Interaction

Maneesh Agrawala

CS 294-10: Visualization
Spring 2007

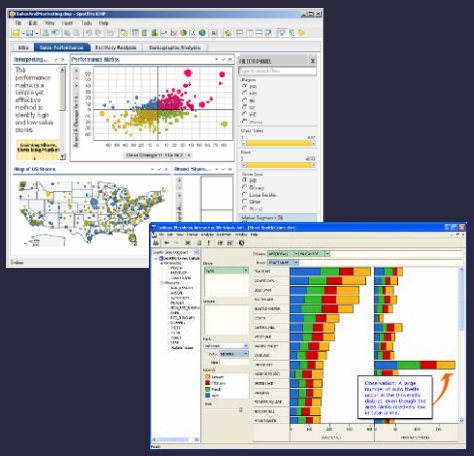
Assignment 2: Creating Visualizations

Use existing software to formulate & answer questions

First steps
- Step 1: Pick a domain
- Step 2: Pose question
- Step 3: Find data
- May need to iterate

Create visualization
- Interact with data
- Question will evolve
- Tableau or Spotfire DXP

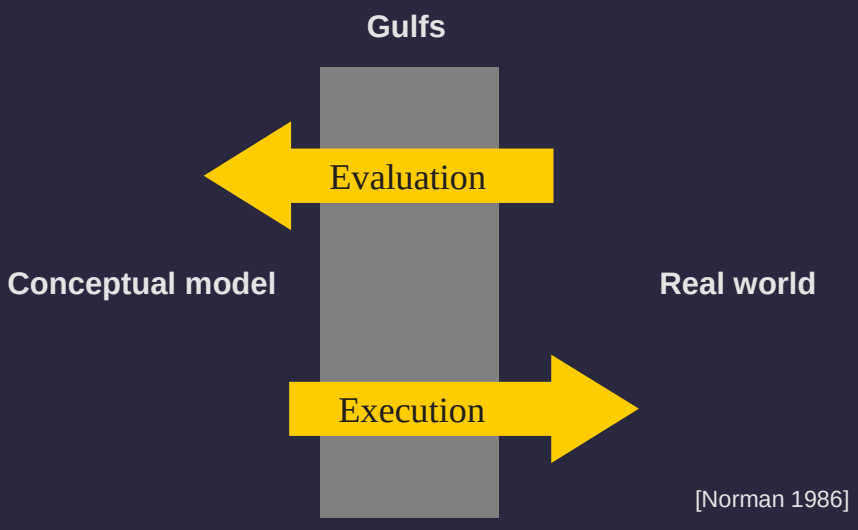
Make wiki notebook
- Keep record of all steps you took to answer the questions



Due before class on Sep 24, 2007

Interaction

Gulfs of execution & evaluation



[Norman 1986]

Gulf of evaluation

Gulf

Evaluation

Conceptual model:
x,y correlated?

Real world:

X	Y
0.67	0.79
0.32	0.63
0.39	0.72
0.27	0.85
0.71	0.43
0.63	0.09
0.03	0.03
0.20	0.54
0.51	0.38
0.11	0.33
0.46	0.46

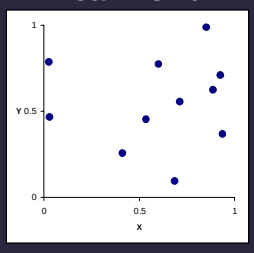
Gulf of evaluation

Gulf

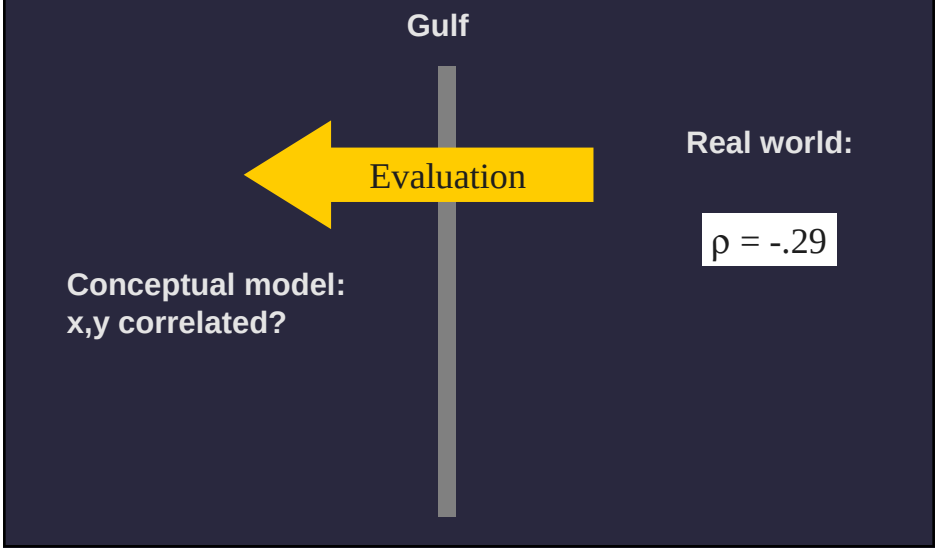
Evaluation

Conceptual model:
x,y correlated?

