Projects

proposals
  - projectdesc.html#proposals

software
  - resources.html#software

datasets
  - resources.html#data

Proposals

meet with me (at least) once in person first
at least two pages, use HTML
  - submit URL to me by 2pm Mon Mar 1

writeup
  - names/email for all team members
  - describe domain, task, dataset, your expertise level
  - explain proposed infovis solution
    - abstraction
  - scenario of use
  - illustrations of proposed interface
    - scanned hand-drawings or mockups with drawing program
    - proposed implementation approach
      - language, platforms, existing toolkits
      - milestones

Software

already covered:
  - Java, Flash
  - X Windows, vtk,

other useful approaches
  - OpenGL
  - Geomview, xml/Tool

zoomable toolkits
  - Jazz/Piccolo, ZVTM

graph drawing packages
  - see resources.html#software

Data

resources.html#data

Navigation/Zooming

Ware Chap 10 (navigation)

Tufte, Macro/Micro

Rapid Controlled Movement

Pad++

Space-Scale Diagrams

Speed-Dependent Automatic Zooming

Smooth and Efficient Zooming

spatial navigation, as time allows
Ware Chapter 10 – Spatial Navigation

world in hand
  - good: spinning discrete objects
  - bad: large-scale terrain

eye in hand
  - explicitly move camera

walking
  - terrain following

flying
  - unconstrained 6DOF navigation

other: constrained navigation!

Macro/Micro

classic example: map
  - arms-length vs. up-close

paper vs. computer screen
  - 300–600 dpi vs. 72 dpi (legally blind)
  - finally changing

possibly available for projects
  - 22" 200dpi IBM T221 display
  - 9 Mpixels (4000x2000)

Rapid Controlled Movement

move to selected point of interest
  - normal to surface, logarithmic speed

trajectories as first-class objects

[video]

Pad++

"infinitely" zoomable user interface (ZUI)

Space-Scale Diagrams

reasoning about navigation and trajectories

Space-Scale Diagrams: Understanding Multiscale Interfaces
George Furnas and Ben Bederson, Proc SIGCHI '95.


Viewing Window
1D Version

Pan–Zoom Trajectories

Joint Pan–Zoom Problem

Shortest Path?

Shortest Path

Shortest Path, Details
Speed–Dependent Automatic Zooming

Speed–Dependent Automatic Zooming for Browsing Large Documents

[demo www.ui.is.s.u-tokyo.ac.jp/~takeo/jave/autozoom/autozoom.htm]
[video www.ui.is.s.u-tokyo.ac.jp/~takeo/video/autozoom.mov]

automatic zoom
  - amount depends on how far to pan

Smooth and Efficient Zooming

uw space: u = pan, w = zoom
  - horiz axis: cross–section through objects
  - point = camera at height w above object
  - path = camera path

Optimal Paths Through Space

at each step, cross same number of ellipses
  - cross minimal number of ellipses total

Multiscale Display

Multiscale Desert Fog

Critical Zones in Desert Fog: Aids to Multiscale Navigation
Susanne Jul, George W. Furnas, UST 98

environment devoid of navigational cues
  - not just Pad: 6DOF navigation where object fills view
designer strategies
  - explicit world creation – fog not made on purpose
    games – partial counter example
  - island of information surrounded by desert fog
Pad: min/max visibility distances

View–Navigation Theory

Effective View Navigation, CHI 97
George Furnas

characterizing navigability: viewing graph
  - nodes: views
  - links: traversable connections

1. short paths between all nodes
  - true in ZUIs (e.g. speed–dependent zooming)
2. all views have small number outlinks
  - not overwhelmed by choices
Critical Zones

region where zoom-in brings interesting views
  • show with navigation "residue"

unambiguous action choice
  • visible critical zone "residue" of stuff beneath
  • zoom out if see nothing

extension to VN theory
  • 3: all views contain good residue of all nodes
  • 4: all links must have small outlink-info
  • must build support for these into ZUs

do not have "minsize", always use a few pixels
  • they don't address clutter/scalability

Spatial Navigation

real navigation only partially understood
  • compared to low-level perception, JNDs

spatial memory / environmental cognition
  • city: landmark/path/whole

implicit logic
  • evolved to deal with reality
  • so we'll learn from synthetic worlds
  • but we can't fly in 3D...

how much applies to synthetic environments?
  • even perception not always the same

What Kind of Motion?

rigid
  • rotate/pan/zoom
  • easy to understand
  • object shape static, positions change

morph/change/distort
  • object evolves
    • beating heart, thunderstorm, walking person
  • multiscale/ZUI
    • object appearance changes by viewpoint
    • focus+context
carefully chosen distortion

What's This?

Fisheye Focus+Context View!

preview of Wednesday