Navigation and Overview

C. Andrews

2014-03-20

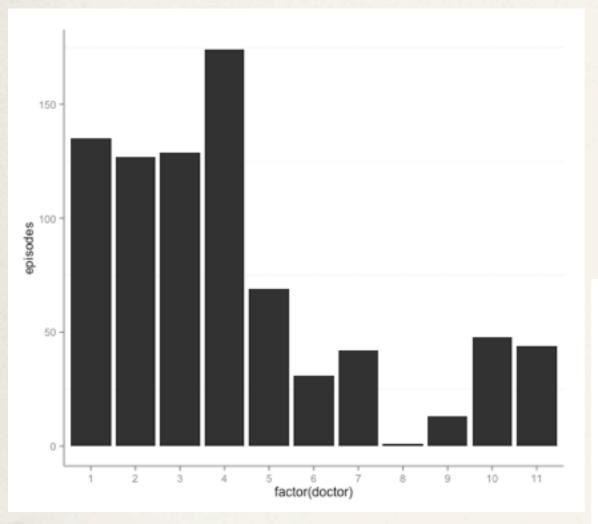
Thursday, March 20, 14

Schneiderman's Mantra

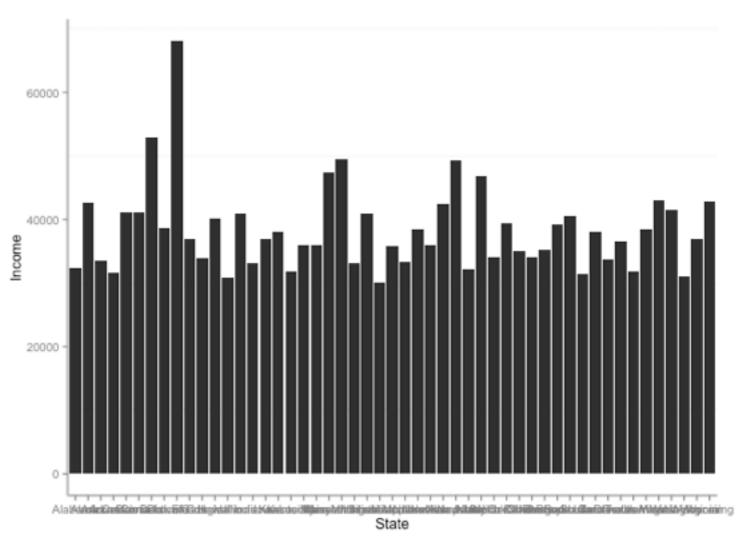


Overview first, zoom and filter, details on demand

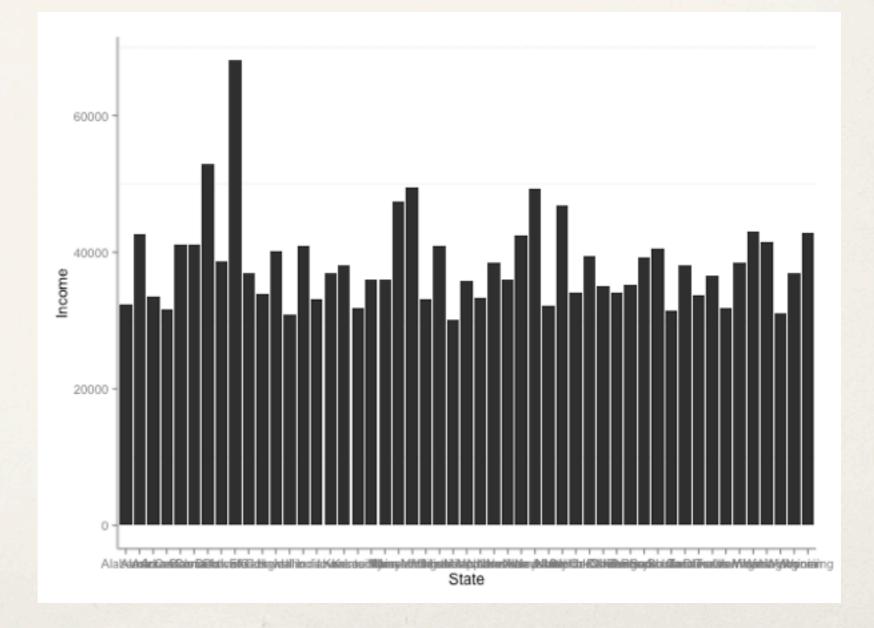
Data scalability



There is always more data

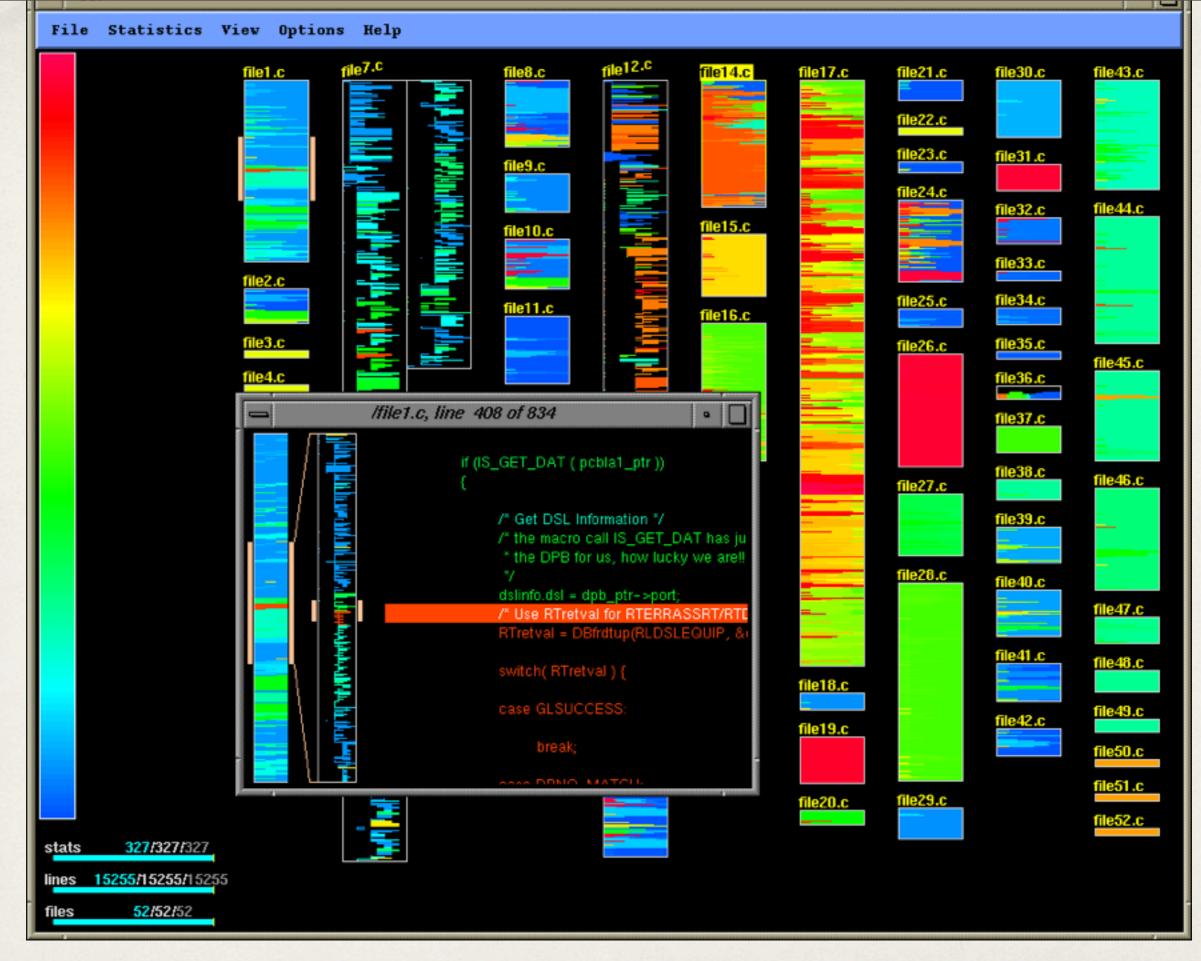


Keep squishing those representations



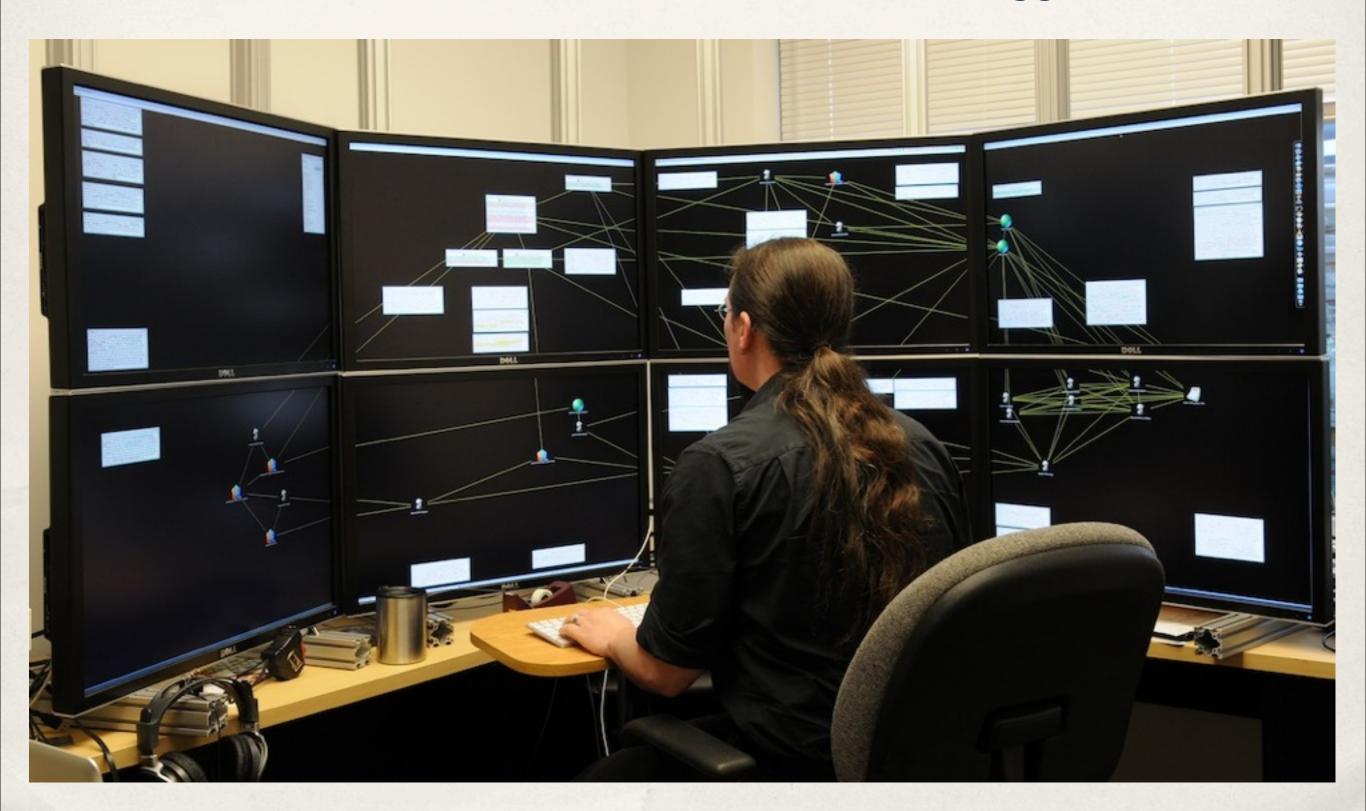


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SeeSoft

Get bigger screens!



Solution 2: data space / attribute space

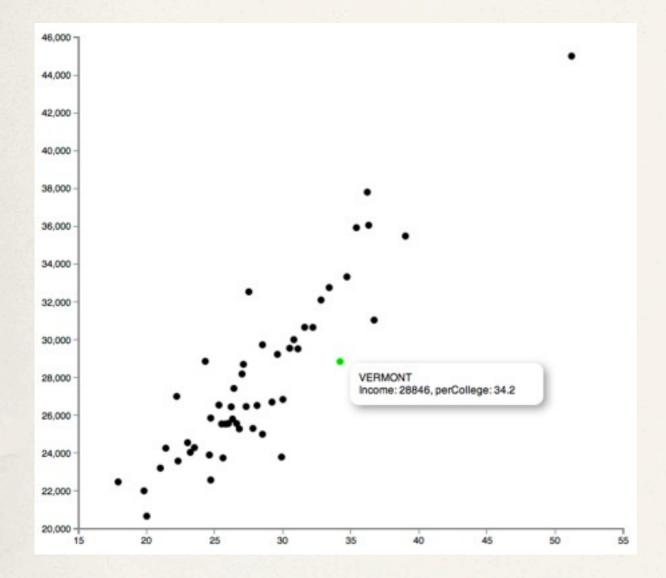
Reduce # of attributes

Reduce # of items

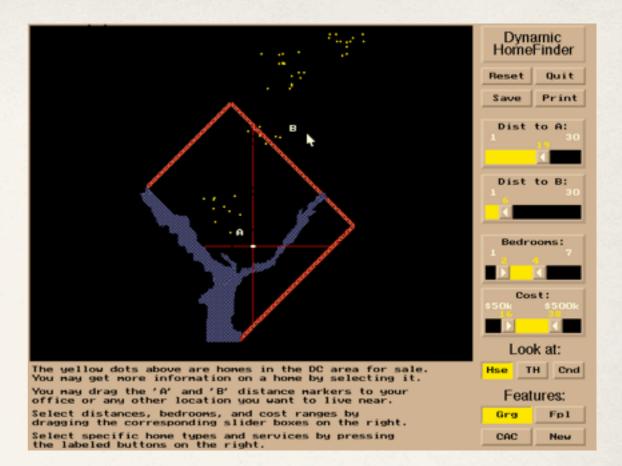
11	A	8	C	D	E	F	G
1	doctor	name	companions	start	end	episodes	duration
2	1	William Hartnell	10	1963	1966	135	3288
3	2	Patrick Troughton	5	1966	1970	127	3183
4	3	Jon Pertwee	3	1970	1974	129	3206
5	4	Tom Baker	8	1974	1982	174	4248
6	5	Peter Davidson	6	1982	1984	69	1800
7	6	Colin Baker	2	1984	1987	31	1029
8	7	Sylvester McCoy	2	1987	1989	42	1025
9	8	Paul McGann	1	1996	1996	1	84
10	9	Christopher Eccleston	3	2005	2005	13	568
11	10	David Tennant	5	2005	2010	48	2368
12	11	Matt Smith	4	2010	2013	44	2083