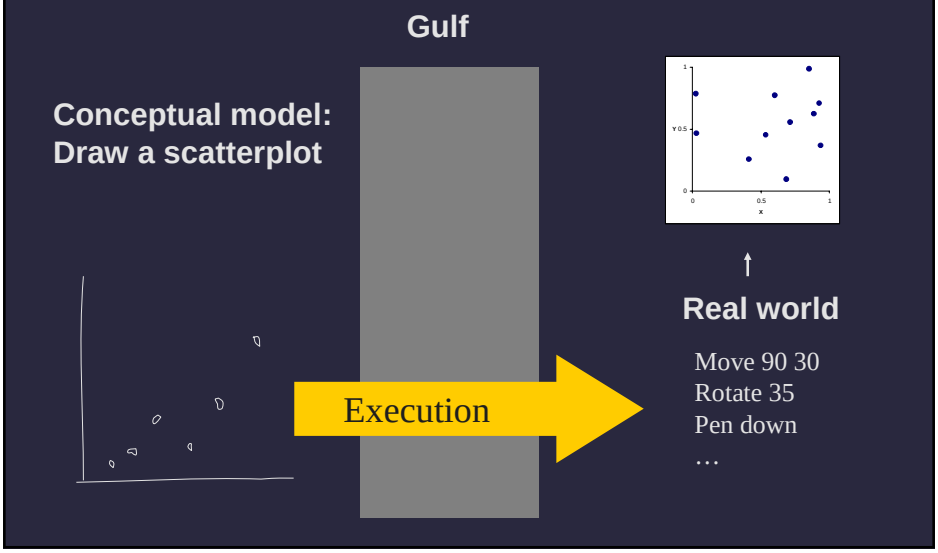
Real world:



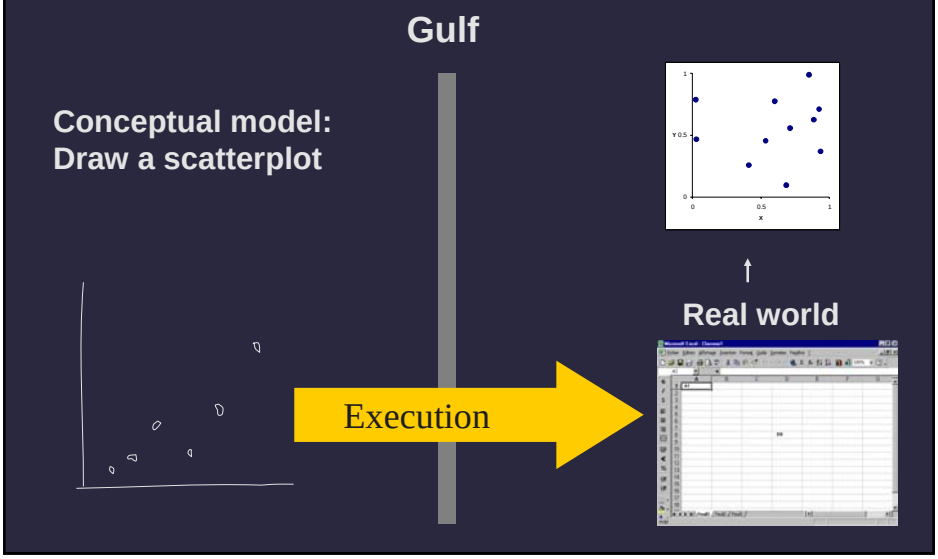
Gulf of evaluation



Gulf of execution



Gulf of execution



Topics

Brushing and linking

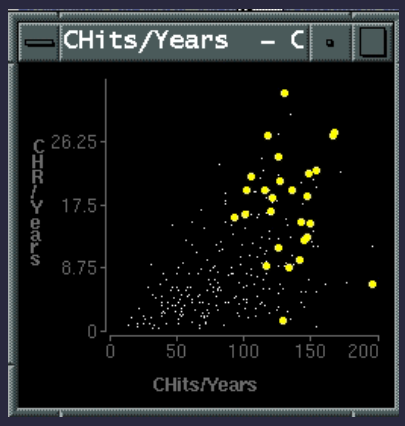
Dynamic queries

Rearrangements

Brushing and Linking

Highlighting

Focus user attention on a subset of the data within one graph [from Wills 95]

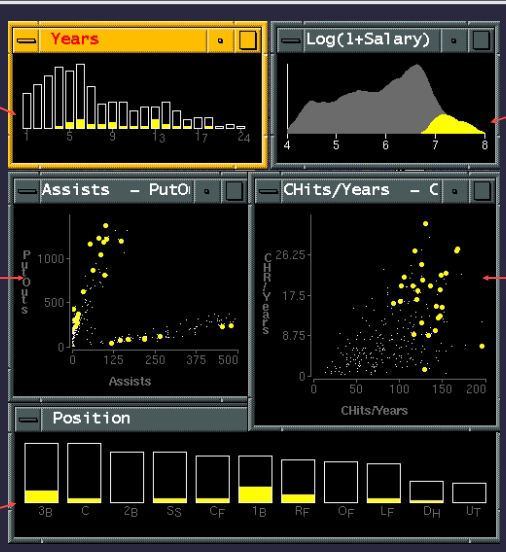


[www.sims.berkeley.edu/courses/is247/s02/lectures/Lecture3.ppt]

