CPSC 447, Foundations 2

Out: Tue 20 Jan 2025. Due: Wed 28 Jan 2026, 6pm.
Submit through Gradescope, as a file in PDF format, following this Google doc answer template.

Administrative overhead penalty of up to 10% will be imposed if additional processing work is required to handle your assignment, such as: did not follow answer template, unreadable file loaded into Gradescope, answer boxes were extended beyond their current size, etc.

Learning goal

Train yourself in decoding charts so that you can better understand how visual representations can be described using the language and rules of visual encoding and decomposed into low-level graphical components.

1 Generate: Two Numbers (6%)

Sketch three different ways to show the two numbers: **8** and **23**, with each sketch using a different combination of channel(s). Write down the channels used in each of your sketches, using terms from the table below for Q2 (or terms from the async video lecture for channels not provided in that table). Provide names of group members if you worked together on this question during class.

Sketches do **not** need to be polished: very rough sketches are fine as long as they are legible, the point is to show the design idea not to make something elegant. We do **not** expect you to redraw the sketches you made in class in a more polished form, just turn in what you did then. The intent behind sketching assignments is not to create something that looks fully finished. The purpose of sketching is to generate ideas and explore alternative designs quickly, instead of spending time in polishing one design. (Studies shows that polished "sketches" actually discourage people to explore more ideas!) When we tell you to make sketches in this course, we would like you to draw them yourself using drawing software on a tablet, or hand-draw the sketches with paper and pen and then snap a photo with your phone.

Rubric: 2% each for 3 examples, 1% sketch and 1% channel analysis

2 Marks & Channels Analysis (76%)

For each example below, fill out the Marks and Channels Table Generator, then download the table using the button on the page, then paste it into the correct spot.

You will have to state the level of analysis being performed, the type of mark used, whether the mark boundaries are touching or overlapping, and which channels encode which attributes.

Note: Please do your best to list attribute names as used on the visualization. Not all attributes will be listed, in those cases you may choose your own name for the attribute. Be as concise as possible.

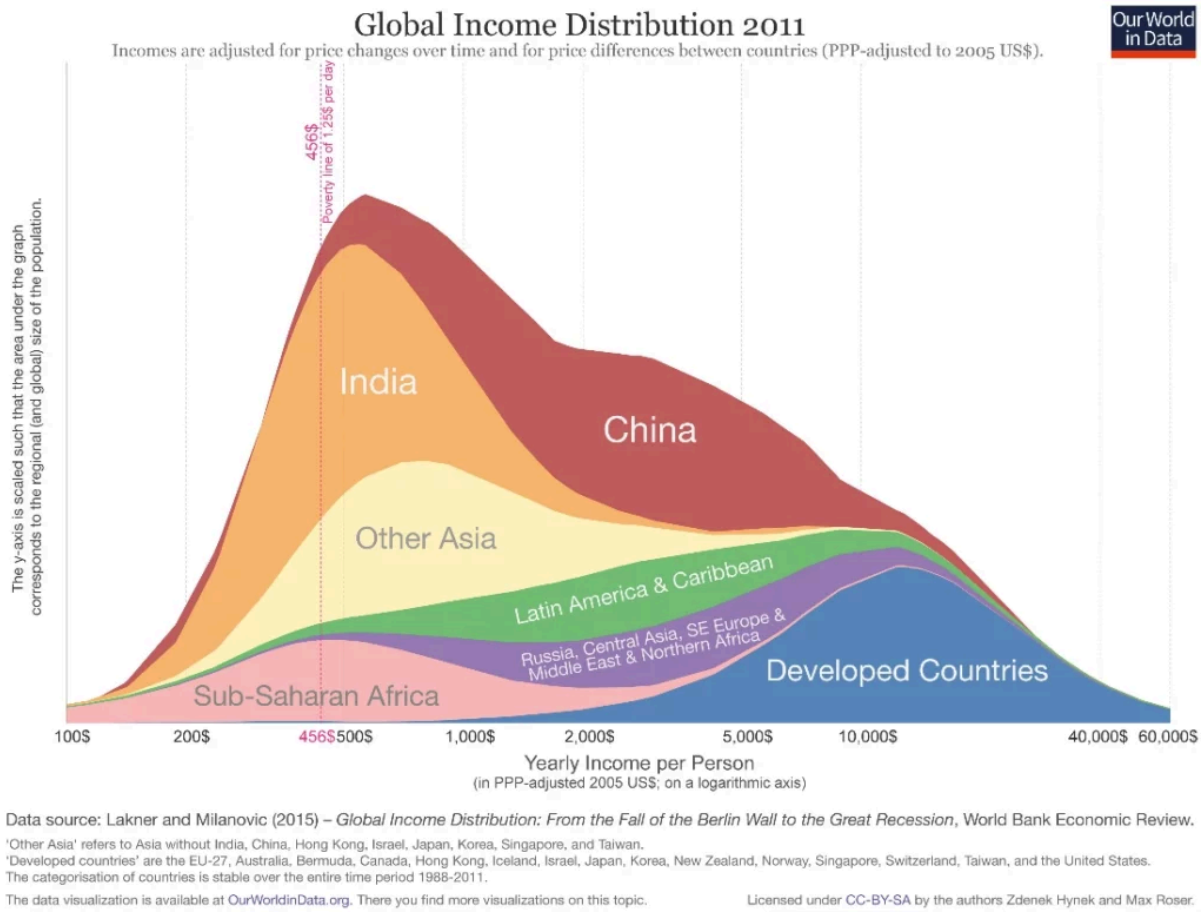
An example is provided to illustrate the expected format.