Reduce range of items

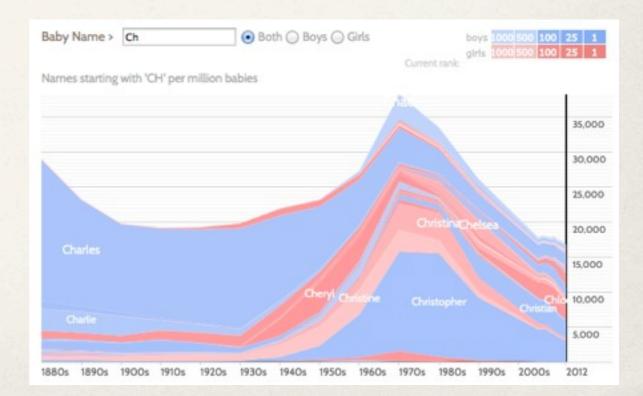
Elimination



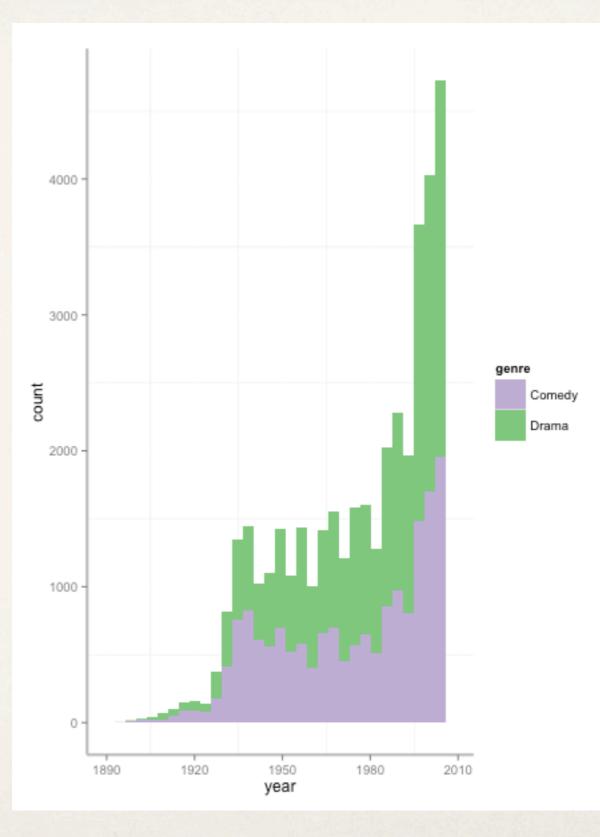
eliminate attributes



eliminate items





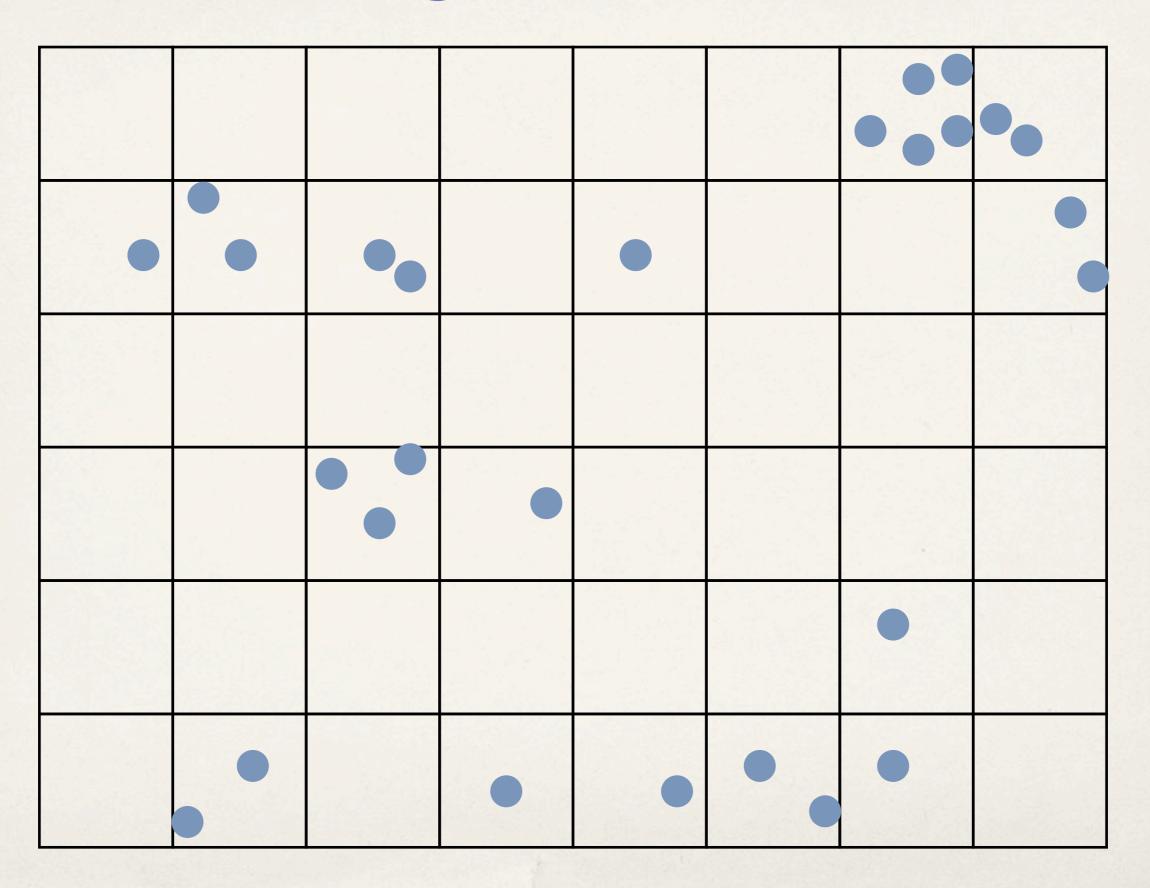


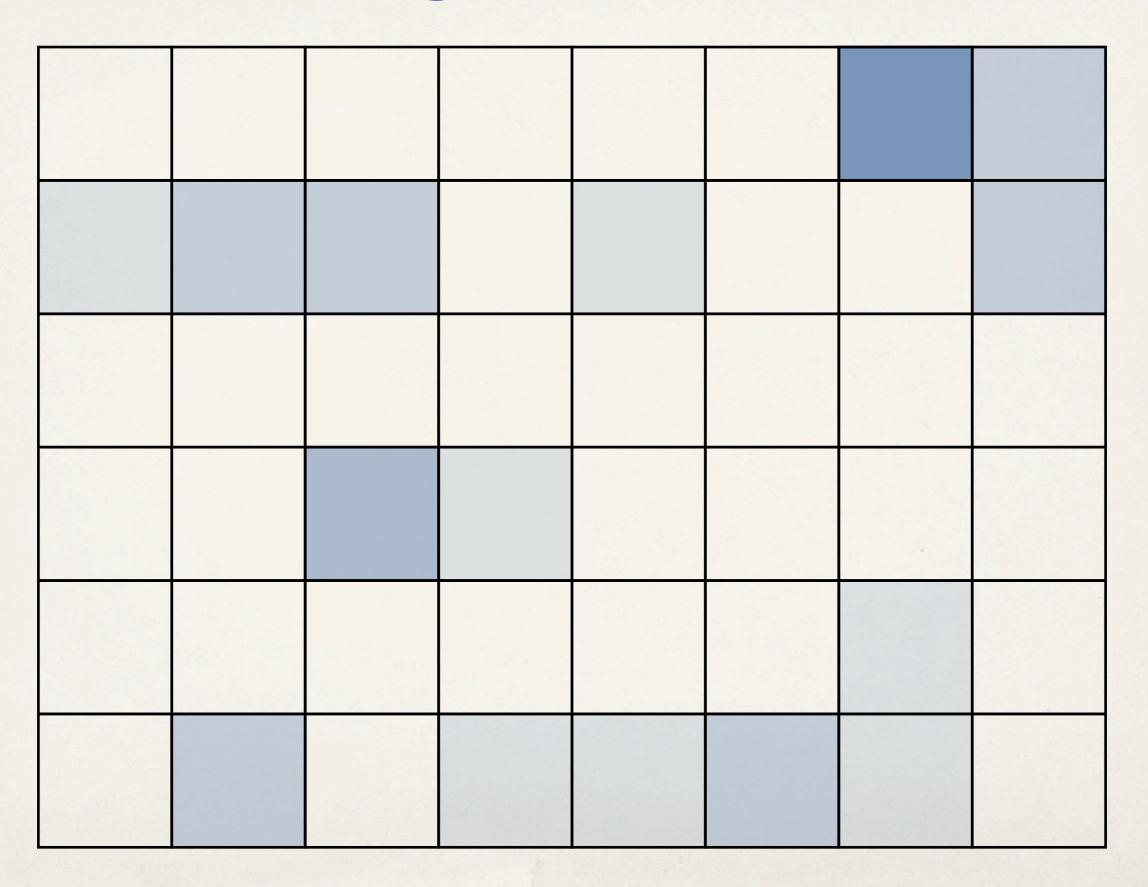
What to group by?

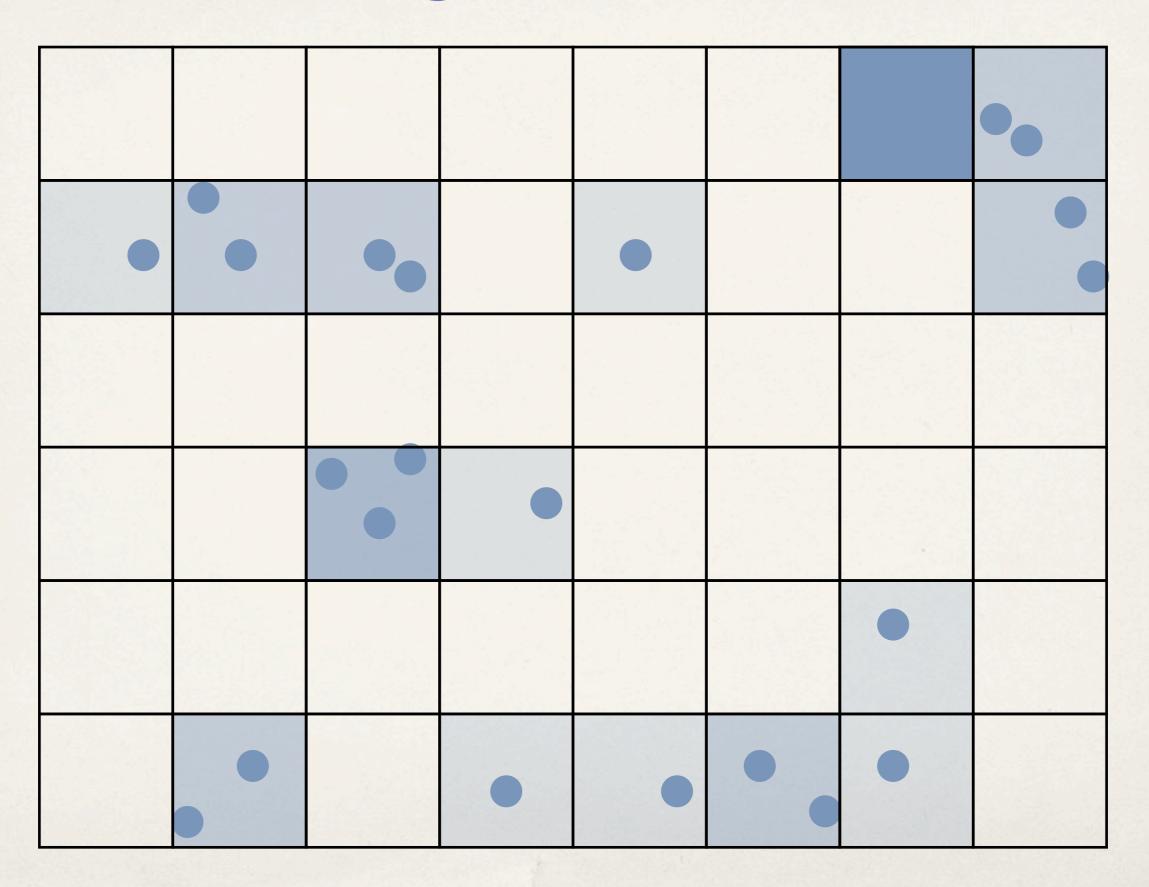
categorical data or shared data values spatial position algorithmic (i.e., clustering based on attributes) user defined

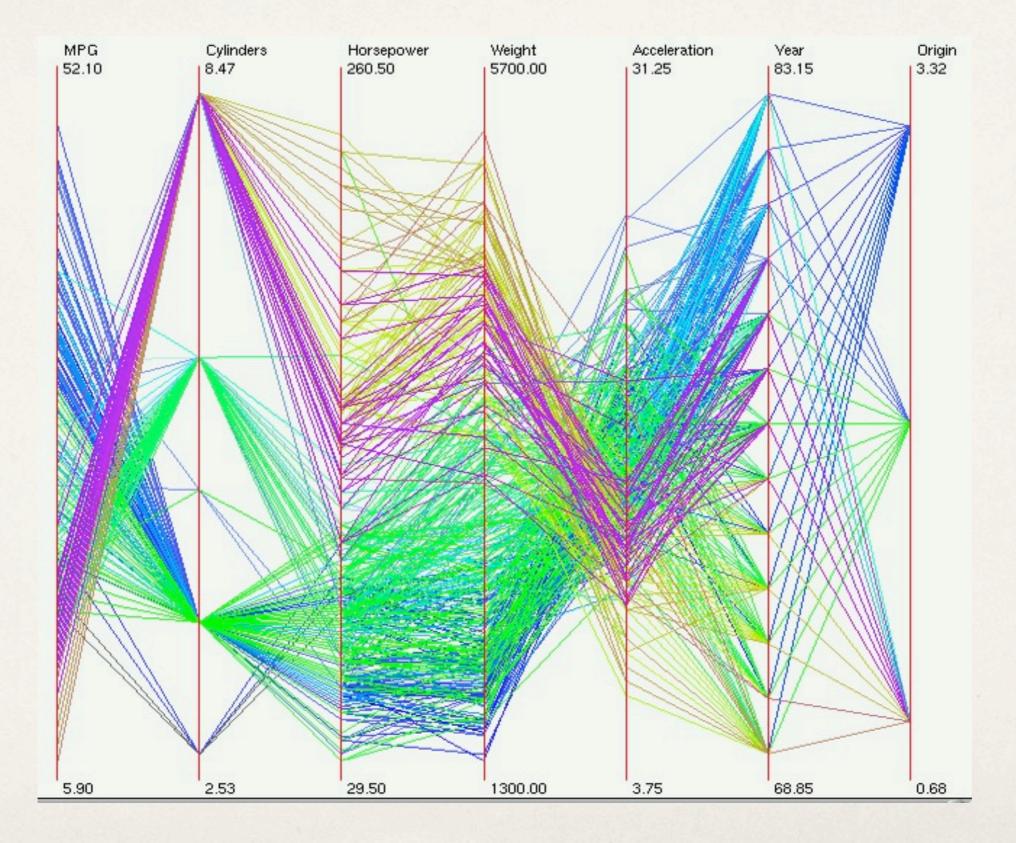
How to group?

