Information Visualization

Lecture 1 CPSC 533C, Fall 2004

13 September 2004

Tamara Munzner

Outline

My History

Course Structure

The Geometry Center

1991–1995 Technical Staff

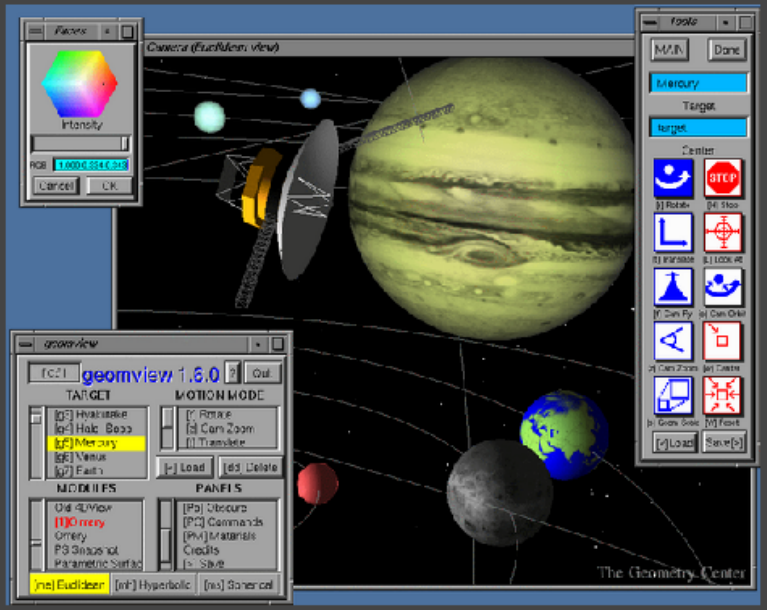
The National Science and Technology Center for Computation and Visualization of Geometric Structures

mathematical (geometry and topology)
visualization

GC: General-purpose visualization

Geomview

- very flexible, several thousand users in many domains
- supports noneuclidean spaces, higher dimensions



www.geom.umn.edu/software/geomview 1993-2000
www.geomview.org 2000-

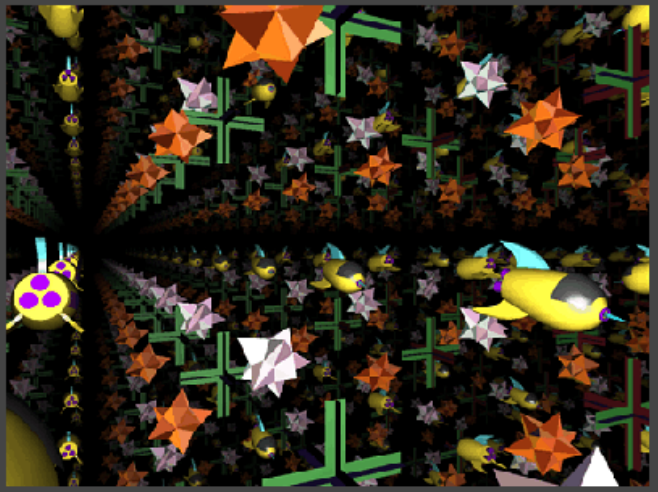
GC: Visualization videos

explain advanced topology to general audience

Outside In

[Silvio Levy, Delle Maxwell, and Tamara Munzner. Outside In (Video, 22 minutes). AK Peters, 1994.]

The Shape of Space

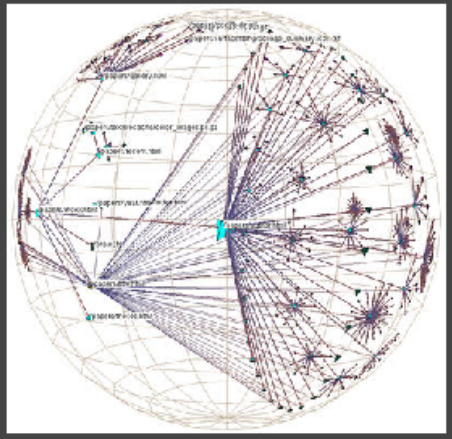


[Tamara Munzner and Delle Maxwell. The Shape of Space (Video, 13 minutes). Key Curriculum Press, 2000.]

Thesis: Interactive Navigation of Large Graphs and Networks

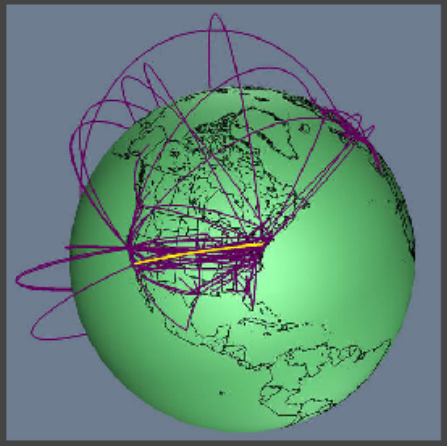
1995–2000 PhD Stanford

H3



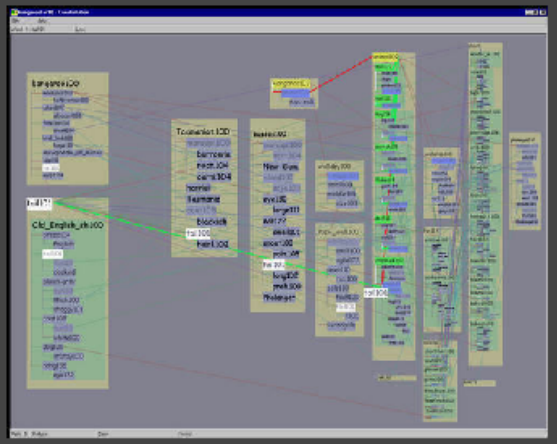
[Munzner 1997, 1998a, 1998b]

