

Interaction

Yannet Interian -- USF

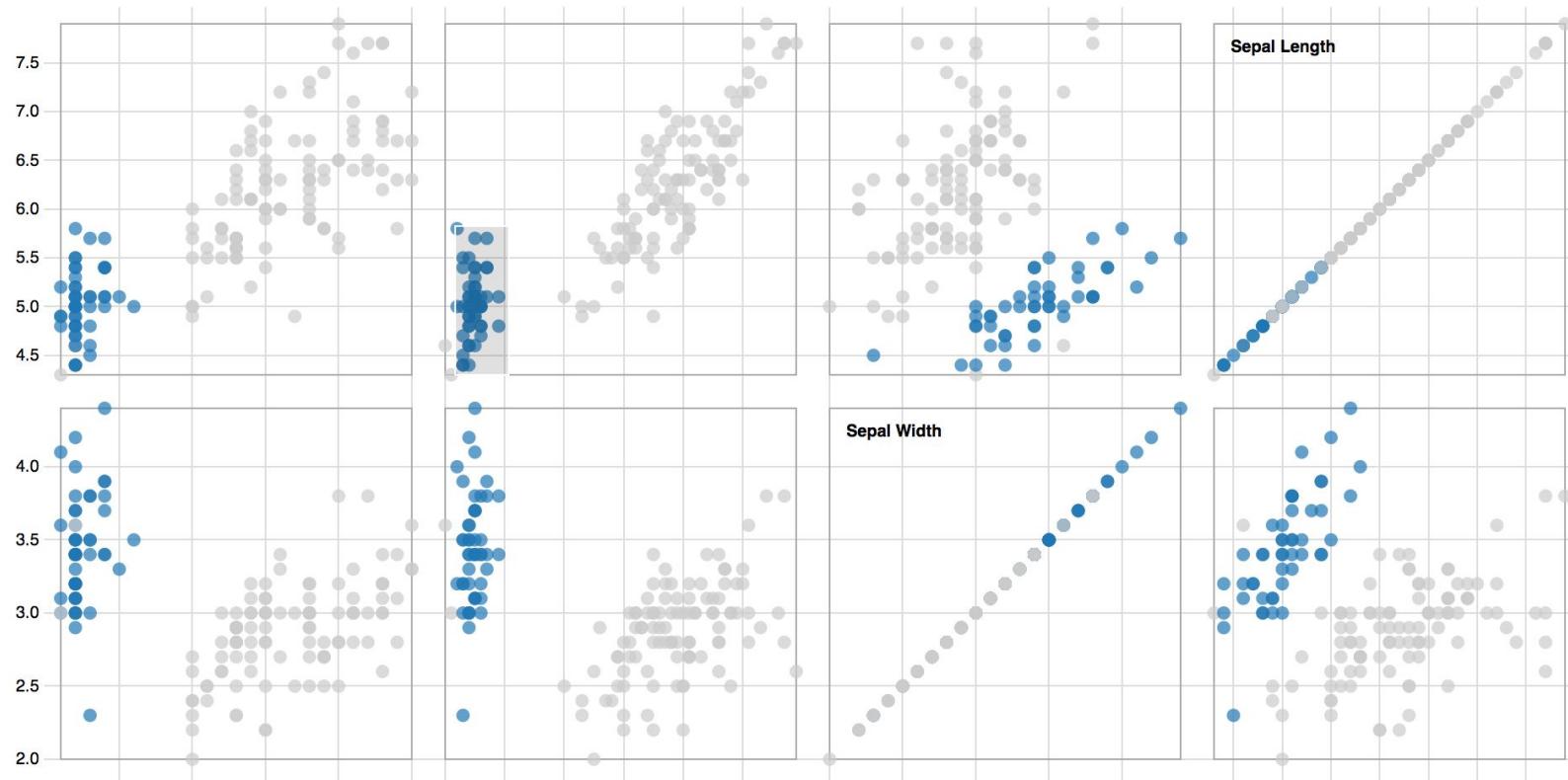
Agenda

- Ted talk video by Hans Rosling
- Interaction Demo
- Why Interactions?
- Interaction Types
- Interaction Lab

Video

https://www.ted.com/talks/hans_rosling_shows_the_best_stats_you_ve_ever_seen

Scatterplot Matrix Brushing and Linking



Shiny example of Splom

```
install.packages("pairsD3")
```

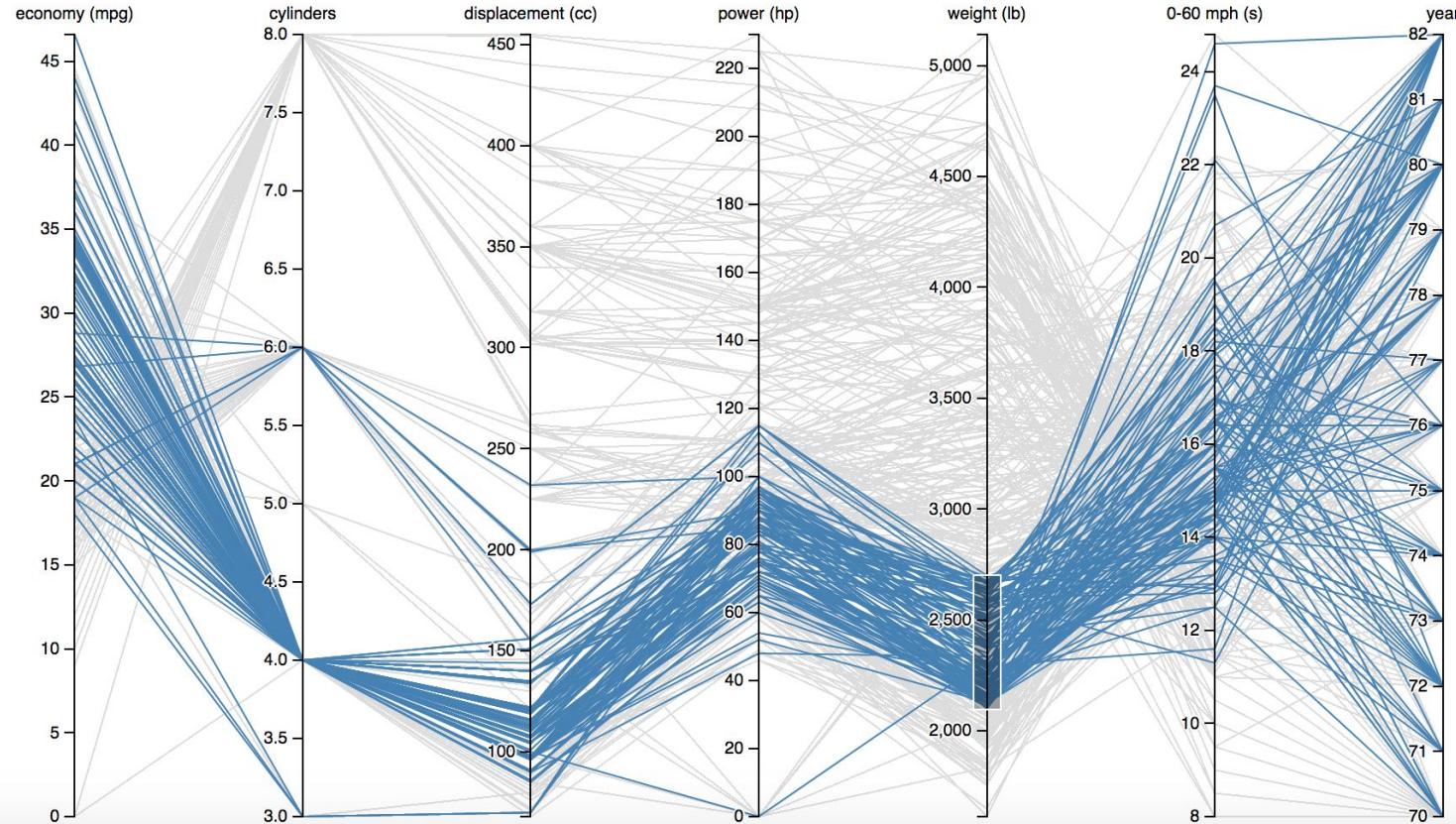
```
shiny::runGitHub('garthtarr/pairsD3-shiny')
```

<https://github.com/garthtarr/pairsD3-shiny>

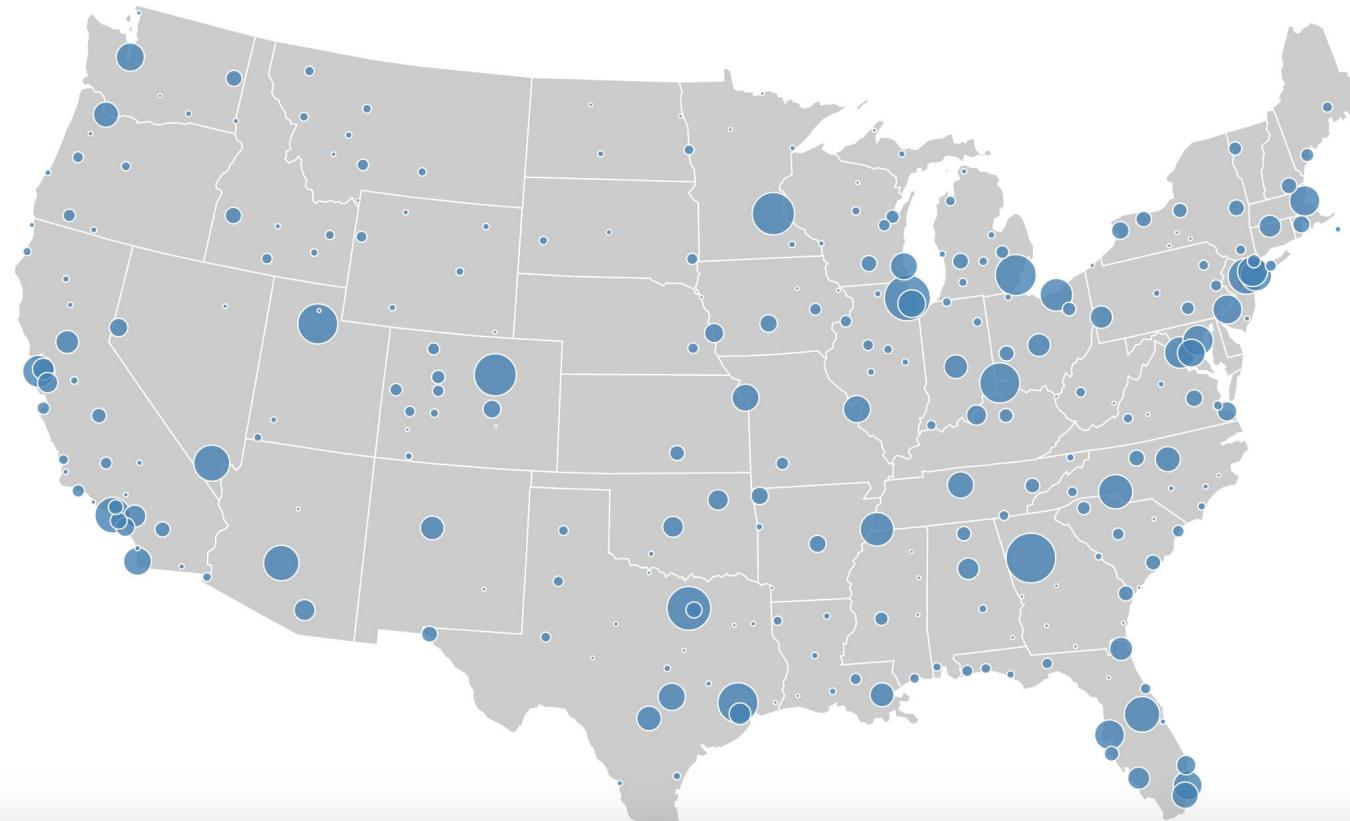
The idea of **linking** and **brushing** is to combine different visualization methods to overcome the shortcomings of single techniques. Interactive changes made in one visualization are automatically reflected in the other visualizations.