Brushing

- Interactively select subset of data
- See selected data in other views
- Two things (normally views) must be *linked* to allow for brushing

Baseball statistics [from Wills 95]



how long in majors

select high salaries

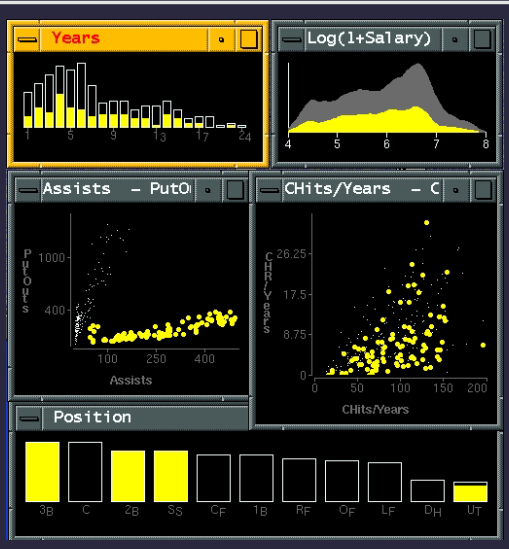
avg assists vs avg putouts (fielding ability)

avg career HRs vs avg career hits (batting ability)

distribution of positions played

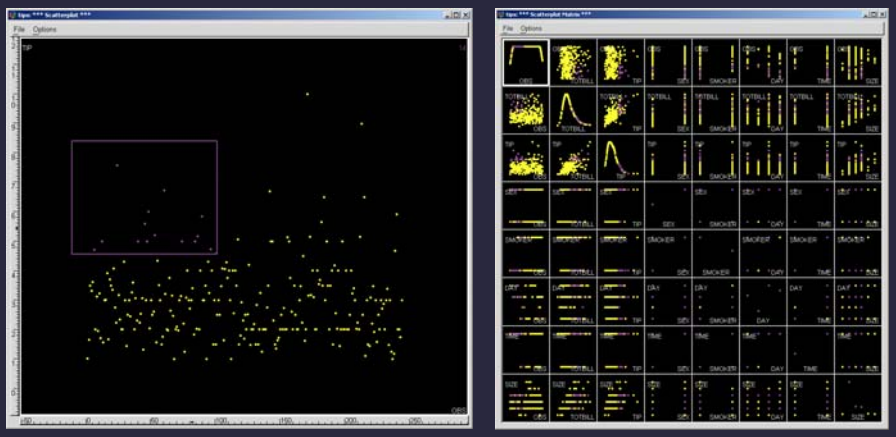
[www.sims.berkeley.edu/courses/is247/s02/lectures/Lecture3.ppt]

Linking assists to positions



[www.sims.berkeley.edu/courses/is247/s02/lectures/Lecture3.ppt]

GGobi: Brushing

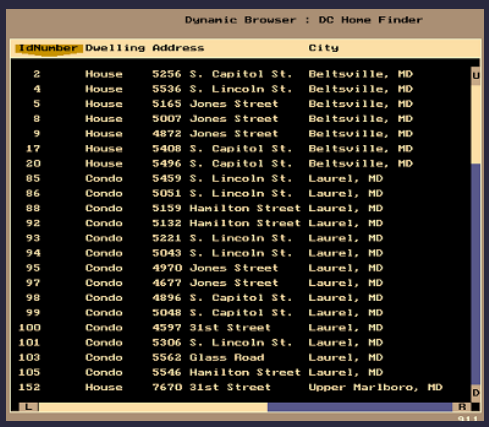


http://www.ggobi.org/

Dynamic Queries

Query and results

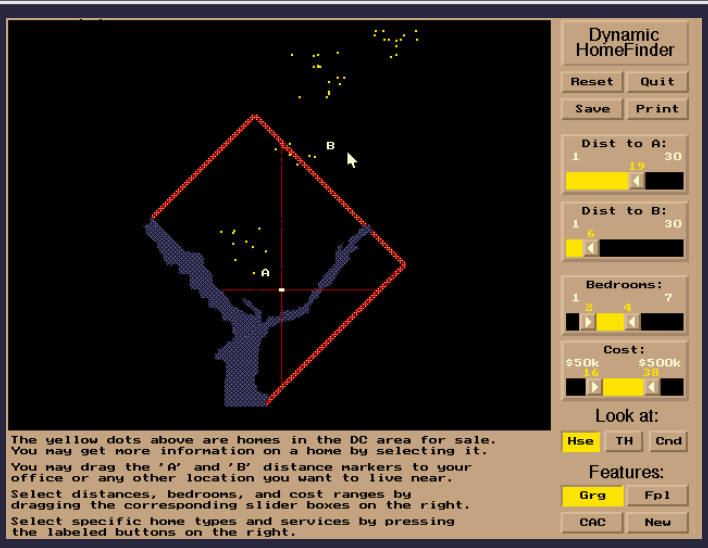
SELECT house
FROM east bay
WHERE price < 1,000,000 AND bedrooms > 2
ORDER BY price



