Maps, Graphs, and More Oh My!:
Reading and Evaluating Data Visualizations

Tyler Hoff
University of Michigan School of Information

Wednesday, July 11, 2018, 2:45pm-3:45pm Eastern

VIRTUAL CONFERENCE ON DATA LITERACY
CREATING DATA LITERATE STUDENTS

A project of the University of Michigan School of Information, ICPSR, with help from the U-M School of Education. This project was made possible in part by the Institute of Museum and Library Services RE 00-00-15-0113-15.

Door Prizes

Door Prize: 3 Months of Easel.ly Pro

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UNIVERSITY OF MICHIGAN

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The University of Michigan School of Information offers organizations an opportunity to benefit from students' developing skill sets through client-based courses and programs.

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- Provide **community profiles** to inform questions affecting cities, non-profits, or libraries
- Organize and analyze **information systems**
- Improve **information flow** through process analysis
- Provide user experience and design recommendations for **websites, apps, and software**
- Gather, manipulate, analyze, and visualize **data**
- Develop, implement, and analyze **social media** strategy
- Analyze or develop guidelines for **online communities**
- Develop a **content management system** (CMS) or interactive website

Contact umsi.client.engagement@umich.edu
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SCECHs

Log in with your **full name**

Attend *all of* at least 4 live sessions and up to 8

Scan/photograph your form and email to 4t.data@gmail.com by 11:59pm Eastern on Friday, July 13.

More information:
http://dataliteracy.si.umich.edu/scech

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For non-Michigan educators needing proof of attendance …

Follow SCECH instructions (scan and email).

Plus

- Go to **http://bit.ly/4t-store**
- Pay $25 there no later than 11:59pm Eastern on Friday, July 13.
- Submit your form to 4t.data@gmail.com

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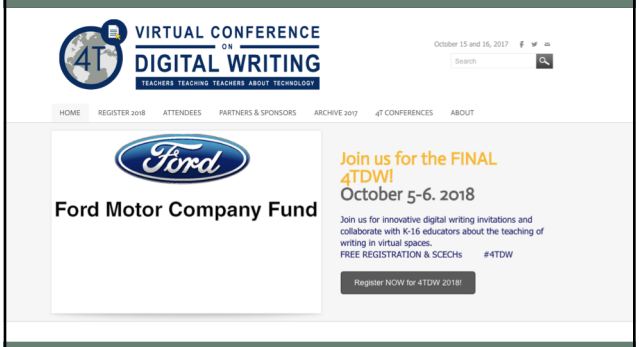

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http://dataliteracy.si.umich.edu/conference

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Tyler Hoff
Presenter

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Today, we'll …

1. Examine creating and using data visualizations
2. Assess some real world visualizations
3. Discuss how to effectively teach these concepts

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Why use Visualizations?

- Tables of data are unintuitive to read
- Reach a broader audience
- Can see patterns/trends that were not immediately obvious

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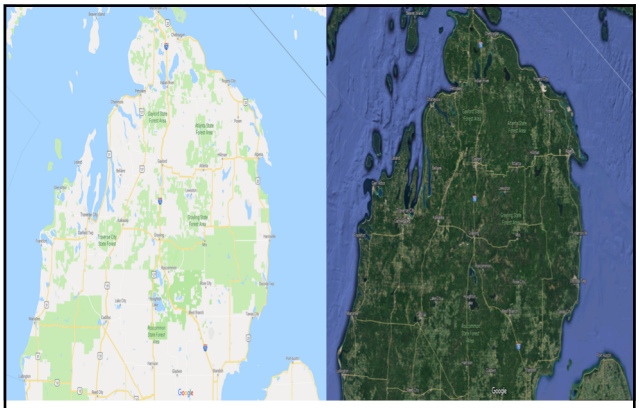


https://www.google.com/maps/search/maps/@44.8910904,-84.3734773,236269m/data=!3m1!1e3

Types of Visualizations

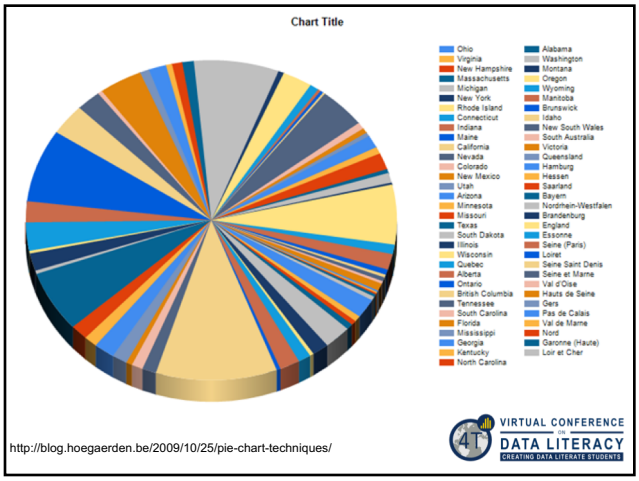
- Pie Charts
- Bar Charts
- Line Charts
- Scatterplots
- Infographics