Please ensure that all images for a question fit on one page. Do your best to resize the image such that the font size in the image is the same as the font size in this template.

Report any bugs with the Table Generator tool on Piazza.

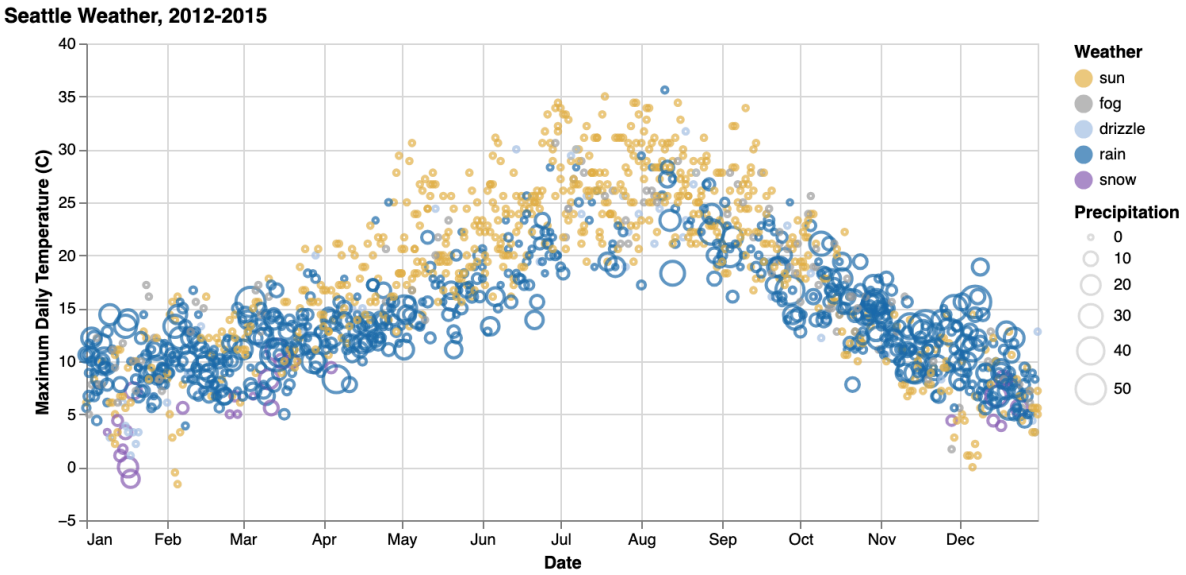
*Rubric: 4% for each level (4% * 19 levels)*

2.0 Global Income Distribution (Example)



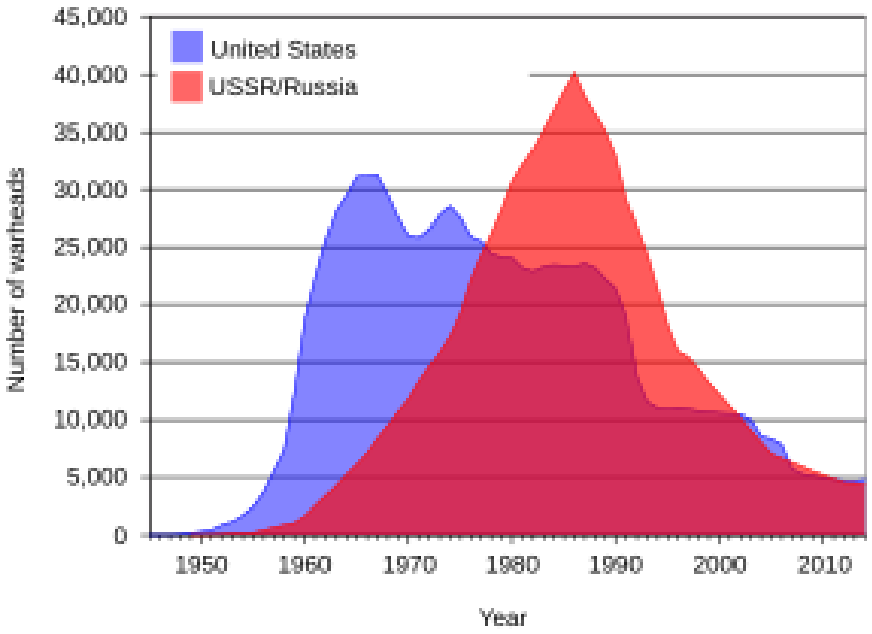
Source: https://inforiver.com/insights/stacked-area-charts-an-overview/