Issues

1. For programmers
2. Rigid syntax
3. Only shows exact matches
4. Too few or too many hits
5. No hint on how to reformulate the query
6. Slow question-answer loop
7. Results returned as table

HomeFinder



[Ahlberg and Schneiderman 92]

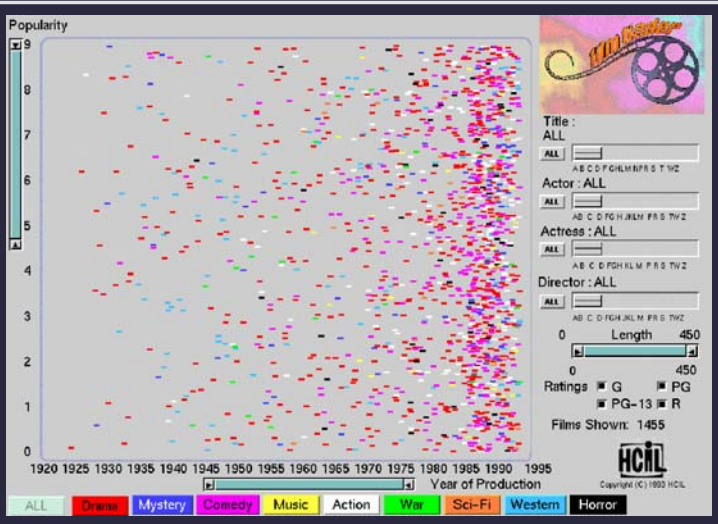
Direct manipulation

1. Visual representation of objects and actions
2. Rapid, incremental and reversible actions
3. Selection by pointing (not typing)
4. Immediate and continuous display of results

Alphaslider

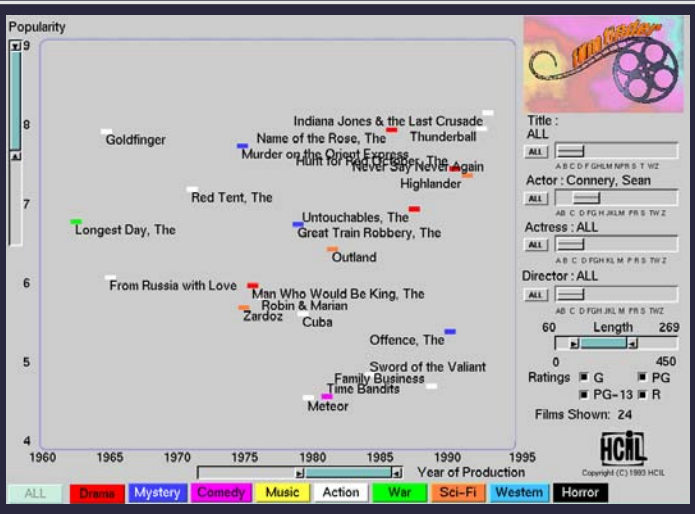
[Ahlberg and Schneiderman 94]

FilmFinder



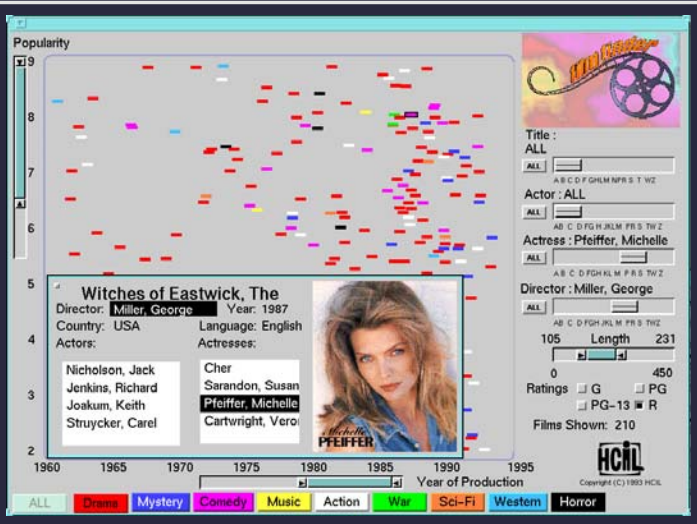
[Ahlberg and Schneiderman 93]

FilmFinder



[Ahlberg and Schneiderman 93]