Planet Multicast



[Munzner, Hoffman, Claffy, and Fenner 1996]

Constellation

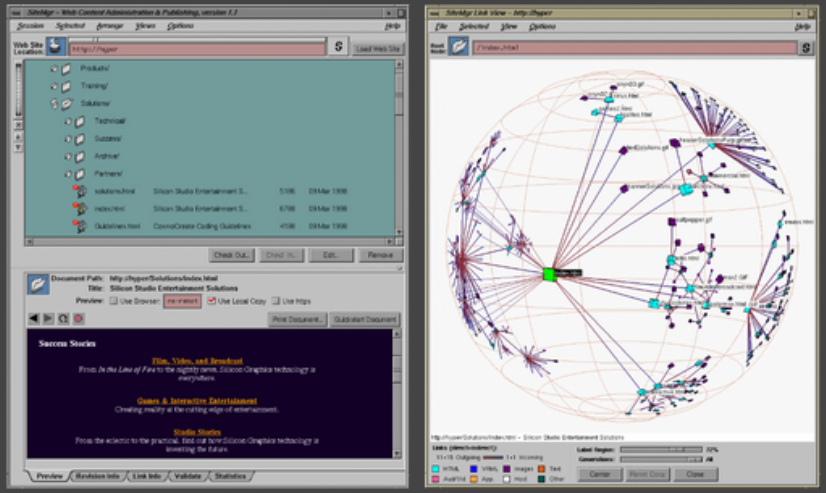


[Munzner, Guimbretiere, and Robertson 1999]
Microsoft Research

SGI: Site Manager

web site content management tool

- H3 view of site hyperlink structure
- shipped from Irix 6.2 on

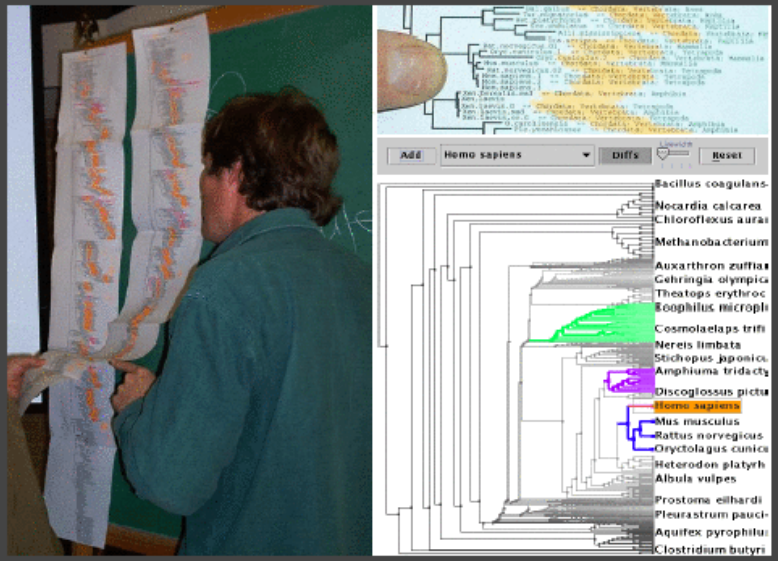


[www.sgi.com/software/sitemgr.html]

Compaq Systems Research Center

2000–2002, Research Scientist
TreeJuxtaposer

- visual comparison of large evolutionary trees



[Munzner, Guimbretiere, Zhang, Tasiran, and Zhou 2003]
[Slack, Munzner 2003]

Current Infovis Research

domains

- evolutionary trees
- genomic sequences
- transaction logs
- environmental sustainability
- power grid control
- computer security

techniques

- accordion drawing
- multidimensional scaling
- scalable graph drawing

InfoVis Symposium organization

- Program Co-Chair 2003, 2004
- Posters Co-Chair 2001, 2002

Course Structure

first part

- professor lectures
- all do core readings

second part

- student presentations
- presenter does topic readings

requirements

- project: 50%
- presentation: 25%
- small assignment: 5%
- class participation: 20%

Projects

choice 1: programming

- like last year
- I will only consider supervising students who do programming projects

choice 2: analysis

- use existing tools on dataset
- detailed domain survey
- suitable for non-CS students

stages

- meeting with me in person
- proposal Nov 5
- update presentations Nov 17,22
- final report/present Dec 15

Presentations

second half of class

sign up by Oct 19

material

- 2 papers from my suggestions
- 1 paper found on your own

talk

- slides required
- critical points of papers
- comparison and critique
- not just outline!

Participation

10%: discussions in class

- both lectures and student presentations

10%: 5 questions on required readings

- due at beginning of class

- if you can't attend: email required *before* class

Required Books

Ware
Information Visualization: Perception for Design
- 2nd edition

Tufte
Envisioning Information

Reserve Books

Information Visualization: Perception for Design, Colin Ware

The Visual Display of Quantitative Information, Edward R. Tufte, Graphics Press 1983

Envisioning Information, Edward R. Tufte, Graphics Press 1990

Visual Explanations, Edward R. Tufte, Graphics Press 1997

Readings in Information Visualization: Using Vision To Think; Card, Mackinlay, and Shneiderman, eds; Morgan Kaufmann 1999.