2.1 Seattle Weather



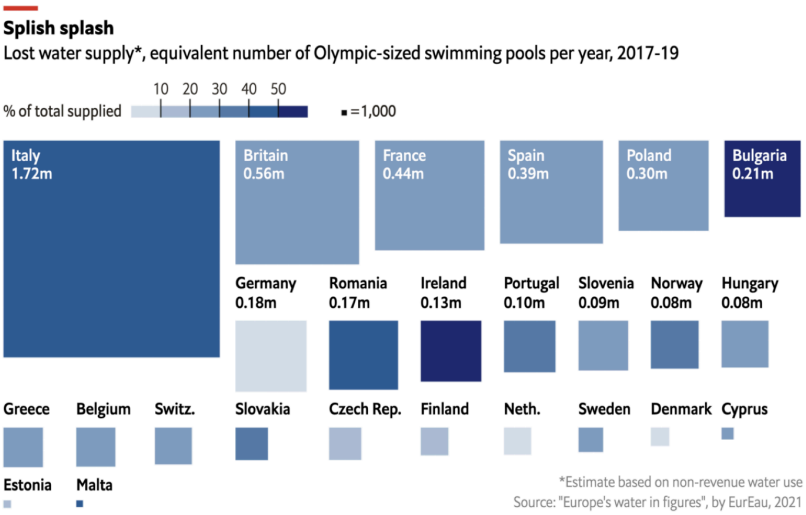
Source: https://vega.github.io/vega-lite/examples/interactive_seattle_weather.html

2.2 Warheads



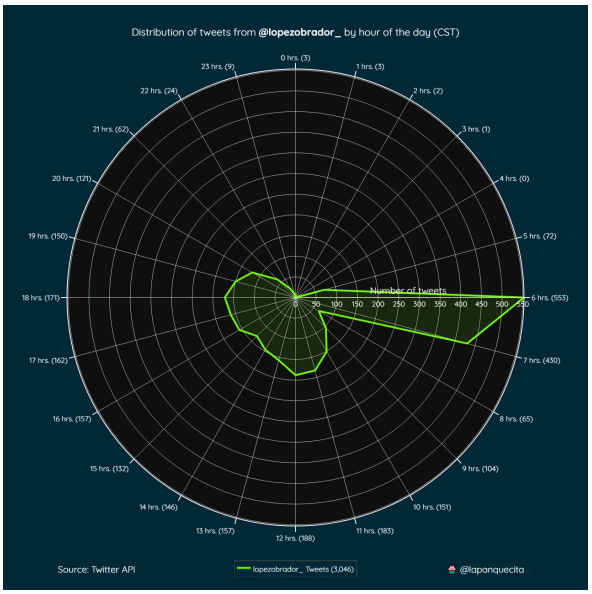
Source: https://en.wikipedia.org/wiki/Area_chart#/media/File:US_and_USSR_nuclear_stockpiles.svg

2.3 Lost Water



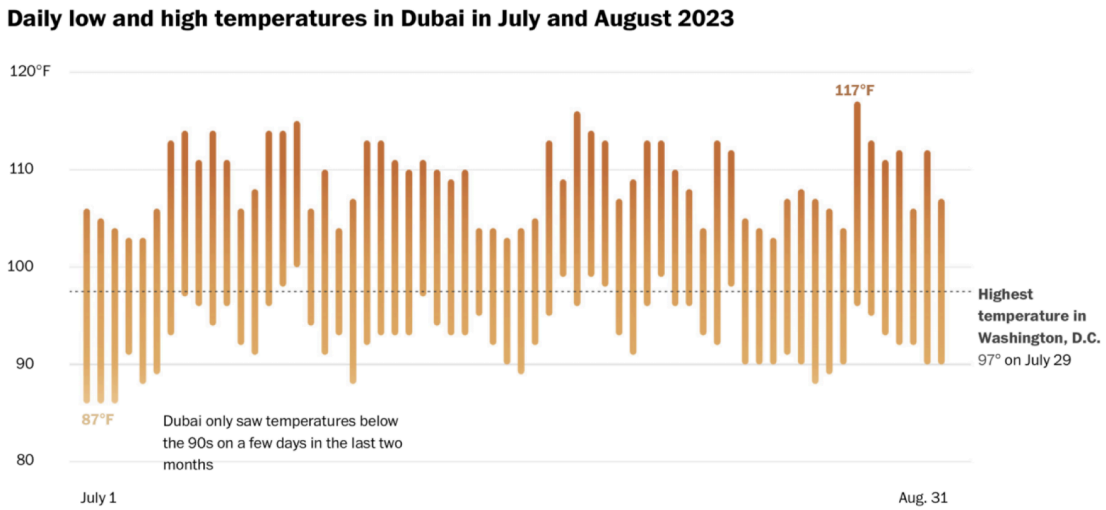
Source:
https://blog.datawrapper.de/data-vis-dispatch-july-18-2023/
https://www.economist.com/graphic-detail/2023/07/18/in-drought-stricken-europe-leaky-pipes-are-worsening-the-problem