FilmFinder

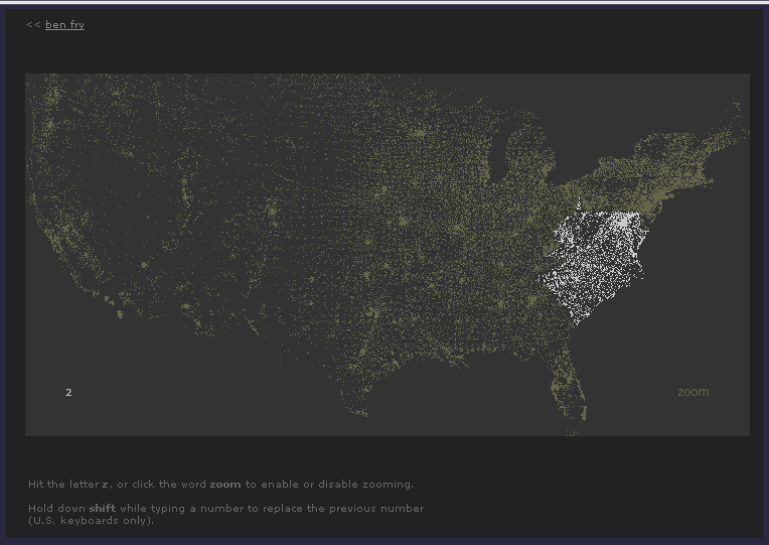


[Ahlberg and Schneiderman 93]

Cellphones

http://www.myrateplan.com/cellphones/

Zipdecode [from Fry 04]

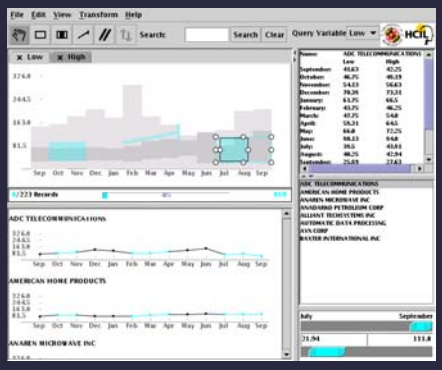


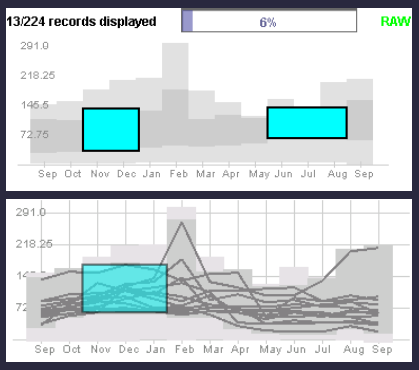
http://acg.media.mit.edu/people/fry/zipdecode/

Attribute explorer [Spence and Tweedie 98]

Video Clip

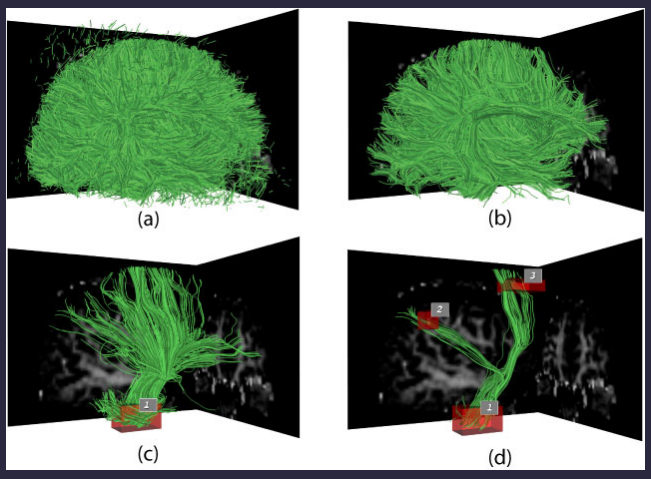
TimeSearcher [Hochheiser & Schneiderman 02]



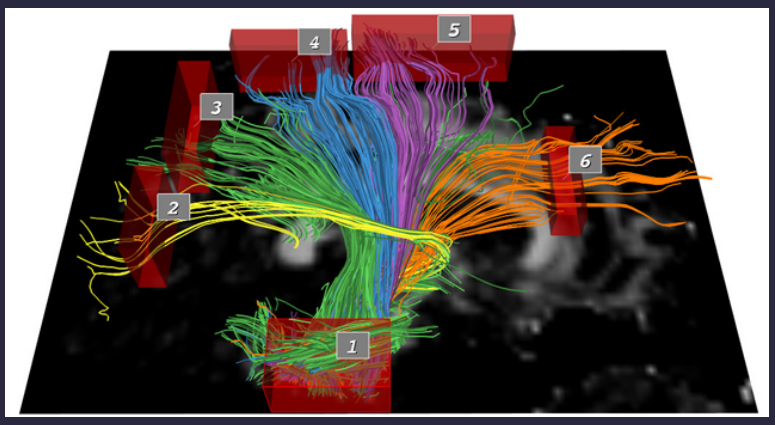


Based on Wattenberg's [2001] idea for sketch-based queries of time-series data.

