## 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 example 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 design. I can imagine situations where it could be useful, but I also wonder if there’s a better way to approach it. For example, what if we could zoom in and out of different parts of the diagram simultaneously?

## Question Examples: Good

- It would be interesting to compare the approach in this paper to some other less-mathematically-thought-out zoom and pan solutions to see if it is really better. Sometimes “faking it” is perceived to be just as good (or better) by users.
- The space-scale diagrams provided a clear intuition of why zooming out, panning then zooming in is a superior navigation technique. However, I found the diagram too cumbersome for practical use, especially for objects with zoom-dependent representations (Figure 11).

## 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 mechanism panned and zoomed with a much smoother and more natural feel. I wonder if this is something that could be implemented in real-time applications.

## Presentations

- second half of class
  - sign up by Oct 20
- material (exact numbers TBD, depending on enrollment)
  - XX papers from my suggestions
  - XX paper found on your own
- talk
  - slides required
  - not just outline!
  - critical points of papers
  - comparison and critique
- grading
  - per-paper: summary 70%, critique 30%
  - general: presentation style 50%, content preparation 20%

## Projects

- choice 1: programming
  - common case
  - 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
  - meetings with me Oct 17-20
  - proposal due Oct 27
  - update presentations Nov 14,16
  - final presentations Dec 14
  - final report Dec 15

## Reserve Books

- Information Visualization: Perception for Design, Colin Ware (2nd ed)
- The Visualization Toolkit, 2nd edition; Schroeder, Martin and Lorensen; Prentice Hall 1998

## Information Visualization

- visual representation of abstract data
  - computer-generated, can be interactive
Interactivity

- static images
  - 10,000 years
  - art, graphic design
- moving images
  - 100 years
  - cinematography
- interactive graphics
  - 20 years
  - computer graphics, human-computer interaction

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: multiplication/division

External Representation: multiplication

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Choosing, doing, evaluating

- Lewis Carroll

Infinity
Paradoxes

My definition

Offload cognition

SciVis not uninformative

Familiar example: multiplication/division

Infovis not unscientific

Names are unfortunate historical accidents

(Information visualization)

(Scientific visualization) or

Self-ref

Visual representation of abstract data

Mental buffer

Is spatialization given (scientific visualization) or chosen (information visualization)

My definition

Names are unfortunate historical accidents

Not scivis iff data generated by scientists

Infovis not unscientific

But - too late to change

Infovis: how to represent

Choosing, doing, evaluating

Huge space of possibilities: random walk ineffective

Need design guidelines

Confusion of levels

Self-engulfing

High-level languages

Crab cannon

Frames

Contracrostipunctus

Central Dogma

External Representation: Topic Graphs

[Gold, Escher, Bach. Hofstadter 1979]

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

Halting problem - Decision procedures

BlooP and FlooP - AI

Halting problem - Unpredictable long searches

BlooP and FlooP - Unpredictable long searches

BlooP and FlooP - Recursive

Tarski - Truth vs. provability

Tarski - Undecidability

Paradoxes - Self-ref

Focus+Context

Frameworks/Models

Quantitative

Position

Length

Angle

Slope

Area

Volume

Density

Saturation

Hue

Texture

Connection

Containment

Nominal

Position

Hue

Texture

Connection

Containment

Density

Saturation

Length

Angle

Slope

Area

Volume

Perception

Space/Order
Depth/Occlusion

High Dimensionality

Color

Evaluation

Guest Lecturer: Maureen Stone

Interaction

Navigation/Zooming

Graphs/Trees

More Guest Lectures

- stayed tuned, things may shuffle

Office Hours

- domains
  - bioinformatics
  - evolutionary trees
  - genomic sequences
  - protein-protein interaction
  - computer science
  - networking
  - security
  - cluster monitoring
  - environmental sustainability
- techniques/projects
  - Focus-Context
  - multidimensional scaling
  - scalable graph drawing
  - evaluation
- 1:30-2:30 Tuesdays or by appointment
  - office in X661, ICICS/CS