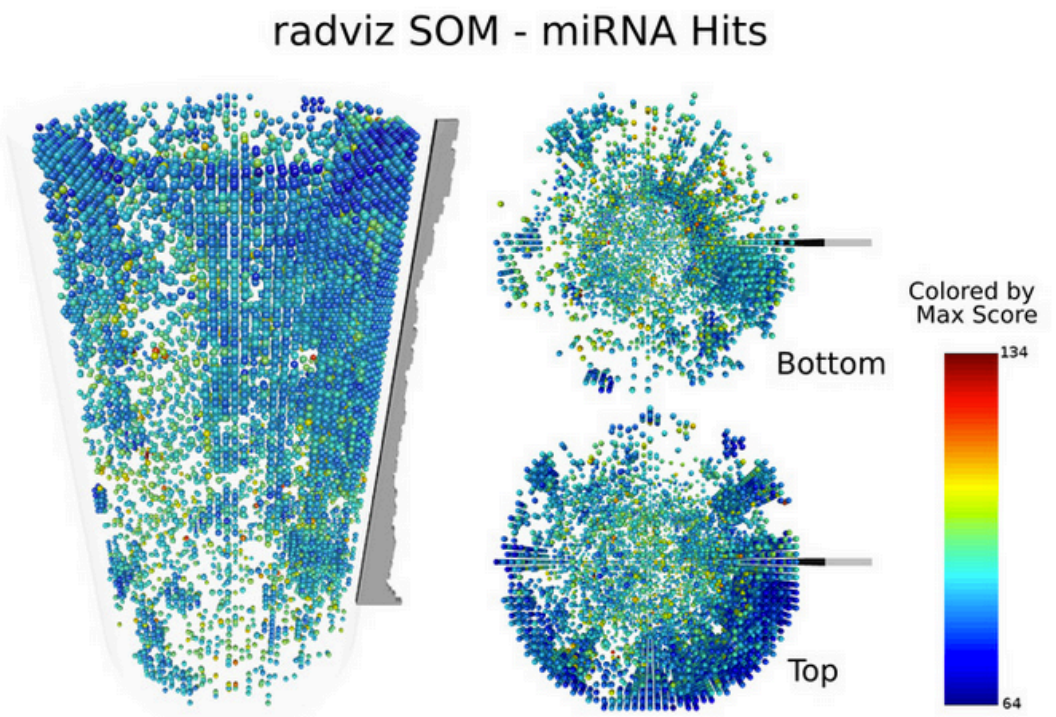
Clustering



Zhou, et al., 2008, Visual clustering in parallel coordinates. In *Computer Graphics Forum* (Vol. 27, No. 3, pp. 1047-1054).