The Visualization Toolkit, 2nd edition; Schroeder, Martin and Lorensen; Prentice Hall 1998

Assignment 1

find and critique two images

- one good visualization
- one bad visualization

make web page, send me URL by noon Wed

- pictures, two paragraphs for each
- first par: story
- second par: specific critique
  - accessability
  - clarity
  - accuracy
  - other important design criteria

be prepared to discuss for 3–4 minutes in class

Assignment 1

sources

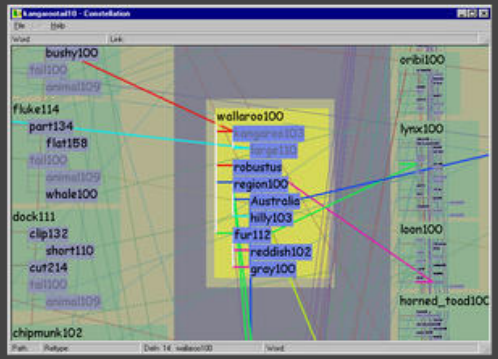
- textbook
- journal
  Journal of Applied Optics, ...
- science magazine
  Nature, Science, Scientific American, ...
- news magazine or newspaper
  Newsweek, Economist, NY Times, USA Today, ...

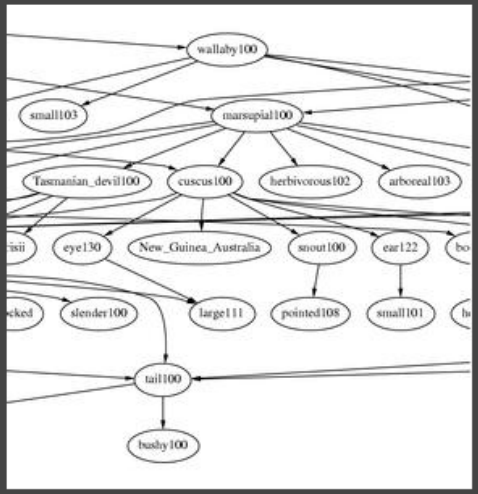
domains

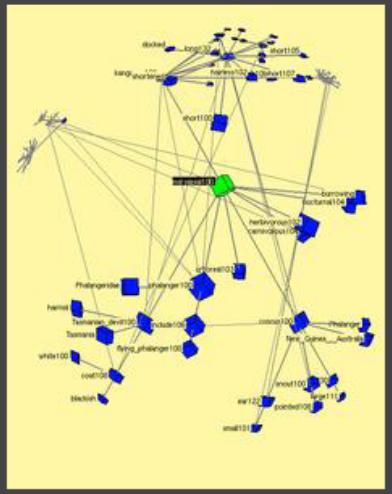
- mathematics
- physical sciences
  astronomy, physics, chemistry, ...
- biological sciences
  ecology, medicine, bioinformatics, ...
- social sciences
  economics, crime statistics, ...

