Casual InfoVis

CS 7450 - Information Visualization
October 7, 2015
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Presented by Ramik Sadana

TVCG (InfoVis) '07

Casual InfoVis

- Let's start off with ideas and concepts from…

Casual Information Visualization:
Depictions of Data in Everyday Life

Zachary Pousman, John T. Stasko, *Member, IEEE*, and Michael Mateas

Abstract—Information visualization has often focused on providing deep insight for expert user populations and on techniques for amplifying cognition through complicated interactive visual models. This paper proposes a new subdomain for infovis research that complements the focus on analytic tasks and expert use. Instead of work-related and analytically driven infovis, we propose Casual Information Visualization (or Casual Infovis) as a complement to more traditional infovis domains. Traditional infovis systems, techniques, and methods do not easily lend themselves to the broad range of user populations, from expert to novices, or from work tasks to more everyday situations. We propose definitions, perspectives, and research directions for further investigations of this emerging subfield. These perspectives build from ambient information visualization [32], social visualization, and also from artistic work that visualizes information [41]. We seek to provide a perspective on infovis that integrates these research agendas under a coherent vocabulary and framework for design. We enumerate the following contributions. First, we demonstrate how blurry the boundary of infovis is by examining systems that exhibit many of the putative properties of infovis systems, but perhaps would not be considered so. Second, we explore the notion of insight and how, instead of a monolithic definition of insight, there may be multiple types, each with particular characteristics. Third, we discuss design challenges for systems intended for casual audiences. Finally we conclude with challenges for system evaluation in this emerging subfield.

Index Terms—Casual information visualization, ambient infovis, social infovis, editorial, design, evaluation.

1 Introduction

Much of the work in information visualization assumes a population of expert users who have knowledge and experience in analyzing problems in specific domains. Workers in widely varying domains from fi-

Are these types of tools really infovis systems? The question arises, where are the limits of infovis with respect to the everyday uses of computational artifacts.

Card, Mackinlay, and Shneiderman define information visualiza-

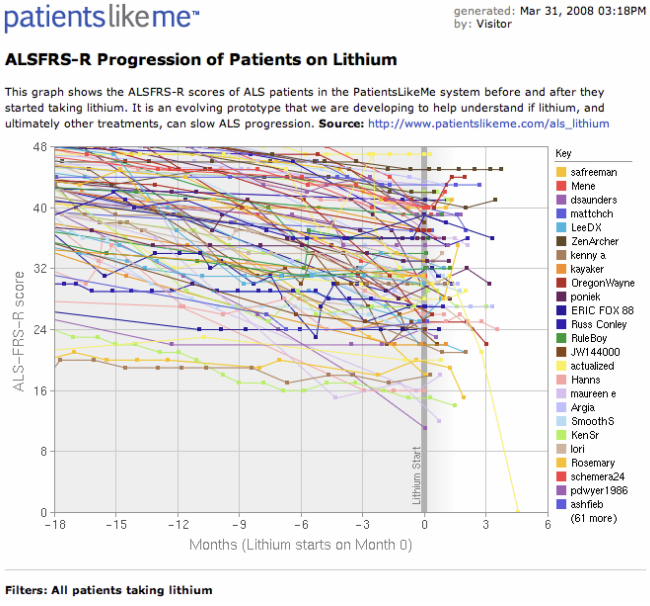
Casual InfoVis

- Let's start off with ideas and concepts from the paper…
- A complement to the majority of 'central' infovis; which is a focus on analytic tasks and analysts as the idealized user.
- *Infovis for the everyday person*
- Spend some time looking at the 'edges' of the infovis domain

Definition

- *Casual Infovis* is the use of computer mediated tools to depict personally meaningful information in visual ways that support everyday users in both everyday work and non-work situations.

Good Examples



Changes to traditional notions

- The user population
  - Expand to include many more kinds of people and many more situations and scenarios.
  - People who are not explicit or implicit analysts
  - Non-professionals in general
  - Low(er) motivation

Changes to traditional notions

- Usage pattern
  - New patterns of use that depart from the more traditional deep-dive explorations and sensemaking
  - In a word, more *casual*
  - Fleeting awareness and monitoring tasks
  - Could also include more substantial reflections
  - Mobile and ubiquitous, not just desktop

Changes to traditional notions

- Data types also change
  - Often personally relevant (about 'me')
  - Tight coupling between user and the data
  - Tight coupling gets at what is *meaningful* about the data stream… not always what is *important*. Sometimes the most minute and boring detail is still very meaningful.

Changes to traditional notions

- Insight
  - Gets a one of the fundamental questions of infovis. We all agree that the purpose of infovis is insight… *Do you agree?*
  - But the examples on the edges show different kinds of insights.
  - Maybe insights are not perfectly quantifiable in a way that's rigorous

    (for an attempt see Saraiya & North 2005)

Areas to explore for today

- Artistic InfoVis
- Ambient InfoVis
- Social InfoVis

Artistic InfoVis

Artistic InfoVis

- Artistic expression using visualizations of data
- They are not just generative art – they still read data, represent it, and some are interactive
- Systems often depart from the central notion of infovis that first and foremost, a visualization should be easy to read.
- Also can 'problemitize' the data…

Many examples

Jason Salavon

Jason Salavon

Homes for Sale

109 Homes for Sale,
Seattle/Tacoma

117 Homes for Sale,
Chicagoland

124 Homes for Sale,
The 5 Boroughs

121 Homes for Sale,
LA/Orange County

114 Homes for Sale,
Dallas/Ft. Worth Metroplex

112 Homes for Sale,
Miami-Dade County

http://salavon.com/work/TopGrossingFilmAllTime/

Jason Salavon

The Top Grossing Film of All Time, 1 x 1 2000

The worldwide top grossing film of all time (until 2010), Titanic, was digitized from video in its entirety and broken up into its constituent frames. Each of these was then averaged to a single color best representative of that frame and reformatted as a photograph mirroring the narrative sequence of the film. Reading from left-to-right and top-to-bottom, the narrative's visual rhythm is laid out in pure color.