[Keim, 2002]

Parallel Coordinates (Brush and Linking)

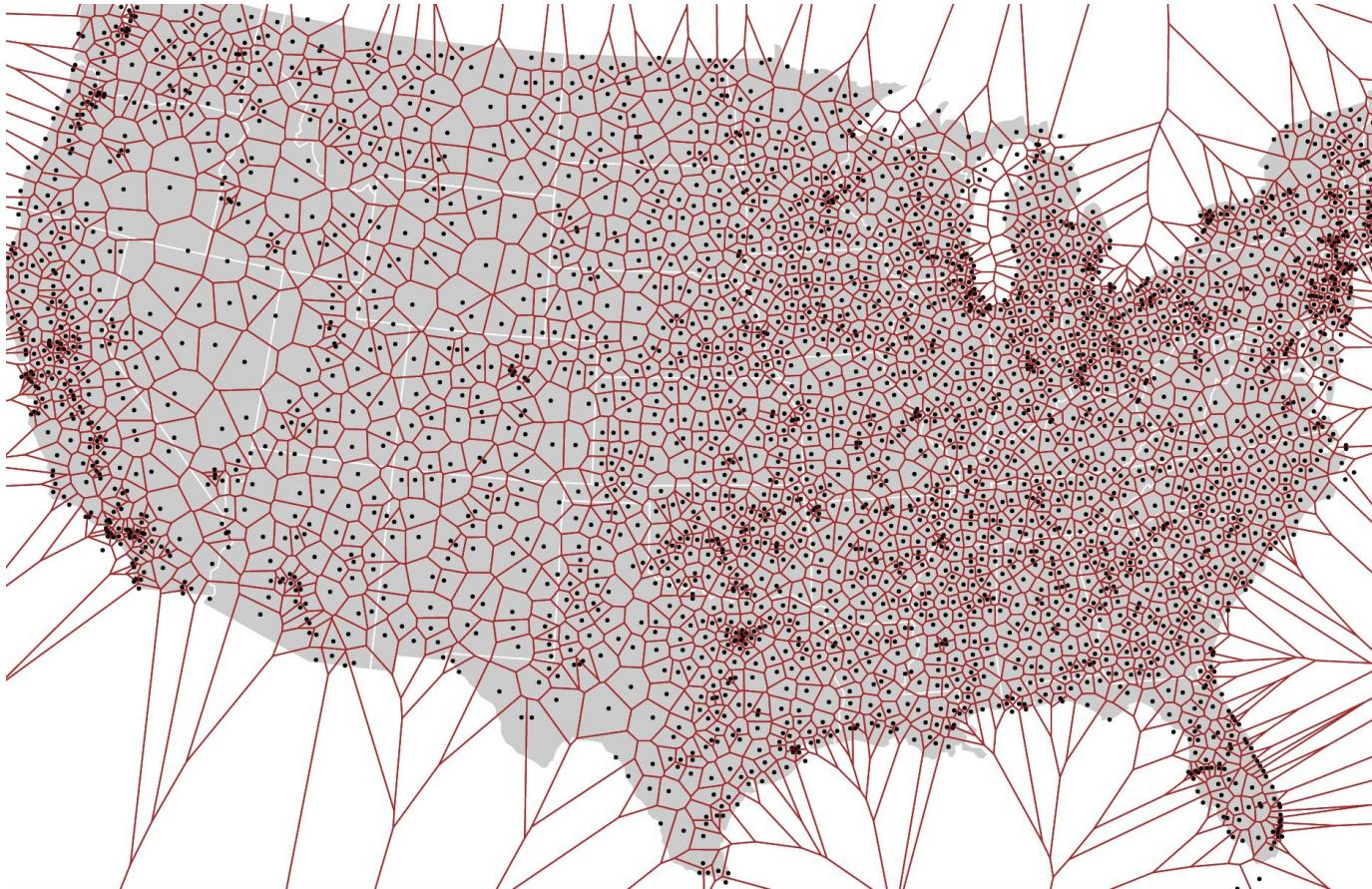


US airports



<https://mbostock.github.io/d3/talk/20111116/airports.html>

Voronoi Diagram (for the Airport viz)



Why Interaction?

“ Data analysis, like experimentation, must be considered as an open-ended, highly **interactive**, **iterative** process, whose actual steps are selected segments of a stubbly branching, tree-like pattern of possible actions.”

The Collected Works of John W. Tukey, Volume IV Philosophy and Principles of Data Analysis: 1965-1986,
by John W. Tukey, and David R. Cox

Why Interaction?

- **Explore data that is big / complex**
 - Too big to show everything at once
 - Explore data with different representations
- **Interactions amplify cognition**
 - We understand things better if we touch them

Types of Interactions

Single View

- Change over time / Transitions
 - Scrollytelling
- Navigation
 - Pan, Zoom, Rotate
 - Semantic zooming
- Focus + Context
- Querying
 - Dynamic querying

Multiple Views

- Selection (Details on demand)
- Linking & Brushing
- Adapting Representations

Change over time

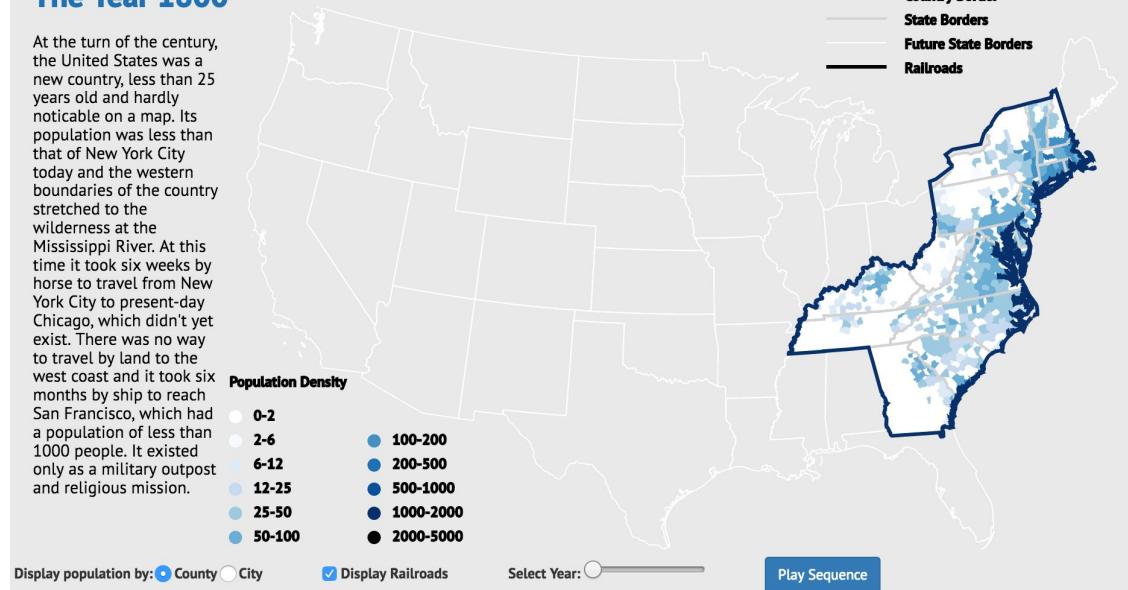
Example: slider to view data at different times

Or....how the railroads changed the face of America in the 1800's

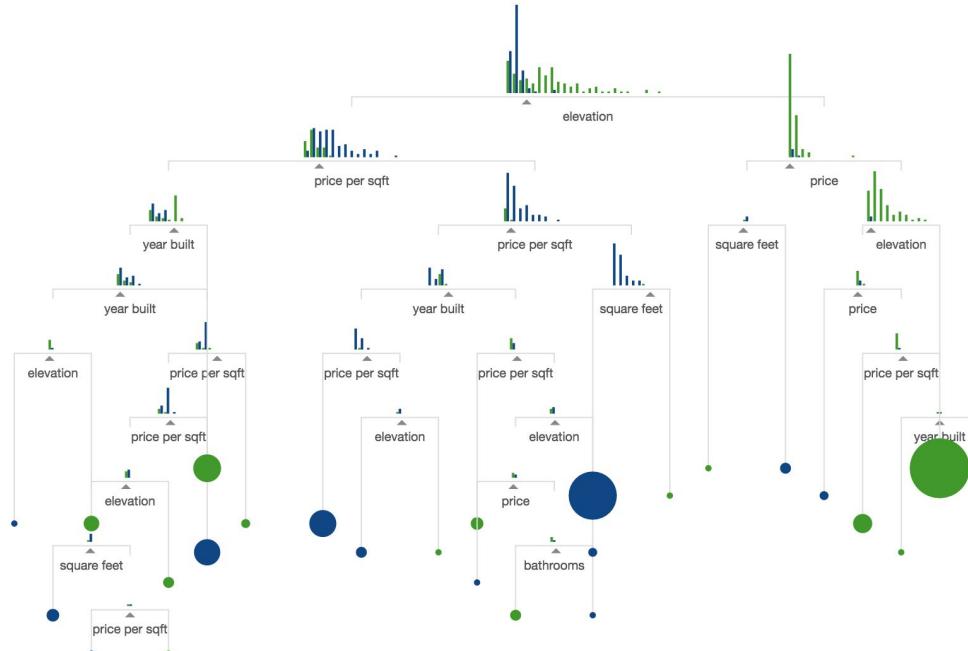
The following visualization shows land, population and railroad growth in 19th Century America.

The Year 1800

At the turn of the century, the United States was a new country, less than 25 years old and hardly noticeable on a map. Its population was less than that of New York City today and the western boundaries of the country stretched to the wilderness at the Mississippi River. At this time it took six weeks by horse to travel from New York City to present-day Chicago, which didn't yet exist. There was no way to travel by land to the west coast and it took six months by ship to reach San Francisco, which had a population of less than 1000 people. It existed only as a military outpost and religious mission.



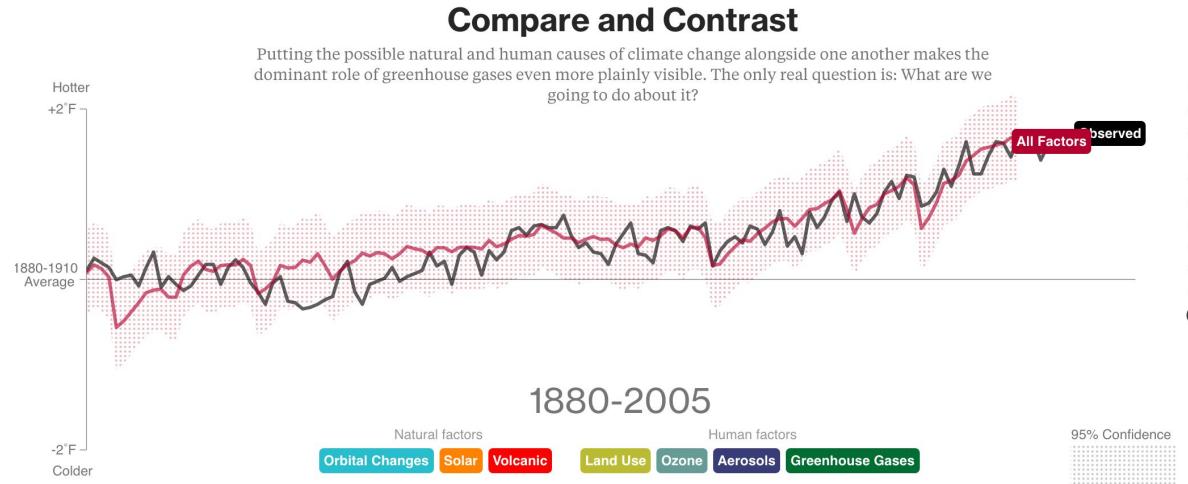
Scrollytelling 1



<http://www.r2d3.us/visual-intro-to-machine-learning-part-1/>

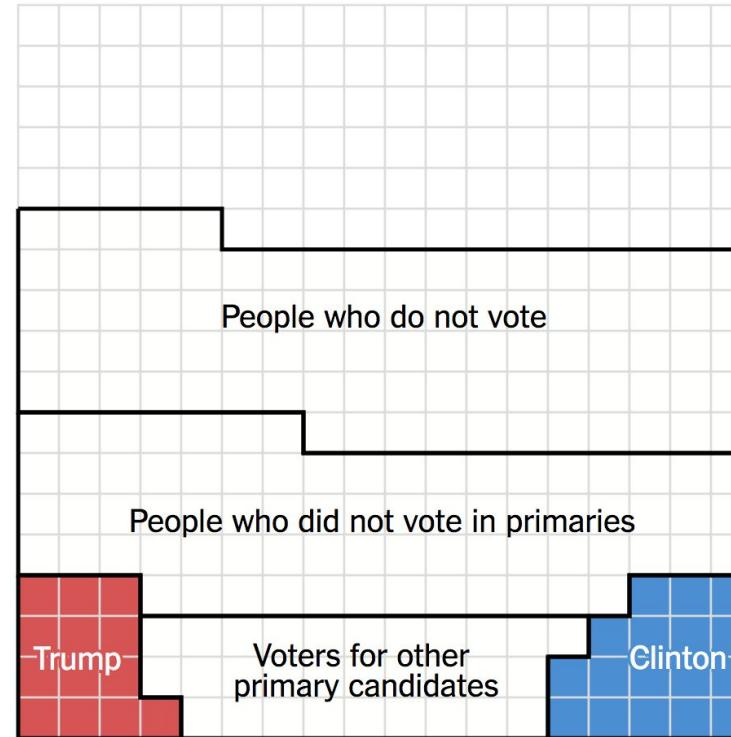
More examples <https://eagereyes.org/blog/2016/the-scrollytelling-scourge>