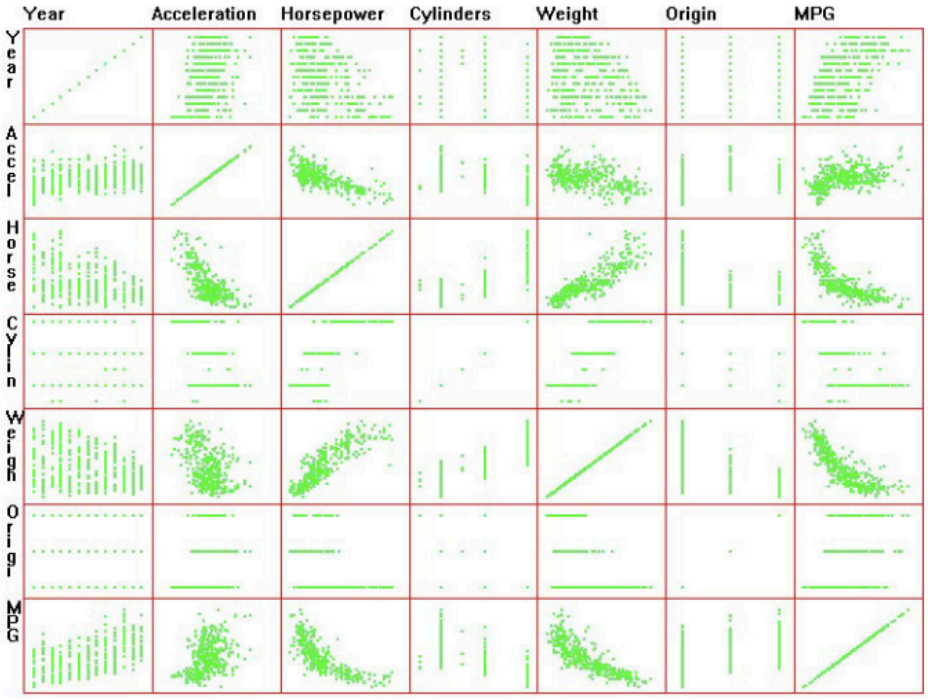
Jittering

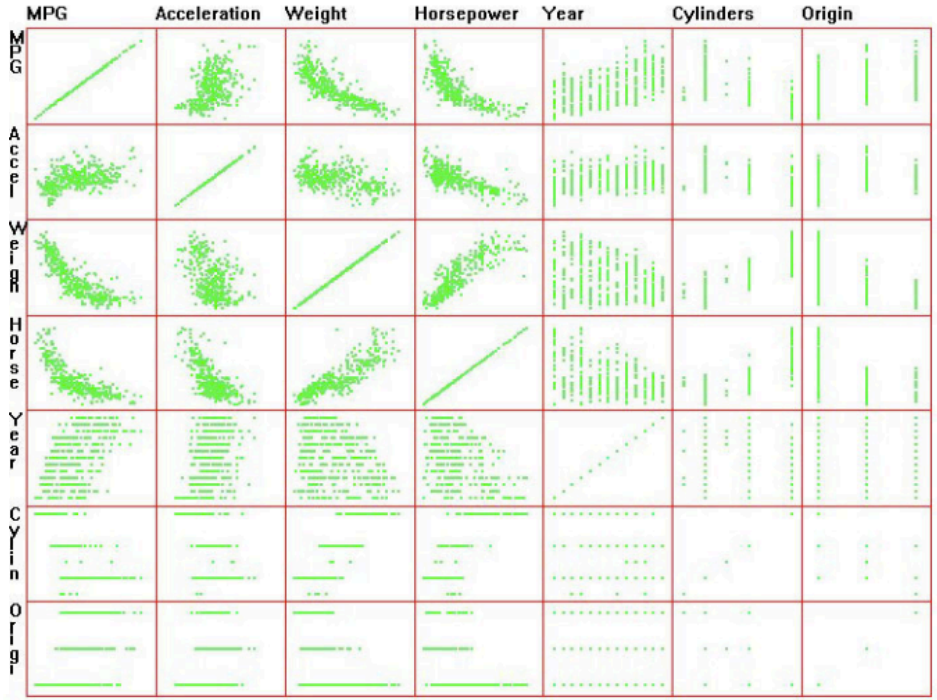




Trutschi & Grinstein, 2003. Intelligently resolving point occlusion.

Dimensional Reordering





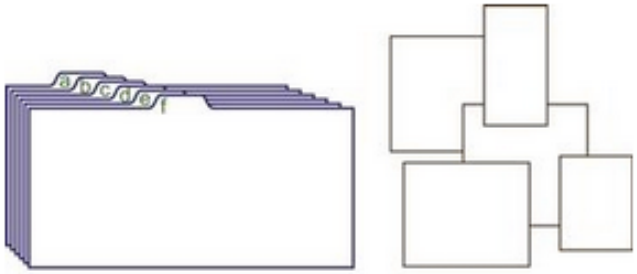
Peng, Ward, & Rundensteiner, 2004. Clutter reduction in multi-dimensional data visualization using dimension reordering.