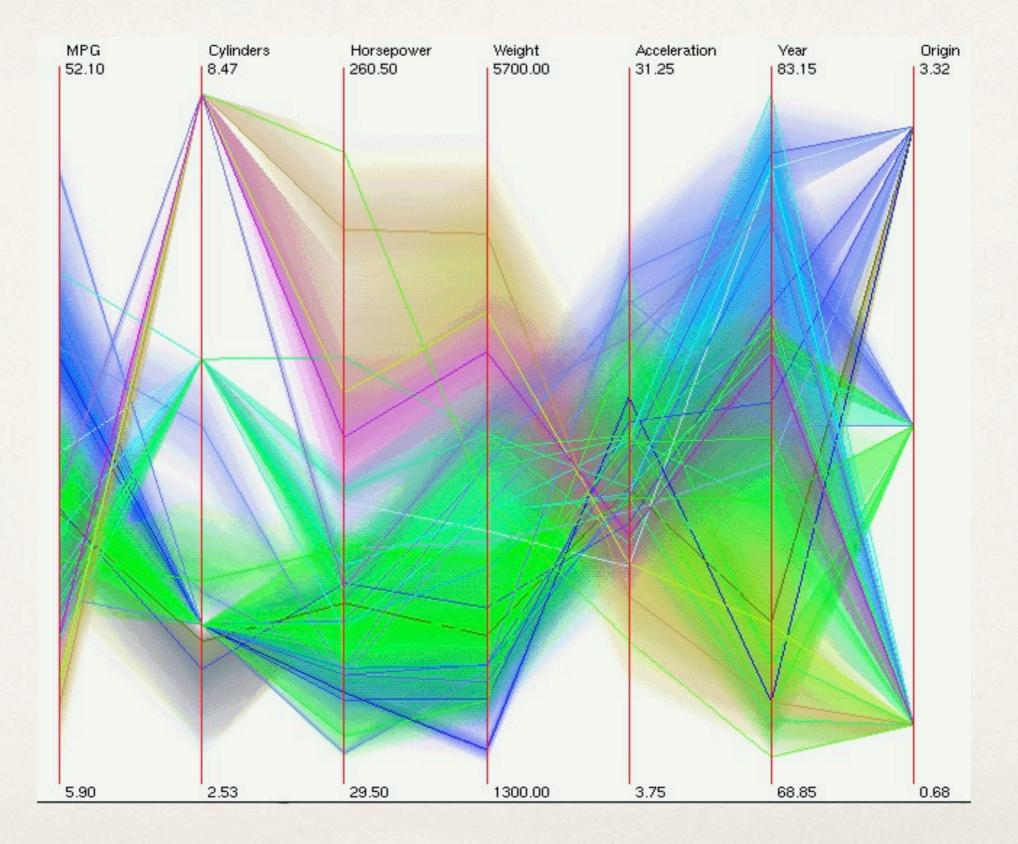
math function on attributes (e.g., min, max, mean, mode, sum, count, etc...) semantics or shared abstraction