Lecture Topics

Design Studies

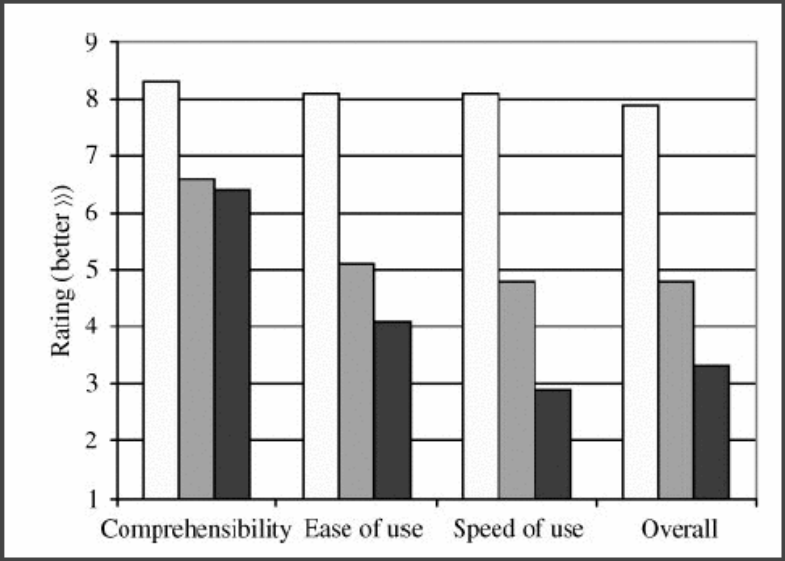




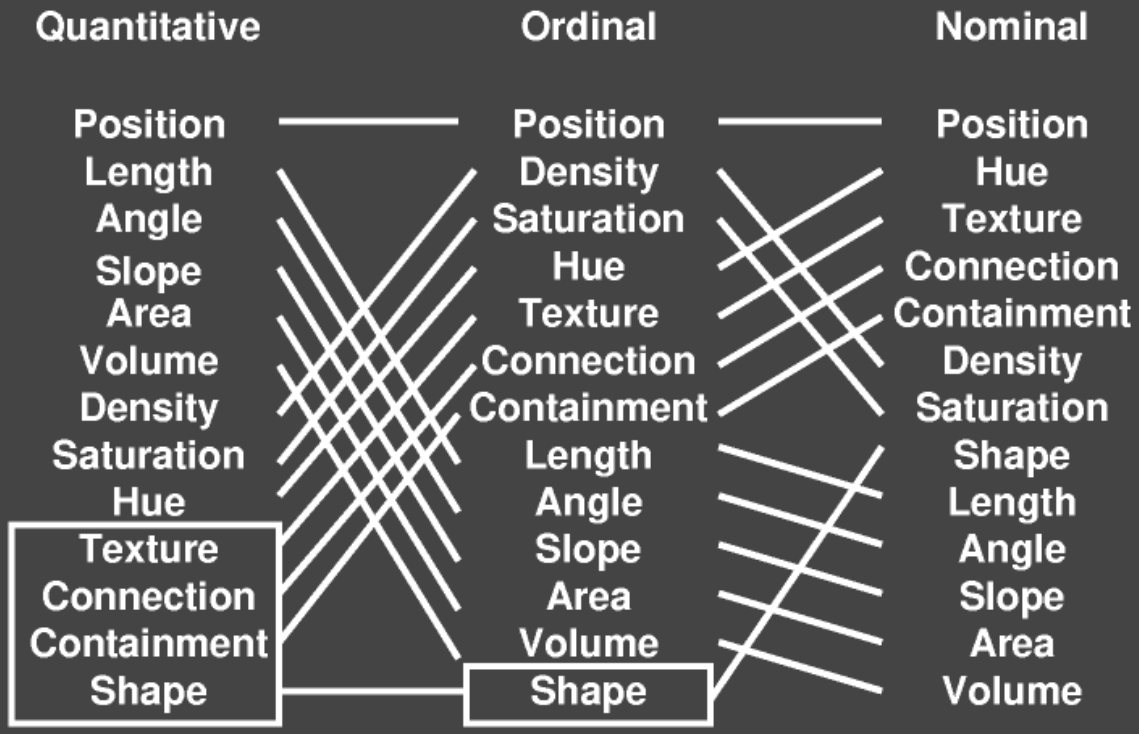


Evaluation

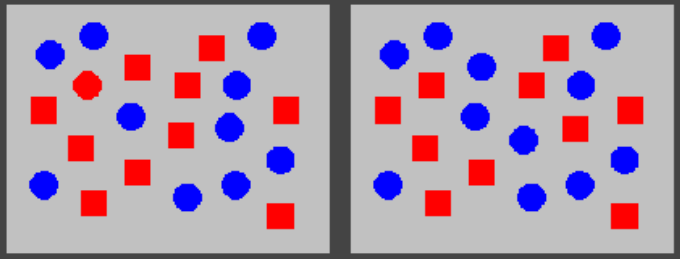
Guest Lecturer: Melanie Tory