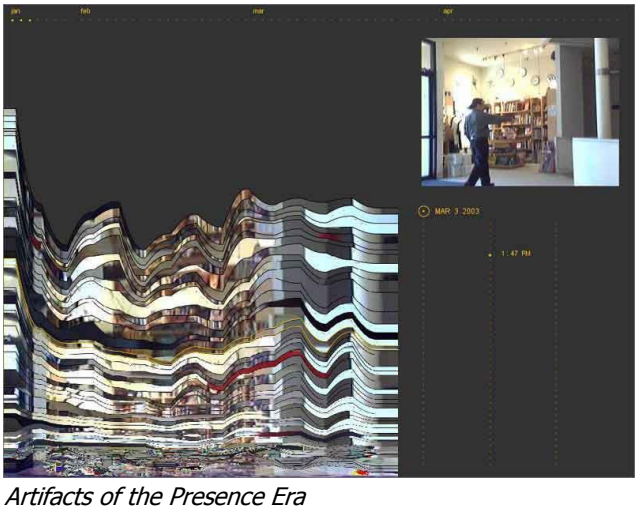
Wignell

Sorting (real time)

Arthur Buxton

http://www.arthurbuxton.com/2010/11/van-gogh-visualisation.html

Viegas, et al.



Artifacts of the Presence Era

Feltron

Annual Report (2008)

Flags as infographics

Foote, Cone & Belding

Flags as infographics

Foote, Cone & Belding

Flags as infographics

Foote, Cone & Belding

Ambient InfoVis

Objectives

- Systems so far
  - What is their purpose or objective?
    High-level purpose or task
  - Analysis, Exploration, Learning
- Are there other high-level tasks that infovis can assist with?
  - Awareness, monitoring

Central idea

- People interpret images well
- As they say, *a picture's worth thousand words* … so use visualization for information awareness

Calm Technology

- Mark Weiser
  - "A calm technology will move easily from the periphery of our attention, to the center, and back."

Ambient Displays

- Conveys low- to medium-priority information to people, while residing in the periphery of their attention
- Other terms sometimes used
  - Peripheral display, notification system

Ambient Displays

- Purpose:
  - Information awareness, perhaps monitoring
- Focus:
  - Aesthetics

    Visually pleasing enhancement to surroundings

Other dimensions in the space

Information capacity

How much info can they transmit?

Notification level

Are they subtle or more attention-grabbing?

Representational Fidelity

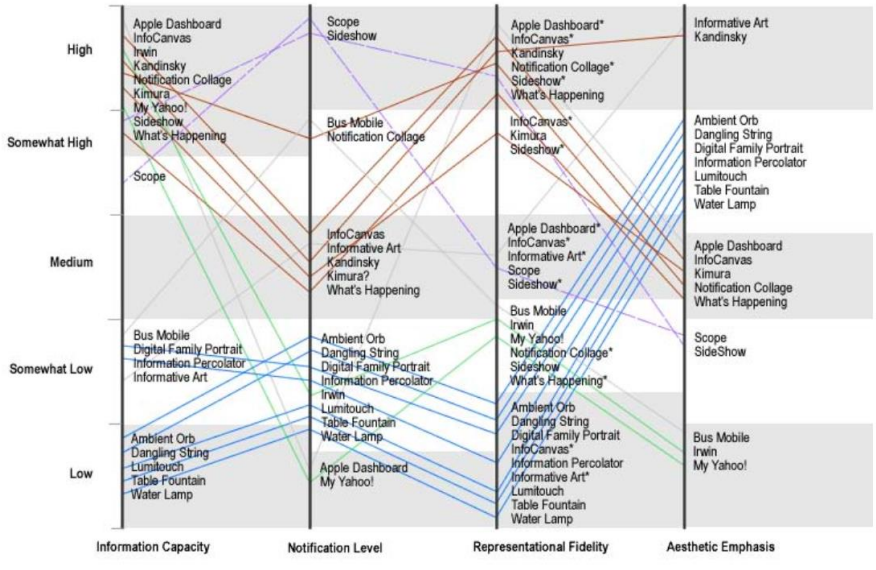
Flexibility with regard to data mappings

Aesthetics

Visually pleasing enhancement to surroundings

Pousman & Stasko
AVI '06

Other dimensions in the space



Ambient InfoVis

- InfoVis off the desktop
- Still visually encoding information, but not for analytic purposes
  - Presenting the information in places where you're not doing "desktop computing"

Examples

- Let's look at some examples of ambient displays or ambient information visualizations

Dangling String

- Plastic spaghetti wire hanging from ceiling
- Hangs from motor in ceiling
- Electrically connected to ethernet cable so bits going by cause it to jiggle
- Created by artist Natalie Jeremijenko

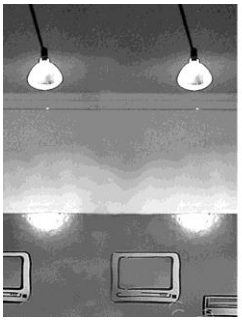
Ambient Room

- Use variety of physical objects in office to communicate the state of relevant information
- Hiroshi Ishii's group at MIT