Scrollytelling 2



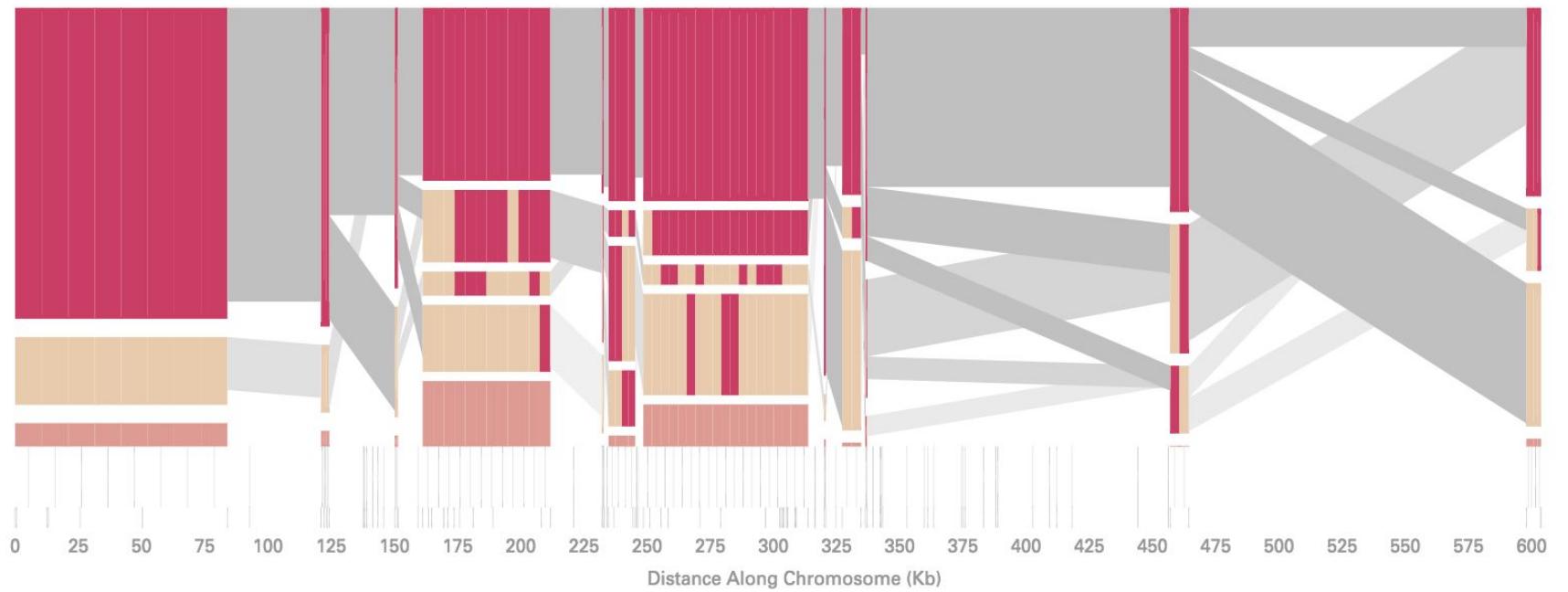
<http://www.bloomberg.com/graphics/2015-whats-warming-the-world/>

Scrollytelling 3



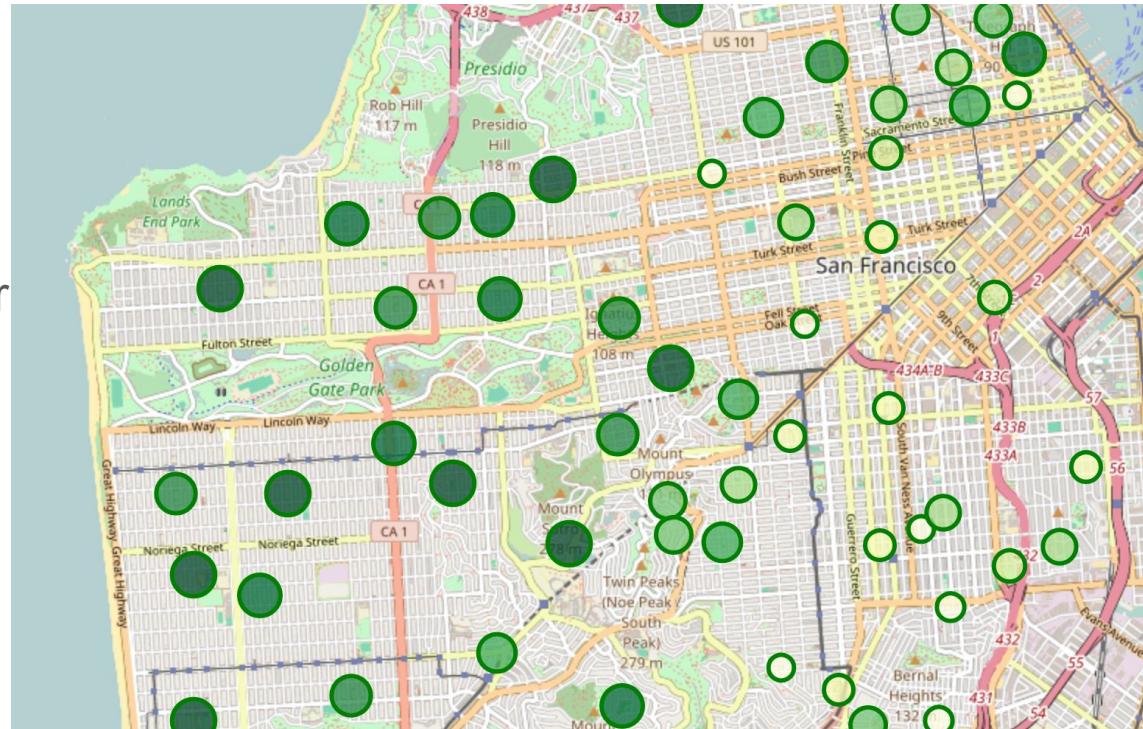
<https://www.nytimes.com/interactive/2016/08/01/us/elections/nine-percent-of-america-selected-trump-and-clinton.html>

Transitions



Navigation: Changing viewpoint

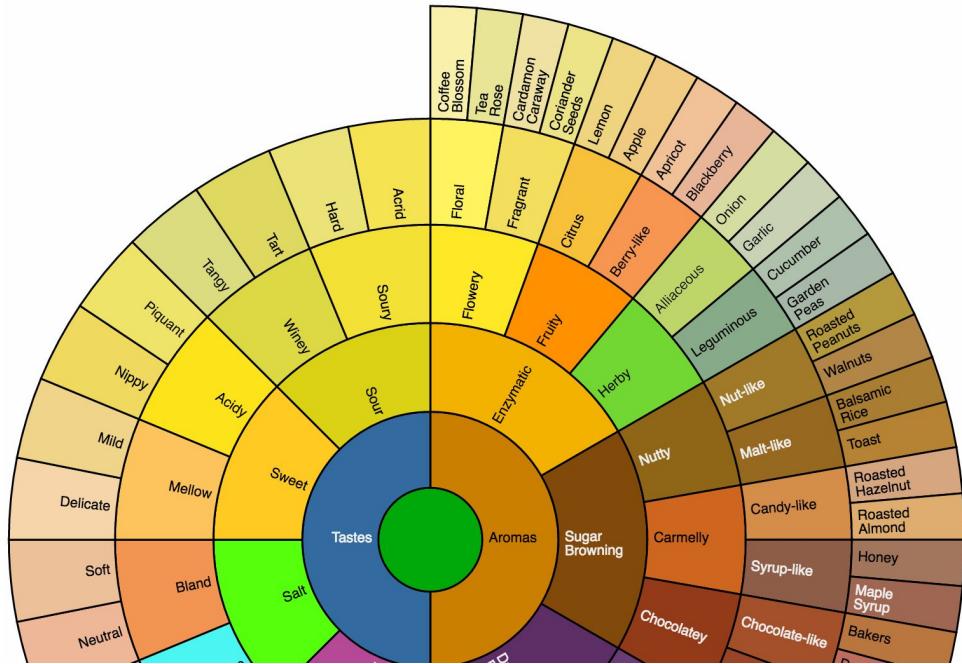
- Pan
 - Move around
- Zoom
 - Enlarge, make smaller
move camera
- Rotate (3D)



Semantic zooming

- As you zoom in, content is updated
- More detail as more space becomes available
- Ideally readable at multiple resolutions

Coffee Flavour Wheel



<https://www.jasondavies.com/coffee-wheel/>

Focus + Context



- Carefully pick what to show
- Hint at what you are not showing

<http://mbostock.github.io/protovis/ex/zoom.html>

Filtering aka brushing, aka selecting &
dynamic querying

The MANTRA of visual information

**Overview first, zoom and filter, then details on demand
relate, history, extract**

[Shneiderman, 1996]

Dynamic Queries

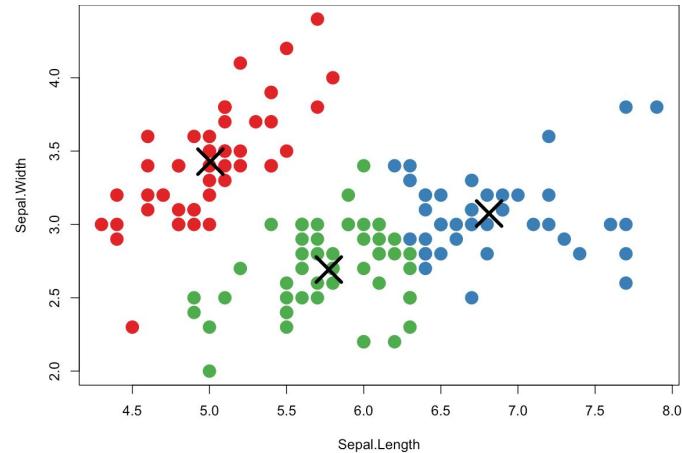
Selecting value ranges
of variables via controls
with real time feedback
in the display

Iris k-means clustering

X Variable

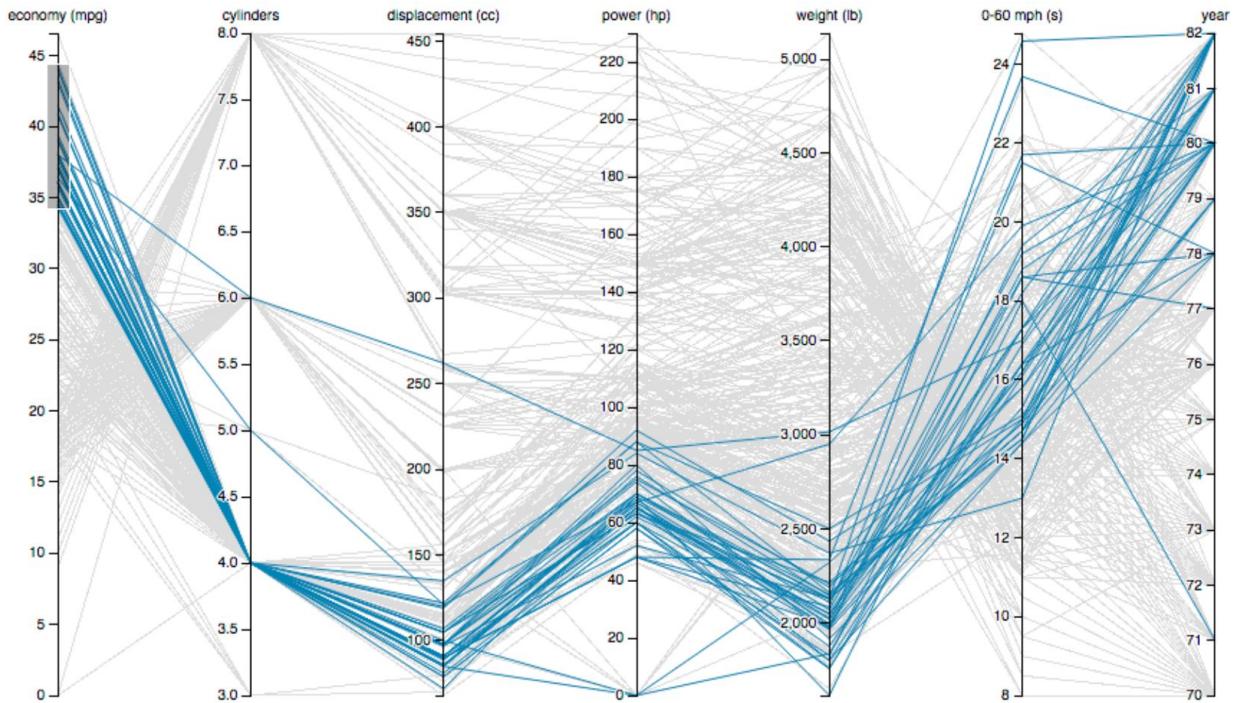
Y Variable

Cluster count
 (↔)