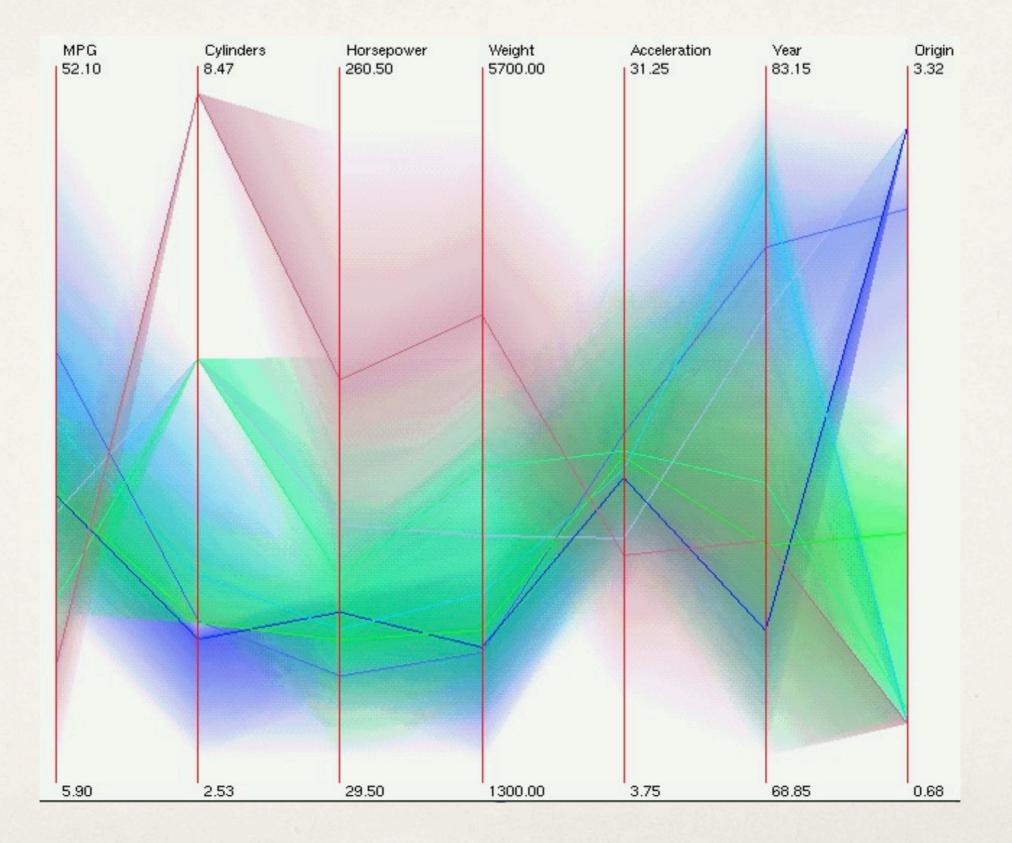


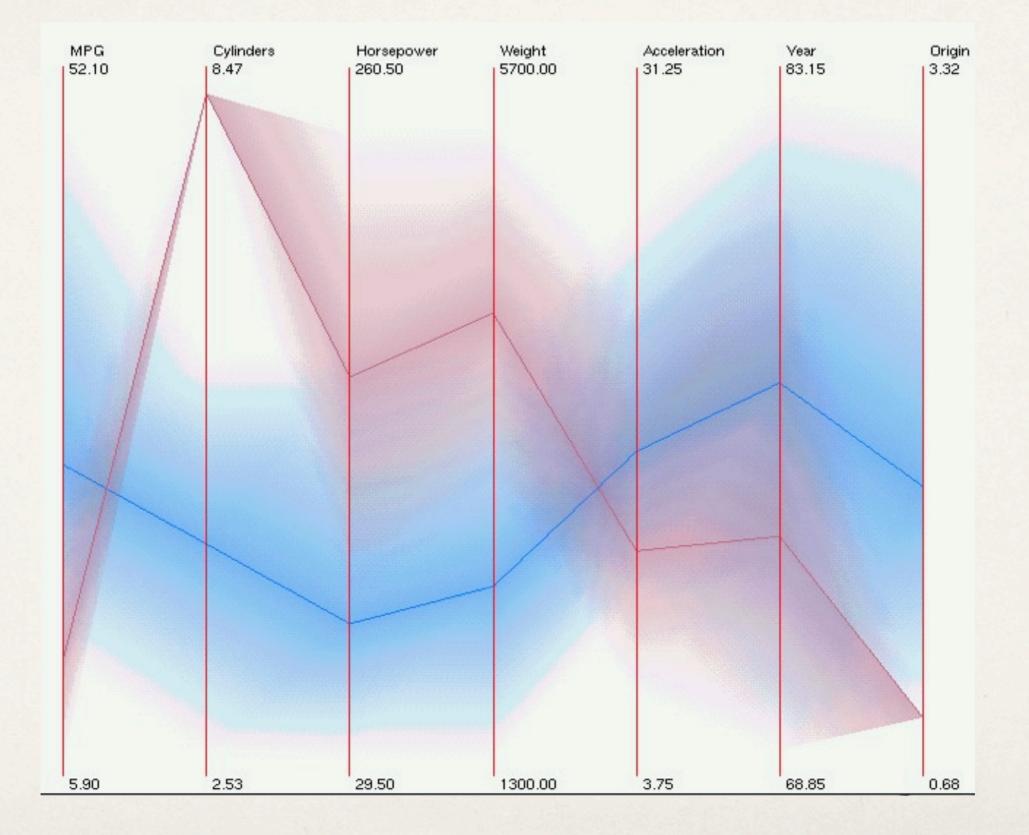


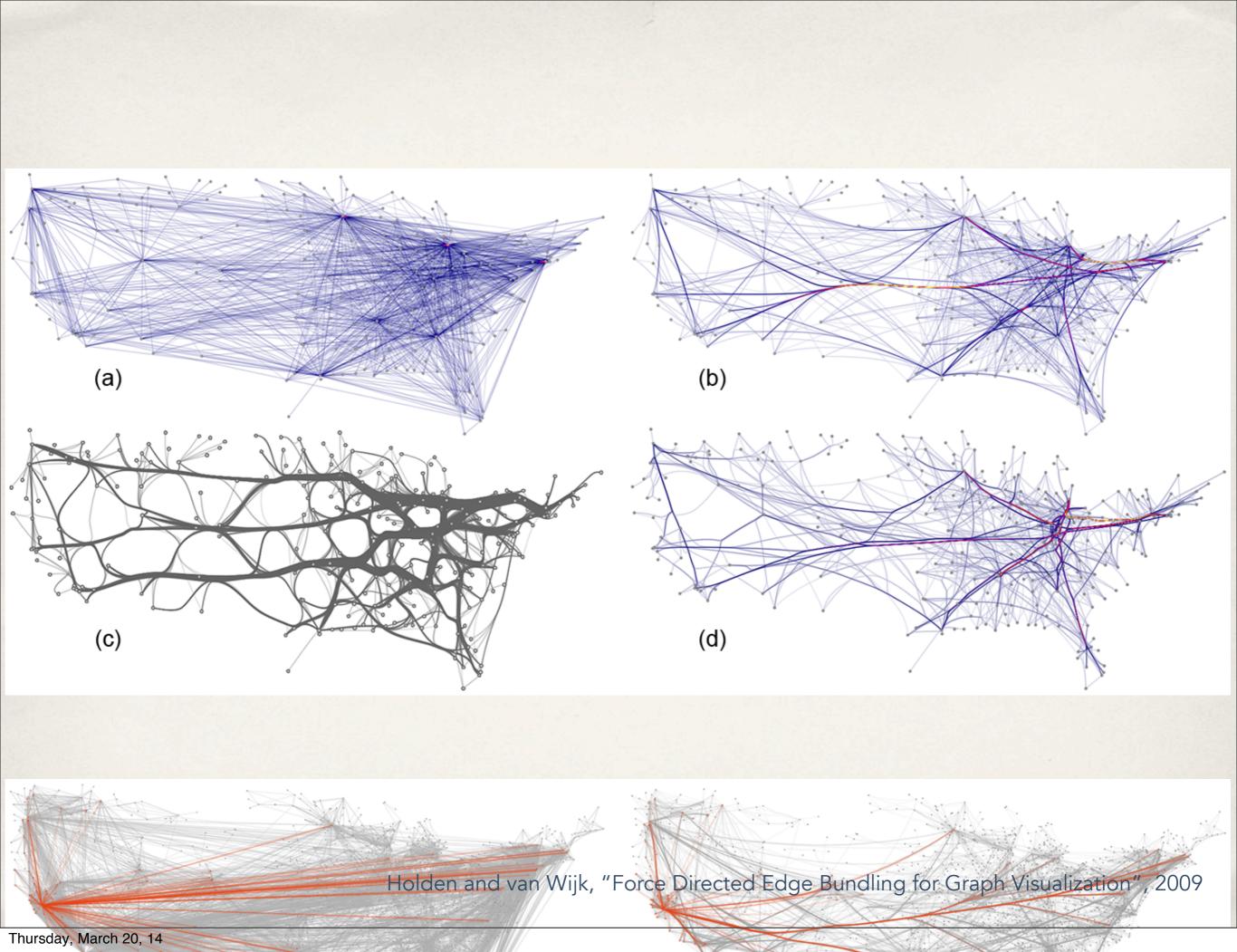


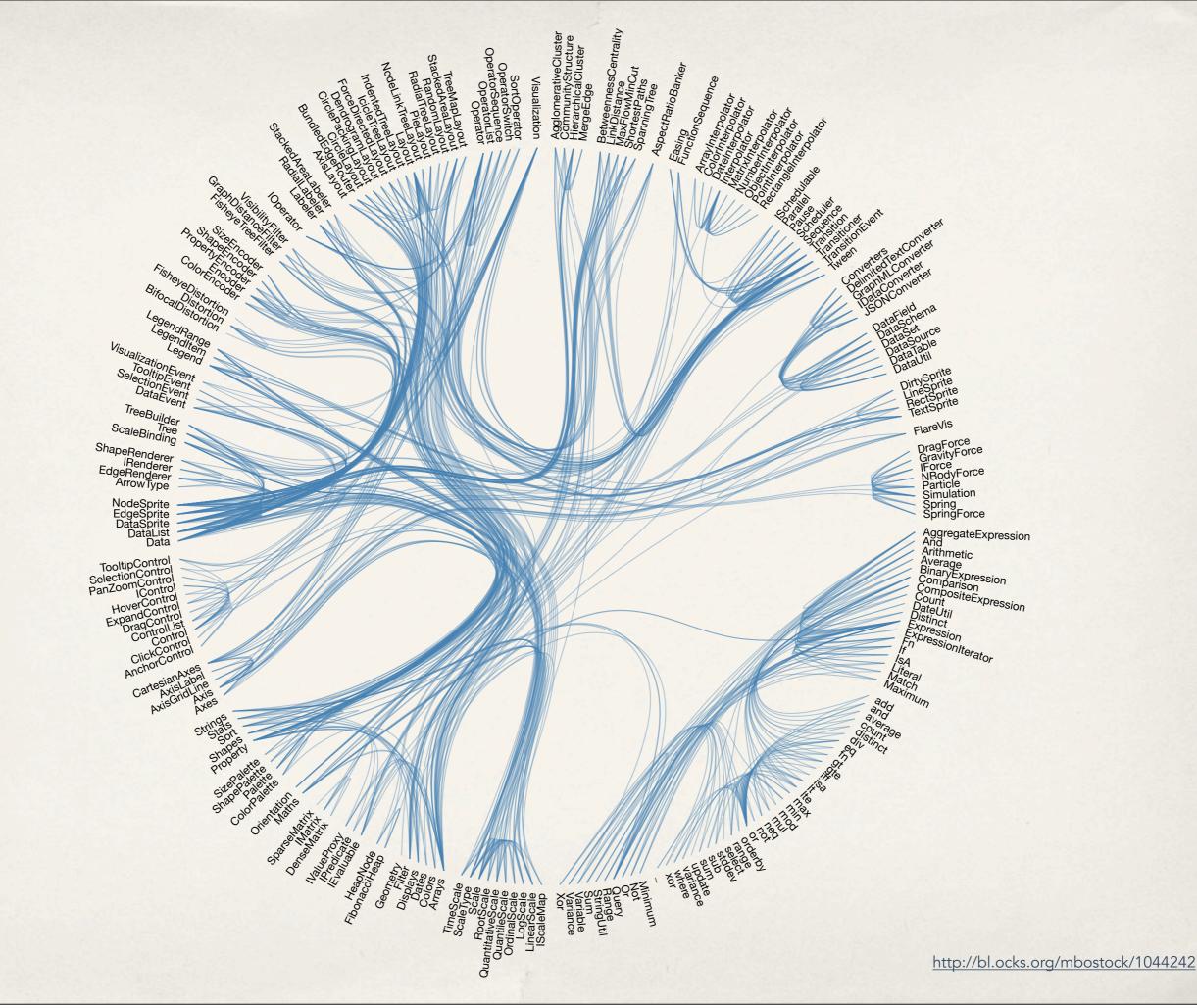




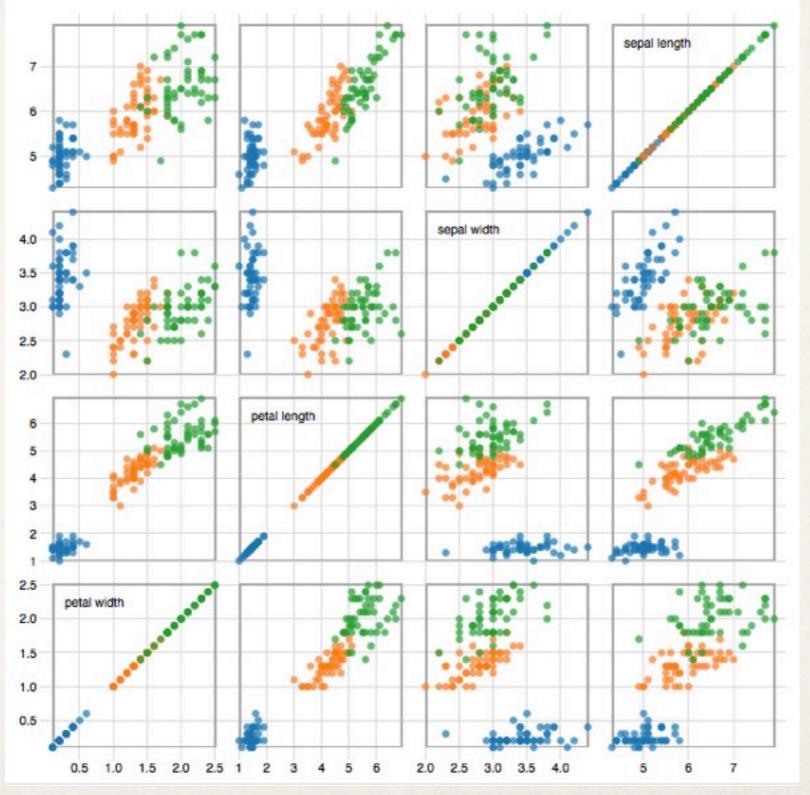






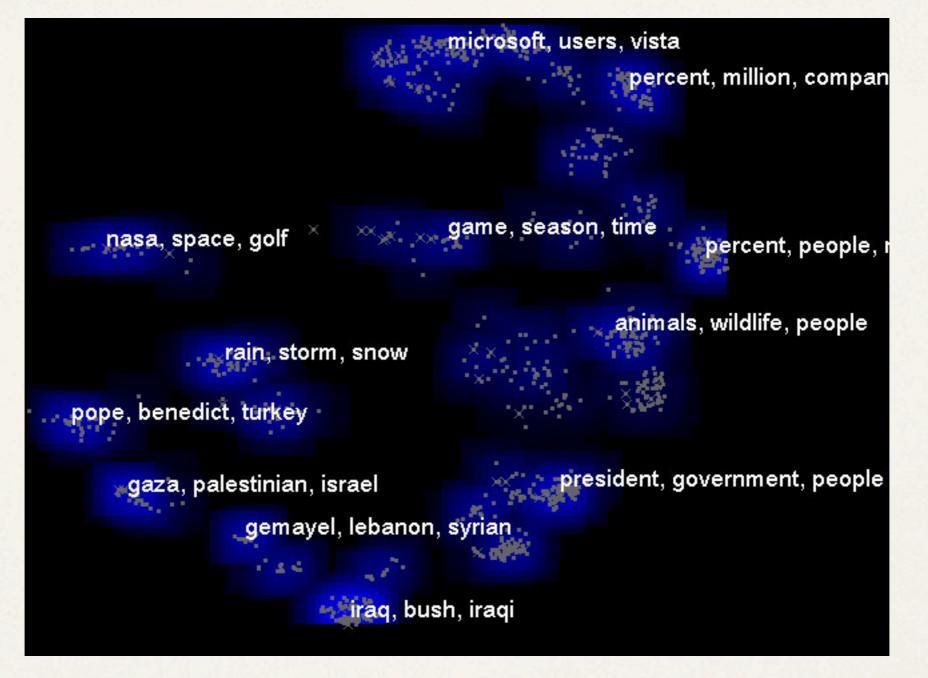


Clustering



http://bl.ocks.org/mbostock/4063663

Clustering



InSpire, PNNL

Navigation

Show me the Navigation data!

Conventional navigation

		CS 465 - Information		C Reader				
Music			e TitanTV Feeds * outline Java API	the second				
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CS 465 - Information Visualization								
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	ing schedule and subject to change							
Date	Topic	Reading	Notes	Assignment				
0.0/14	Introduction to information		Interduction					
02/11	visualization	WGK Ch 1	Introduction					
02/13	Introduction to R		R command history	HW1 due 2014- 02-20				
02/18	Data	WGK Ch 2	Data. R command history	02-20				
				HW2 due 2014-				
02/20	Perception	WGK 3.1-3.3	Perception 1	02-27				
02/25	Visual variables	WGK 3.3-3.5 +	Visual variables I					
		4.1-4.3 WGK 3.3-3.5 +						
02/27	Visual variables II	4.1-4.3	Visual variables II					
03/04	Effective visualization	WGK 12	Good vis, bad vis	HW3 due 2014-				
				03-11				
03/06	Intro to D3	M 2-3, 5-8	D3 template, First bar chart	1994				
03/11	D3 II	M 7-8	Second bar chart, scatterplot, line chart	HW4 due 2014- 03-18				
03/13	Interaction	WGK 10-11						
03/18	D3 Interaction	M 9-10						
03/20	Multivariate data							
03/25	Spring break							
03/27	Spring break							
04/01	Hierarchical data							
04/03								
04/08	Text							
04/10								
04/15	Maps							
04/17								

Conventional navigation

Music		v.cs.middlebury.edu/~can Data * photo * Audibl	drews/classes/infovis/ le TitanTV Feeds * outline Java API	Cooking For Engineers	
desen Science	uoiparativity edi visualization graphics	Sprin	465 - Information Visu g 2014 Vilabus Nazza (class forum)	alization	
	ing schedule and subject to change				
Date	Topic Introduction to information	Reading	Notes	Assignment	
2/11	visualization	WGK Ch 1	Introduction		
2/13	Introduction to R		R command history	HW1 due 2014- 02-20	
2/18	Data	WGK Ch 2	Data. R command history		
2/20	Perception	WGK 3.1-3.3	Perception 1	HW2 due 2014- 02-27	
2/25	Visual variables	WGK 3.3-3.5 + 4.1-4.3	Visual variables I		
2/27	Visual variables II	WGK 3.3-3.5 + 4.1-4.3	Visual variables II		
3/04	Effective visualization	WGK 12	Good vis, bad vis	HW3 due 2014- 03-11	
3/06	Intro to D3	M 2-3, 5-8	D3 template, First bar chart	1	
3/11	D3 II	M 7-8	Second bar chart, scatterplot, line chart	HW4 due 2014- 03-18	
3/13	Interaction	WGK 10-11		1	
3/18	D3 Interaction	M 9-10			
3/20	Multivariate data				
	Spring break				
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	Maps			N.	
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4/15 4/17					

The keyhole problem

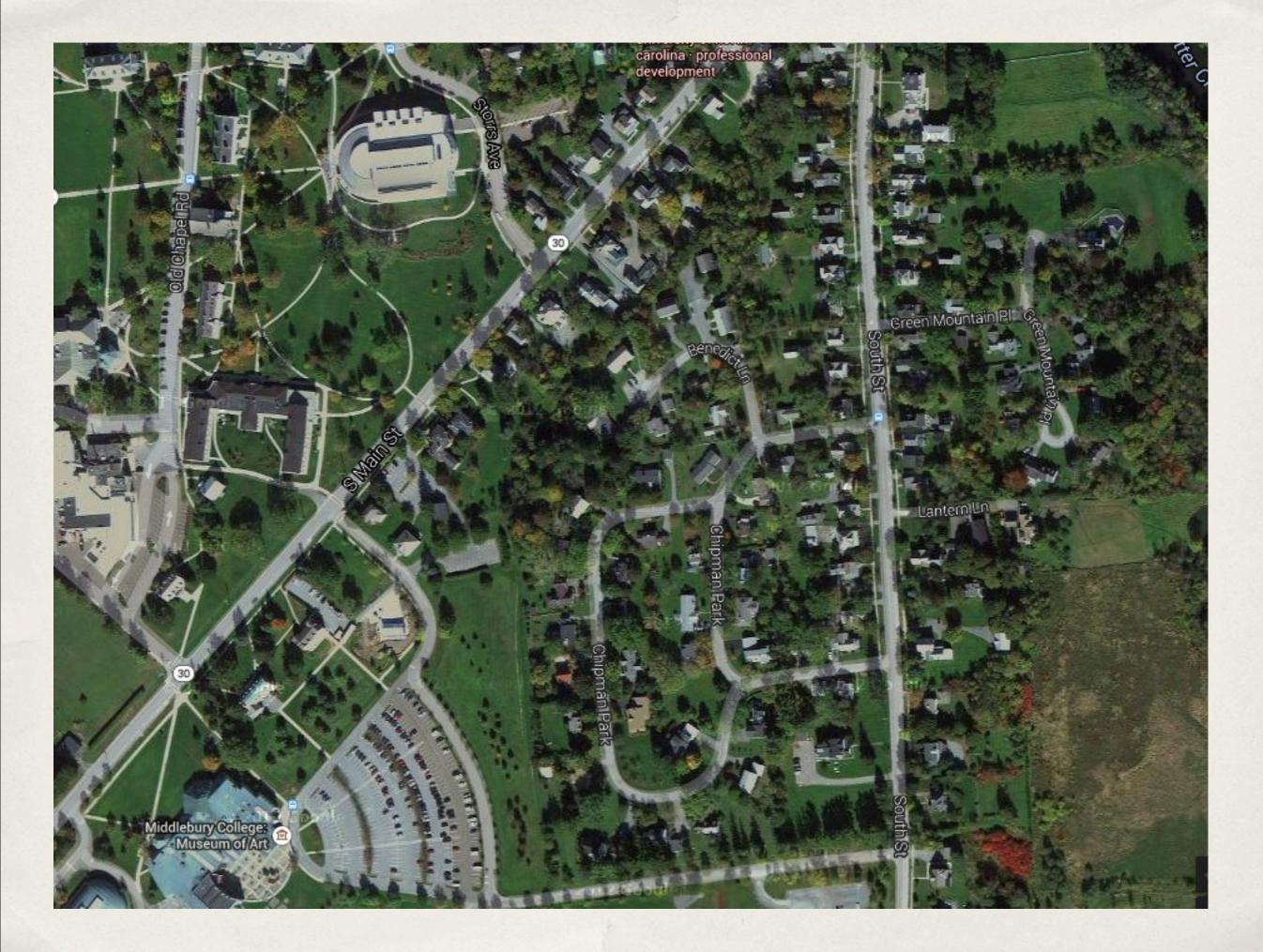


The keyhole problem

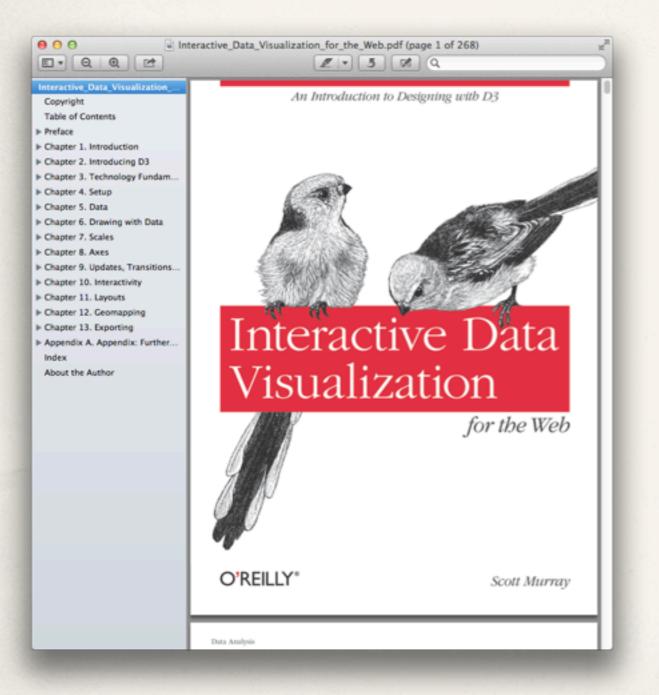


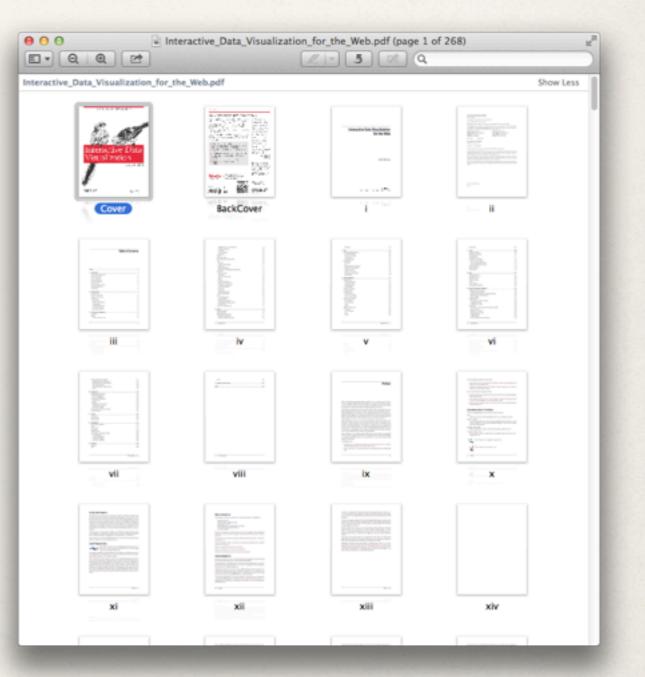
The keyhole problem





Text document overview





Text document overview

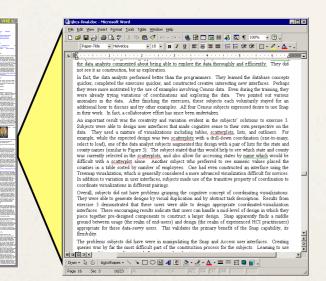
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	nsus1.html		
32			
33	<pre>function makeScatterplot(){</pre>		
34	<pre>var margin = {top:20, bottom:20, left:60, right: 20};</pre>		, 858
35	<i>var</i> width = 500, height = 500;		
36	<pre>var xValue = function(d){return d[0]};</pre>		
37	<pre>var yValue = function(d){return d[1]};</pre>		A RECEIPTION OF SAL
38	<pre>var xScale = d3.scale.linear();</pre>		COLUMN AND ADDRESS
39	<pre>var yScale = d3.scale.linear();</pre>		Silaton Secondaria Silaton Secondaria Silaton Secondaria
40	<pre>var xAxis = d3.svg.axis().scale(xScale).orient("bottom");</pre>		
41	<pre>var yAxis = d3.svg.axis().scale(yScale).orient("left");</pre>		Second a second
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47	<pre>selection.each(function(data){</pre>		
48			
49	xScale.range([0,width - margin.left - margin.right])		
50	.nice()		A and a second
51	<pre>.domain(d3.extent(data, xValue));</pre>		
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53			Firm
54	<pre>yScale.range([height - margin.top - margin.bottom, 0])</pre>		
55	.nice()		
56	.domain(d3.extent(data, yValue));		
57			
58	<pre>var svg = d3.select(this).append("svg")</pre>		
59	.attr({width:width, height:height});		
60			
61	<pre>var canvas = svg.append("g")</pre>		
62	.attr("transform","translate("+margin.left +","+margin.top+")");		
63			
64	// create the dots		
65	<pre>var dots = canvas.selectAll("circle")</pre>		
66	.data(data)		
67	.enter()		
68	.annend("circle"):		
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Navigation strategies