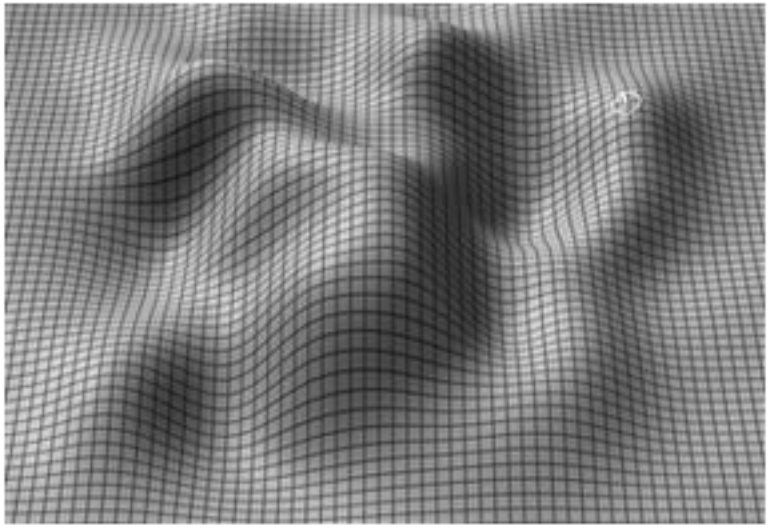
Showing Depth

Photo by Ernie Cate
feelgrafix.com

Spatial Depth Cues

- Size
- Gridlines
- Surface shading and texture
- Shadows





Ware, 2013. Information Visualization: Perce

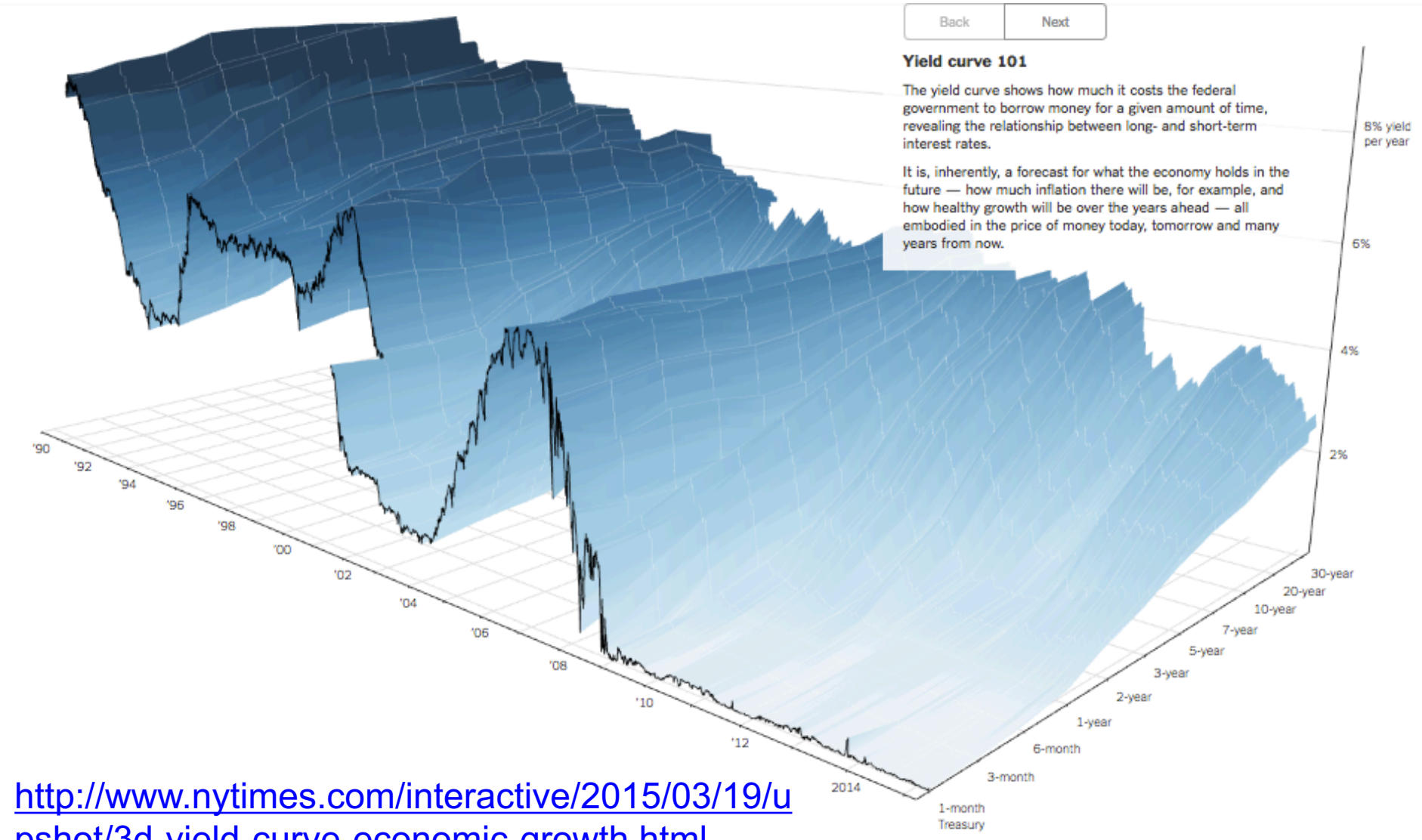
3D
ahead
proceed with
CAUTION!