Visual Queries

Define criteria for inclusion/
exclusion



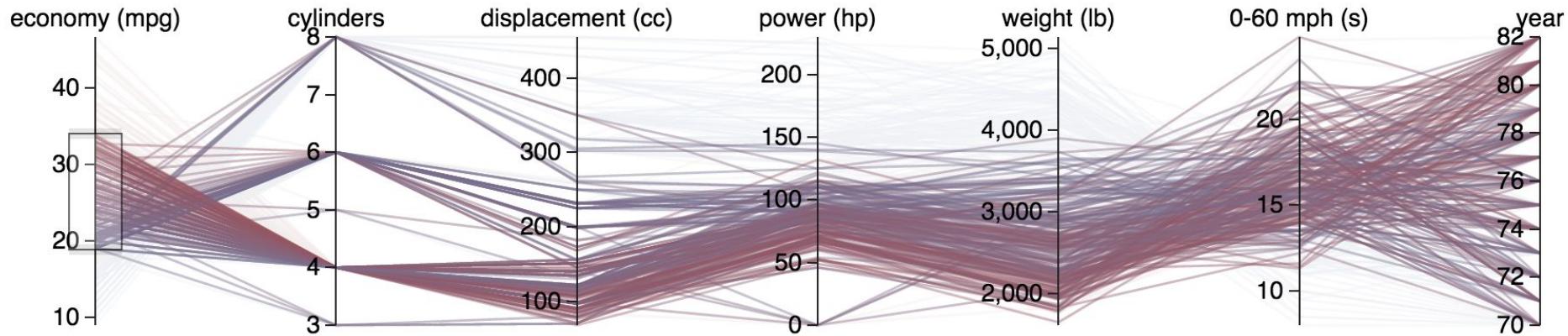
Linking

Visually indicating which parts of one data display correspond to that of another

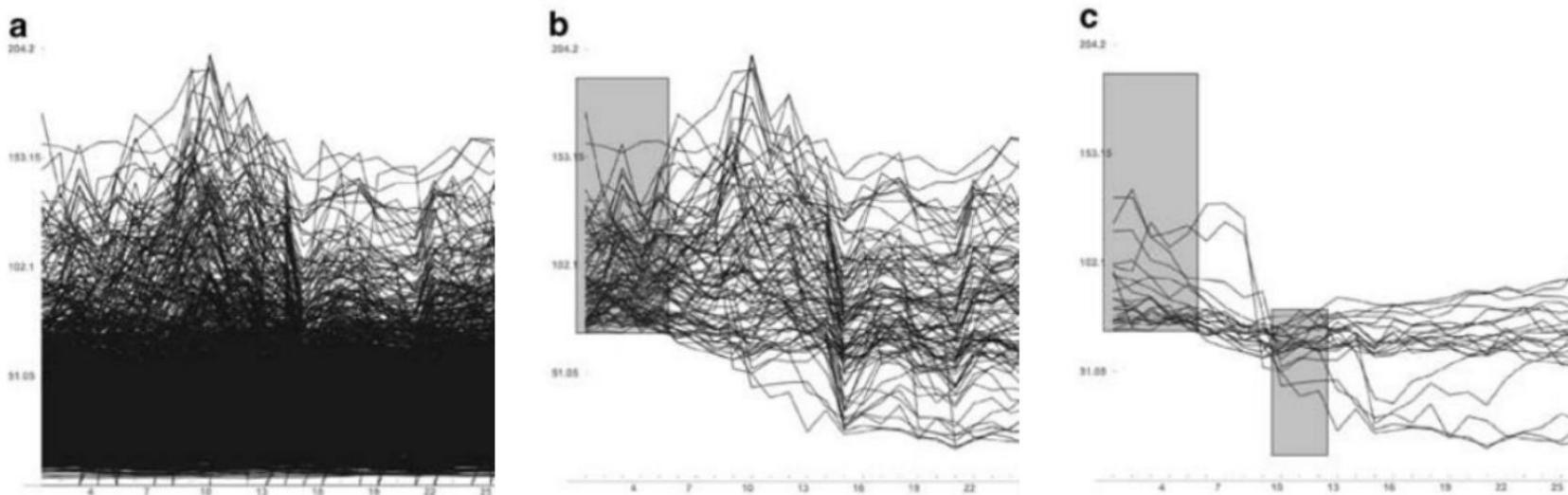
Brushing

Allowing the user to move a region (brush) around the data display to highlight groups

Visual Queries: Brushing



Visual Queries



Visual Queries: Incremental Text Search

NameVoyager: Explore baby names and name trends letter by letter

Looking for the perfect baby name? [Sign up for free](#) to receive access to our expert tools!

Baby Name > A

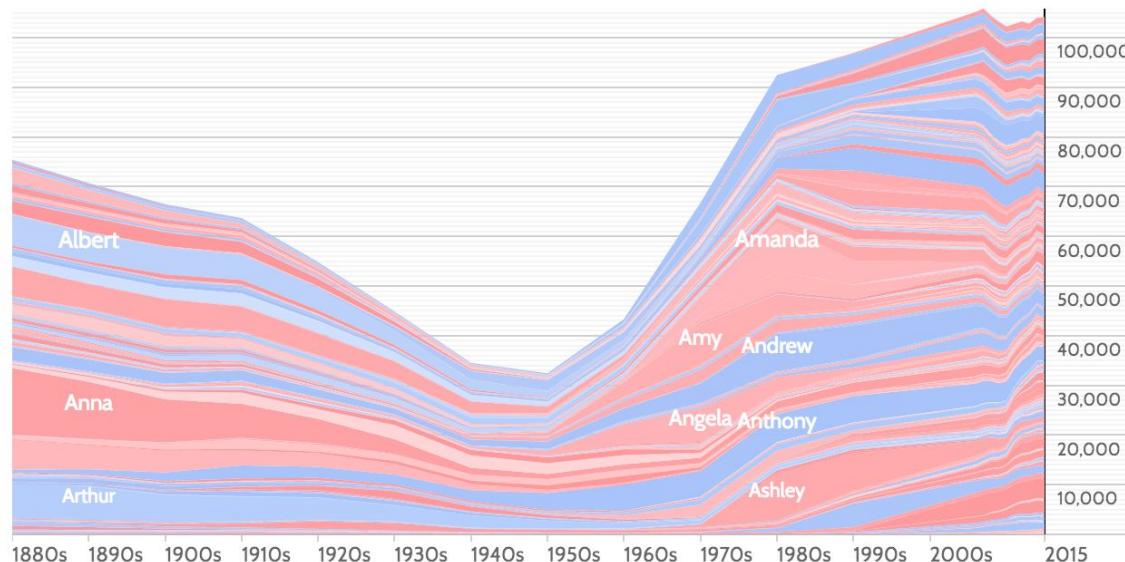
Both Boys Girls

boys	1000	500	100	25	1
girls	1000	500	100	25	1

Current rank:

Names starting with 'A' per million babies

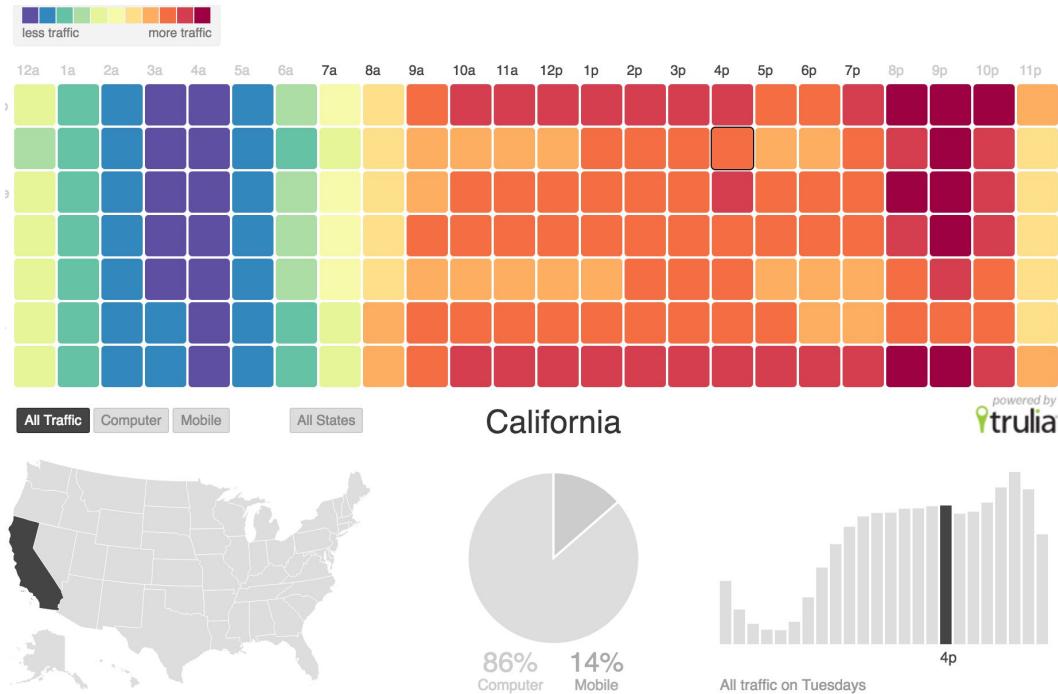
per million births



Multiple Views

Eyes over Memory:

Trade-off of display space
and working memory



Linked View Options

Multiple Views that are simultaneously visible and lined together such that actions in one view affect the others