Wisneski et al
CoBuild '98

Video

Karlsruhe Projects



Web awareness

Gellersen & Schmidt
Personal Technologies '99

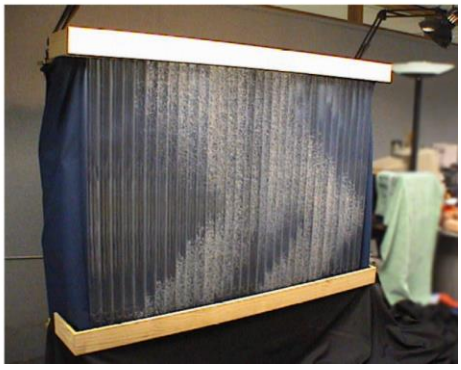
Lumitouch

- Touch one picture frame, the other lights up

Chang et al
CHI '01 Extended Abstracts

Information Percolator

- Fish tank with bubble controller
- Various messages can be sent in bubbles



Heiner et al
UIST '99

Busmobile, Weathermobile

Mankoff et al
CHI '03

Ambient Orb

Monitor stock market data, weather, etc.

www.ambientdevices.com

Information Visualizations?

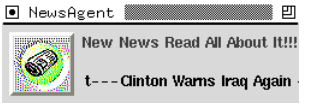
- Well, they are visually presenting information
- But perhaps not an emphasis on the *information*
  - More about peripherality, calmness, aesthetics

Other Styles

- Another set of techniques/systems focus less on aesthetics and more on the quality of information conveyance

Ticker Displays

- Animated text strings (ticker, fade, roll, blast) typically in periphery of person's monitor



Fitzpatrick et al
CHI '99 Extended Abstracts

McCrickard et al
IJHCS '03

What's Happening/The Buzz

Screen-saver or projected display using collages of images

Zhao & Stasko
AVI '02

Eagan & Stasko
CHI '08

Sideshow

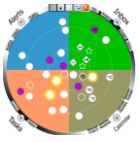
- Sidebar on edge of monitor
- Provides info on weather, traffic, presence, project status, etc.
- Can author new items
- From Microsoft

Cadiz et al
CSCW '02

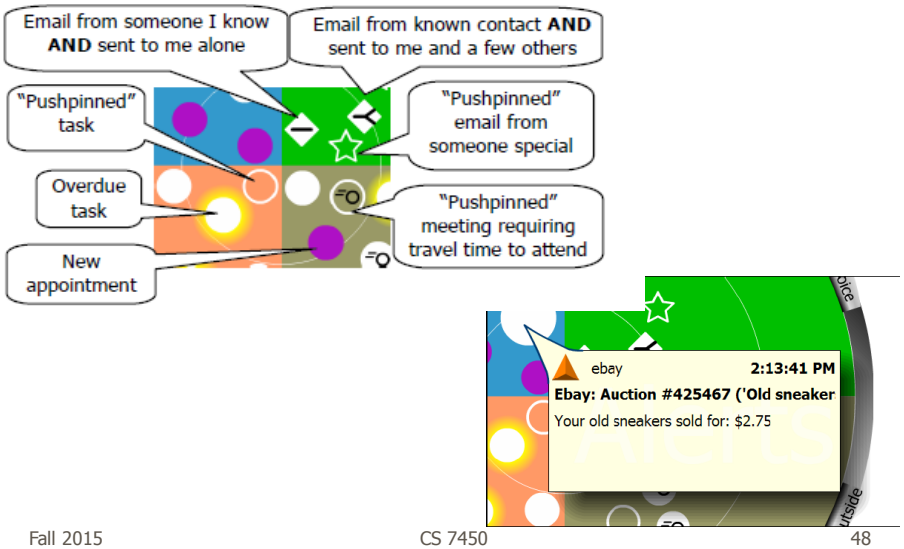
Scope

- Corner of the screen awareness widget to help with tasks, appts, etc.
- Glanceable awareness, more details on demand

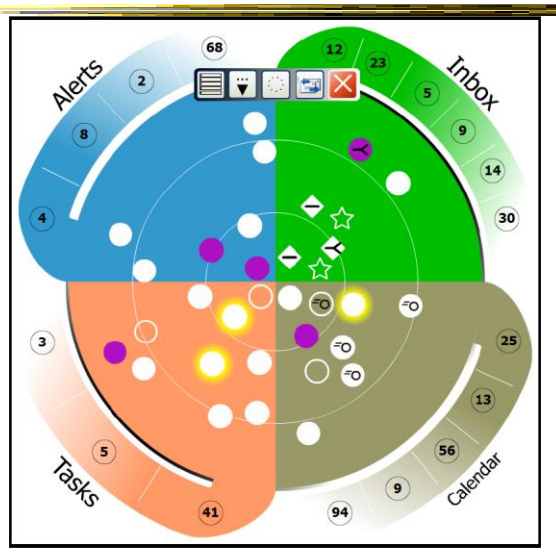
van Dantzich et al
AVI '02



Encoding



Final Interface



Trade-off

Aesthetics Utility

Informative Art

- Electronic paintings–Flat panel LCDs hung on the wall
- Abstract art in which aspects of the picture change to signify underlying data values
- From Future Applications Lab, Viktoria Institute, Sweden