3D dynamic queries [Akers et al. 04]



3D dynamic queries [Akers et al. 04]



Pros and cons

Pros

- Controls useful for both novices and experts
- Quick way to explore data

Cons

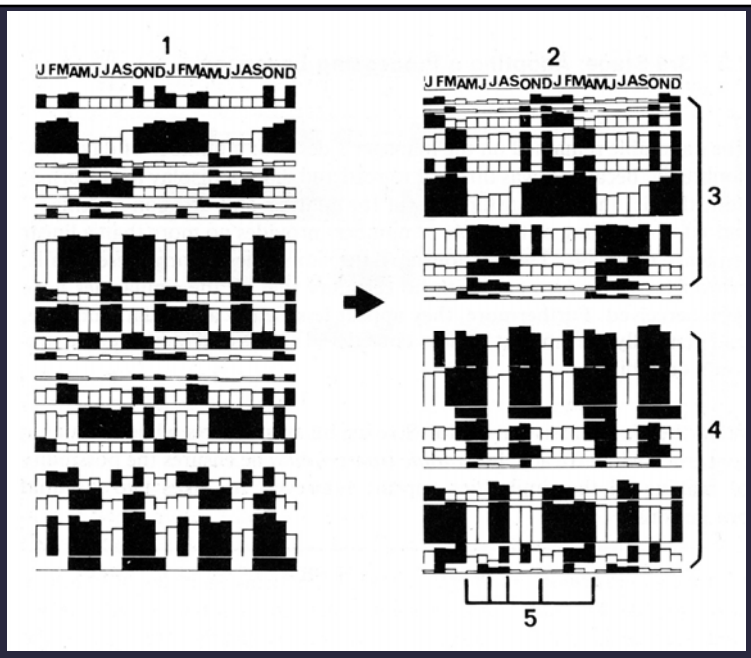
- Simple queries
- Lots of controls
- Amount of data shown limited by screen space

Who would use these kinds of tools?

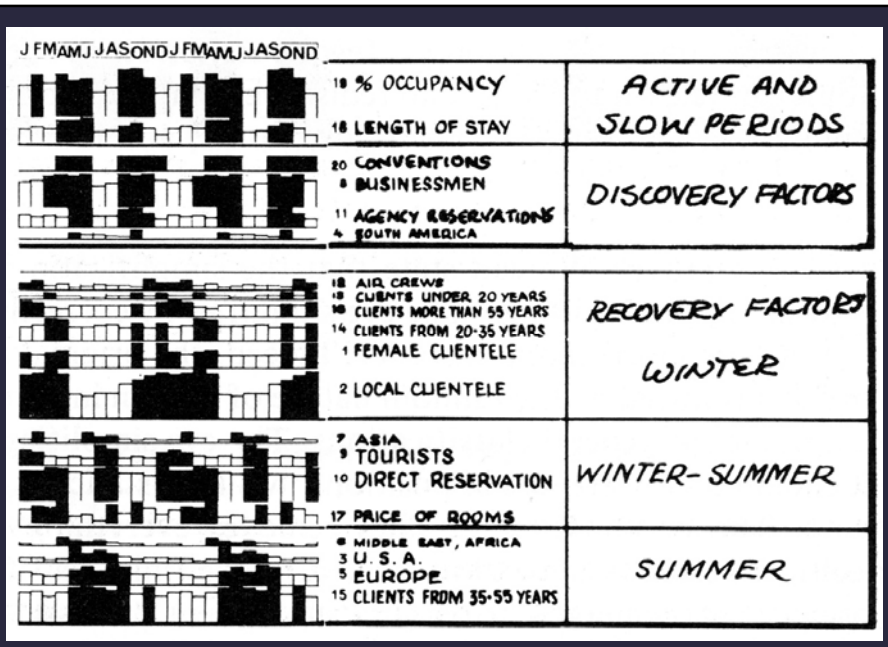
Rearrangements

J	F	M	A	M	J	J	A	S	O	N	D		
26	21	26	28	20	20	20	20	20	40	15	40	1	% CLIENTELE FEMALE
69	70	77	71	37	36	39	39	55	60	68	72	2	% —〃— LOCAL
7	6	3	6	23	14	19	14	9	6	8	8	3	% —〃— U.S.A.
0	0	0	0	8	6	6	4	2	12	0	0	4	% —〃— SOUTH AMERICA
20	15	14	15	23	27	22	30	27	19	19	17	5	% —〃— EUROPE
1	0	0	8	6	4	6	4	2	1	0	1	6	% —〃— M.EAST, AFRICA
3	10	6	0	3	13	8	9	5	2	5	2	7	% —〃— ASIA
78	80	85	86	85	87	70	76	87	85	87	80	8	% BUSINESSMEN
22	20	15	14	15	13	30	24	13	15	13	20	9	% TOURISTS
70	70	75	74	69	68	74	75	68	68	64	75	10	% DIRECT RESERVATIONS
20	18	19	17	27	27	19	19	26	27	21	15	11	% AGENCY ———〃———
10	12	6	9	4	5	7	6	6	5	15	10	12	% AIR CREWS
2	2	4	2	2	1	1	2	2	4	2	5	13	% CLIENTS UNDER 20 YEARS
25	27	37	35	25	25	27	28	24	30	24	30	14	% —〃— 20-35 —〃—
48	49	42	48	54	55	53	51	55	46	55	43	15	% —〃— 35-55 —〃—
25	22	17	15	19	19	19	19	19	20	19	22	16	% —〃— MORE THAN 55 —〃—
163	167	166	174	152	155	145	170	157	174	165	156	17	PRICE OF ROOMS
1.65	1.71	1.65	1.91	1.90	2.	1.54	1.60	1.73	1.82	1.66	1.44	18	LENGTH OF STAY
67	82	70	83	74	77	56	62	90	92	78	55	19	% OCCUPANCY
			X	X	X			X	X	X	X	20	CONVENTIONS