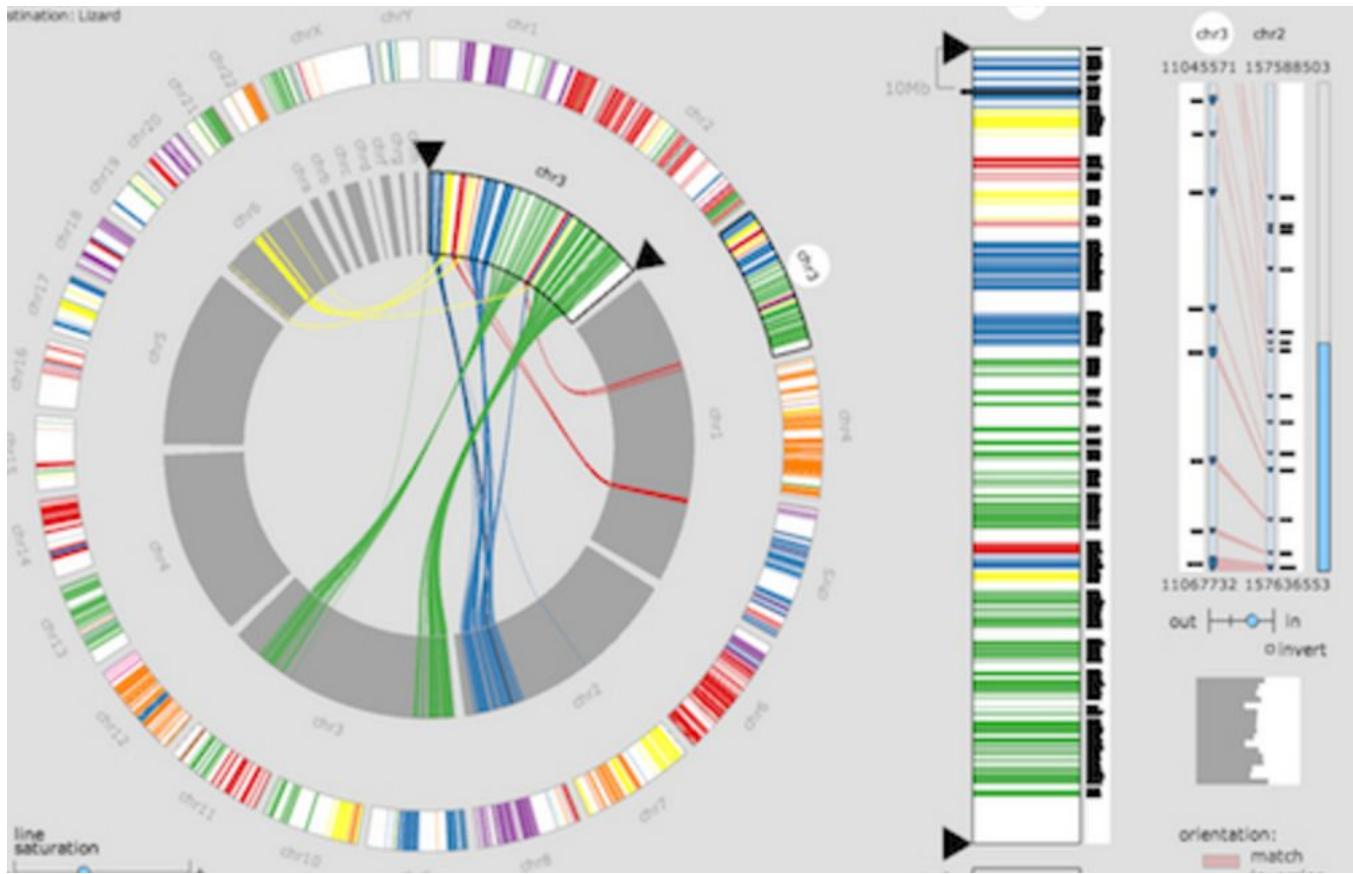
Example: Overview + Detail

Summarized information

Detailed information about a subset of the data

MizBee

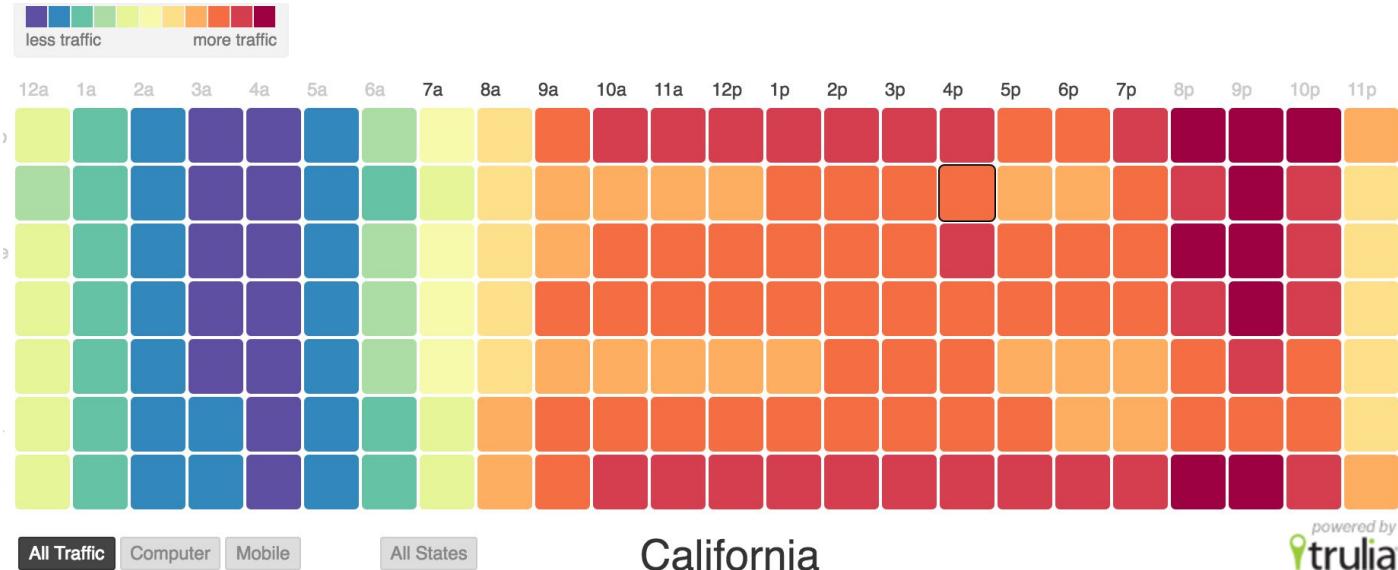
Internal ring show details



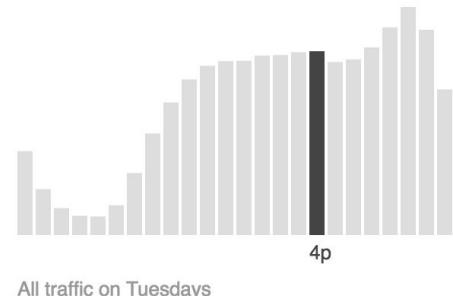
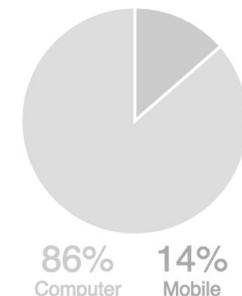
<https://www.youtube.com/watch?v=86p7brwuz2g>

House Hunting All Day, Every Day

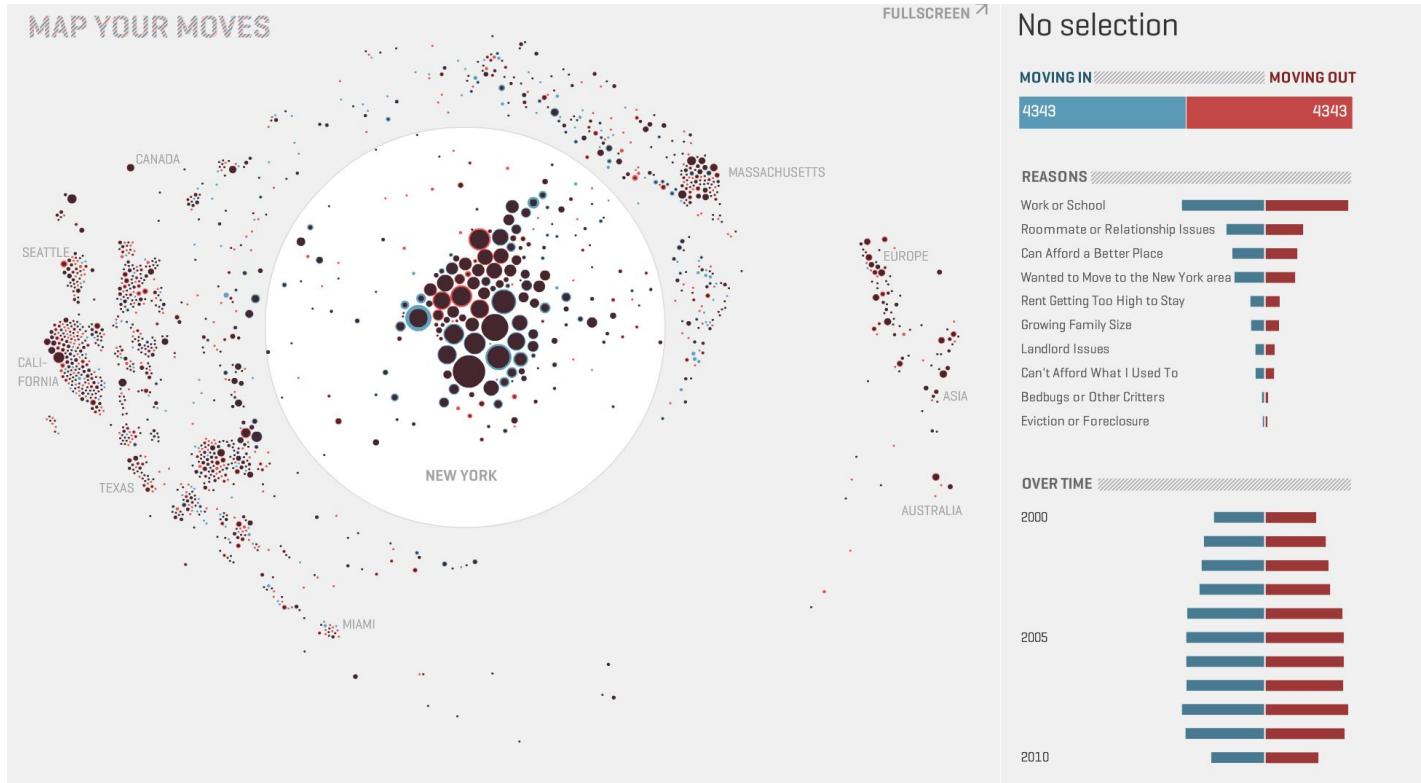
Most people search for homes on Mondays at 9:00 PM. When are you window shopping?