Pie Charts

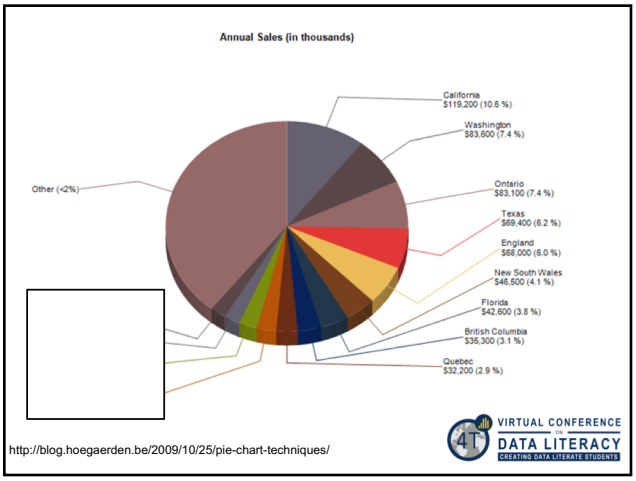
- Use Pie Charts when…
  - Your data adds up to a round number
  - You have few categories
  - They fit your design goals
  - But…

Pie Charts

- Other types of charts are clearer for almost all data
  - Humans have trouble assessing how large 'slices' are



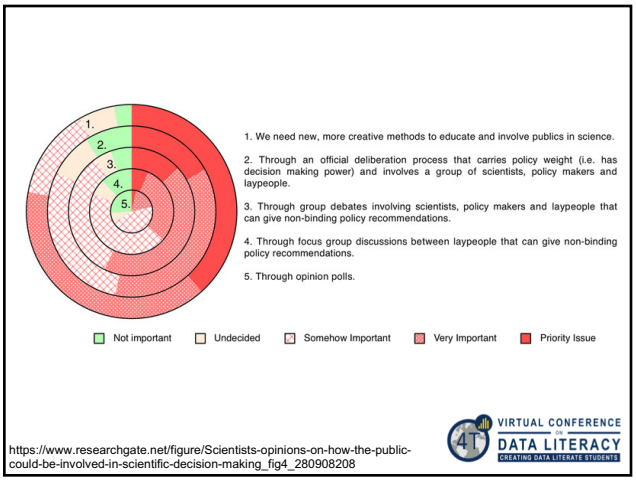
http://blog.hoegaerden.be/2009/10/25/pie-chart-techniques/



http://blog.hoegaerden.be/2009/10/25/pie-chart-techniques/

Pie Charts

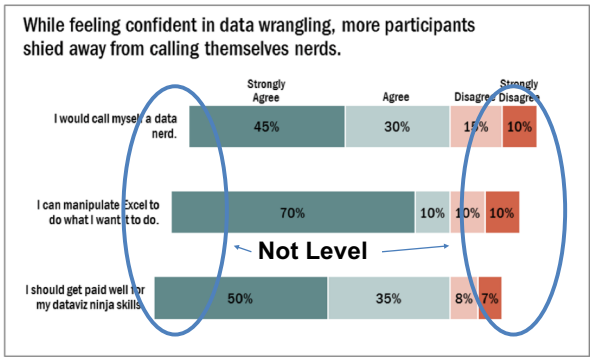
- One last note: when chart design goes bad with pie charts, it can go very bad



https://www.researchgate.net/figure/Scientists-opinions-on-how-the-public-could-be-involved-in-scientific-decision-making_fig4_280908208

Bar Charts

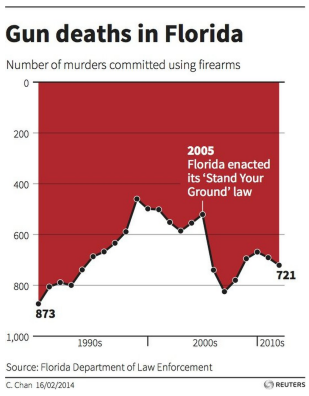
- Are great for comparisons
- Easier to compare than pie charts
- Good for "snapshots"



http://stephanieevergreen.com/diverging-stacked-bars/

Bar Charts

- Check the Y-axis!
- Check the Y-axis!
- Check the Y-axis! (When not measuring in percentages)
- Does it start at 0?



https://www.livescience.com/45083-misleading-gun-death-chart.html

Bar Charts

- Take a minute or two:
  - Which country had the most deaths in World War 2?

https://en.wikipedia.org/wiki/Bar_chart

Line Charts

- Great for tracking change over a category (time, location, etc.)

Line Charts

- Why use it over a bar chart?
- Let's look at an example…

Line Charts

- Line charts can be less useful for comparing two types of data
- Easy to see correlations that are not there

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Line Charts

- http://www.tylervigen.com/spurious-correlations
- Take 5 minutes to poke around
- What design decisions of the charts could be misleading?