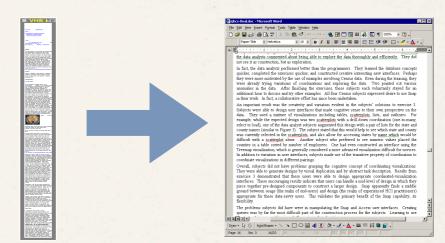
Detail only

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_	Paper-Title • Helvetica • 18 • B / U = = = = = = = = = + + + + + + + + + +
ľ	the data analysis commented about being able to explore the data thoroughly and efficiently. They did not see it as construction, but as exploration.
	In fact, the data analysis performed better than the programmers. They learned the database concepts quecks, completed the correster quecker, and commuted creations interview, new minimum of the programmers of the second secon
	An important renk was the crastinity and variation evident in the solvent's haloma to exercise 1 Solverts were also dering user instruction that make compute neuton that were represente on the data. They used a matter of vanishington is solvered in the solver of that the solver solver distance energht, which the speech derings was true to expression. The solver correlation (so etc.)- using related to lead, one of the data analym indirects supposed that dering with a part of hint for the site and was correctly selected in the significant of the solver and the solver of the solver and difficult was an end of the solver and the solver of the solver and the solver of the solver was correctly selected in the significant of the solver of the solver of the solver of the difficult was a solver of the solver was correctly selected by some of end end polyer. Core had encours frate by magnetic solver placed the contains in a hile solver of the solver below the solver and the solver of the solver of the solver of the Therman was characterized by some of end end polyer. Core had encours of the solver place of the solver of the contains in a hile solver of the
	Overal, adopts that on how problems grapping the coupling coupling considering vanishing Theory were able togenet denging by your adoptication and by others tain decoupling. Results from exercise 3 demonstrated that these users were able to dengin appropriate coordinated-vanishing interface. These consequing entrabilitations that users can balance and elserging in which diary and an entransmitted that the second second second second second second second grantal second and the second second second second second second grantal second second second second second second second appropriate for these data-server users. The validates the primerise balance (second sec
	flexibility. The problems subjects did have were in manipulating the Snap and Access user interfaces. Creating queries was by far the most difficult part of the construction process for the subjects. Learning to use