2.4 Mexican President Tweets



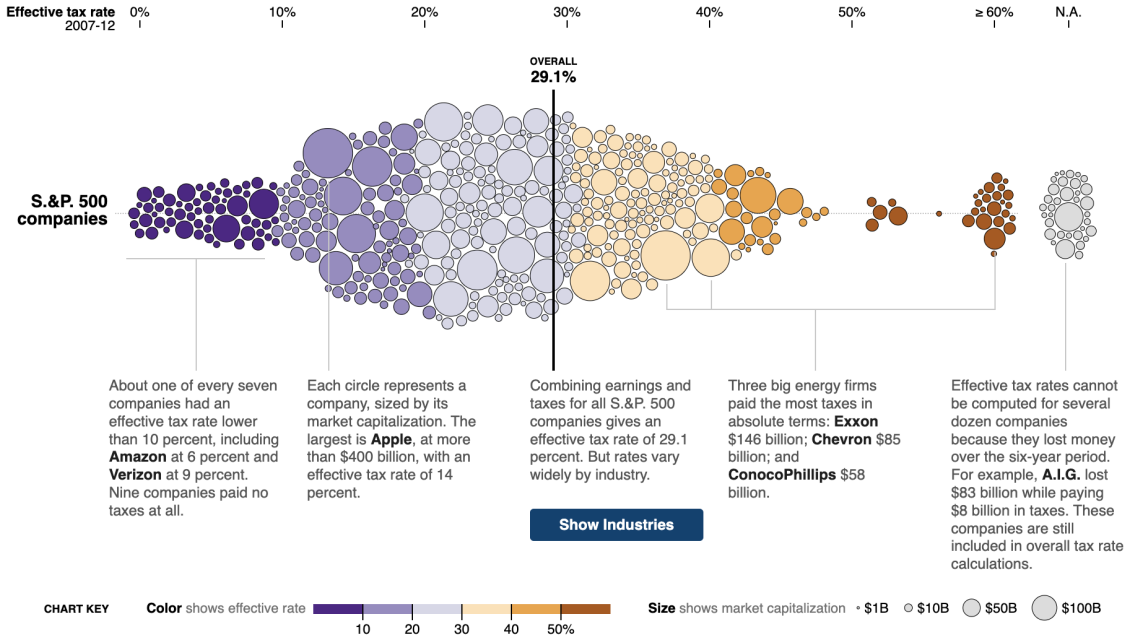
Source:
https://www.reddit.com/r/dataisbeautiful/comments/108br46/oc_distribution_of_tweets_from_the_mexican/

2.5 Dubai Temperatures



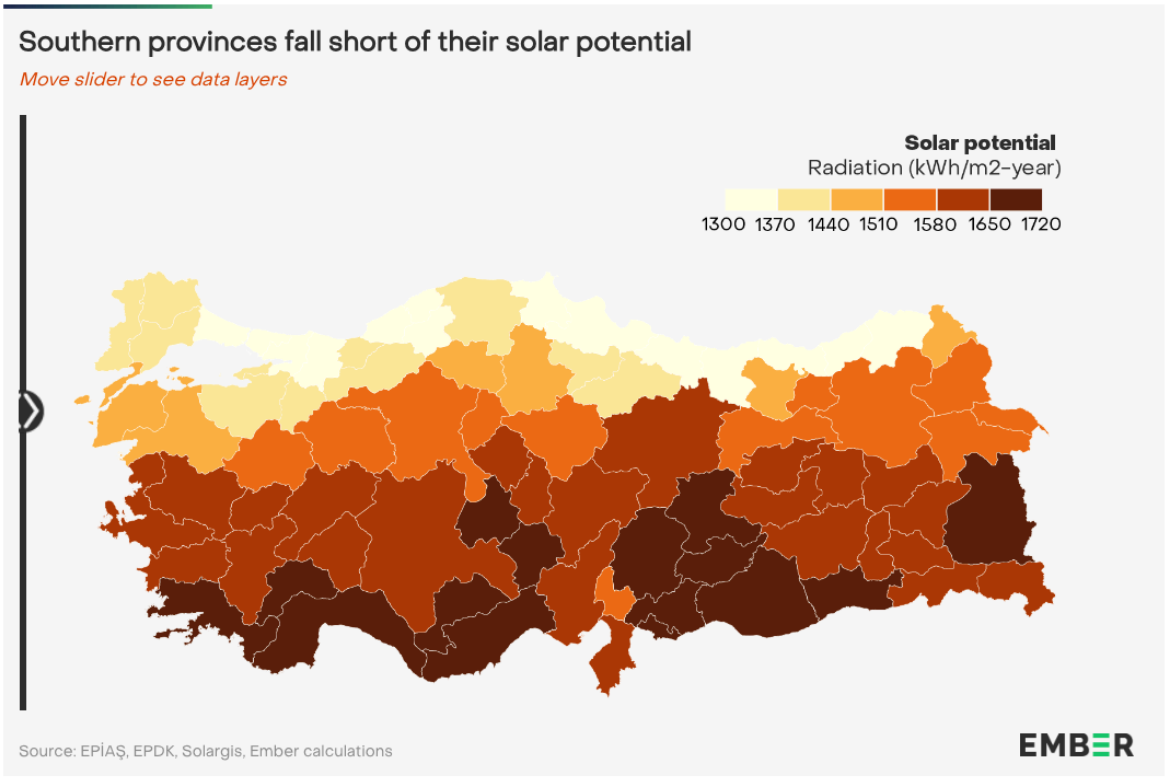
Source: https://www.washingtonpost.com/world/2023/09/10/dubai-heat-staying-cool

