Casual InfoVis

CS 7450 - Information Visualization
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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 assisting cognition through conceptual models and visual symbols. This paper proposes a new substantive research agenda that complements the focus on analytic tasks and expert use. Instead of work-related and analytic work in visual interfaces, we propose Casual Information Visualization (or Casual InfoVis) as a complementary methodological framework and targeted learning environment for non-expert populations. Casual InfoVis is intended for use in settings where information visualization techniques are needed, but where insights are not required from a perspective of the expert or the non-expert. Casual InfoVis is intended to provide non-expert users with a realistic, hands-on experience with technologies that allow users to learn and promote judgment to improve future applications. The goal is to provide novices with valuable information understanding and critical thinking skills. The presentation of the paper will focus on the following points: first, we describe the different types of computer systems used in the design and development; second, we discuss the technical and design challenges; third, we discuss the experimental design; and fourth, we discuss the results and implications of the research.”

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

This graph shows the ALSFRS-R scores of ALS patients in the PatientsLikeMe system before and after they started taking lithium. It is an evolving prototype that we are developing to help understand if lithium, and ultimately other treatments, can slow ALS progression. Source: http://www.patientslikeme.com/als_lithium

Filters: All patients taking lithium
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
The Top Grossing Film of All Time, 1 x 1

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.

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

Sorting (real time)

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Viegas, et al.
**Feltron**

*Annual Report (2008)*

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**Flags as infographics**

*Foote, Cone & Belding*

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Flags as infographics

Foote, Cone & Belding

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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
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

Busmobile, Weathermobile

Mankoff et al
CHI '03
**Ambient Orb**

Monitor stock market data, weather, etc.

[Website](www.ambientdevices.com)

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**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

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

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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

Central Station
Towards Högsbo
(final stop)
The river
(Göta älv)

Buses from
city center
Buses towards
city center

It's still too early to leave
Time to leave for the bus
Hurry, if you want to catch it!

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

Aesthetics

Informative art

Utility

InfoCanvas
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
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

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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

- 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