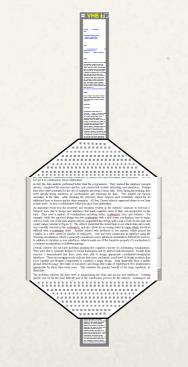
Overview + Detail



Zooming

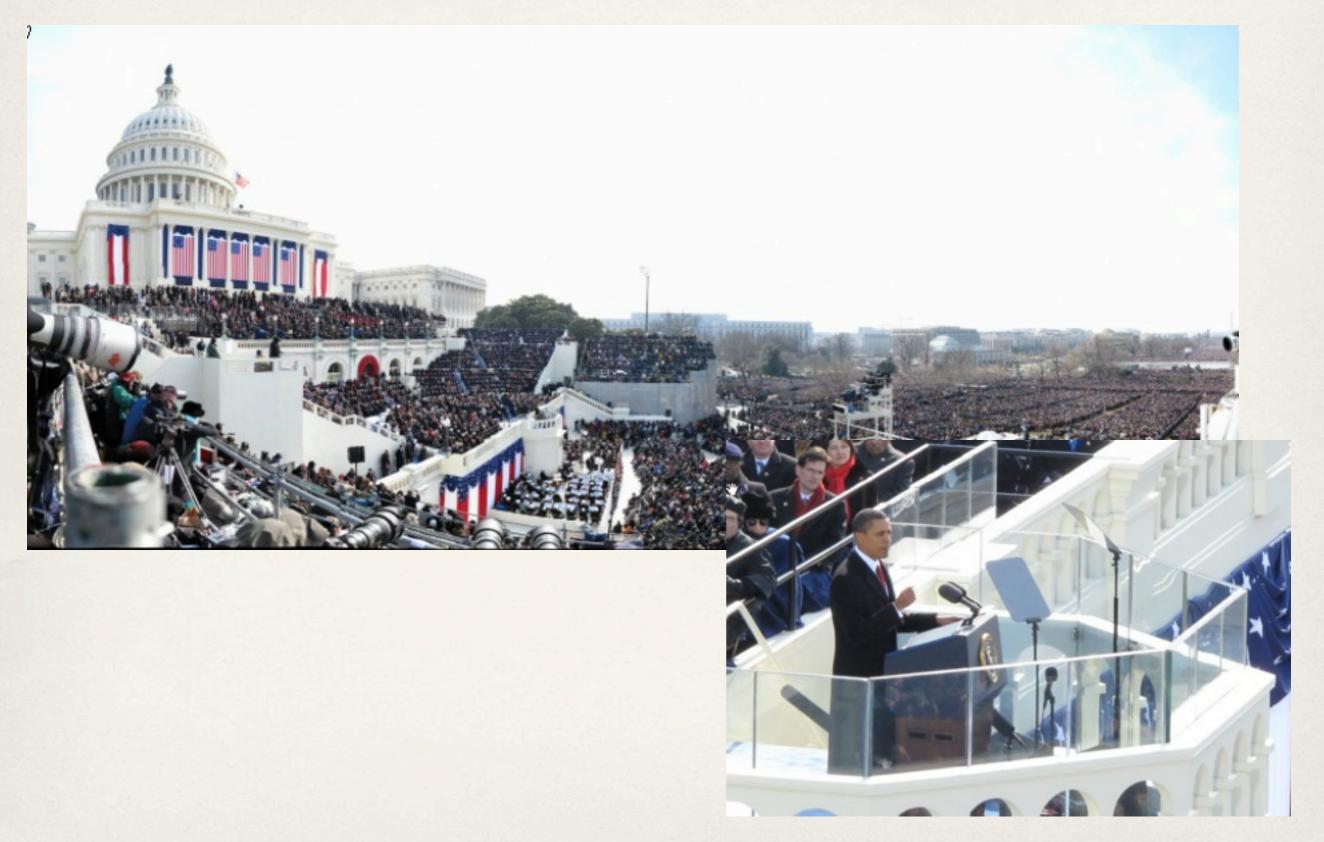


Focus + Context



borrowed from C. North

Pan and zoom

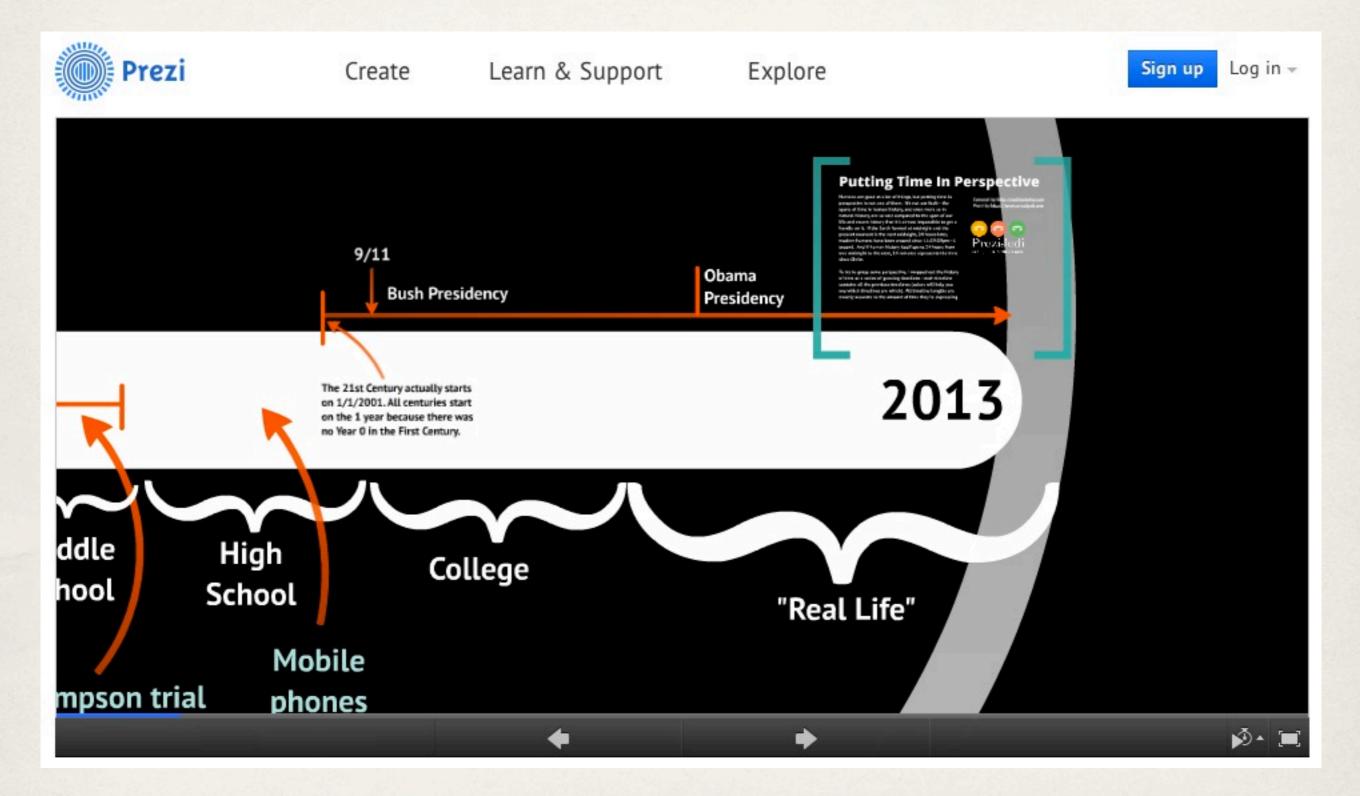


http://gigapan.com/

Pan and Zoom

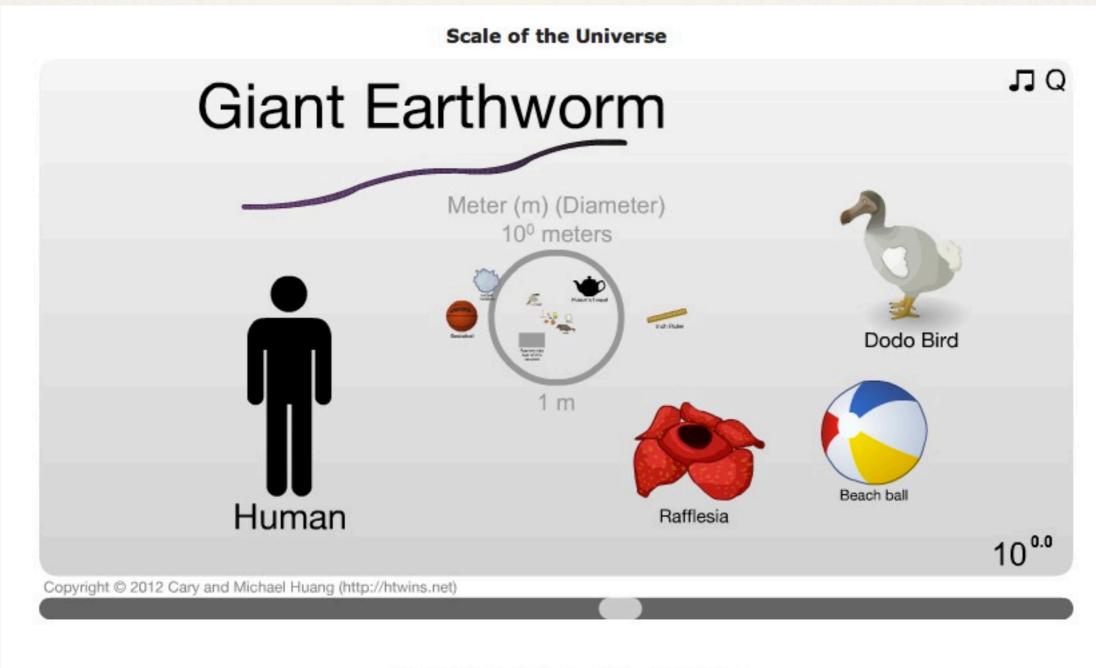


Zoomable user interface



http://prezi.com/veychlhwrdgz/putting-time-in-perspective/

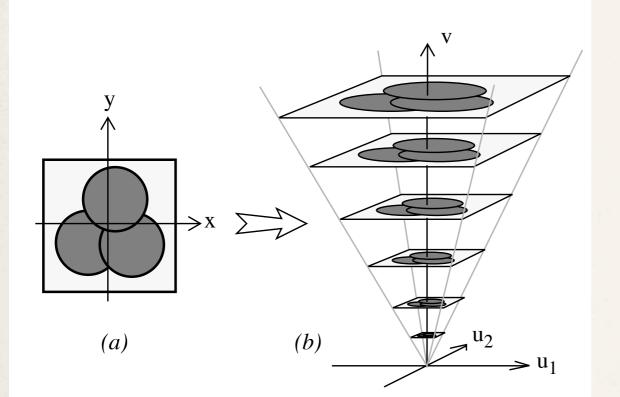
Zoomable user interface

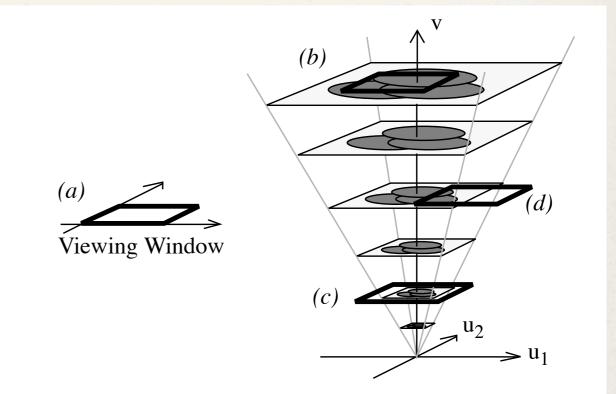


Developed by Cary Huang at htwins

http://scaleofuniverse.com

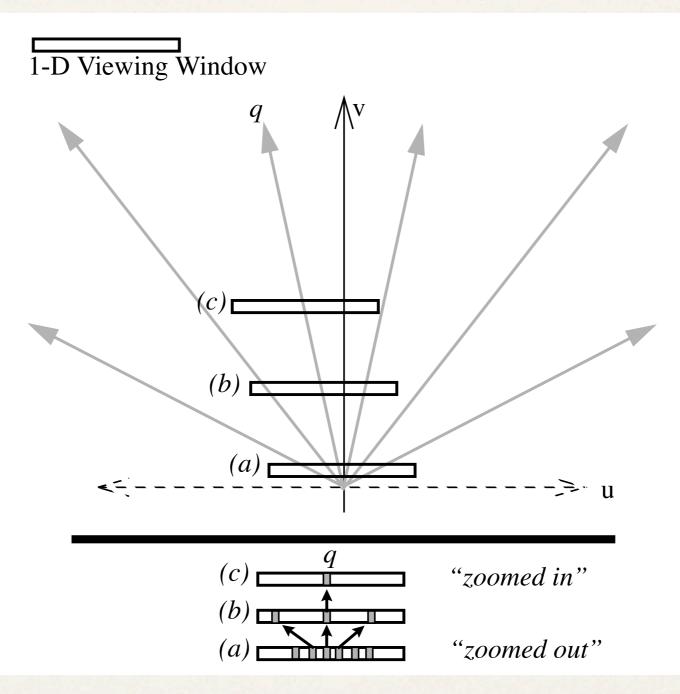
Space-scale diagrams





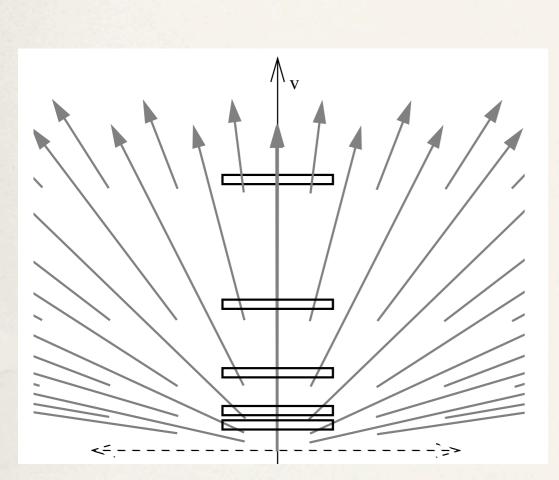
Furnas and Bederson, "Space-Scale Diagrams: Understanding Multiscale Interfaces"

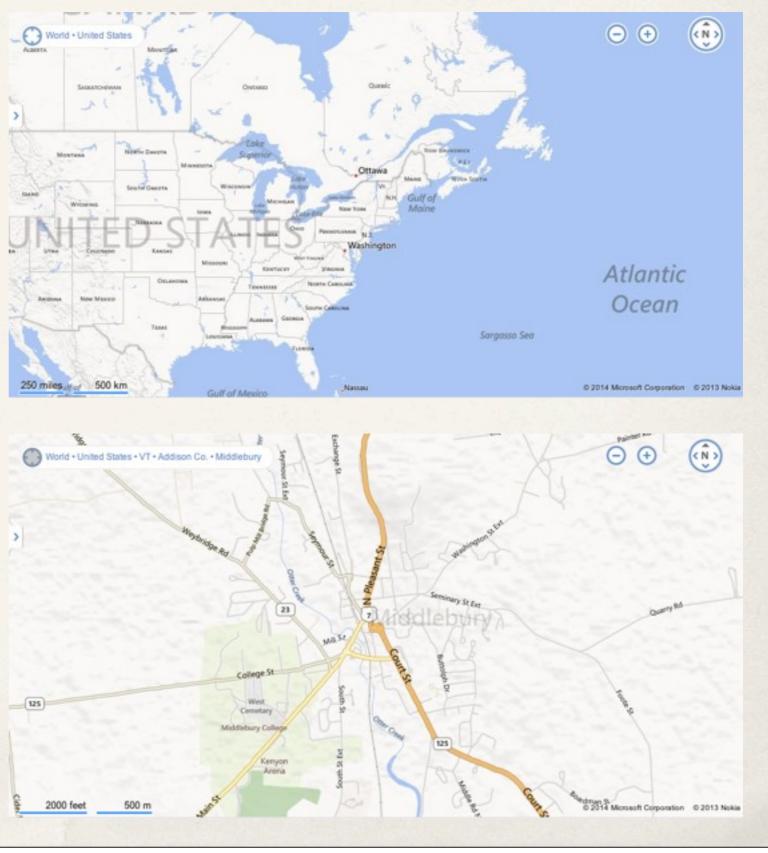
Space-scale diagrams



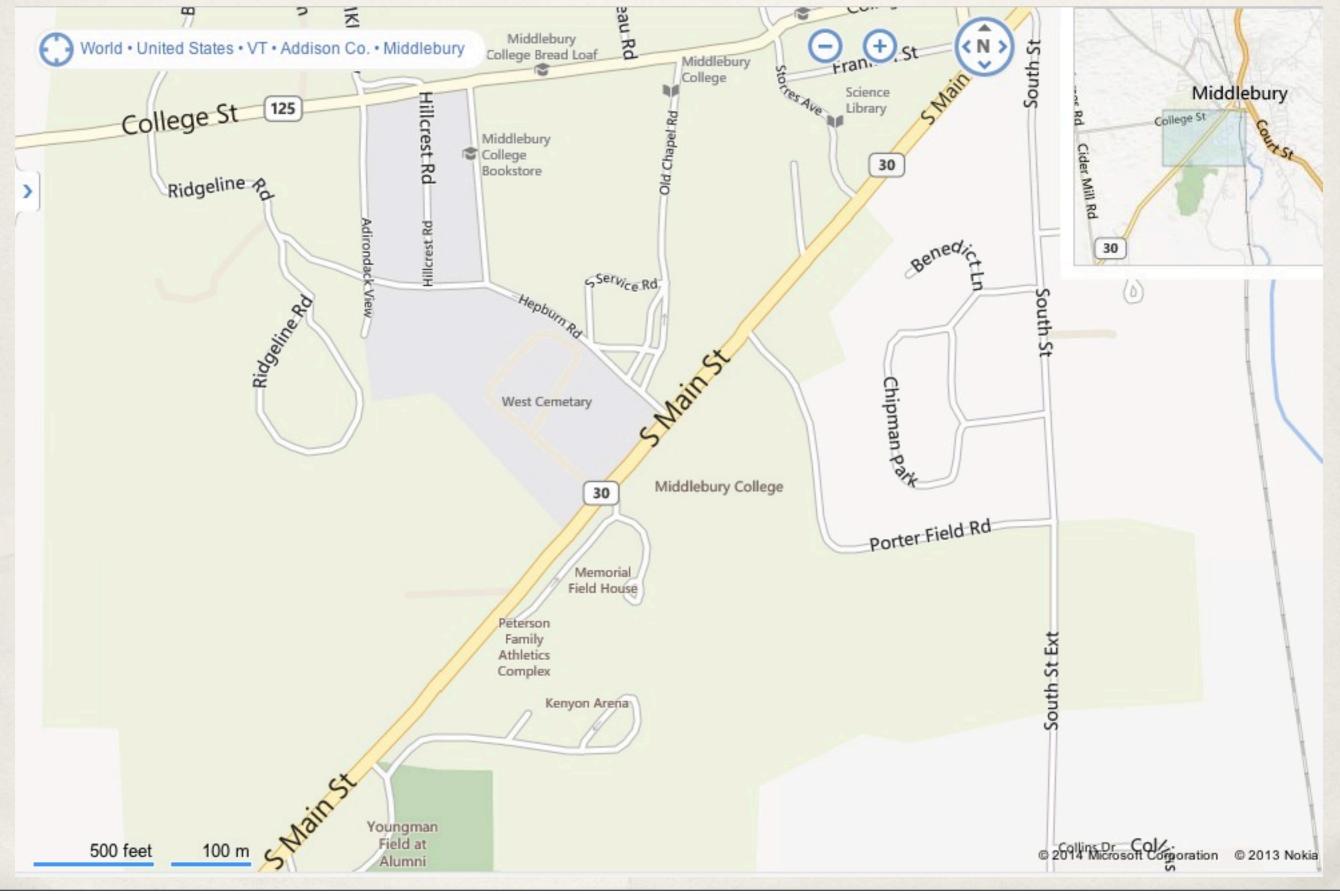
Furnas and Bederson, "Space-Scale Diagrams: Understanding Multiscale Interfaces"

Semantic zooming

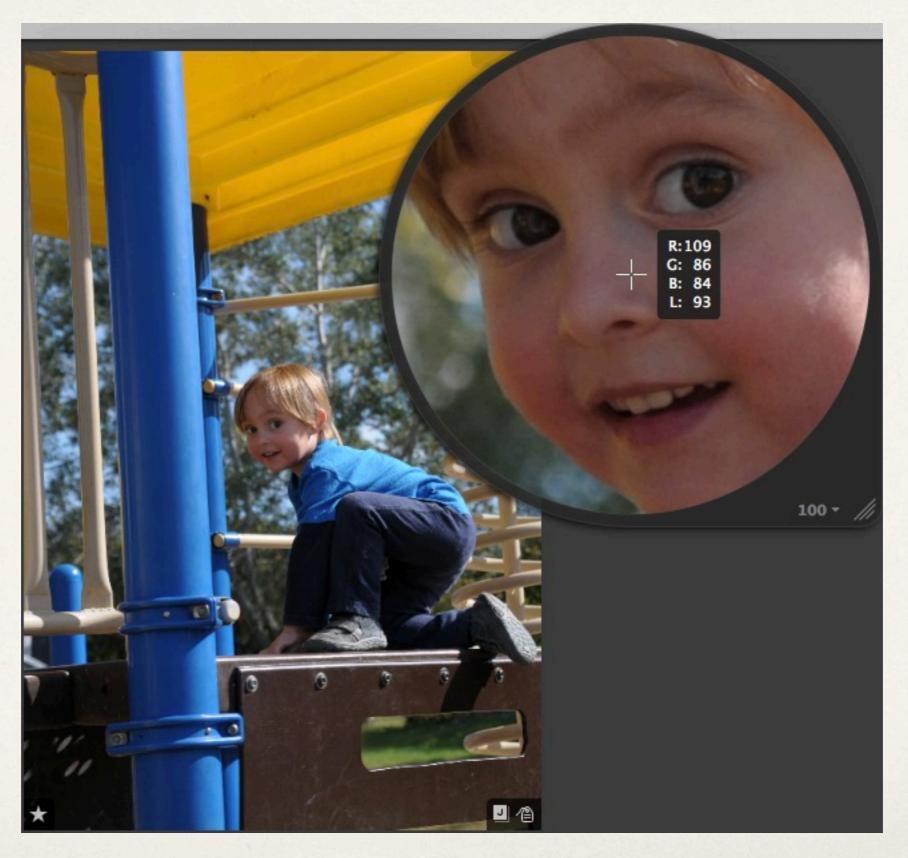


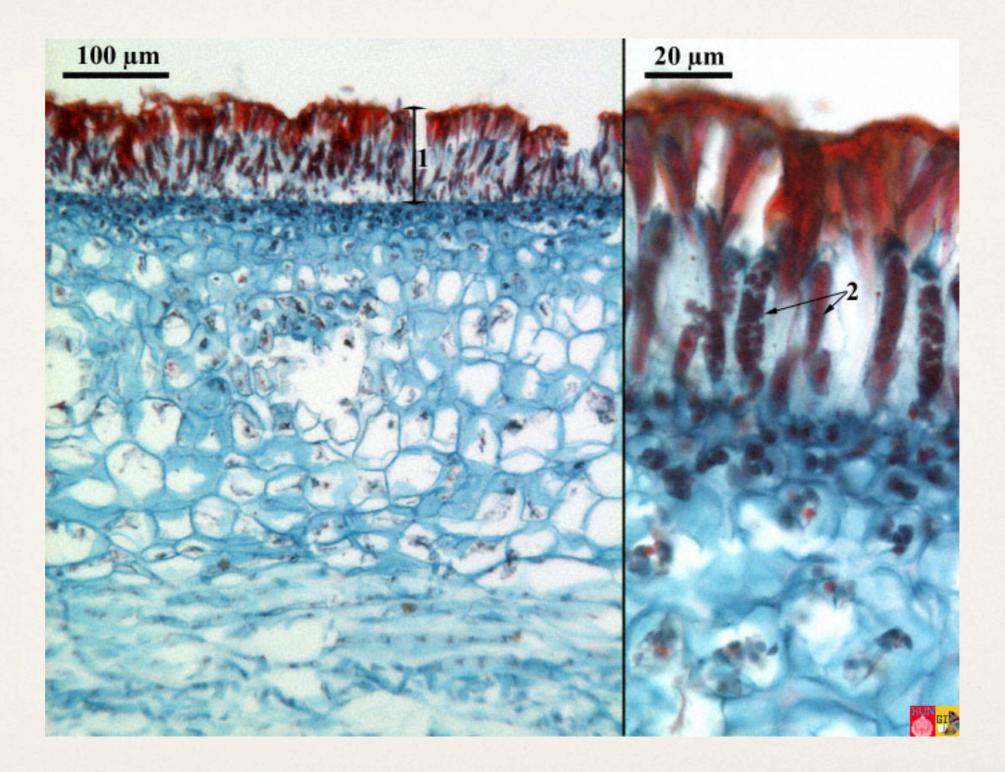


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33	<pre>function makeScatterplot(){</pre>		
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35	<pre>var margin = {top:20, bottom:20, left:60, right: 20}; var width = 500, beight = 500;</pre>		
36	<pre>var width = 500, height = 500; var xValue = function(d){return d[0]};</pre>		THE SHOP IN THE
37	<pre>var yValue = function(d){return d[1]};</pre>		
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40 41	<pre>var xAxis = d3.svg.axis().scale(xScale).orient("bottom");</pre>		
41 42	<pre>var yAxis = d3.svg.axis().scale(yScale).orient("left");</pre>		
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55 56	.nice()		
	.domain(d3.extent(data, yValue));		
57	$u_{0} = d^2 = d^$		
58	<pre>var svg = d3.select(this).append("svg") </pre>		
59	<pre>.attr({width:width, height:height});</pre>		
60 61			
61 62	<pre>var canvas = svg.append("g") atts("tappedor")</pre>		
62 62	.attr("transform","translate("+margin.left +","+margin.top+")");		
63 64	// create the data		
	<pre>// create the dots</pre>		
65	<pre>var dots = canvas.selectAll("circle") data(data)</pre>		
66 67	.data(data)		
67 68	<pre>.enter() .append("circle"):</pre>		
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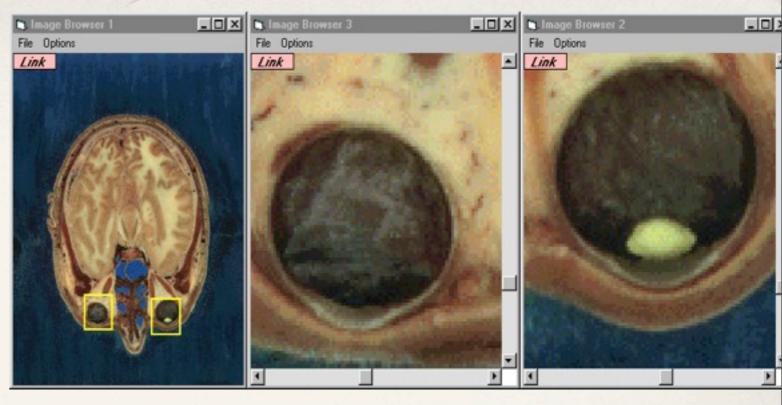


