Storytelling

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http://www.cs.odu.edu/~mweigle/CS725-S18/

Topic Objectives

- Define the terms *story* and *narrative visualization*.
- List the six genres of narrative visualization.
- Describe the Martini glass structure of narrative visualization.
- Given a narrative visualization, describe the design strategies it uses.
- Describe how narrative visualization and presentation visualization differ from exploratory/analysis visualization, especially in terms of tools and approaches.

Acknowledgement: Many of the slides here are based on John Stasko's InfoVis course at Georgia Tech (note the Stasko, Ga Tech 2011 tag at the bottom).
Outline

- What is Storytelling?
- Data Journalism
- Narrative Visualization
- Other Examples
- Research Directions

Purpose

- Two main uses of info vis
  - analysis – understand your data better and act upon that understanding
  - presentation – communicate and inform others more effectively

- Today, we focus on presentation
Telling Stories

- Data visualization can help to
  - communicate ideas
  - summarize
  - influence
  - unite
  - explain
  - persuade

- Visuals can serve as evidence or support

Focus

- One difference between analysis and presentation is need for focus
  - essential points
  - no unnecessary detail
    - just because you have data doesn't mean you have to use it

- What's the core of the story?

http://eagereyes.org/journalism/storytelling-focus
A Famous Example

TED 2006

Hans Rosling shows the best stats you’ve ever seen

200 Countries, 200 Years, 4 Minutes
http://www.gapminder.org/videos/200-years-that-changed-the-world-bbc/

What is a Story?

- *Ordered* sequence of steps with a clearly defined path
  

- Question + Visual Data + Context
  
  "Once Upon a Stacked Time Series"
  
  M. Shapiro, *Beautiful Visualization*
Outline

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Data Journalism

- Is data journalism really any different than storytelling?

- Many leaders in visualizations that tell stories are media
  - NY Times
  - BBC
  - The Guardian
Journalism in the Age of Data

http://datajournalism.stanford.edu/

Amanda Cox, NY Times
Knight-Mozilla Learning Lab

https://www.youtube.com/watch?v=XH-F9jV7EuE
Amanda Cox Quotes

» "There's a strand of the data vis world that argues that everything could be a bar chart. That's possibly true but also possibly a world without joy."

» "But we're already at a place where we can make people understand what they didn't understand. Now we want to make people understand what no one has understood before. The best visualizations cause you to see something you weren't expecting, and allow you to act on it."


Outline

» What is Storytelling?
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» Narrative Visualization
» Other Examples
» Research Directions
Narrative Visualization

- Collected a set of visualizations with narrative components
- Analyzed narrative and interactive devices used

Sources
- New York Times
- The Guardian
- The Financial Times
- Washington Post
- Slate
- books, blogs, research papers, ...

http://vis.stanford.edu/papers/narrative

Journalism in the Age of Data video
http://vimeo.com/14777910
**NY Times Example (2006)**

![NY Times Example (2006)](image)

**NY Times Example (2010)**

Published: February 2, 2010


Budget Forecasts, Compared With Reality

Just two years ago, surpluses were predicted by 2012. How accurate have past White House budget forecasts been?

- progress bar
- consistent visual platform
- multi-messaging
- details-on-demand
- timeline slider
- interactive slideshow
- single-frame interactivity
- tacit tutorial
- martini glass structure
Financial Times Example

- semantically consistent
- timeline slider
- details-on-demand
- consistent visual platform
- markers of interactivity

Gapminder Example


Human Development Trends 2005

- interactive slideshow
- checklist structure
- progress bar
- animated transition
- annotations
- highlighting
- single-frame interactivity
- details-on-demand
- semantically consistent
- martini glass structure
- timeline slider
Minnesota Employment Example

Minnesota Quarterly Employment (by Industry) 2000-2007

<table>
<thead>
<tr>
<th>Industry</th>
<th>2000</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Minnesota Industries</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mining</td>
<td></td>
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<tr>
<td>Construction</td>
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<td>Manufacturing</td>
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<td>Wholesale Trade</td>
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<td>Retail Trade</td>
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<td>Transportation and Warehousing</td>
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<td>Information</td>
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<tr>
<td>Finance and Insurance</td>
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<td>Agriculture, Forestry, Fishing &amp; Hunting</td>
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<td>Health and Social Assistance</td>
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<td>Educational Services</td>
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<td>Administrative and Waste Services</td>
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<tr>
<td>Professional and Technical Services</td>
<td></td>
<td></td>
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<tr>
<td>Real Estate and Rental and Leasing</td>
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Share Your Insights (13,624 Comments)
These seem to be three of the areas hardest hit by the slowdown:

- What happened to 'information' jobs?? 25% lost in one quarter? That doesn't seem possible. Or did somebody move more out of state that I've overlooked? by Andew H. on Jul 15
- Health care has accounted for more than half of the jobs added since 2000. by Bryan C. on Jul 18 - 7 reply
- What happened to 'information' jobs?? 25% lost in one quarter? That doesn't seem possible. Or did somebody move more out of state that I've overlooked? by andrew H. on Jul 18 - 7 reply

Minn Dept of Econ Dev attributed 2000-2001 unemployment to the dot.com bust (http://www.ideal.state.mn.us/fs/publications/trends/0701/article1.htm). It's interesting that the initial drop in Arts employment preceded the start in managerial employment by 1 qtr. And Arts also bottomed out 3 qtrs before Management is Arts, Entertainment, and Recreation employment an indicator of future trends in White-Collar employment.