2.6 Tax rates



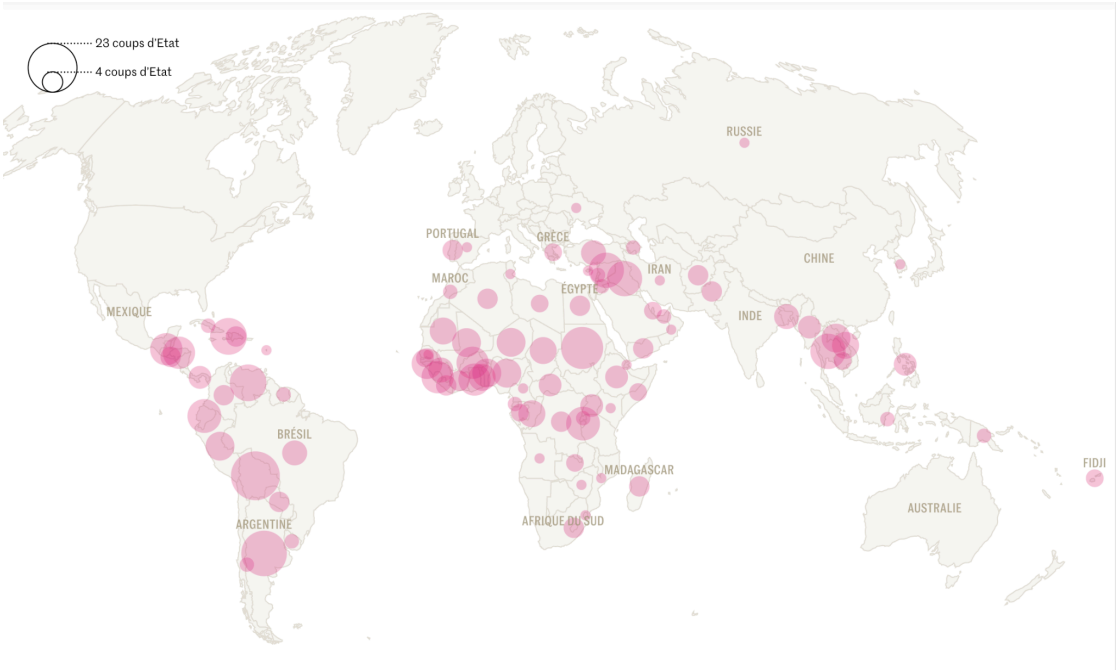
Source: https://archive.nytimes.com/www.nytimes.com/interactive/2013/05/25/sunday-review/corporate-taxes.html

2.7 Turkish Solar



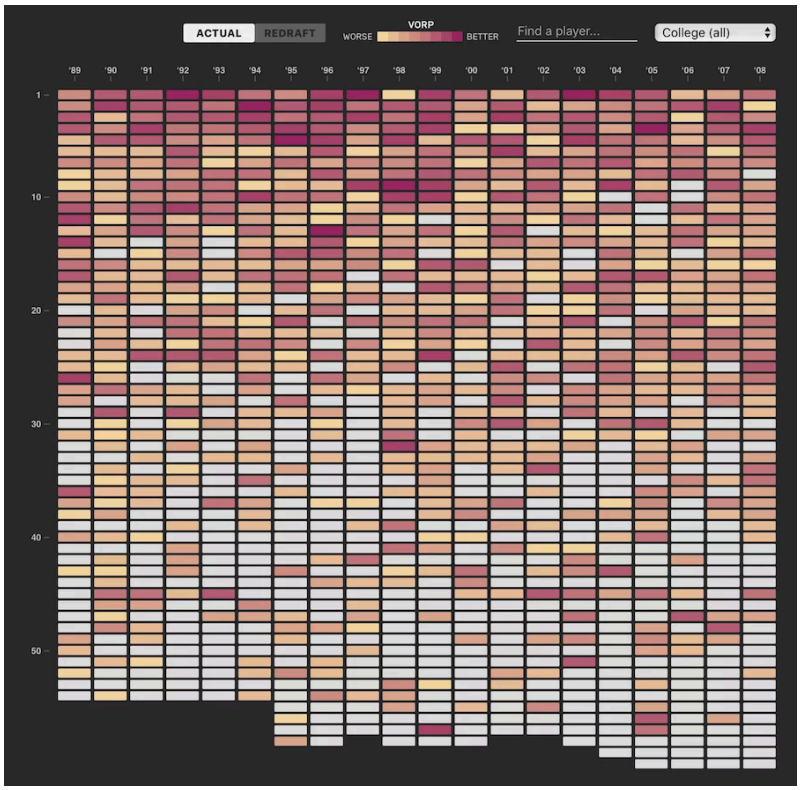
Source: https://ember-climate.org/insights/research/the-south-can-unlock-turkiyes-solar-ambitions/
https://blog.datawrapper.de/data-vis-dispatch-april-11-2023/