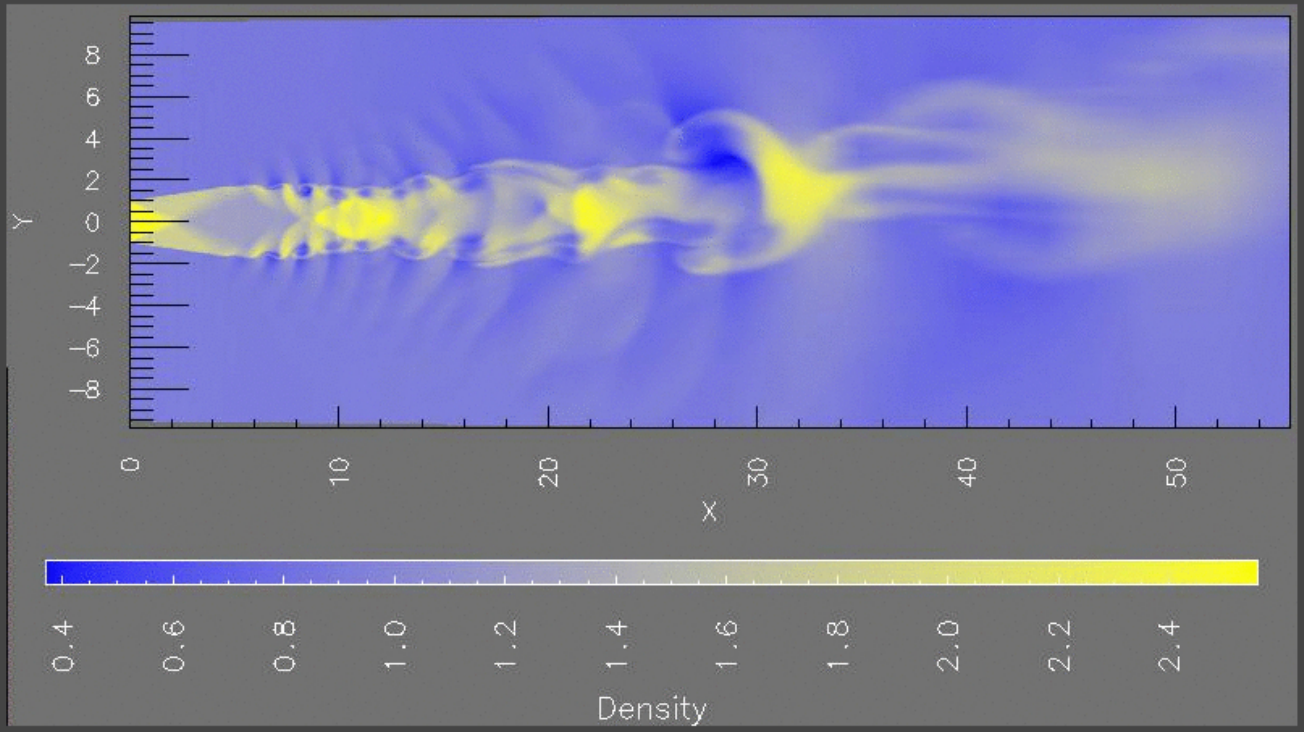
Frameworks/Models



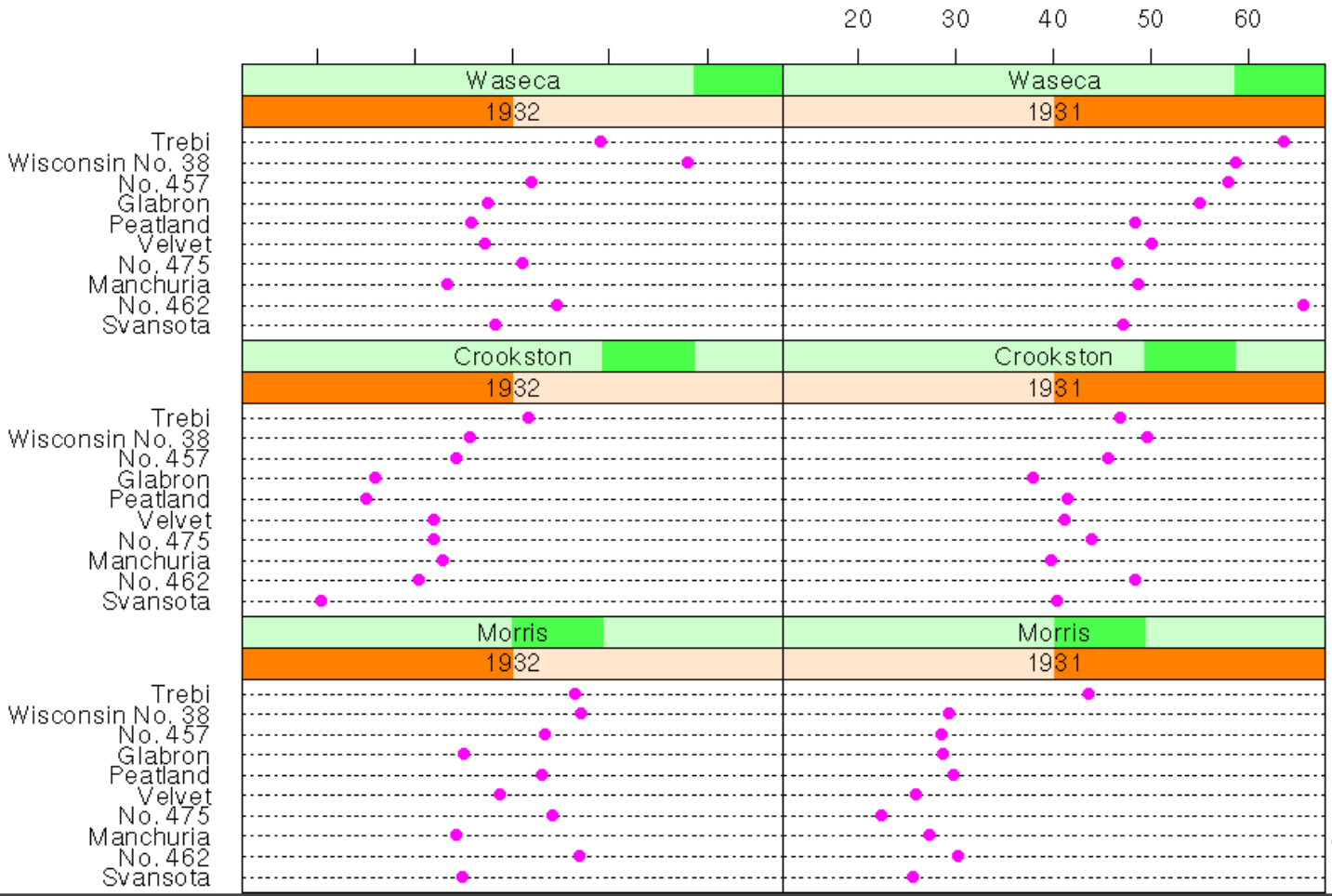
Perception



Color


8
6
4
2
0
−2
−4
−6
−8
Y
0
10
20
30
40
50
X
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
2.2
2.4
Density

