

# Information Visualization Evaluation and User Study

CSE591 Visual Analytics

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## Evaluation for Information Visualization

Enrico Bertini <http://www.dis.uniroma1.it/~belic06/infvis-eval.html>

- Component/system level evaluation
- Low level components/perceptual studies
- Longitudinal studies, case studies
- Metrics, benchmarks, model-based evaluation, frameworks, taxonomies
- Novel evaluation methodologies, non-conventional methods/parameters
- Reviews

## Evaluation for Information Visualization

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- Longitudinal studies, case studies
  - Martin Wattenberg. *Baby names, visualization, and social data analysis*. INFOVIS '05
- Metrics, benchmarks, model-based evaluation, frameworks, taxonomies
  - Robert Amor, James Eagan, and John Staska. *Low-level components of analytic activity in information visualization*. INFOVIS '05
- Novel evaluation methodologies, non-conventional methods/parameters
- Reviews
  - Catherine Plaisant. *The challenge of information visualization evaluation*. *Advanced Visual Interfaces '04*

## The Challenge of Information Visualization Evaluation

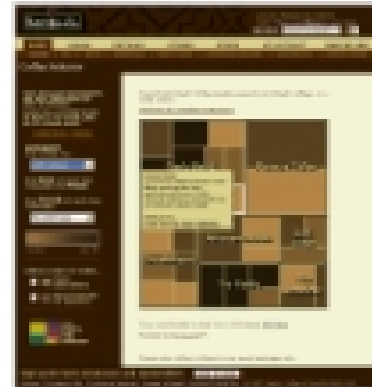
Catherine Plaisant

Human-Computer Interaction Laboratory  
University of Maryland at College Park

*Advanced Visual Interfaces '04*

## Introduction

- The tools and ideas in information visualization research publications are reaching users
  - Commercial products
    - Spotfire, Insight, and HumanIT
  - Additions to statistical packages
    - SPSS/SigmaPlot, SAS/GRAPH, DataDesk
  - Commercial development environments
    - ILOG JViews
  - Others
    - SmartMoney financial maps, Feet's Coffee Selector, health information maps, highway traffic information



## Information Visualization Evaluation

- The reports of usability studies and controlled experiments are helpful to understand the potential and limitations of tools
- However, we need
  - Consider other evaluation approaches that take into account
    - the long exploratory nature of users tasks
    - the value of potential discoveries
    - or the benefits of overall awareness
  - Better metrics and benchmark repositories to compare tools
  - Seek reports of successful adoption and demonstrated utility
- We need to understand how to improve evaluation methods in order to present actionable evidence of measurable benefits that will *encourage more widespread adoption*

## Current Evaluation Practices

Four thematic areas of evaluation: (fifty user studies of InfoVia system)

- *Controlled experiments comparing design elements*
  - Comparing specific widgets, mappings of information to graphical display
- *Usability evaluation of a tool*
  - Provide feedback on problems of a tool, show how to refine the design
- *Controlled experiments comparing two or more tools*
  - Compare a novel technique with the state of the art
- *Case studies of tools in realistic settings*
  - Do real tasks, demonstrate feasibility and in-context usefulness
  - Time consuming, results may not be replicable and generalisable

## Challenges

- *Matching tools with users, tasks and real problems*
  - Using real datasets and demonstrating realistic tasks is important
- *Improving user testing*
  - Looking at the same data from different perspectives, over a long time
  - Answering questions you didn't know you had
  - Factoring in the chances of discovery and benefits of awareness
- *Addressing universal usability*
  - General public, diverse users

## Possible Next Steps

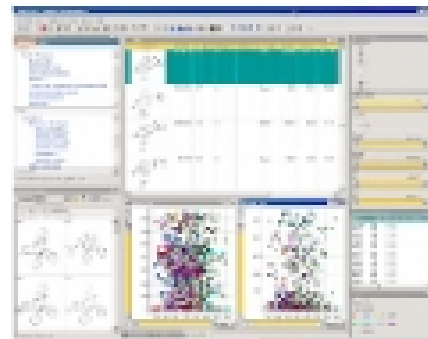
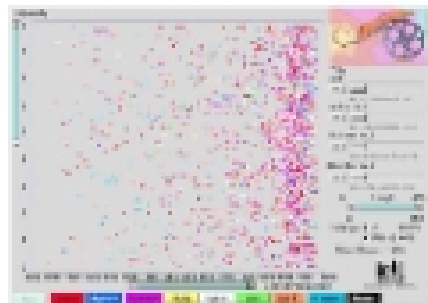
- Development of repositories of data and tasks
  - Create benchmark datasets and tasks
  - InfoVis 2003, 2004, 2005, 2006 contest, VAST 2006 contest
  - Information Visualization Benchmark Repository  
<http://www.cs.umd.edu/hcil/InfovisRepository/index.shtml>
- Gathering of case studies and success stories
- Strengthening the role of toolkits and development tools
  - Making a technique a part of a toolkit greatly improves its chance of success

## Examples of Technology Transfer

- A common evaluation measure for any technology is adoption by others, and the move into commercial products
- Commercial success depends on
  - The quality of a product
  - Financial alliances
  - Marketing strategies
  - Personal networking
  - Luck
- Gain lessons from examples of transformations from prototypes to products and applications

## Example 1: From the Film Finder to Spotfire

- A 11-year-long voyage
- Dynamic scattergrams
- Other visualizations such as parallel coordinates, table views or standard business graphics were combined



## Example 2: Treemap

- SmartMoney Map of Market
  - The first widely known commercial application of treemaps
- Hive Group developed an application used by US marines for inventory management
  - The availability of tools for data preparation and publishing, provides automatically updated views
  - A simplified interface allows end-users to view the data and perform limited filtering and grouping operations