[Graphics and Graphic Information Processing, Bertin 81]



[Graphics and Graphic Information Processing, Bertin 81]



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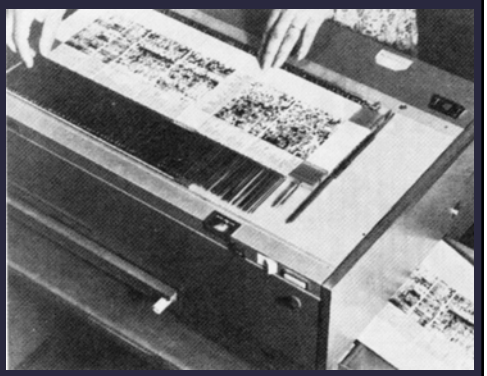

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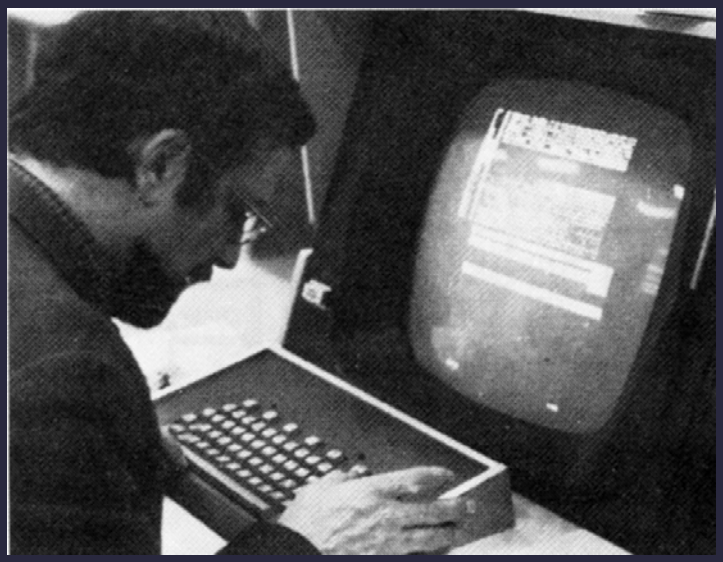
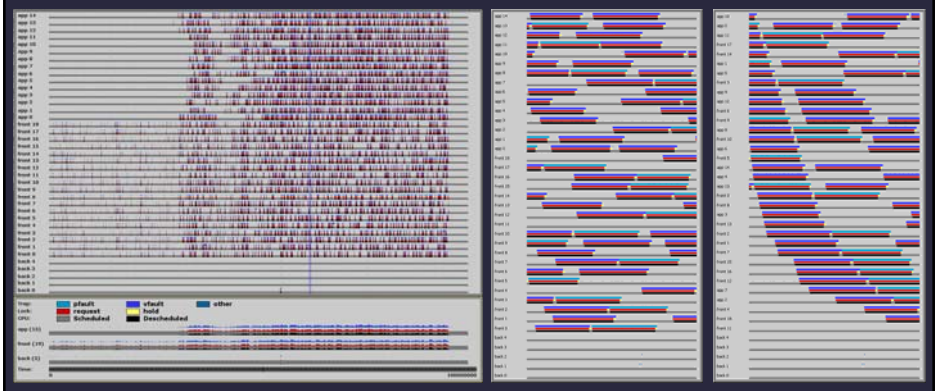


[Graphics and Graphic Information Processing, Bertin 81]

Rivet: Interactive reordering

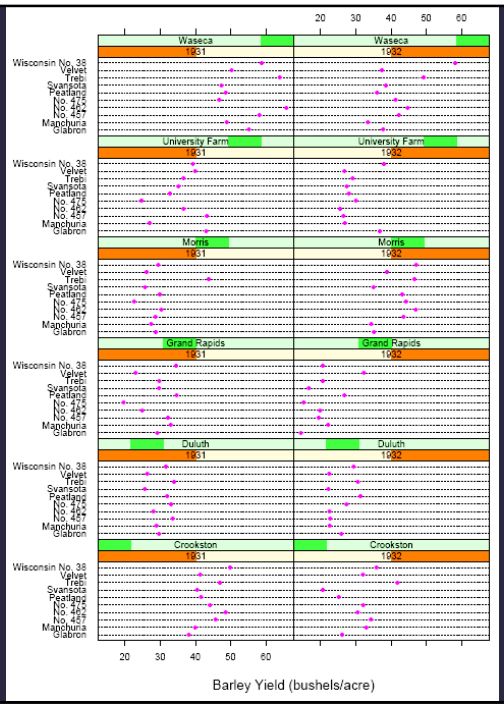
Overview | Zoom | Reorder



Performance Analysis and Visualization of Parallel Systems Using SimOS and Rivet: A Case Study [Bosch et al. 00]