Space/Order


20
30
40
50
60
Waseca
1932
Waseca
1931
Trebi
Wisconsin No. 38
No. 457
Glabron
Peatland
Velvet
No. 475
Manchuria
No. 462
Svansota
Crookston
1932
Crookston
1931
Trebi
Wisconsin No. 38
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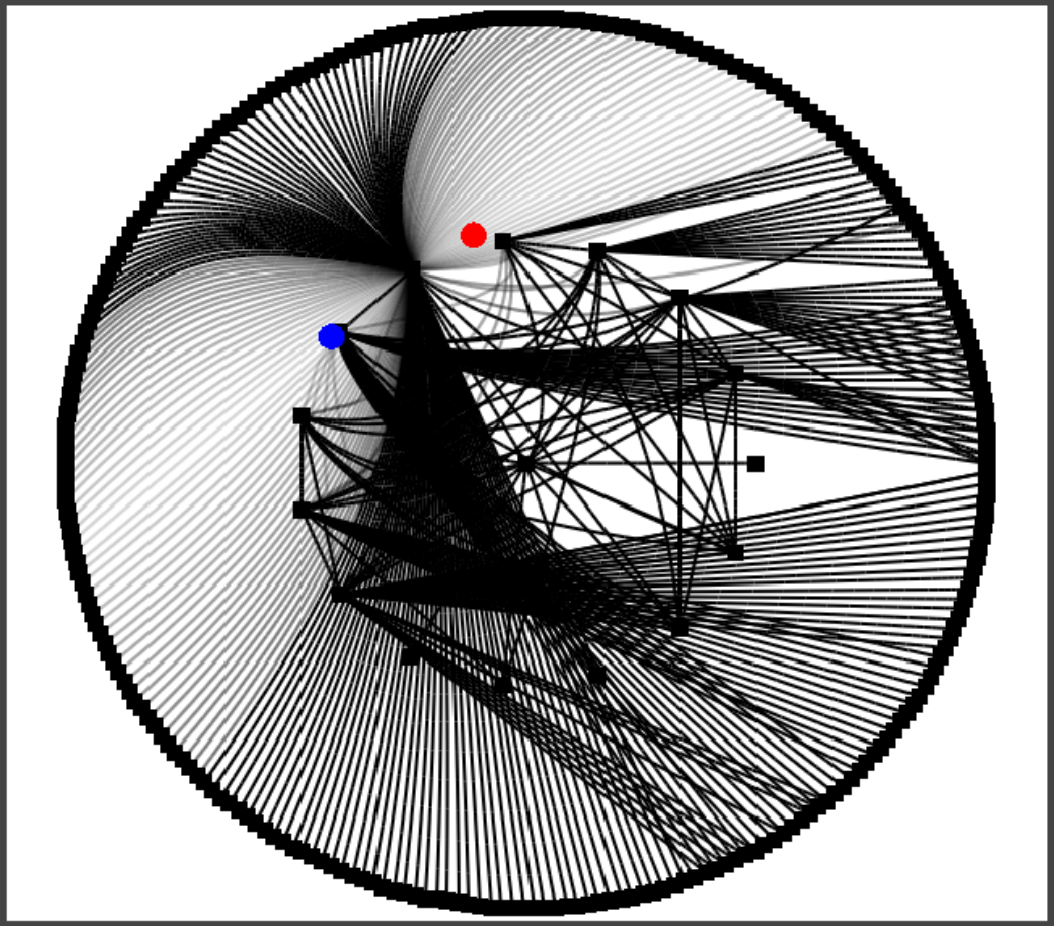
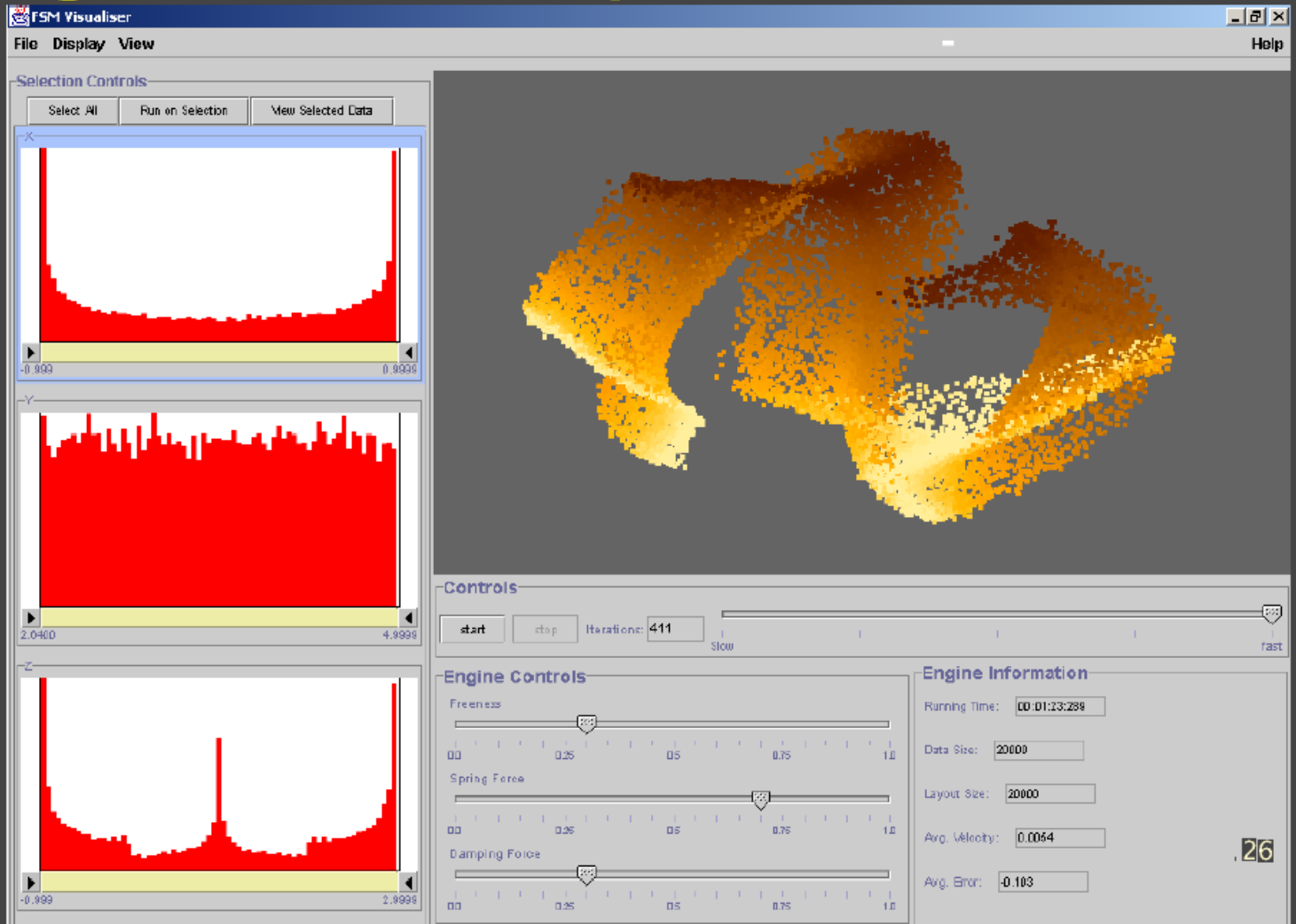
Glabron
Peatland
Velvet
No. 475
Manchuria
No. 462
Svansota
Morris
1932
Morris
1931
Trebi
Wisconsin No. 38
No. 457
Glabron
Peatland
Velvet
No. 475
Manchuria
No. 462
Svansota