California

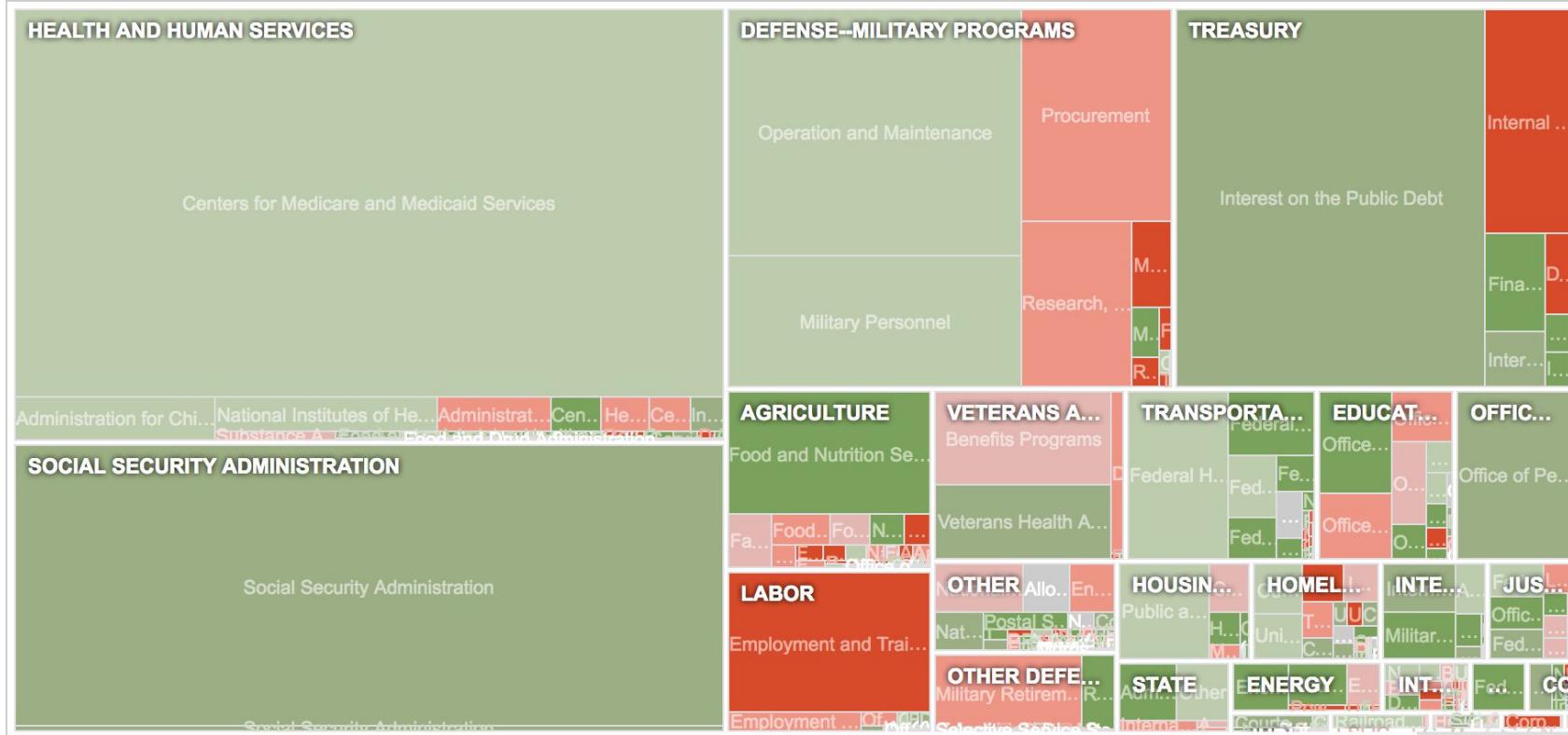


Where newyorkers moved

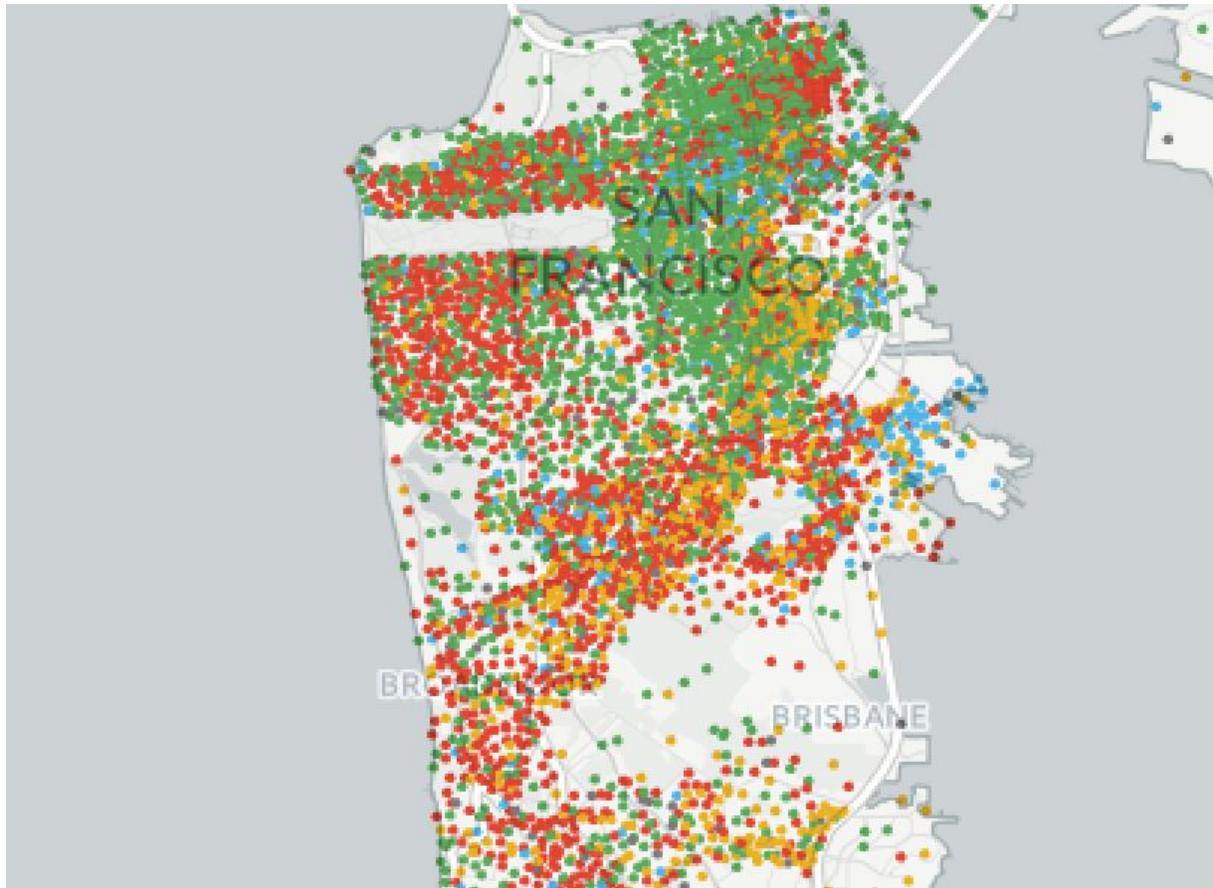


Other cool interactive visualizations

Treemaps

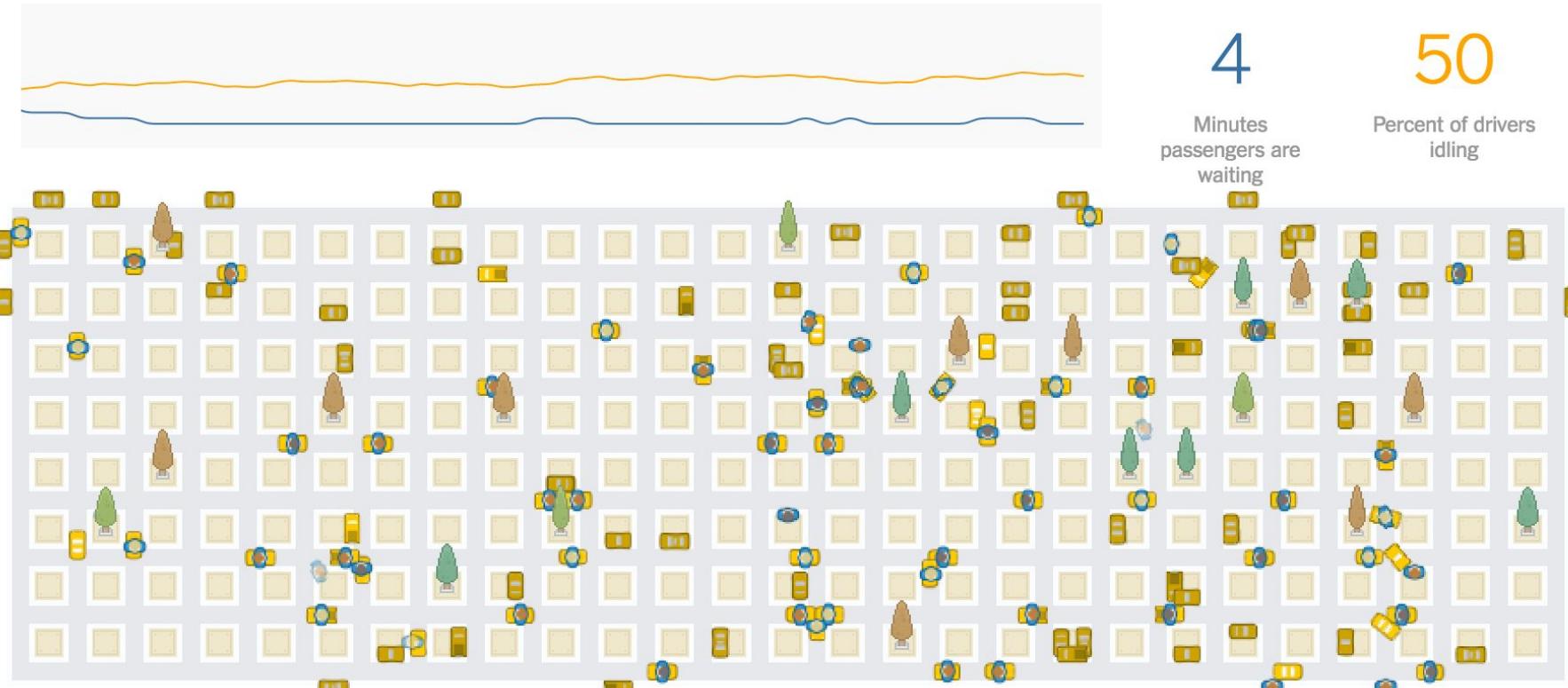


Mapping America



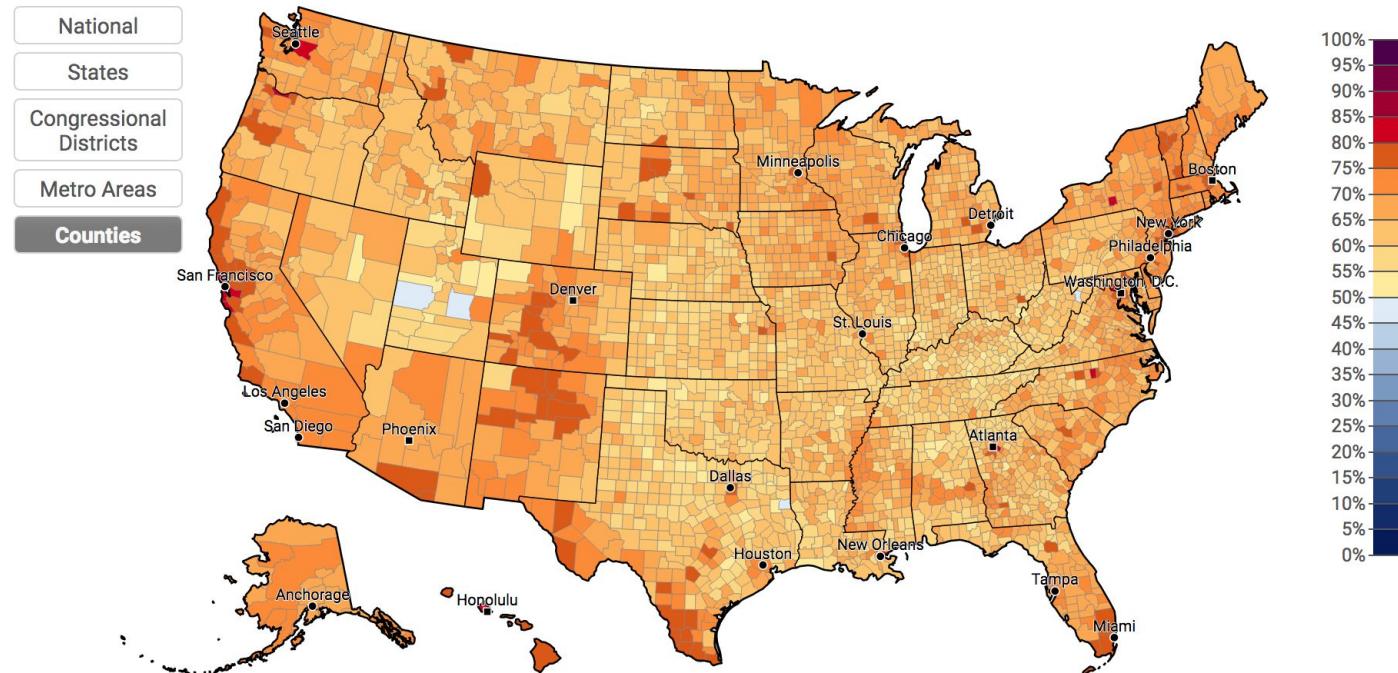
<http://www.nytimes.com/projects/census/2010/explorer.html>

Uber-- Faster pickup times mean more idle drivers



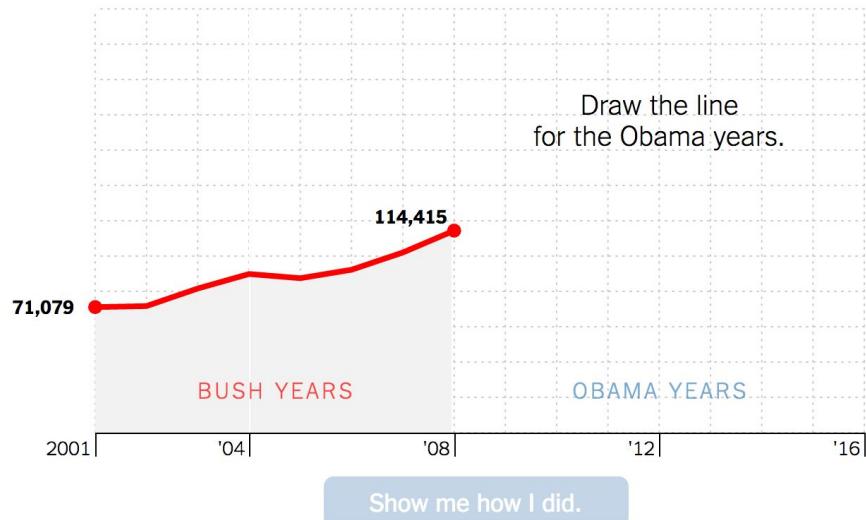
<https://www.nytimes.com/interactive/2017/04/02/technology/uber-drivers-psychological-tricks.html>