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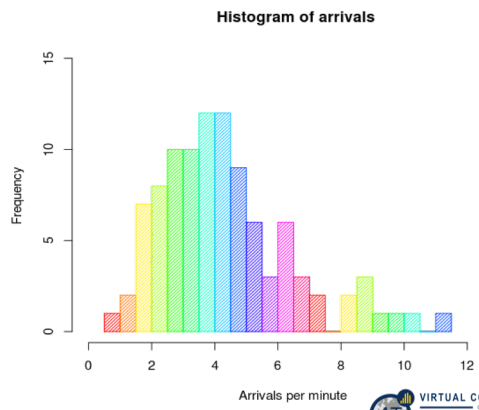
Line Charts (and kind of Bar Charts)

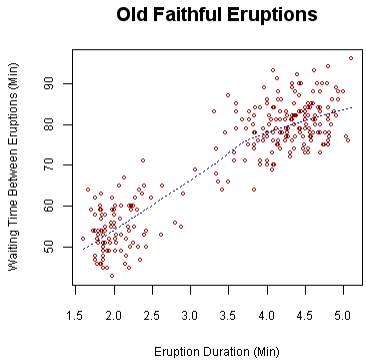
- Histograms are a mix between Line/Bar charts
- Always a representation of the probability distribution of a given category



https://en.wikipedia.org/wiki/Histogram

Scatterplots

- How are scatterplots different from line graphs?
- They are often combined, but scatterplots have continuous variables on both axes



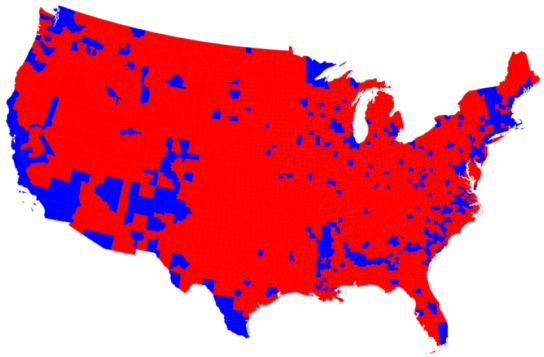
https://en.wikipedia.org/wiki/Scatter_plot

Scatterplots

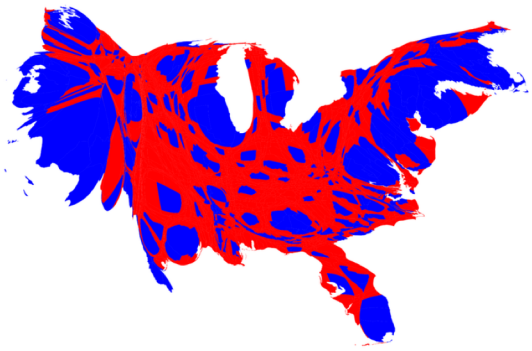
- Excellent for comparing the shape and relationship of data
- Easy to understand design
- Students already familiar from graphs in math

Infographics

- Hard to define: artistic presentations of multiple types of data generally used as an argument



http://www-personal.umich.edu/~mejn/election/2016/



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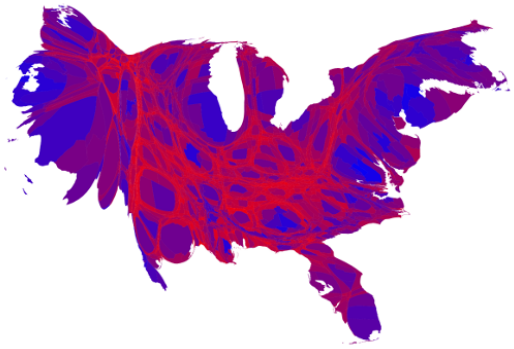

http://www-personal.umich.edu/~mejn/election/2016/

Infographics

- Reading infographics can be very hard!
- Find a starting point
  - Looking at the bottom can often tell you who made it and where the data is from

Infographics

- Ask the 5 W questions:
  - Who made it
  - Why was it made
  - What argument is being made
  - When was it made
  - How was the data acquired

Infographics

- https://www.creativebloq.com/graphic-design-tips/information-graphics-1232836#explore-a-world
- Take 5 minutes to peruse the infographics at this link
- Which do you think are most effective? Least effective? Why?

Teaching Visualizations

- Stick to rules of thumb to start
- Always use examples!
  - Show good and bad- you learn lots from both
- Ask what the source for the data is

Teaching Visualizations

- Relevant for almost every subject area
  - Timelines, maps, infographics are examples of flexible visualizations

Teaching Visualizations

- Lots of other specialized visualizations not covered:
  - Box plots, radar charts are some common specialized ones
- Google is your friend! Lots of resources out there

Teaching Visualizations

- Creating Visualizations
  - Stick to basics
  - Excel is a robust tool:
    - This tutorial is a good starting point: https://www.workzone.com/blog/how-to-make-a-graph-in-excel/

Recap:

1. Visualizations can be used in any area
2. Teaching with Rules of Thumb and examples is key
3. Ask what the design is trying to convey

Questions?

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Please take the evaluation (link in chat) to be entered for door prizes!

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