Redstrom et al
DARE '00

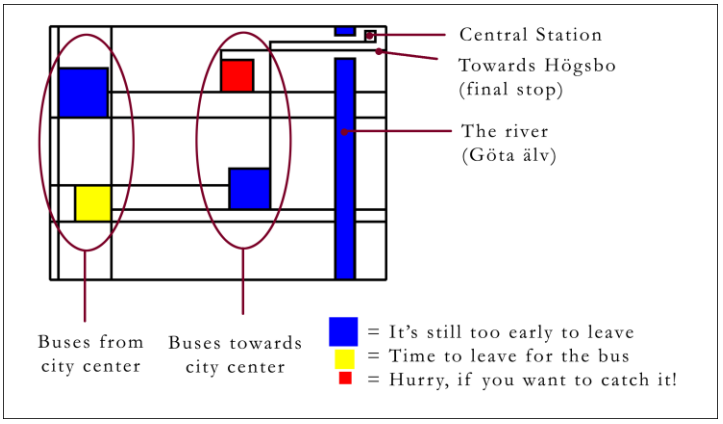
Skog et al
InfoVis '03

Design Criteria

- Communicate useful information
- Blend in with surroundings and be appealing to look at
- Minimize animation – Don't want to draw the eye too much

Example

Mondrian



Example

Andy Warhol

Cans gradually change from asparagus soup to tomato soup to signify upcoming event

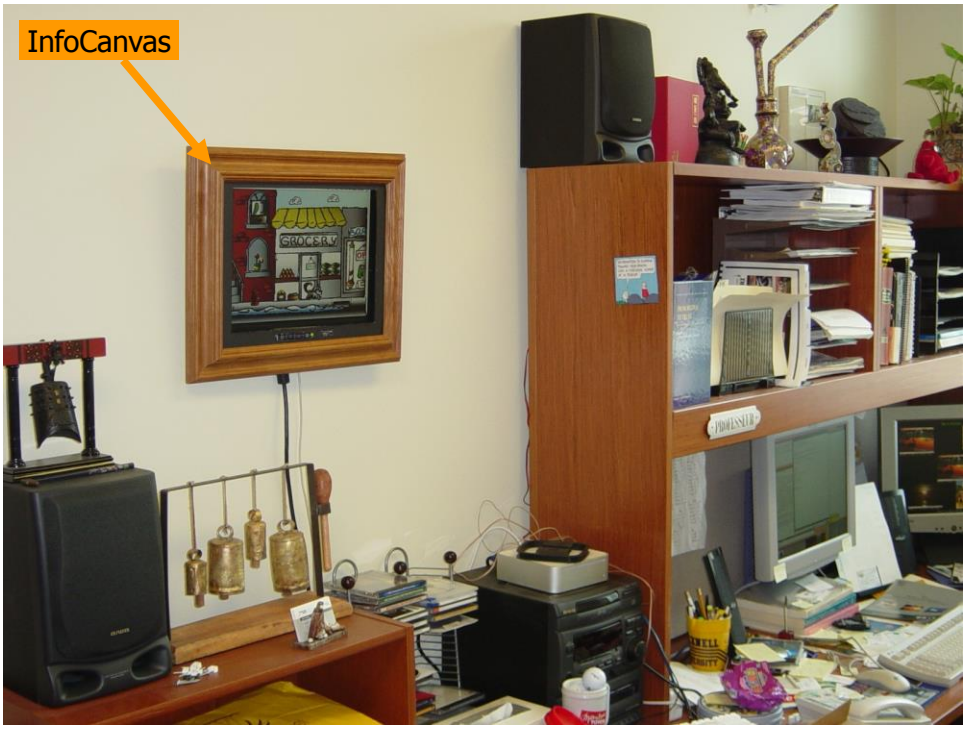
Lessons Learned

- Find info relevant to place where display is located
- Rate of change of info should be enough to promote relevance and draw interest
- Base visualization on artistic display, may support readability and promote comprehension
- Let features of info source affect visual encoding to improve memory of mapping

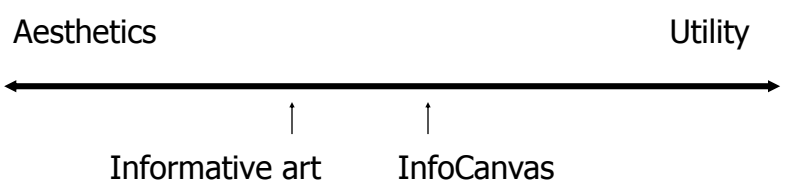
InfoCanvas

- Information Art–Similar approach as in Viktoria project
- Electronic painting deployed on LCDs in the environment
- Focus: User-driven views
- II group at Georgia Tech

