Question Examples: Poor

Well, what exactly Pad++ is? Is it a programming library or a set of API or a programming language? How can we use it in our systems, for sample may be programming in TCL or OpenGL may be?

I learned some from this paper and got some ideas of my project.

Question Examples: OK

This seems like something fun to play around with, are there any real implementations of this? Has a good application for this type of zooming been found? Is there still a real need for this now that scroll wheels have become prevalent and most people don’t even use the scroll bar anymore?

Playing with the applet, I find I like half of their approach. It’s nice to zoom out as my scroll speed increases, but then I don’t like the automatic zoom in when I stop scrolling. Searching the overview I found the location I wanted, but while I paused and looked at the overview, I fell back in to the close up. I think they need to significantly dampen their curve.

Question Examples: Great

I’m curious as to what would have happened if the authors had simply preselected the values of the free parameters for the participants in their user study, and then had the users compare their technique to the standard magnification tools present in a ‘normal’ application (much like the space-scale folks did). Could it be that the users are ‘manufacturing’ a large standard deviation in the free parameter specifications by settling for values that merely produce a local improvement in their ability to manipulate the interface, instead of actively searching for an optimal valuation scheme?

In a related vein, the speed-dependent automatic zooming met with mixed success on some applications. Isn’t this success related to how “comparable” some information is? i.e. because zooming must necessarily throw out some information, it isn’t obvious which information to keep around to preserve the navigable structure.
### Information Visualization
- Visual representation of abstract data
- Computer-generated, often interactive
- Help human perform some task more effectively
- Bridging many fields
  - Graphics: drawing in realtime
  - Cognitive psych: finding appropriate representation
  - HCI: using task to guide design and evaluation
- External representation
  - Reduces load on working memory
  - Offloads cognition
  - Familiar example: multidigit multiplication

### External Representation: Multiplication
#### Paper
<table>
<thead>
<tr>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>57</td>
</tr>
<tr>
<td>x 48</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>6</td>
</tr>
</tbody>
</table>

#### Mental Buffer
<p>| 5 |
| 56 |</p>
<table>
<thead>
<tr>
<th>x 48</th>
</tr>
</thead>
<tbody>
<tr>
<td>228</td>
</tr>
</tbody>
</table>

#### Familiar Example: Multidigit Multiplication
- 5 \times 48 = 240 + 20 = 260
- 6 \times 48 = 288
- 2 \times 48 = 96
- 5 \times 48 = 240 + 20 = 260
External Representation: multiplication

\[
\begin{array}{c|c}
57 & 48 \\
\hline
456 & 228 \\
\hline
6 & \end{array}
\]

External Representation: multiplication

\[
\begin{array}{c|c}
57 & 48 \\
\hline
456 & 228 \\
\hline
36 & \end{array}
\]

External Representation: multiplication

\[
\begin{array}{c|c}
57 & 48 \\
\hline
456 & 228 \\
\hline
36 & \end{array}
\]

External Representation: multiplication

\[
\begin{array}{c|c}
57 & 48 \\
\hline
456 & 228 \\
\hline
736 & \end{array}
\]

Information Visualization

- visual representation of abstract data
  - computer-generated, can be interactive
  - help human perform some task more effectively
- bridging many fields
  - graphics: drawing in realtime
  - cognitive psych: finding appropriate representation
  - HCI: using task to guide design and evaluation
- external representation
  - reduces load on working memory
  - offload cognition
  - familiar example: multidigit multiplication
  - infovis example: topic graphs

InfoVis vs. SciVis

- is spatialization given (scientific visualization) or chosen (information visualization)
- names are unfortunate historical accidents
  - not scivis iff data generated by scientists
  - infovis not uninformative
  - but - too late to change
- infovis: how to represent
  - choosing, doing, evaluating
  - huge space of possibilities: random walk ineffective
  - need design guidelines

Lecture Topics

- Turing - Halting problem
- Halting problem - Infinity
- Paradoxes - Lewis Carroll
- Infinity - Lewis Carroll
- Infinity - Unpredictably long searches
- Infinity - Recursion
- Infinity - Zeno
- Infinity - Paradoxes
- Lewis Carroll - Zeno
- Lewis Carroll - Wordplay

Paradoxes - Self-ref

Design Studies

- Quantitative
  - Position
  - Length
  - Angle
  - Area
  - Volume
  - Density
  - Saturation
  - Hue
  - Texture
  - Connection
  - Containment
  - Shape
- Ordinal
  - Position
  - Density
  - Saturation
  - Hue
  - Texture
  - Connection
  - Containment
  - Length
  - Angle
  - Slope
  - Area
  - Volume
- Nominal
  - Position
  - Hue
  - Texture
  - Connection
  - Containment
  - Density
  - Saturation
  - Length
  - Angle
  - Slope
  - Area
  - Volume

Perception

Color

- Fermat
- infovis example: topic graphs
- familiar example: multidigit multiplication
- offload cognition
- reduces load on working memory
- choosing, doing, evaluating
- infovis not unscientific
Focus+Context

Problem-driven work
- web logs – SessionViewer
- large-scale system monitoring – LiveRAC

High Dimensionality

Graphs/Trees

Navigation/Zooming

Guest Lectures
- 11/4: Text - Keith Andrews, Univ. Graz
- 11/9: Scientific Visualization - Stefan Bruckner, SFU

Office Hours
- 2-3 Wed after class, or by appointment
  - office in X661, ICICS/CS X-Wing

My Own Current Research Interests
- problem-driven work
- technique-driven work
- user studies

Problem-driven work
- evolutionary tree comparison – TreeJuxtaposer
- protein-gene interaction networks – Cerebral
- linguistic graphs – Constellation

Studies: different flavors
- head to head system comparison (HCI)
  - H3 vs. 2D web browser
- psychophysical characterization (cog psych)
  - impact of distortion on visual search
  - on visual memory

Studies: different flavors
- characterize technique applicability, derive design guidelines
  - stretch and squash vs. pan/zoom navigation
  - separate vs. integrated views
  - 2D points vs. 3D landscapes
Studies: different flavors

• requirements analysis
  (before starting)
  – semi-structured interviews
  – watch what they do before new tool introduced
  – current workflow analysis

• field study of deployed system
  (after prototype refined)
  – watch them use tool
  – characterize what they can do now