2.8 Coups d'Etat (Map)



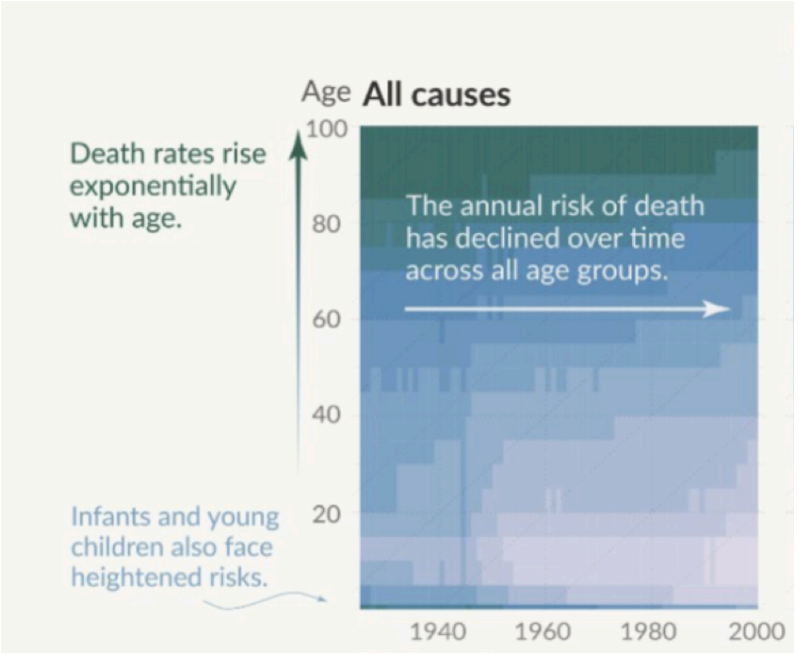
Source:
https://www.lemonde.fr/les-decodeurs/article/2023/09/11/depuis-1950-pres-de-cinq-cents-coups-d-etat-tentes-ou-reussis-surtout-en-amerique-latine-et-en-afrique_6188906_4355770.html

2.9 Basketball VORP



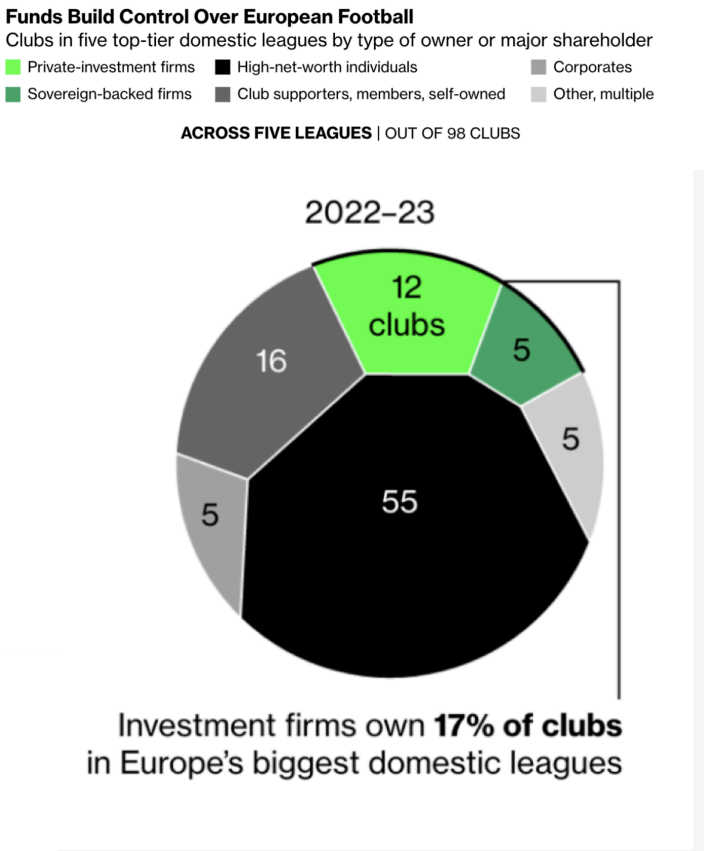
Source:
https://pudding.cool/2017/03/redraft/