Stasko et al
Ubicomp '04



Revisit Trade-off



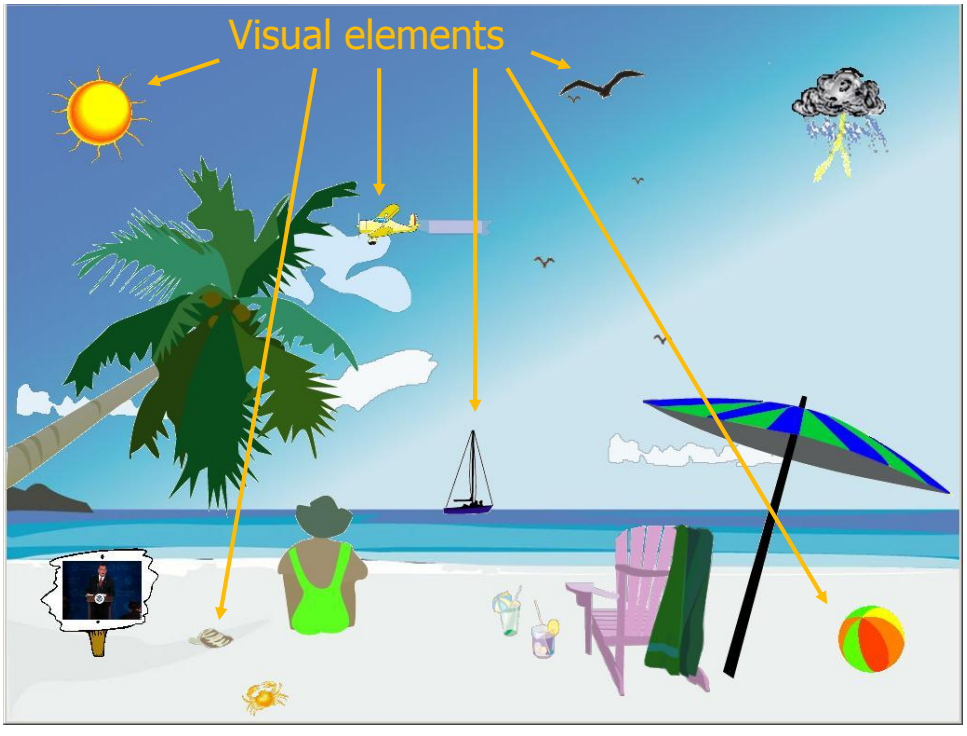
Objectives

- Personalized
  - Display individual's personal information
- Flexible
  - Variety of info sources and representations
- Consolidated
  - Present multiple data items on one display
- Accurate
  - Be clear, and highlight uncertainty
- Appealing
  - Fun to use, aesthetically pleasing