A Hierarchy of Accuracy

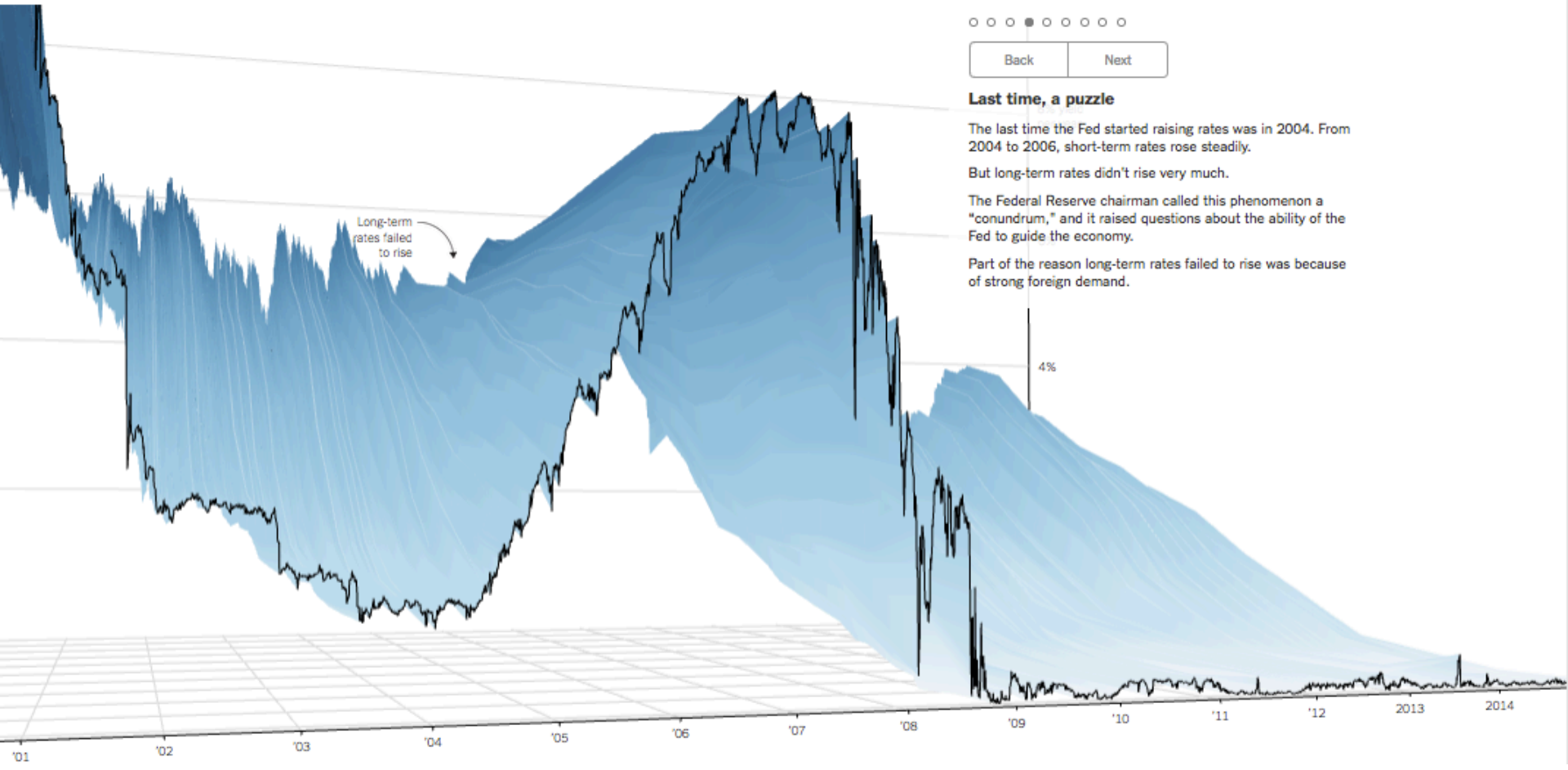
Decreasing quantitative accuracy

- Position
- Length
- Angle, slope
- Area
- **Volume**
- Color, density

NY Times 3-D Economics View



http://www.nytimes.com/interactive/2015/03/19/upshot/3d-yield-curve-economic-growth.html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Last time, a puzzle
The last time the Fed started raising rates was in 2004. From 2004 to 2006, short-term rates rose steadily.
But long-term rates didn't rise very much.
The Federal Reserve chairman called this phenomenon a "conundrum," and it raised questions about the ability of the Fed to guide the economy.
Part of the reason long-term rates failed to rise was because of strong foreign demand.
Long-term rates failed to rise
4%
'01
'02
'03
'04
'05
'06
'07
'08
'09
'10
'11
'12
2013
2014

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