2.10 Death Causes



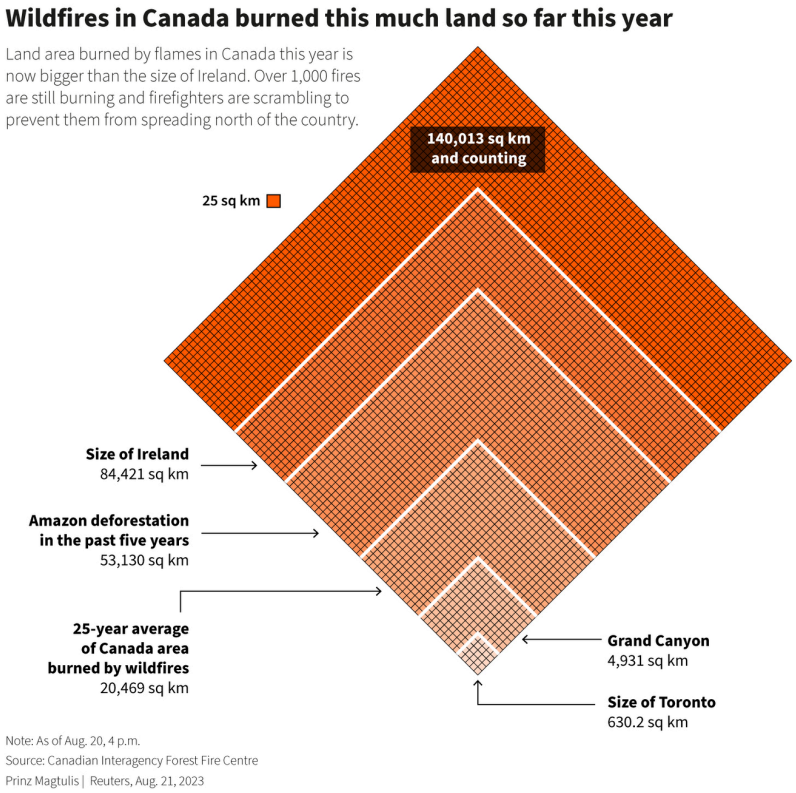
Source:
https://ourworldindata.org/causes-of-death?insight=causes-of-death-have-changed-over-time-and-vary-by-age#key-insights

2.11 Football Club Owners



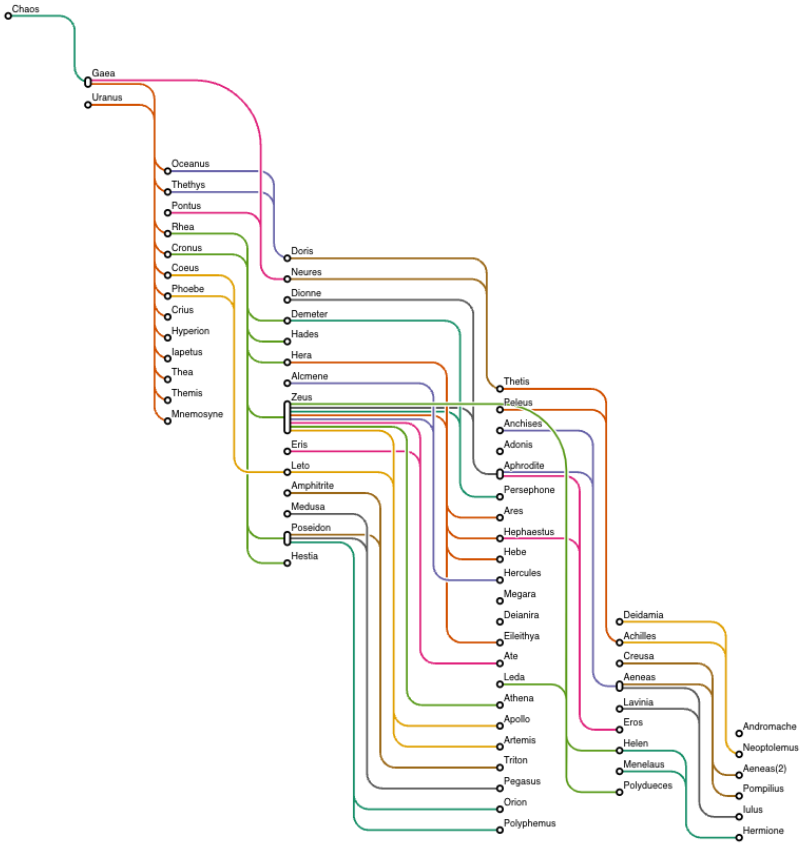
Source:
https://blog.datawrapper.de/data-vis-dispatch-june-13-2023/
https://www.bloomberg.com/graphics/2023-european-football-owners-premier-league-la-liga-serie-a/