Hardware

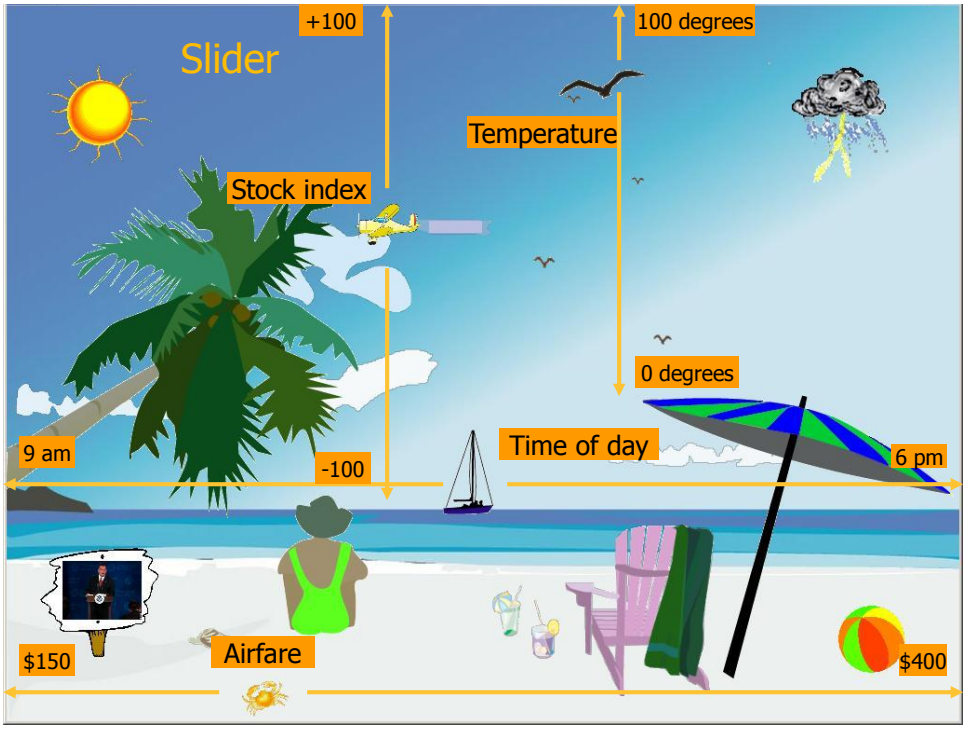
LCD – bezel + picture frame

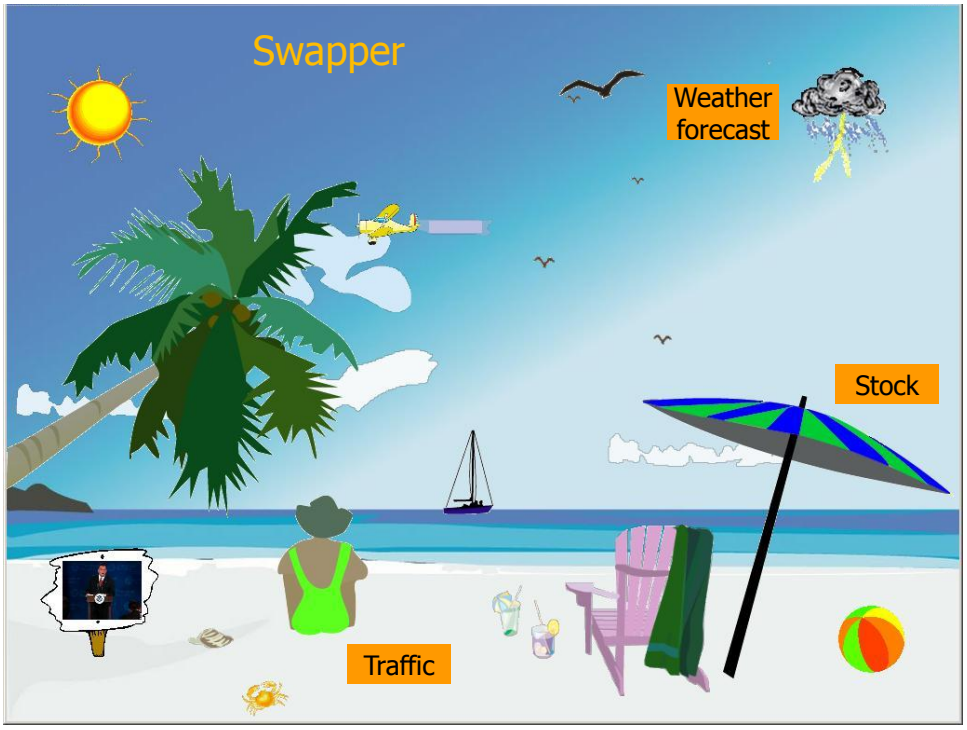

Theme

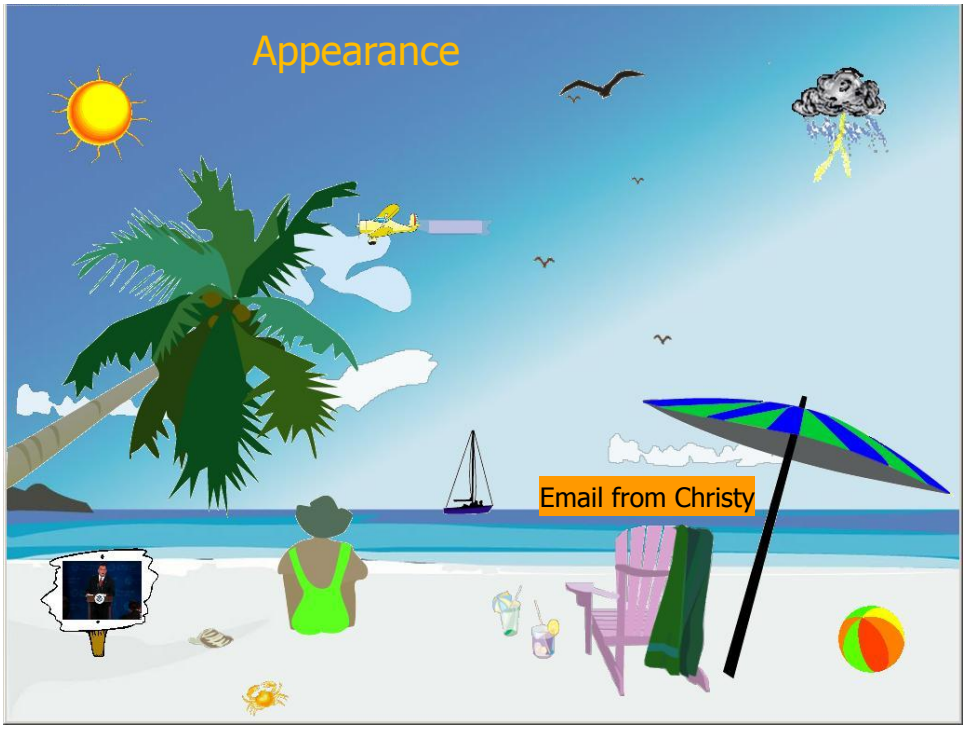

Visual elements

Transformations

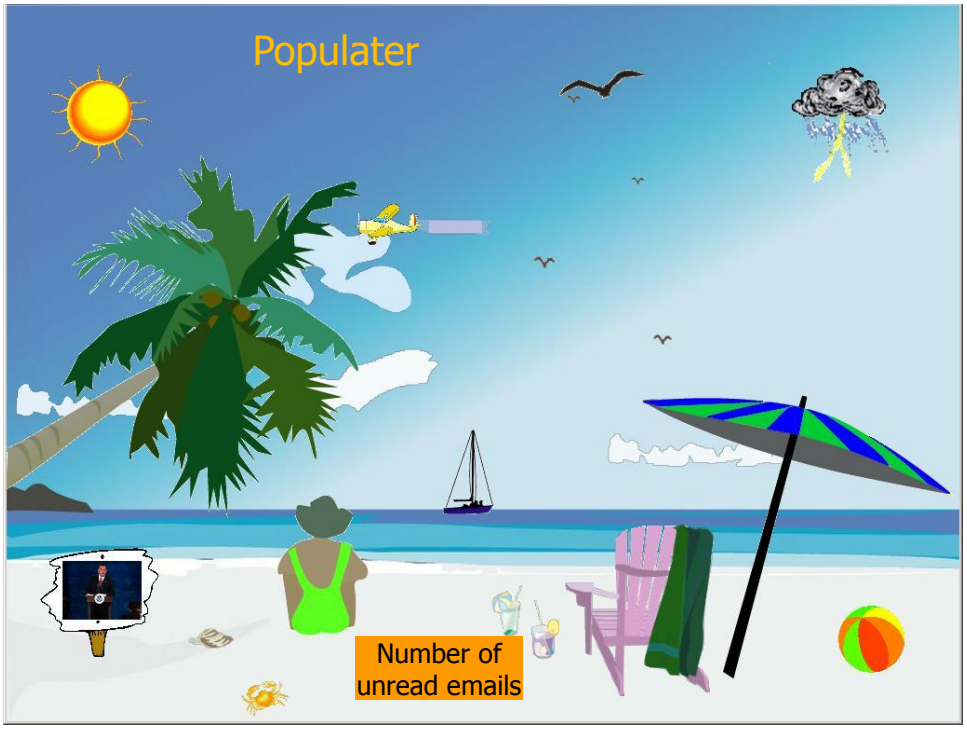
- Slider
- Image swapper
- Appearance
- Scaler
- Populater
- Projector