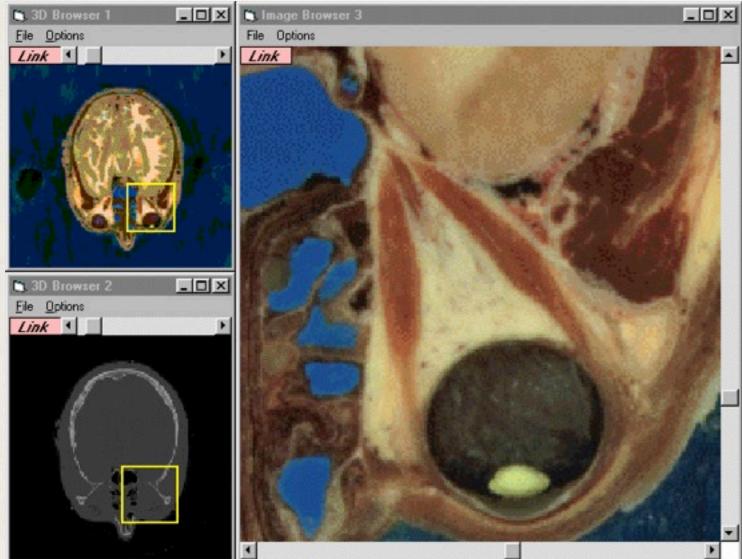
Thursday, March 20, 14





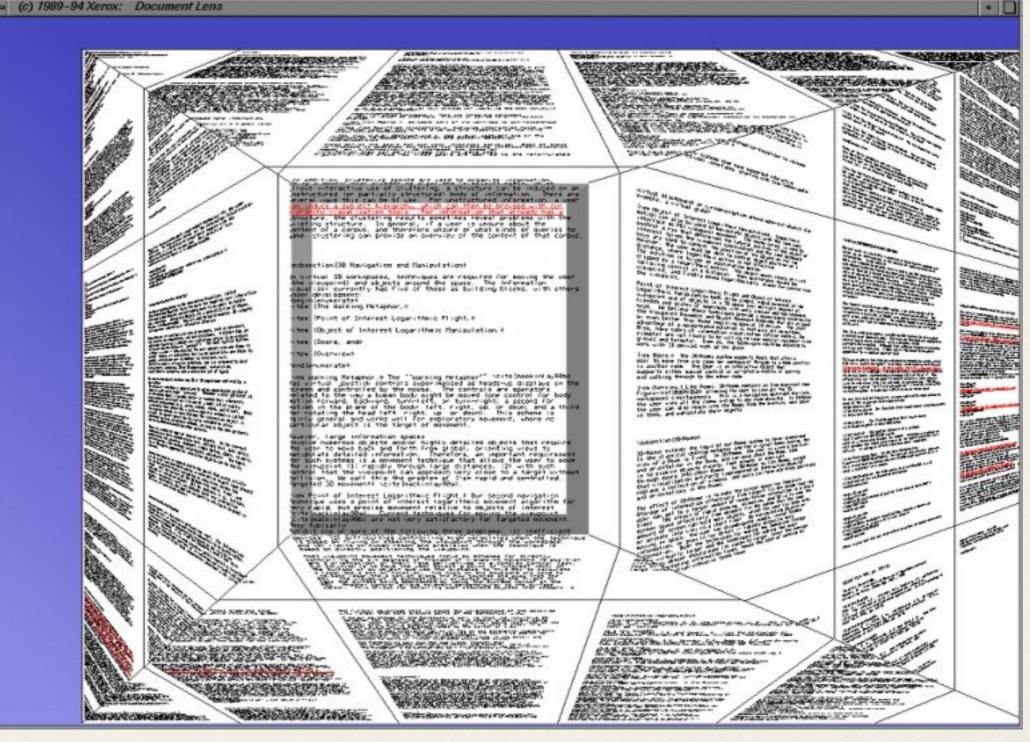
http://www.vcbio.science.ru.nl/en/image-gallery/show/labels/print/PL0016/