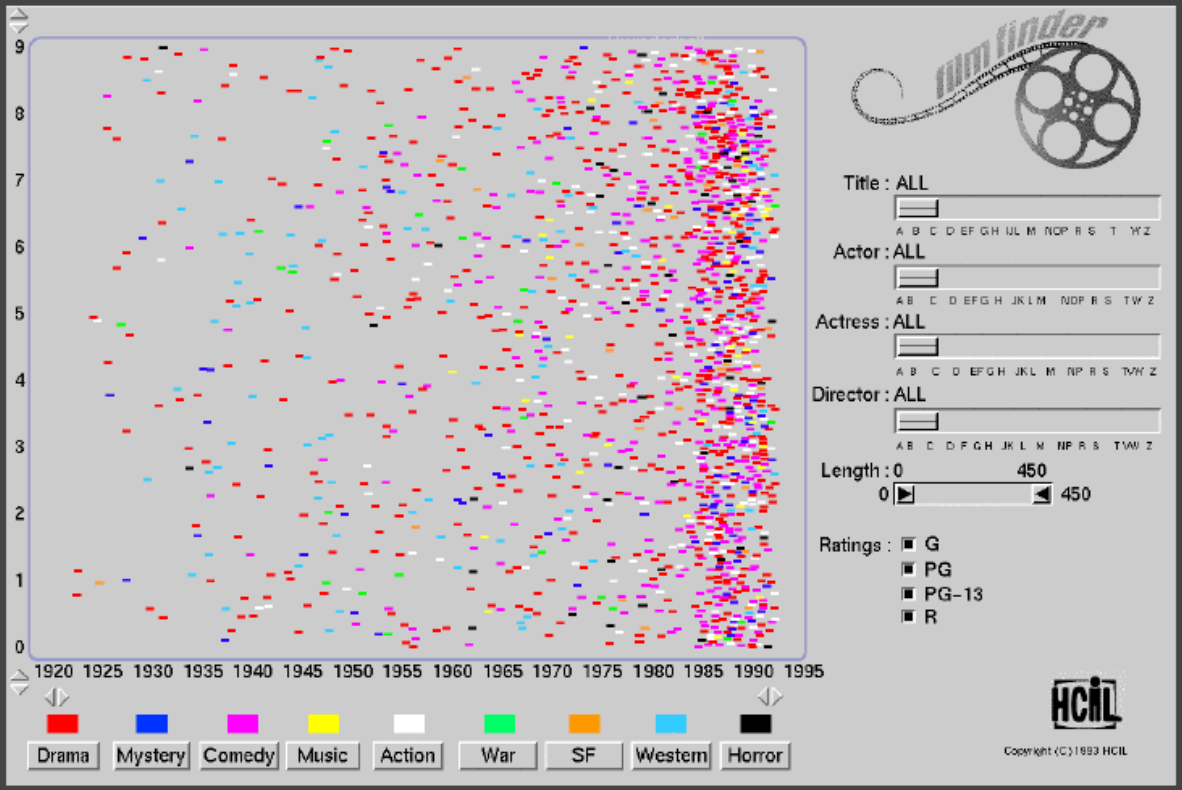
Depth/Occlusion



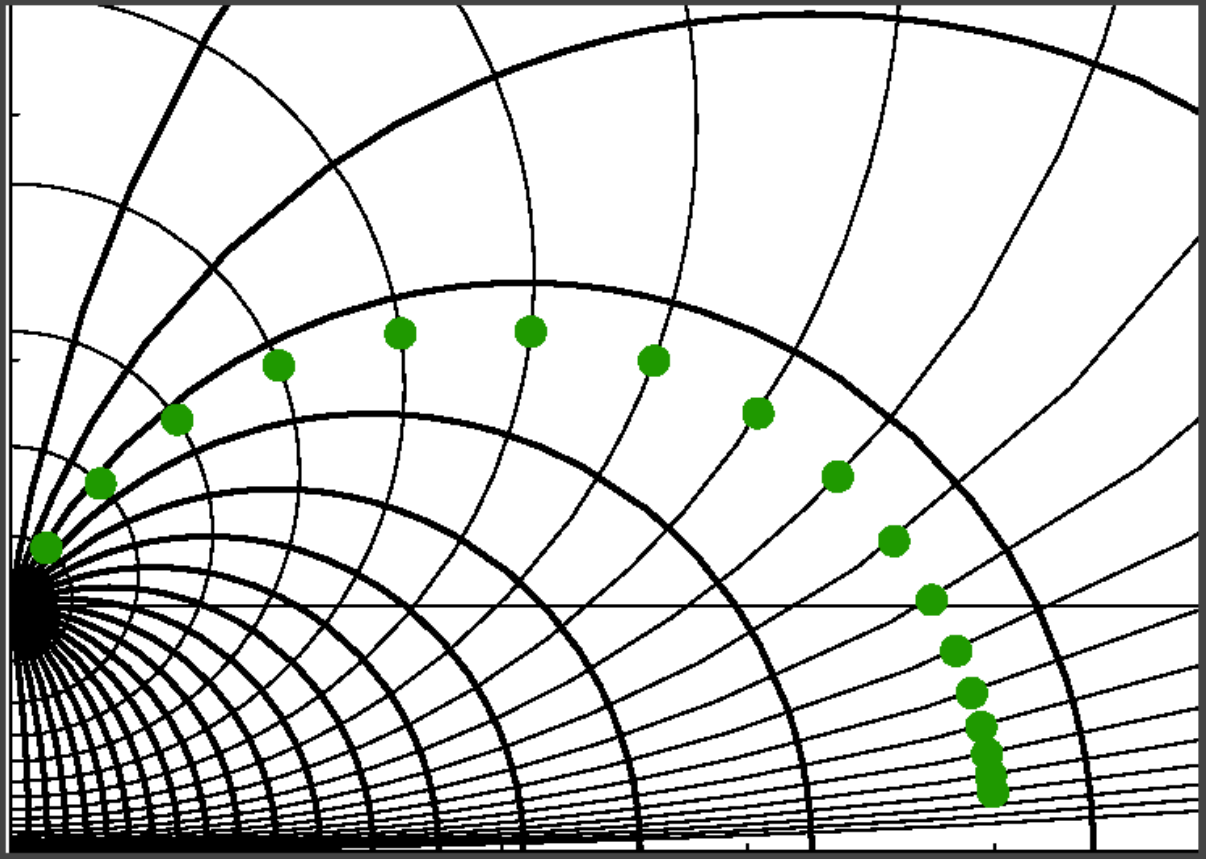
High Dimensionality



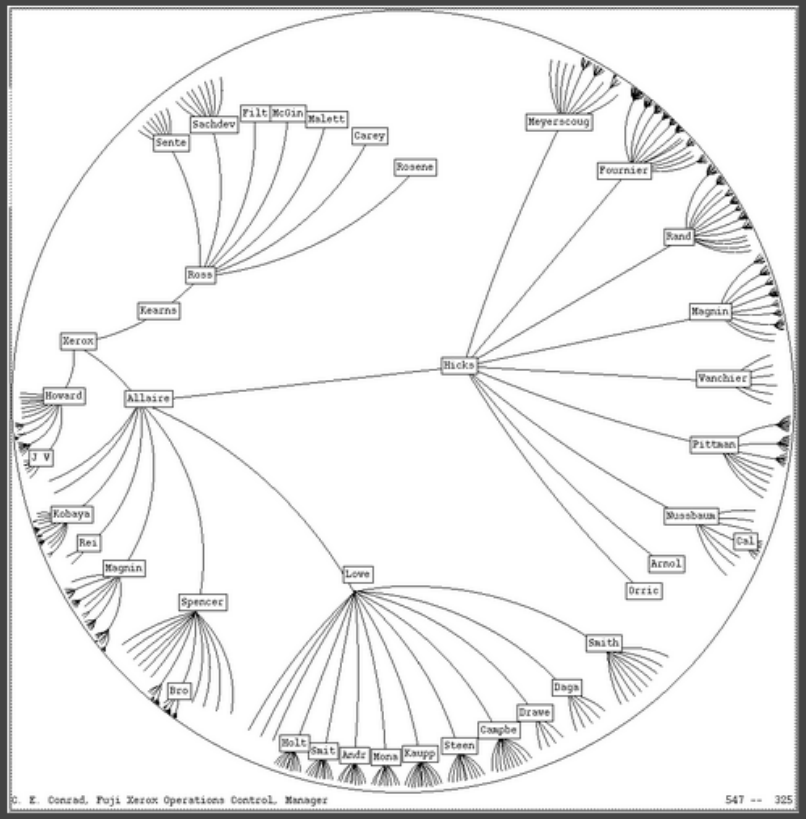
Interaction



Navigation/Zooming



Focus+Context



Graphs/Trees

Scientific Visualization

Guest Lecturer: Melanie Tory

Course Home Page

permanent URL

- www.cs.ubc.ca/~tmm/courses/cpsc533c-04-fall

shortcut

- www.cs.ubc.ca/~tmm/courses/533

reload frequently, updates common!