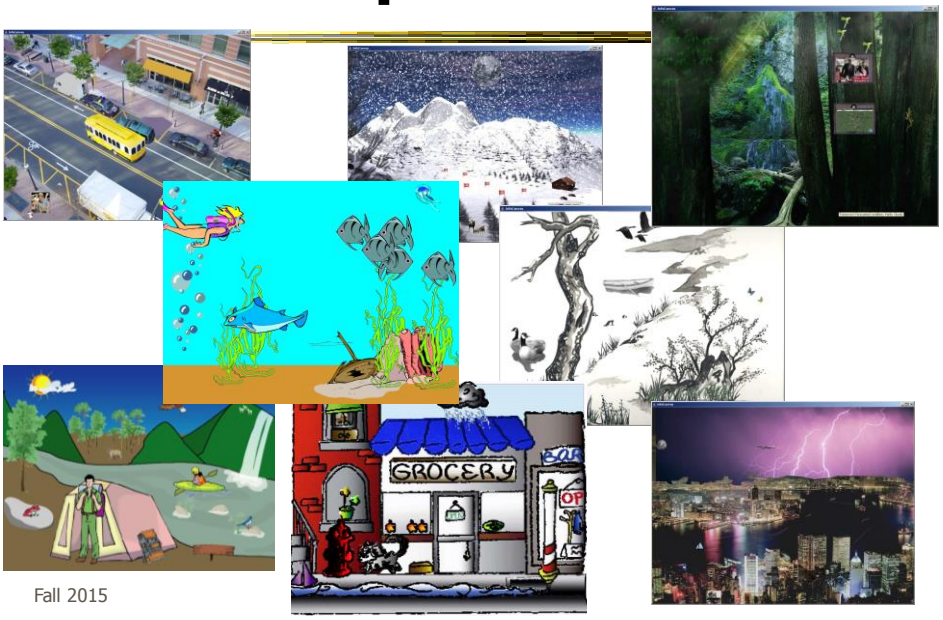

Swapper
Weather forecast
Stock
Traffic


Appearance
Email from Christy


Scaler
Account balance


Populater
Number of unread emails

Other Example Themes



Implementation

- Java application
- Data harvester classes
- Painting specified through XML file
- System establishes data->visual mapping and polls data sources to maintain current representation

Lessons Learned

- Ubiquitous computing technologies can operate effectively in the field
- Consolidating information is valuable
- Abstractness/symbolism can be beneficial
- "Push" technology merits reconsideration
- Personalization is important
- Better customization tools are needed

Social InfoVis

- Another growing area… let's just scratch the surface today.

Definition

- Social Visualization
  - "Visualization *of* social information *for* social purposes"
    ---Judith Donath, MIT
  - Visualizing data that concerns people or is somehow people-centered

Social Visualization

- "Unlike information visualization which has as its goal of helping users digest information more effectively or data visualization which has as its goal of helping users analyze and see trends in the data, **social visualization** has as its goal of creating **awareness and catalyzing social interactions among its users**."
  (Alison Lee)

Example Domains

- Social visualization might depict
  - Conversations
  - Newsgroup activities
  - Email patterns
  - Chat room activities
  - Presence at specific locations
  - Social networks
  - Life histories

Can you think of others?

On-line Communities

- PeopleGarden
  - Visualization technique for portraying on-line interaction environments (Virtual Communities)
  - Provides both individual and societal views
  - Utilizes garden and flower metaphors

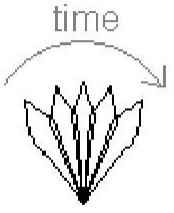
Xiong & Donath
UIST '99

Particulars

- Who – Anyone visiting online community
- Problem – Help someone gain a more rapid understanding of the community as a whole and the individual participants
- Data – Postings from past

Data Portrait: Petals

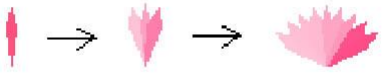
Fundamental view of an individual



His/Her postings are represented as petals of the flower, arranged by time in a clockwise

Data Portrait: Postings

Time of Posting



New posts are added to the right

Slide everything back so it stays symmetric

Each petal fades over time showing time since posting

A marked difference in saturation of adjacent petals denotes a gap in posting

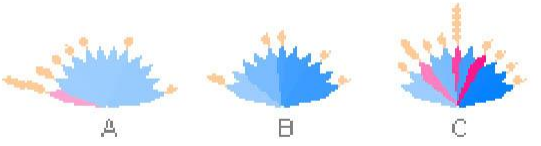
Data Portrait: Responses

Response to posting

Small circle drawn on top of a posting to represent each follow-up response

Data Portrait: Color

Initial post vs. reply



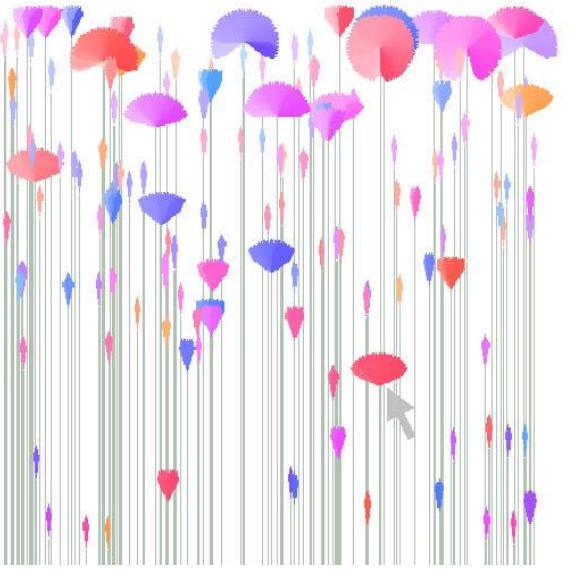
Color can represent original/reply
Here magenta is original post, blue is reply

