Choosing the Right Visualization Design

Abstract Visualization Exercise

- Close your eyes, think about a 1 year timespan and a typical set of events of 1 year. What does your mental visualization of this look like?
- Grab some paper & markers/crayons/etc. and spend ~10 minutes drawing this mental picture. Don’t discuss or share with your neighbors... Yet.
- We’ll tape them up on the board and look at & discuss them as a collection (so make sure it is reasonably legible from a distance)
"Eenie, Meenie, Minie, Moe: Selecting the Right Graph for Your Message", Stephen Few, Intelligent Enterprise, 2004

- Nice reference for basic visualizations & terms
  - Quantitative vs. Qualitative, more than just values, how best to display those values
- Dots vs. lines vs. bars & impact the meaning
  - Similar to gestalt principles (shape, structure, etc.)
  - Two graphs might convey exactly the same information, but one be ineffective if the graph type is wrong, can send a different message by simply changing the graph type
- Familiar, intuitive, common sense suggestions
  - Ok for simple data
  - Inefficient use of space (bigger datasets will require much more complex visuals)
  - “Good” examples were obvious, including “bad” examples might have been more educational?
  - Could have included even more diagrams
- Location & line length most effective visually (human perception?)
  - Pie charts are bad because they use color & size (less effective visually)
- What is the origin of these rules (time must be x-axis)? Is this a convention? Or is it an aesthetic choice?

About the writing

- Provided table is very helpful/immediately useable
  - Good for business data – all graphs you can make in Excel
  - Mastering this “how to & why” information is important for scientists writing reports & research papers
  - “For this message/purpose use this graph” (rather than the other way around)
  - “Cheat sheet” of 7 types was good, but little prose description of this information
- Article was narrow in focus
- Overall flow of article was good
  - easy to read (unlike some of those SIGGRAPH papers from ACG)
- Lacking references (except to author’s prior work)
- Fig 2. Interval scales example was confusing
  - Bug in figure?
  - Is itself an example of a misleading, poorly explained figure/caption
  - Data is not altered, just organized differently, differently organized is not misinformation, just conveying different meanings, may or may not be useful
Want even more...

- What about data with >= 2 categories of data?
- What about color? Too important to leave out!
- What about interactivity?
  - Article is dated. We spend so much of our life in front of screens now, static information is under-utilization of this interface.
- What about more complex data sets?
- 7 categories... too limited
  - What about creativity? These “rules” are an ok place to start, but sometimes breaking a rule can lead to a very powerful visualization
  - Focuses on scientific data (natural spatial coordinate system), not on abstract information visualization.

"Eenie, Meenie, Minie, Moe: Selecting the Right Graph for Your Message”, Stephen Few, Intelligent Enterprise, 2004

<table>
<thead>
<tr>
<th>Type/Description</th>
<th>Encoding Methods</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Comparison</td>
<td>Bars only (horizontal or vertical)</td>
<td>S/D/B/I/C Calls by Region</td>
</tr>
<tr>
<td>Time Series</td>
<td>Lines to emphasize overall pattern</td>
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<tr>
<td></td>
<td>Bars to emphasize individual values</td>
<td></td>
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<tr>
<td></td>
<td>Points connected by lines to slightly emphasize</td>
<td></td>
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<tr>
<td></td>
<td>individual values while still highlighting the overall</td>
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<tr>
<td></td>
<td>Always place time on the horizontal axis</td>
<td></td>
</tr>
<tr>
<td>Ranking</td>
<td>Bars only (horizontal or vertical)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>To highlight high values, sort in descending order</td>
<td></td>
</tr>
<tr>
<td></td>
<td>To highlight low values, sort in ascending order</td>
<td></td>
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<tr>
<td>Part-to-Whole</td>
<td>Bars only (horizontal or vertical)</td>
<td></td>
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<tr>
<td></td>
<td>Use stacked bars only when you must display</td>
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</tr>
<tr>
<td></td>
<td>measures of the whole as well as the parts</td>
<td></td>
</tr>
</tbody>
</table>

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What I learned in 7th grade Science Fair: Presenting Scientific Results

- Why are the bars sorted in this order?
- Why/How are neighboring data points linked?

**Plant Height**

**Same plant over time (10 days)**

**10 different plants**
These 4 data sets while quite different, coincidentally all have the same mean, variance, correlation, and regression.


http://www.axiis.org/examples/BrowserMarketShare.html

http://futurist.se/gldt/wp-content/uploads/12.01/gldt1201.png
Spark Lines – intense word size graphics

- Current: Word & number
  - Over time!
  - Quantified
    (last measurement)
  - Range of what’s normal

- High resolution
- Integrated with prose
- Multiple spark lines compared to each other

Win/Loss over sports season

http://www.edwardtufteducation.com/bboard/q-and-a-fetch-msg?msg_id=0001OR&topic_id=1

Drawing for Communication

http://arterior-motives.blogspot.com/

http://idcminnovations.com/facilitation/facilitation-services
Drawing for Communication

http://www.visualcoaches.com/training/fundamentals/

Brainstorming Other Visualization Conventions for Abstract Data

• A day
• Government Hierarchy/Company Org Chart
• How to: prepare food/drink – or – do your laundry
• ToDo list for the day – or – what you accomplished today
• Course pre/co-requisites
• God
• Yourself,
• Bank account (where does the money come from)
• Ideal house
• An emotion, like happiness

Homework Assignment 1: due Monday @ 11:59pm

Inspirational Visualization Images

• Find two example visualization images:
  – one great visualization
  – one example that needs revision to be effective
• For each example write a paragraph or two describing:
  – the author, context, audience, original media format and purpose of the visualization
  – your analysis of the positive and negative aspects of each example and how it could be improved, and
  – any generalizations you can make about what makes for a compelling, high-quality visualization
Tuesday mini-presentations

- 3-5 volunteers to do 5 minute presentation on their “Assignment #1: Inspiration Visualization Images” submission (due Monday @ 11:59pm)
  – Rebecca, Altan, Jaron, Jesse
- Send me a .pdf or .ppt or URL before class.
  Or just present directly from LMS.

Reading for Next Thursday 11:59pm

- “Force Directed Graph Drawing” chapter by Steven Kobourov
  from the book
  Handbook of Graph Drawing and Visualization
  2013