2.12 Canada Wildfires



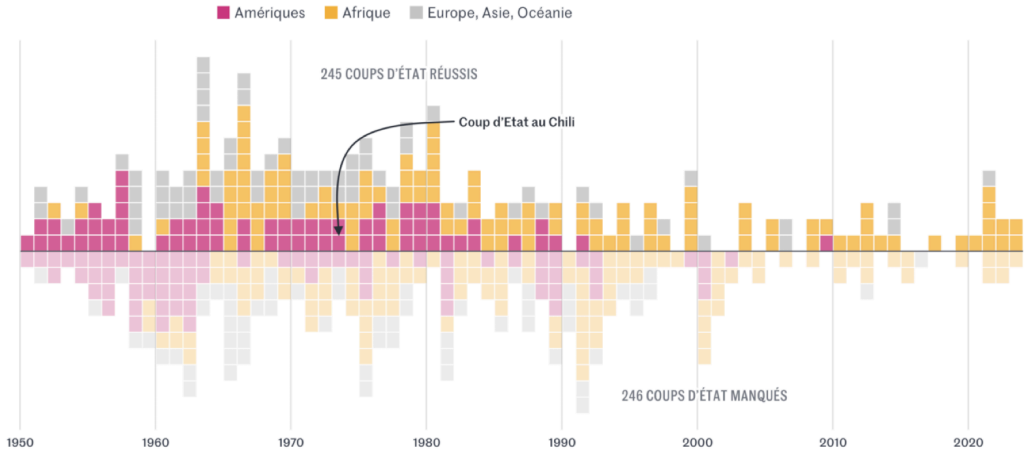
Source: https://twitter.com/prinzmagtulis/status/1693684342818574675

2.13 Greek Gods



Source: https://observablehq.com/@nitaku/tangled-tree-visualization-ii

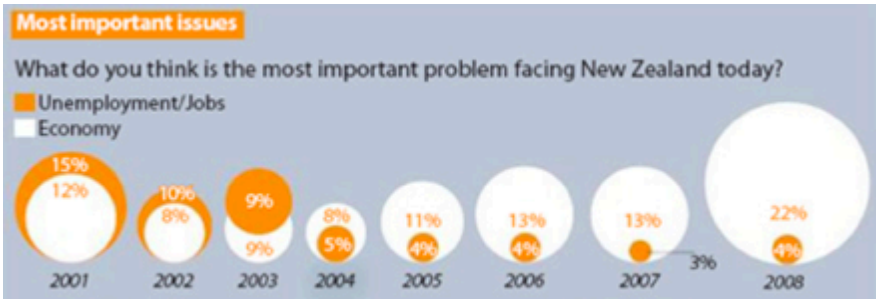
2.14 Coups d'Etat (Multiscale)

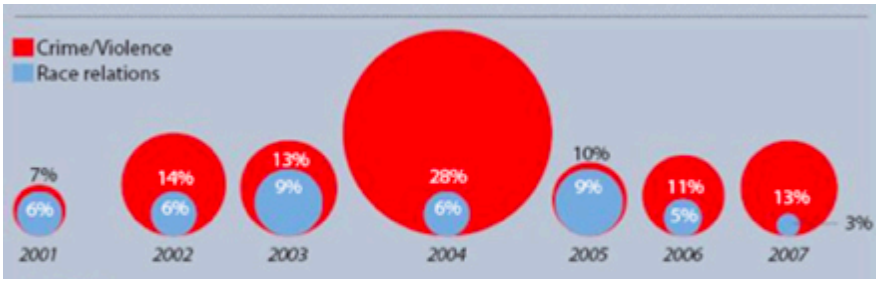


Source: https://www.lemonde.fr/les-decodeurs/article/2023/09/11/depuis-1950-pres-de-cinq-cents-coups-d-etat-tentes-ou-reussis-surtout-en-amerique-latine-et-en-afrique_6188906_4355770.html

3 Redesign: New Zealand Table (18%)

Consider this visual encoding from a newspaper:





Answer the following questions:

3.1 Describe the data abstraction in the abstract language covered in this class

- dataset type
- for each attribute
    - Type (categorical, ordinal, quantitative)
    - Either number of levels for categorical/ordinal attributes, or min-max ranges for quantitative attributes

3.2 How is this data visually encoded, in terms of channels and the attributes they encode?

3.3 If the numeric labels were not visible, would you be able to decode the data precisely? Why or why not?

3.4 Develop one better alternative design to visualize this data. Show it with a sketch. Provide a brief rationale for why it is better in terms of a task that is poorly supported by their design. When discussing the task, use both domain-specific language and also describe it more abstractly using {action,target} pairs.

Rubric: 3.1 (4%), 3.2 (7%), 3.3 (1%), 3.4 (6%): sketch 2%, explanation 4%