Garden

Combine many portraits to make a garden

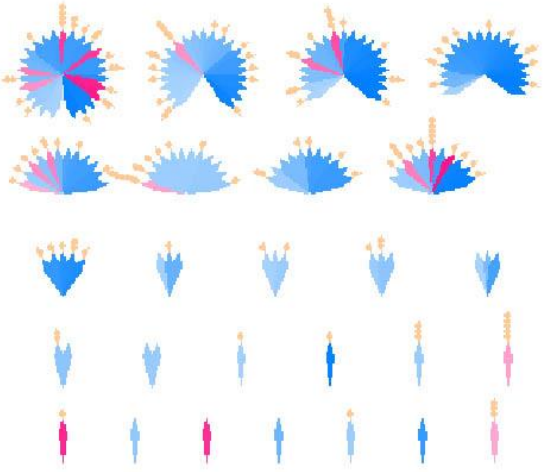
Message board with 1200 postings over 2 months

Each flower is a different user
Height indicates length of time at the board

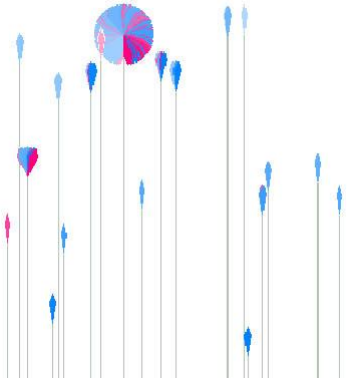


Alternate Garden View

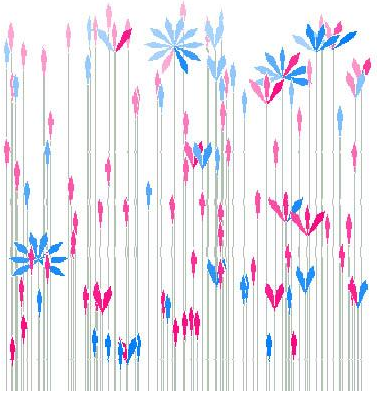
Sorted by number of postings



Interpreting Displays



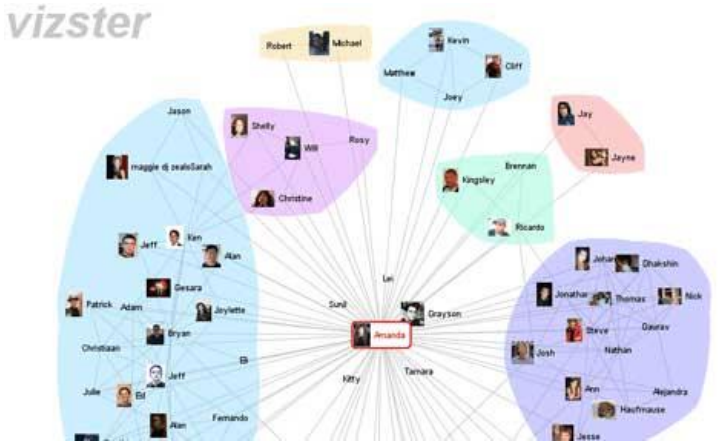
Group with one dominating person



More democratic group

Vizster

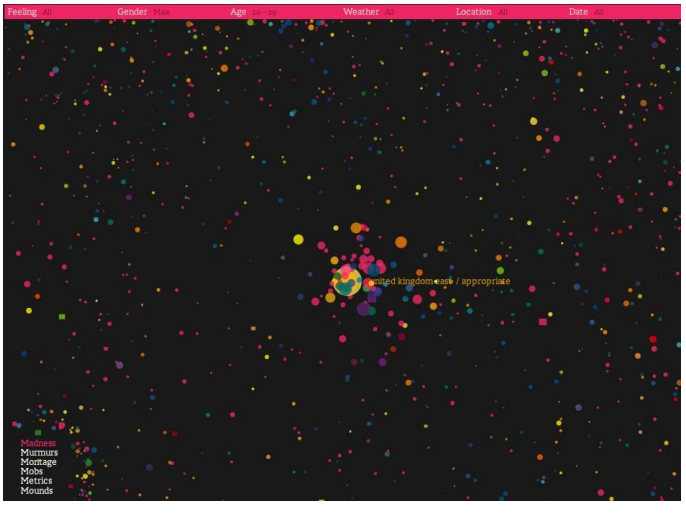
More during graph & network vis week



Heer & boyd InfoVis '05

We Feel Fine

http://www.wefeelfine.org/



Harris & Kamvar

In Sum…

- Different kinds of 'insight'
  - Analytical insights (more traditional concept)
  - Reflective insights
  - Awareness insights
  - Social insight

In Sum…

- Info Vis is moving into lots of life, not just desk work and data analysis by experts
  - News, commerce, story-telling, sociality
  - Self-reflection
  - One way to help manage information overload
- Requires a change to evaluation techniques (what matters is changing)
- Opens new design spaces

Project

- Next milestone – Oct. 21 (2 weeks)
  - Design document (3 copies)
    - Describe users & objectives more
    - Describe data
    - Show different design ideas and critique them
    - Describe which one(s) you plan to go with and implement

Upcoming

- Fall Break

- Tufte's design principles
  - Reading:
    - *Envisioning Information*

References

- Thanks to Zach Pousman for contributions to the lecture