Projects, Navigation/Zooming

Lecture 12 CPSC 533C, Fall 2004
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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 Fri Nov 5

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

Data

resources.html#data

Reading

(from before) Ware, Chap 10 [navigation]
Rapid Controlled Movement Through a Virtual 3D Workspace
( optional)
Design Guidelines for Landmarks to Support Navigation in Virtual Environments
Norman C. Vitamin, Proc. SIGCHI 99. (optional)
Tuft, Chap 2: Macro/Micro
Pad++: A Zooming Graphical Interface for Exploring Alternate Interface Physics
Ben Bederson, and James D Hallin, Proc. IAST 94.
Space-Scale Diagrams: Understanding Multiscale Interfaces
George Furnas and Ben Bederson, Proc SIGCH 95.
Speed-Dependent Automatic Zooming for Browsing Large Documents
 Taken Ijastorza and Ken Hinckley, Proc. UIST 00, pp. 139–148.
Smooth and Efficient Zooming and Panning,

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
**Ware Chapter 10 – Spatial Navigation**

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

- eye in hand
  - explicitly move camera

- walking
  - real-world walking
  - terrain following

- flying
  - unconstrained 6DOF navigation

- other: constrained navigation!

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**Rapid Controlled Movement**

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

- trajectories as first-class objects

[video]

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**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!

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**Design Guidelines for VE Landmarks**

- Ware's derived guidelines
  - enough so always can see some
  - visually distinguishable from others
  - visible and recognizable at all scales
  - placed at major paths/junctions
  - others, only some of of these crossover for infovis!
  - need all 5 types of landmarks
    - path, edge, district, node, landmark
  - concrete not abstract
  - asymmetry, different side looks different
  - clumps
  - different from "data objects"
  - need grid structure, alignment

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**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)

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**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.

**Shortest Path**

**Shortest Path, Details**

**Speed–Dependent Automatic Zooming**

- Automatic zooming for browsing large documents

[Demo](www.ui.is.s.u-tokyo.ac.jp/~takeo/java/autozoom/autozoom.html)
[Video](www.ui.is.s.u-tokyo.ac.jp/~takeo/video/autozoom.mov)

- Amount depends on how far to pan

**Smooth and Efficient Zooming**

- \( u \) = 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  UIST 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

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**View–Navigation Theory**

Effective View Navigation, CHI 97
George Furnas

- characterizing navigability: viewing graph
  - nodes: views
  - links: traversible 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

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**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 ZUIs

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

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**What's This?**

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**Fisheye Focus+Context View!**

preview of next time