Global Warming

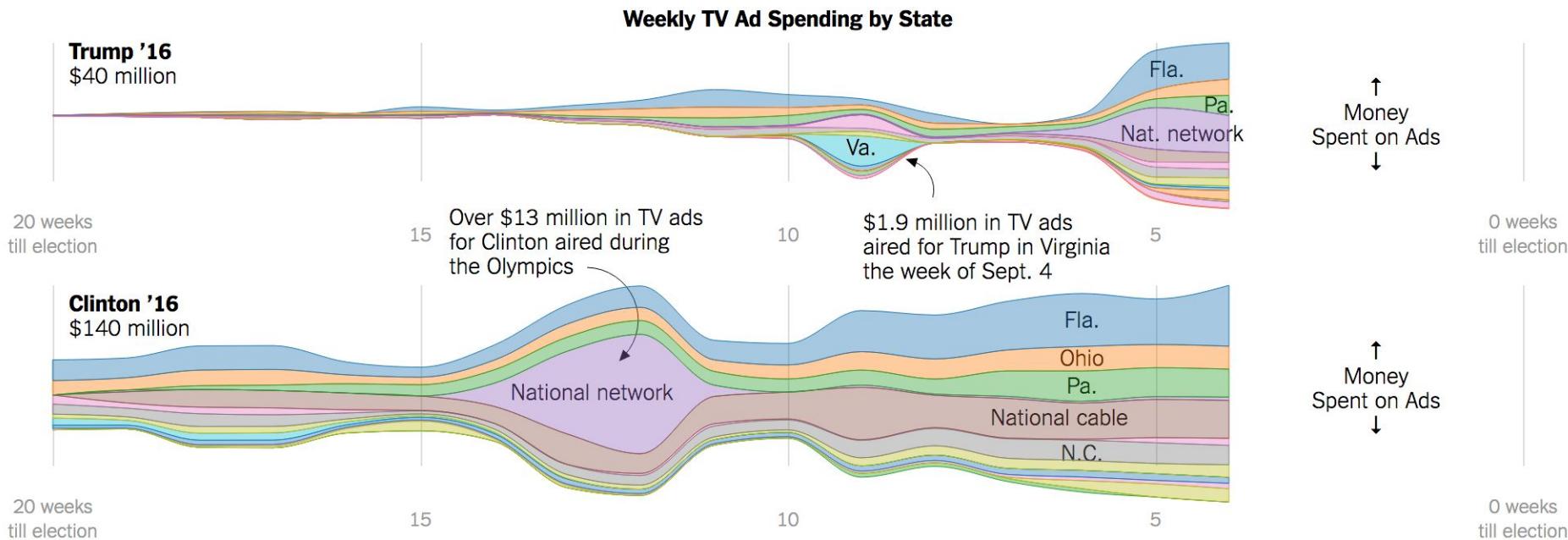


You Draw It: What Got Better or Worse During Obama's Presidency

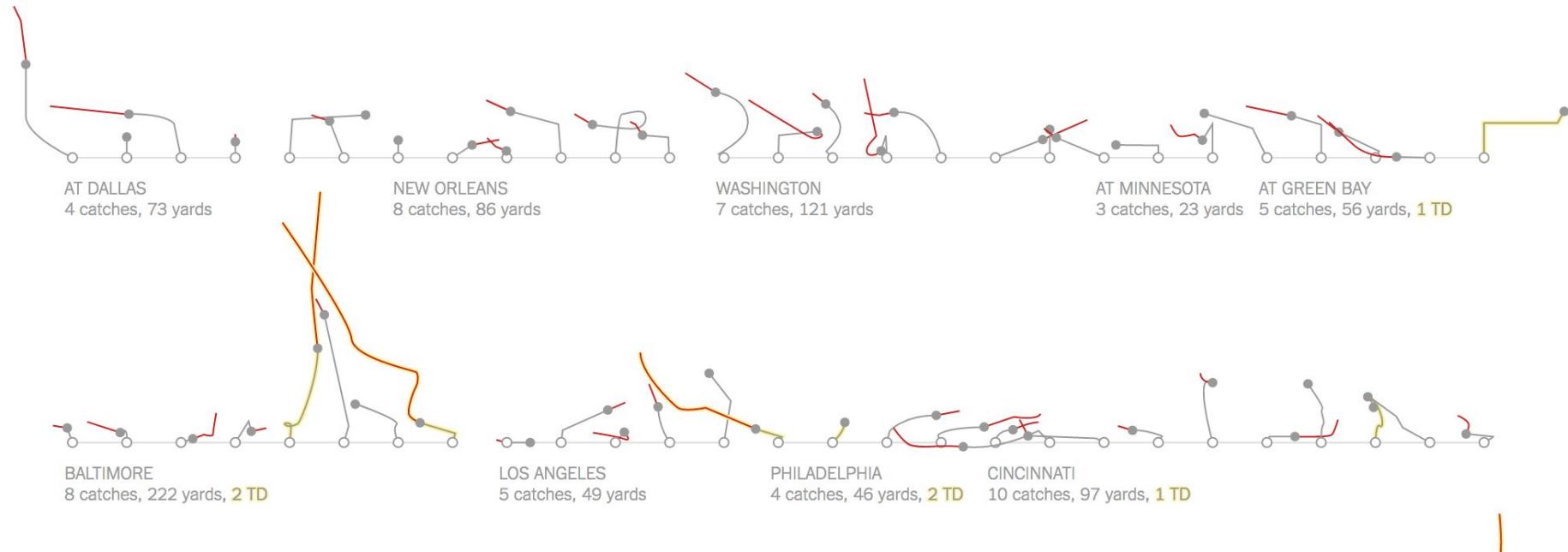
Under Mr. Obama, the **number of immigrants
convicted of crimes who were deported ...**



TU Ad spending

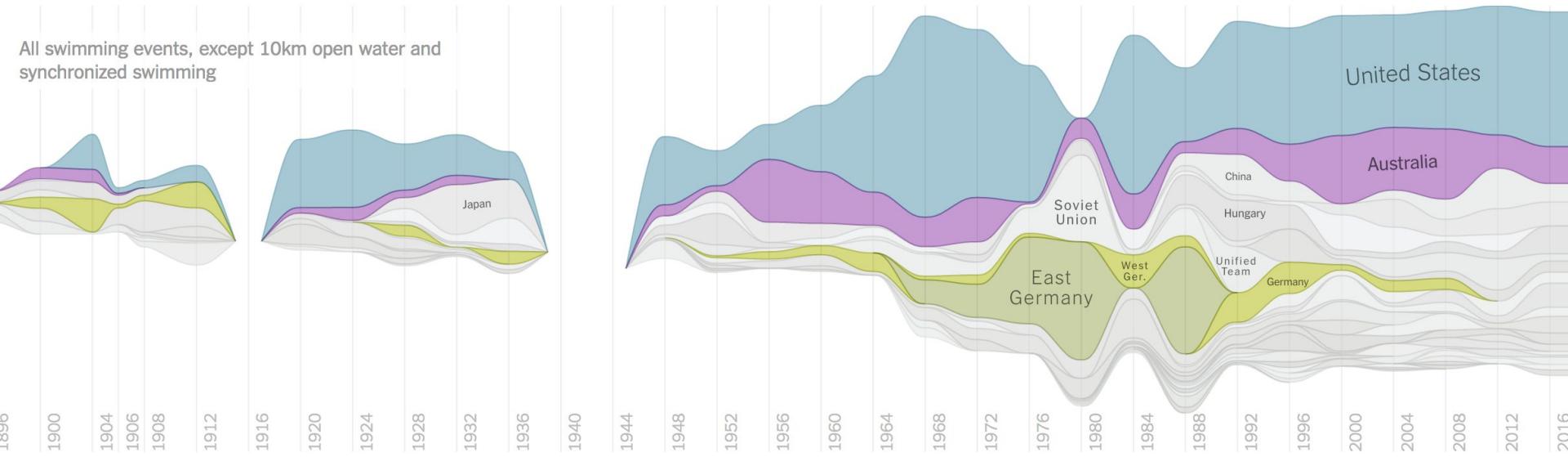


Animation in football

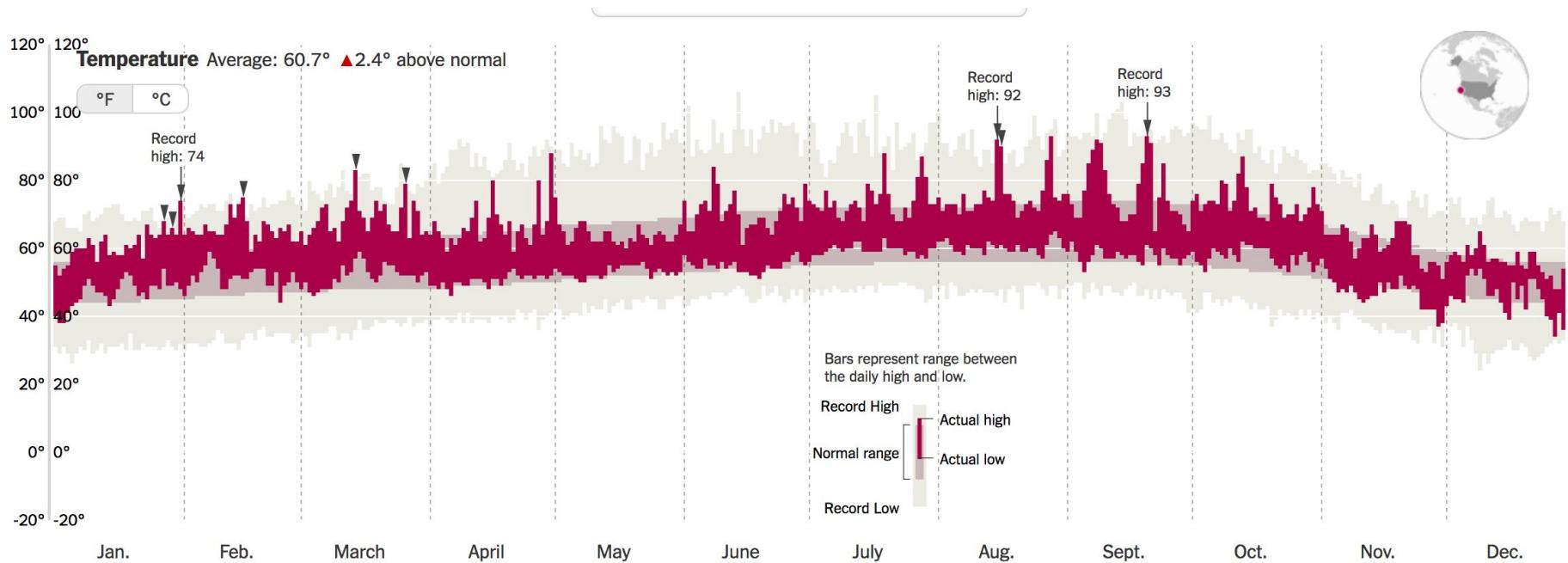


https://www.nytimes.com/interactive/2017/01/08/sports/football/odell-beckham-giants-yards-after-catch.html?_r=2