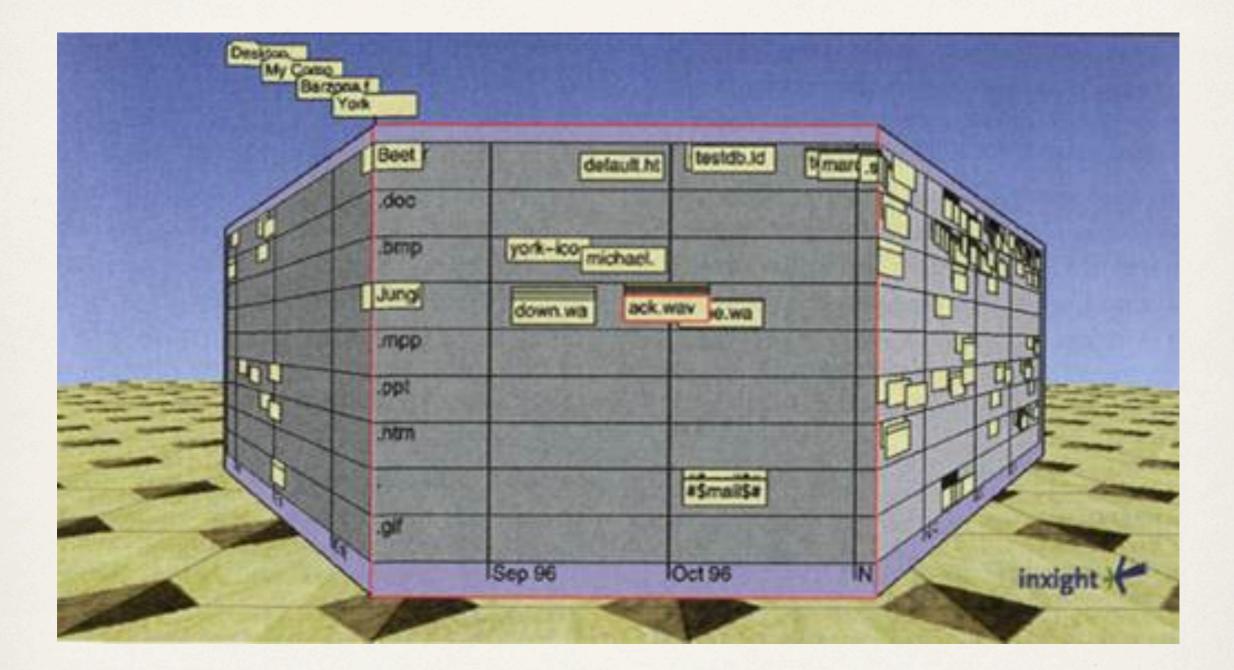


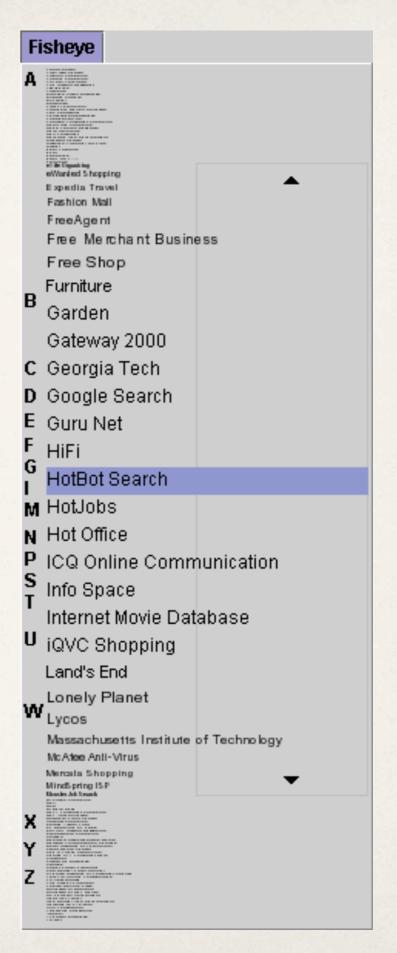


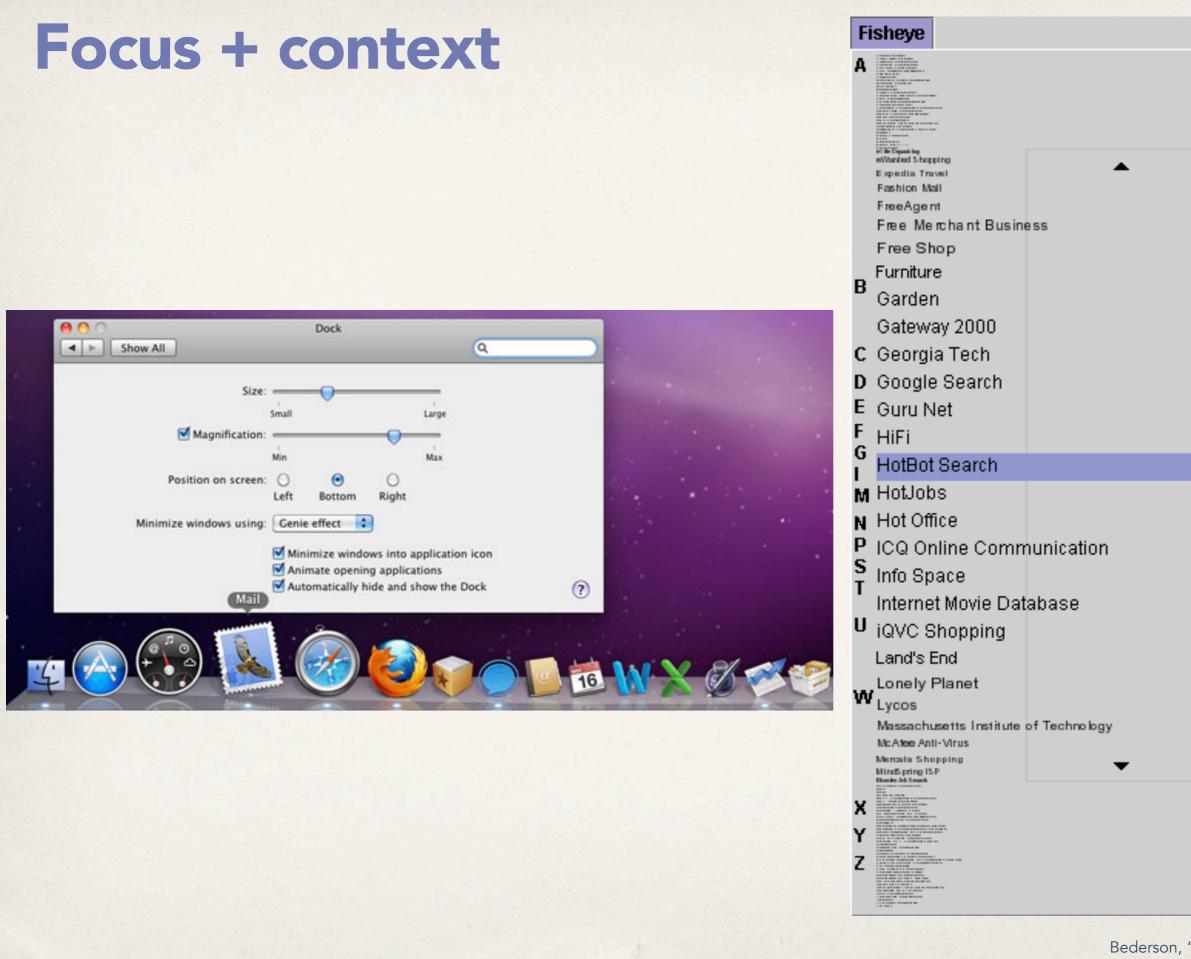
borrowed from C. North

a (c) 1989–94 Xerox: Document Lens



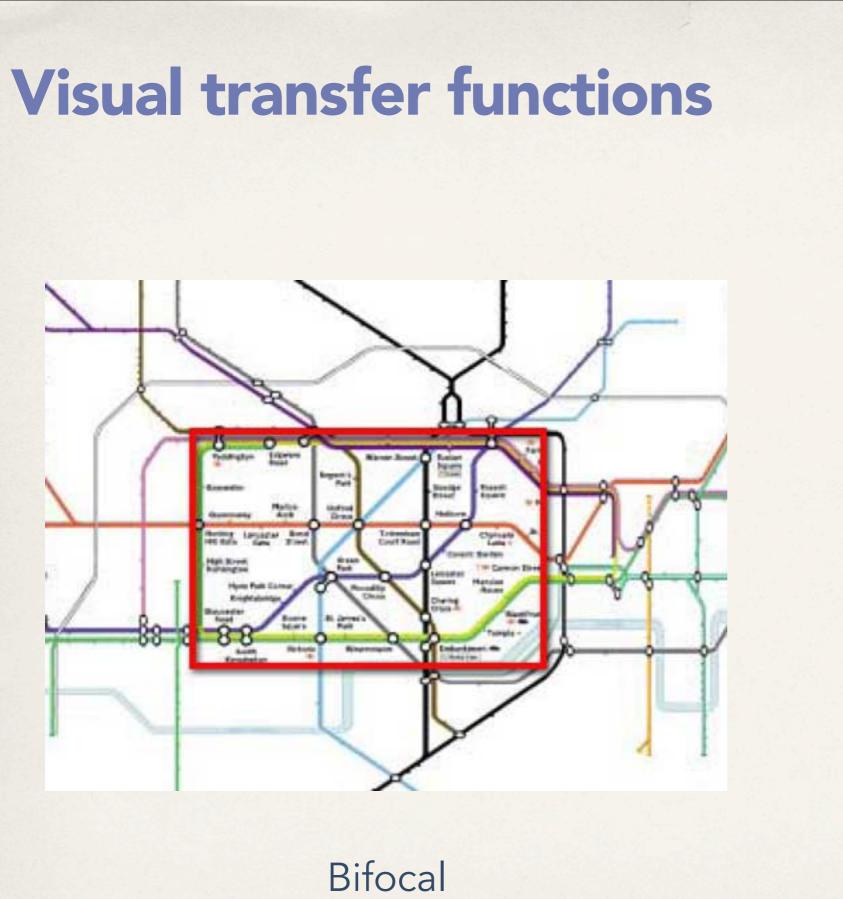


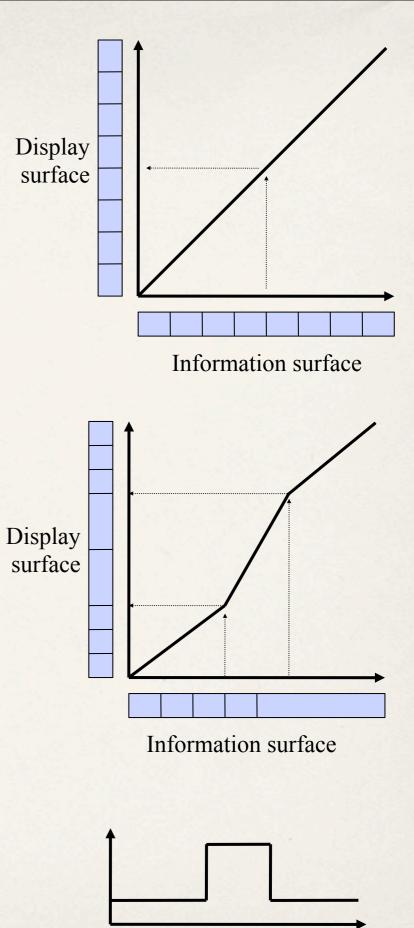


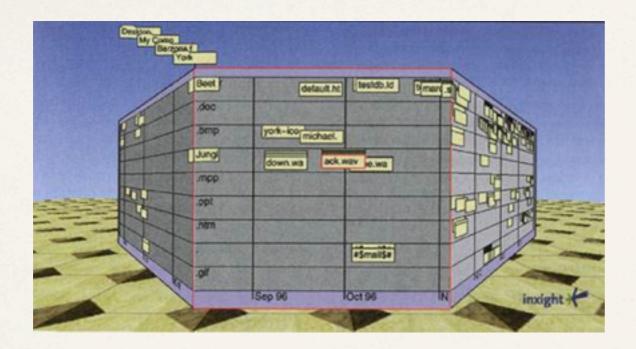


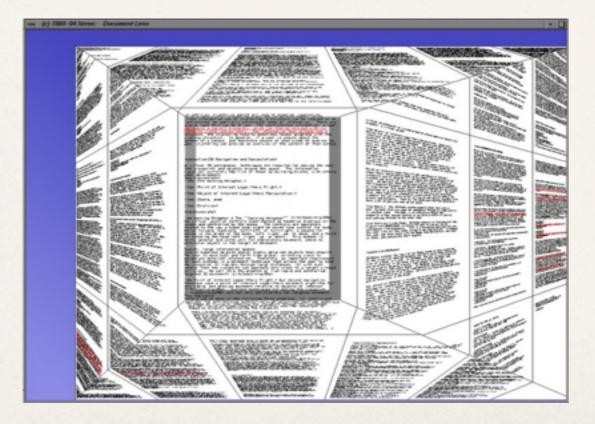
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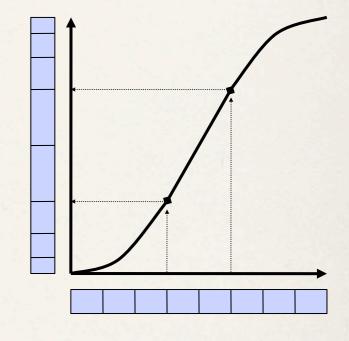
Rao and Card, "The Table Lens: Merging Graphical and Symbolic Representations in an Interactive Focus+Context Visualization for Tabular Information"

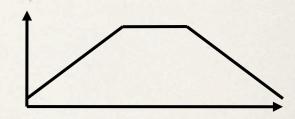




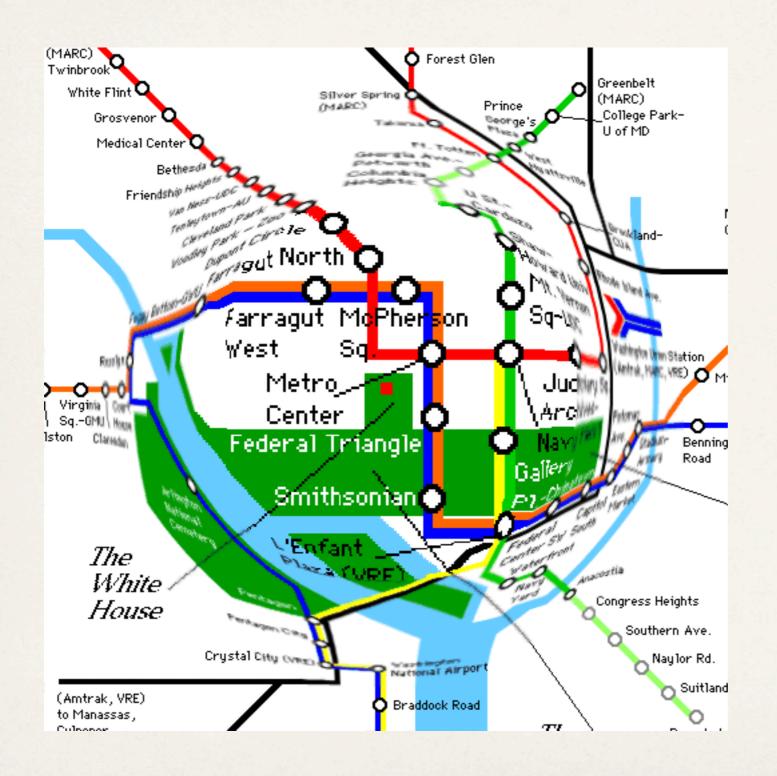




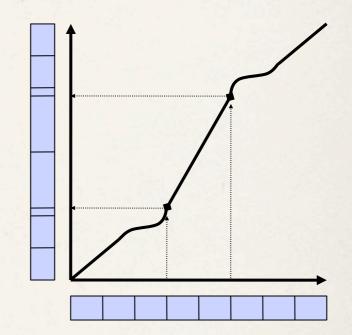


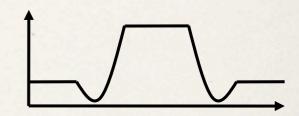


Perspective

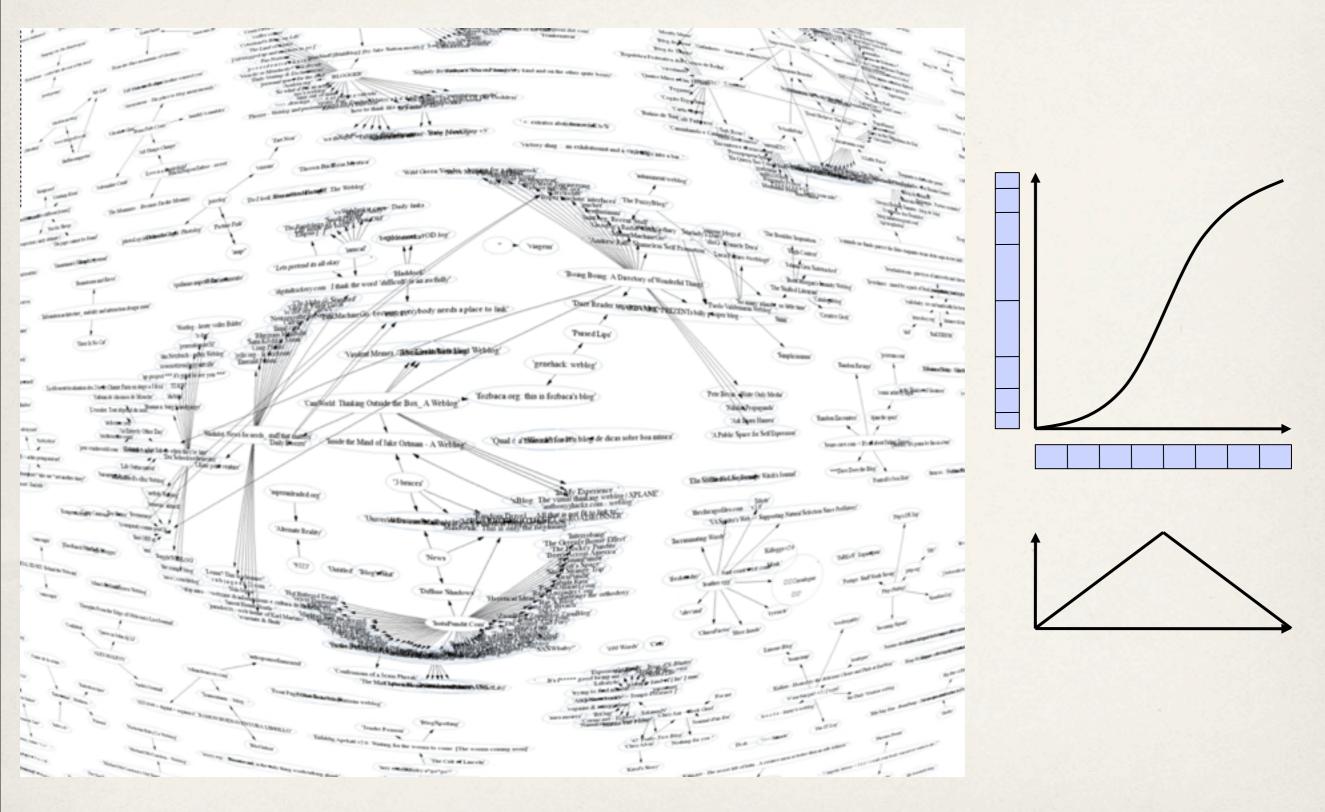


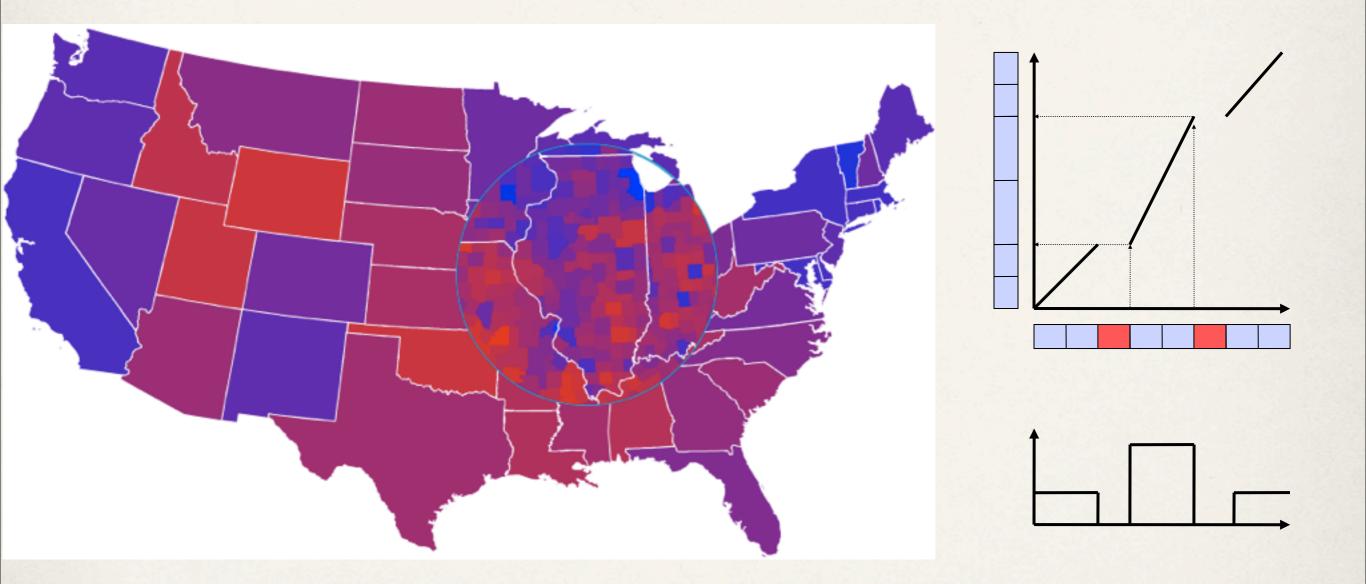
Bubble





borrowed from C. North



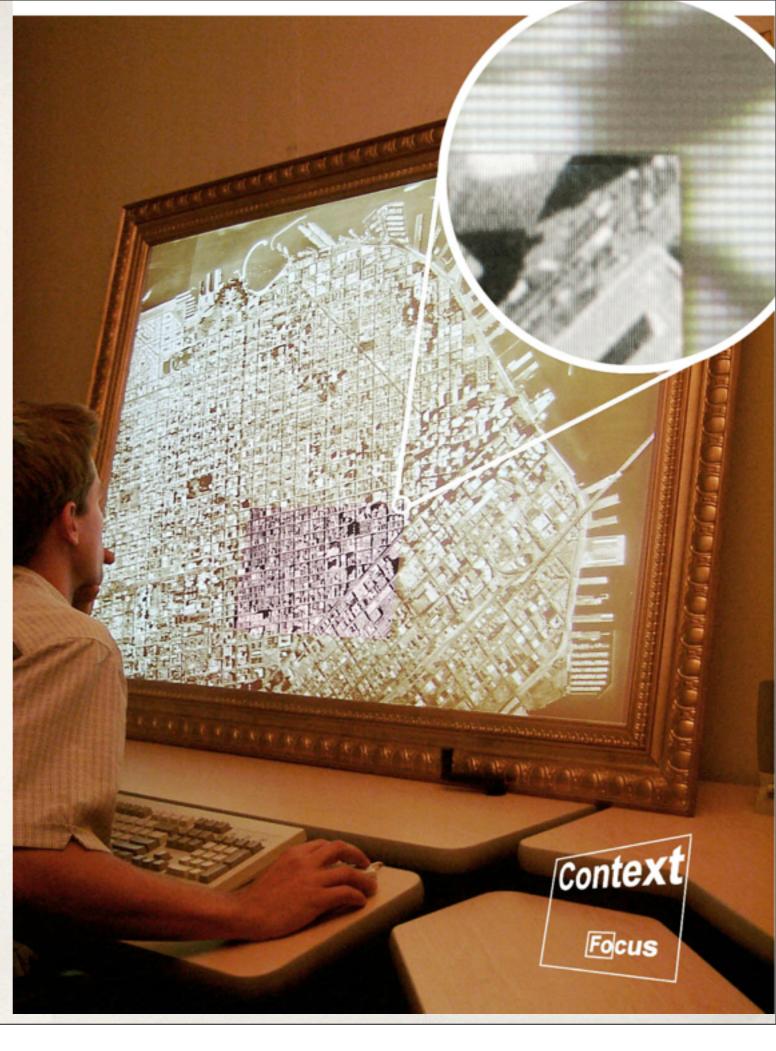


Magnifying glass

borrowed from C. North

Thursday, March 20, 14

Focus + Context Screen



Baudish, "Keeping things in context..."

F+C versus O+D

Focus + Context

+ space efficient

+ smooth transition between detail and context

- distorts the view
- content moves differently than the mouse

- zoom factors are usually small (otherwise the distortion is large)

Overview + Detail

+ scales up to much larger data
+ multiple overviews possible
+ easier to implement

- detail and overview are disconnected
- replicates data
- takes up more screen real estate

Navigation strategies

detail only pan and zoom overview + detail focus + context

detail *without* overview detail *or* overview detail *next* to overview detail *with* overview