Trellis

[Becker, Cleveland, and Shyu 96]

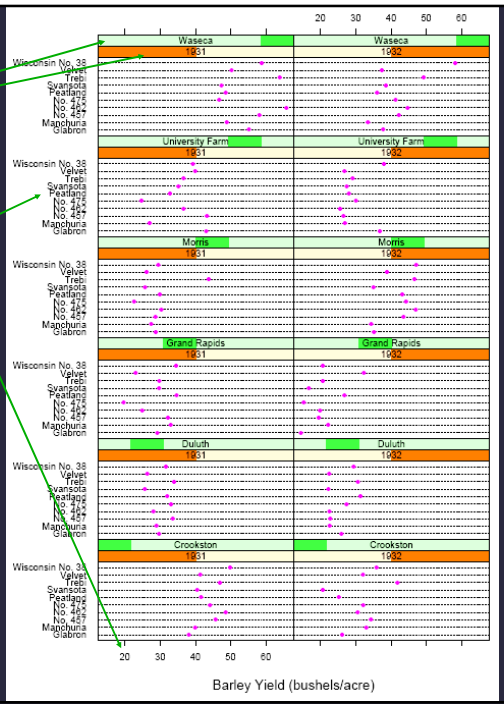


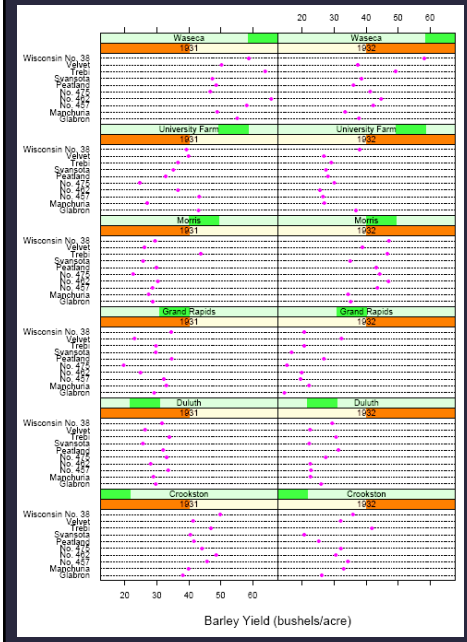
Condition variables
location, year

Panel variables
type, yield

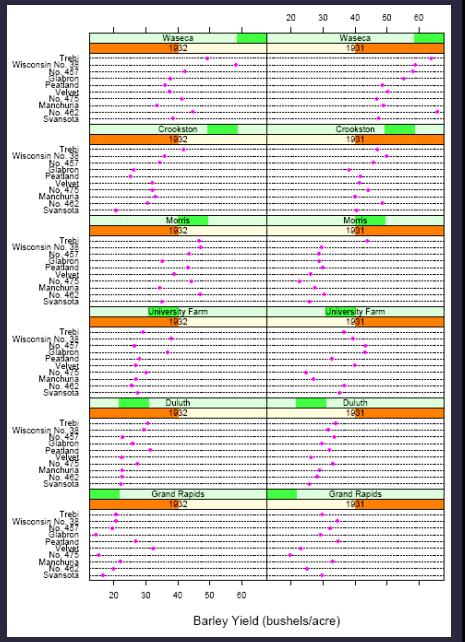
Trellis

[Becker, Cleveland, and Shyu 96]

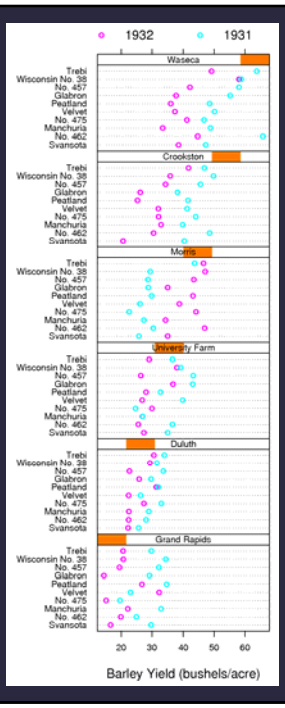




Alphabetical ordering



Main-effects ordering



Summary

Most visualizations are interactive

- Even passive media elicit interactions

Good visualizations are task dependant

- Choose the right space
- Pick the right interaction technique

Human factors are important

- Leverage human strengths
- Assist to get past human limitations