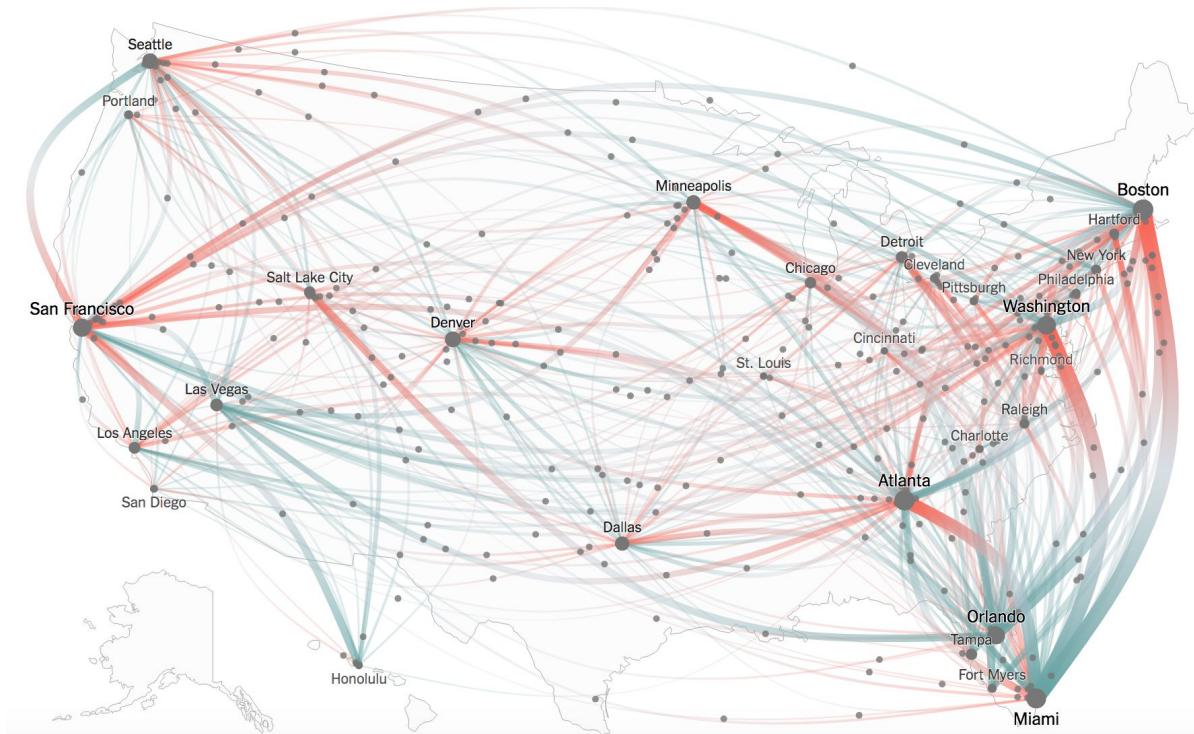
Olympic medals



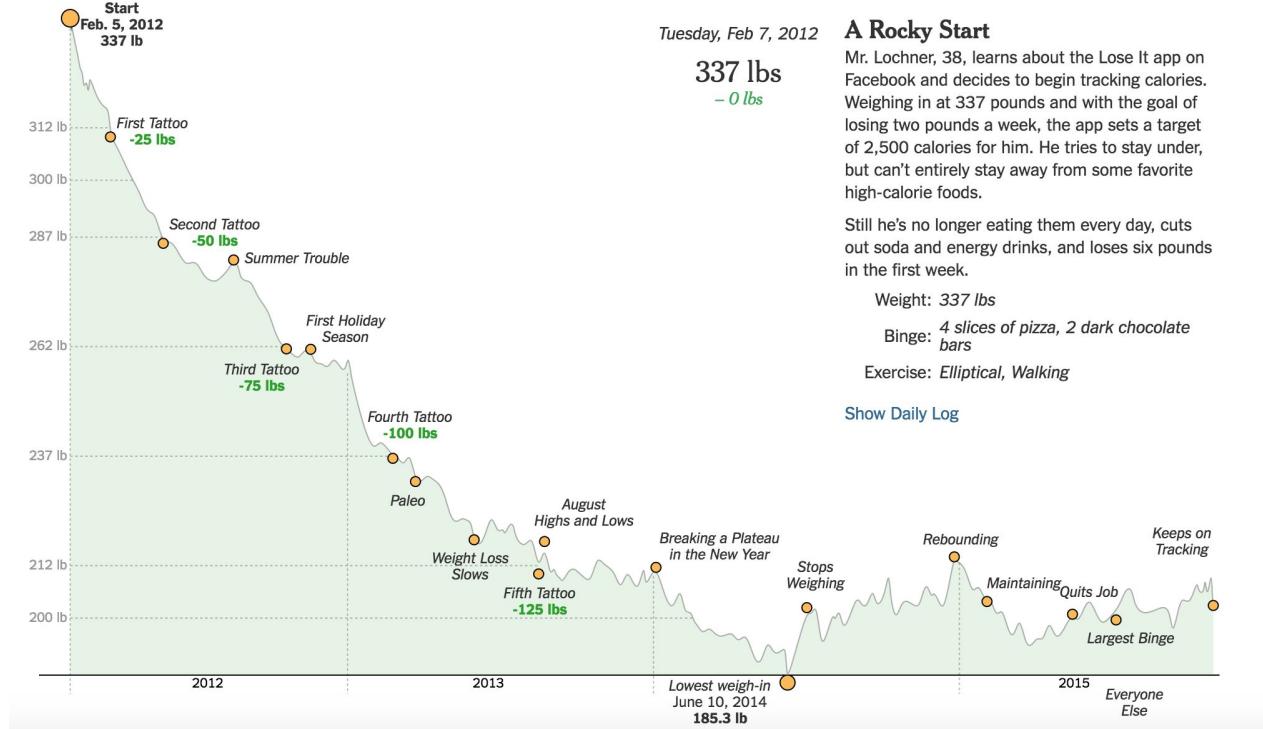
How Much Warmer Was Your City in 2015?



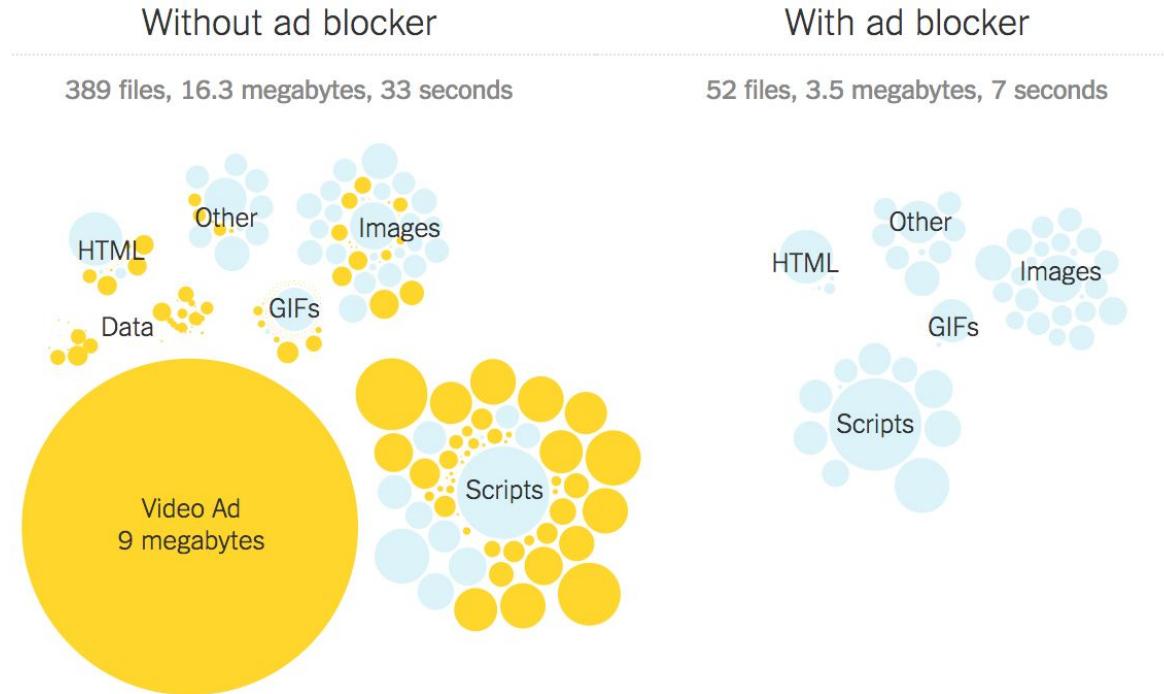
Pumpkin Pie in Miami: Thanksgiving Flight Patterns



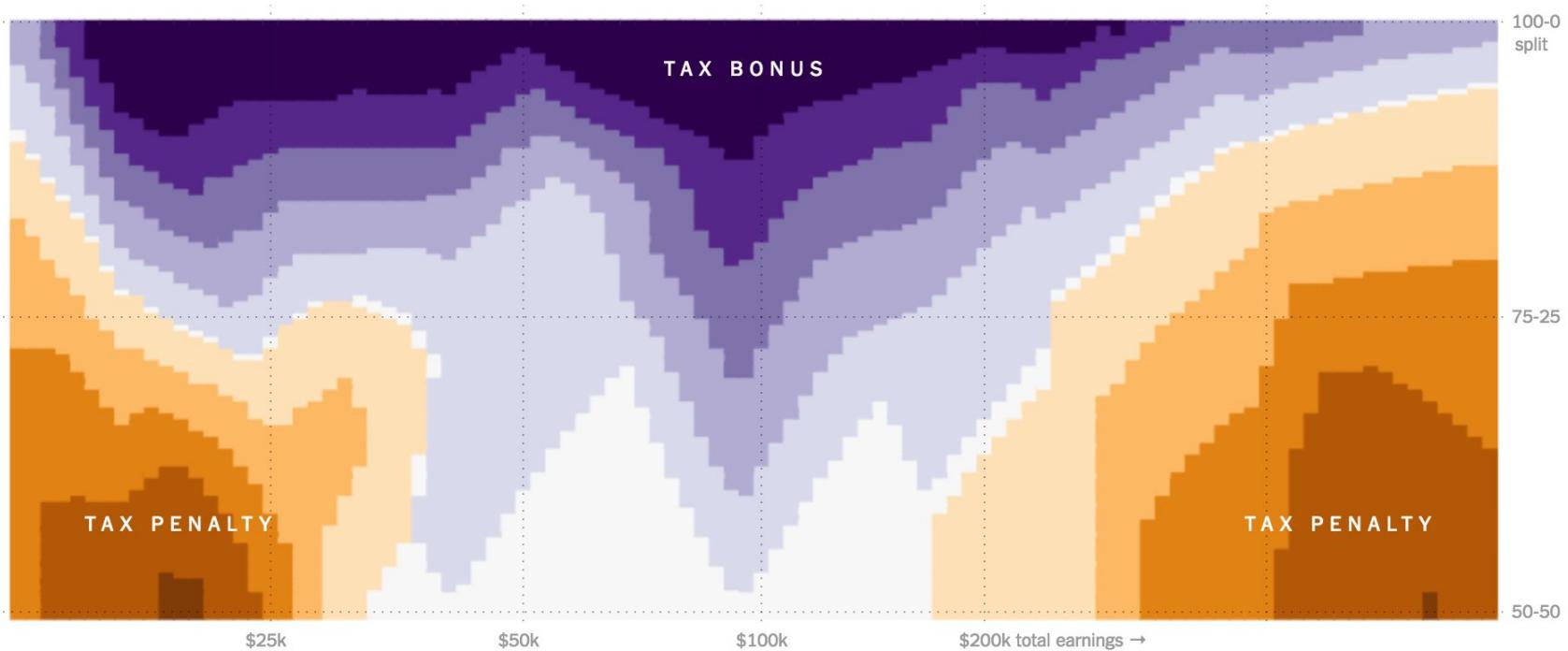
Diary of a Food Tracker



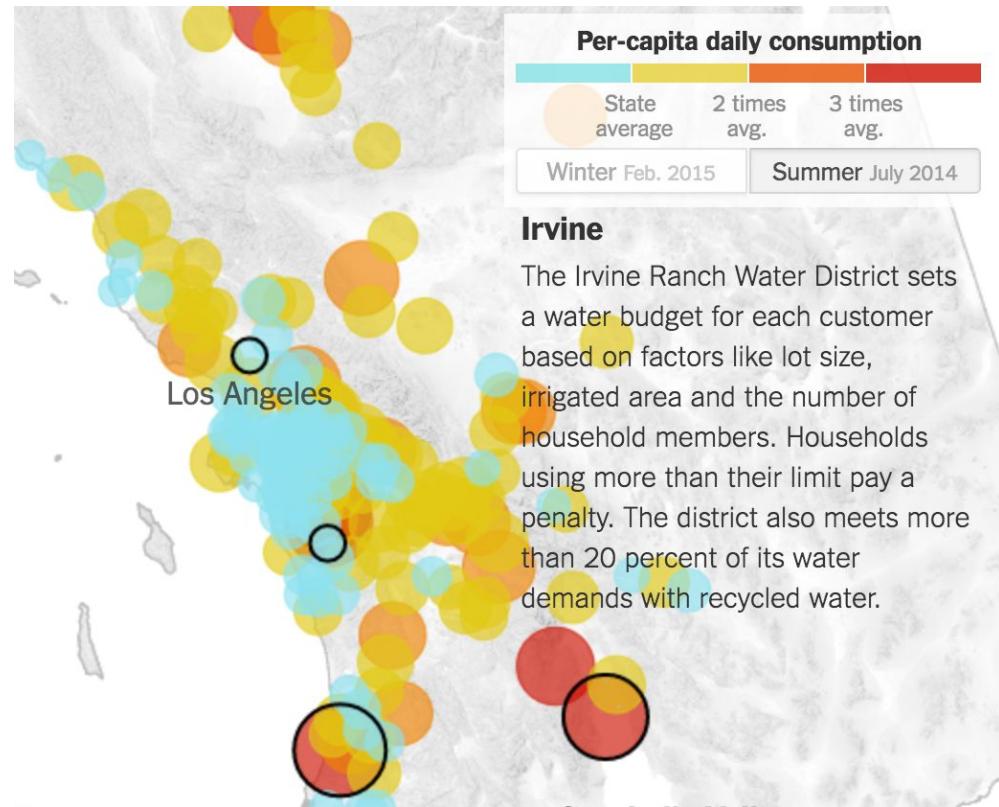
The Cost of Mobile Ads on 50 News Websites



Tax Day



Drought in California



References

<https://www.youtube.com/watch?v=Wr-7Tw88dOs>

<http://www.scribblelive.com/blog/2012/08/06/interaction-design-for-data-visualizations/>

The functional Art. Alberto Cairo Chapter 9

<https://flowingdata.com/tag/new-york-times/>

Homework Critiques

You will be assigned two repositories to peer review for Homework 2: automatically by Canvas. You must have these reviews completed by Tuesday 4/21 at midnight.

Enter your review as comments to the homework you have been assigned. Each review should be 3 to 5 sentences, and must be constructive. Do not just give critiques; also give suggestions. It is okay to have subjective comments.

With you HW submit to Canvas:

```
shiny::runGitHub("class-code", "usfviz", subdir = "intro-shiny/ggvis-app-1")
```

Submit Code that runs your app

With you HW submit to Canvas a code that runs your app

```
shiny::runGitHub("class-code", "usfviz", subdir = "intro-shiny/ggvis-app-1")
```

```
runGitHub(repo, username, subdir)
```

Test to make sure it works

Homework Critiques

- Read Data Visualization Checklist

How to learn more Shiny

Go to <https://searchcode.com/>

Search for library (ggvis)

Interaction Lab

<https://gallery.shinyapps.io/105-plot-interaction-zoom/>

<https://gallery.shinyapps.io/106-plot-interaction-exclude/>

<https://shiny.rstudio.com/articles/plot-interaction-advanced.html>

<https://github.com/rstudio/shiny-examples/blob/master/051-movie-explorer/server.R>

<http://shiny.rstudio.com/gallery/movie-explorer.html>