**Design Space**

- **Genre**
- **Visual Narrative**
  - visual structuring
  - highlighting
  - transition guidance
- **Narrative Structure**
  - ordering
  - interactivity
  - messaging

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<table>
<thead>
<tr>
<th>Design Space Dimension</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Narrative Structure</td>
<td>Ordering</td>
</tr>
<tr>
<td>Genre</td>
<td>Visual Narrative</td>
</tr>
<tr>
<td>Six Genres</td>
<td>Seven Genres</td>
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<td>Magazin Style</td>
<td>Annoted Chart</td>
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<tr>
<td>Flow Chart</td>
<td>Comic Strip</td>
</tr>
<tr>
<td>Slide Show</td>
<td>Animated Transition</td>
</tr>
</tbody>
</table>

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Segel and Heer, Narrative Visualization: Telling Stories with Data, InfoVis 2010

Stasko, GaTech 2011
Observations

- Clusters of different ordering structures
  - correspond to narrative formats such as slide shows, comic strips, annotated graphs, etc.

- Consistency of interaction design
  - hover highlighting, details-on-demand, limited interactivity, explicit instruction, navigation buttons
  - underutilization of tacit tutorials, stimulating default views

- Under-utilization of narrative messaging
  - repetition of key points, introductory texts, final summaries and synthesis

Approach

- Author-driven vs. reader-driven

- Common patterns
  - martini glass
  - interactive slideshow
  - drill-down story
Visualization Rhetoric

Visualization Rhetoric: Framing Effects in Narrative Visualization

Jessica Hullman, Student Member, IEEE; and Nicholas Diakopoulos, Member, IEEE

Abstract—Narrative visualizations combine conventions of communicative and exploratory information visualization to convey an intended story. We demonstrate visualization rhetoric as an analytical framework for understanding how design techniques that prioritize particular interpretations in visualizations that “tell a story” can significantly affect end-user interpretation. We draw a parallel between narrative visualization interpretation and evidence from framing studies in political messaging, decision-making, and literary studies. Devices for understanding the rhetorical nature of narrative information visualizations are presented, informed by the rigorous application of concepts from critical theory, semiotics, journalism, and political theory. We draw attention to how design tactics represent additions or omissions of information at various levels—the data, visual representation, textual annotations, and interactivity—and how visualizations denote and connotate phenomena with reference to unstated viewing conventions and codes. Classes of rhetorical techniques identified via a systematic analysis of recent narrative visualizations are presented, and characterized according to their rhetorical contribution to the visualization. We describe how designers and researchers can benefit from the scientifically positive aspects of visualization rhetoric in designing engaging, layered narrative visualizations and how our framework can shed light on how a visualization design prioritizes specific interpretations. We identify areas where future inquiry into visualization rhetoric can improve understanding of visualization interpretation.

- How design elements can be used strategically to influence
  - equip designers with tools for communicating layered meanings

- How rhetorical techniques interact with characteristics of the visualization interaction, end-user's knowledge, and the socio-cultural context
  - improve designers' awareness of how designs might be received differently by individual end-users and how they can cue shared cultural knowledge and associations
How to Have Impact

- Martin Wattenberg and Fernanda Viegas at 2012 Google Faculty Summit

- Don't "dumb down" the data.
  - If complexity is handled correctly and in interesting ways, our users find the details appealing and find their own ways to interact with and expand upon the data.

- Users like to see their personal world in a visualization.
  - Being able to see the spread of a Google+ post, or zoom in to see the wind around one's town is what makes a visualization personal and compelling— we call this the "I can see my house from here" feature.

http://googleresearch.blogspot.com/2012/07/big-pictures-with-big-messages.html

Using Data to Tell a Story

Outline

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Research Directions

- Storytelling Approaches and Affordances
- Evaluation
- Memory, Context, Embellishments
- Interaction
- Annotations and Highlights
- Learning from Other Disciplines
- Techniques Specific to Storytelling
- Stories and Collaboration

Storytelling Affordances

- Features of a visualization that provide a narrative structure and guide the reader through the story.

Evaluation

- Testing stories for effectiveness is quite different from the way evaluation is done in visualization today.

  - Meaningful metrics
    - engagement and interest
    - ability to remember key points
    - being able to make more informed decisions
    - ... ?
Memory, Context, and Embellishments

- How does visualization affect memory?

- Features that set a visualization apart from the others are exactly the ones that make it memorable.

Questions

- What other strategies are there to make a visualization memorable?
- Are unusual visualization techniques useful for memory, or do they get in the way more than they help?
- What elements can be added to make a visualization unique, in particular ones that can be automatically generated without the program having to have an understanding of the problem domain?

Interaction

- Interaction is one of the most important parts of visualization

- Trade-off between interaction and focus
Annotations and Highlights

- To tell a story, visualization may need to be augmented with other means of communication.

- To make it part of a story, it needs to fit in with other elements of an article or other presentation, however.

Techniques Specific to Storytelling


Storytelling - Bottom Line

- Prepare Yourself
  - must know your source material
  - how else will you know what's interesting?
  - often, it may take longer to get all of the data in order than to design the graphic

- Prepare Your Readers
  - don't assume your readers know everything or that they can spot features in your graphic

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