Visualizing Spatial Data

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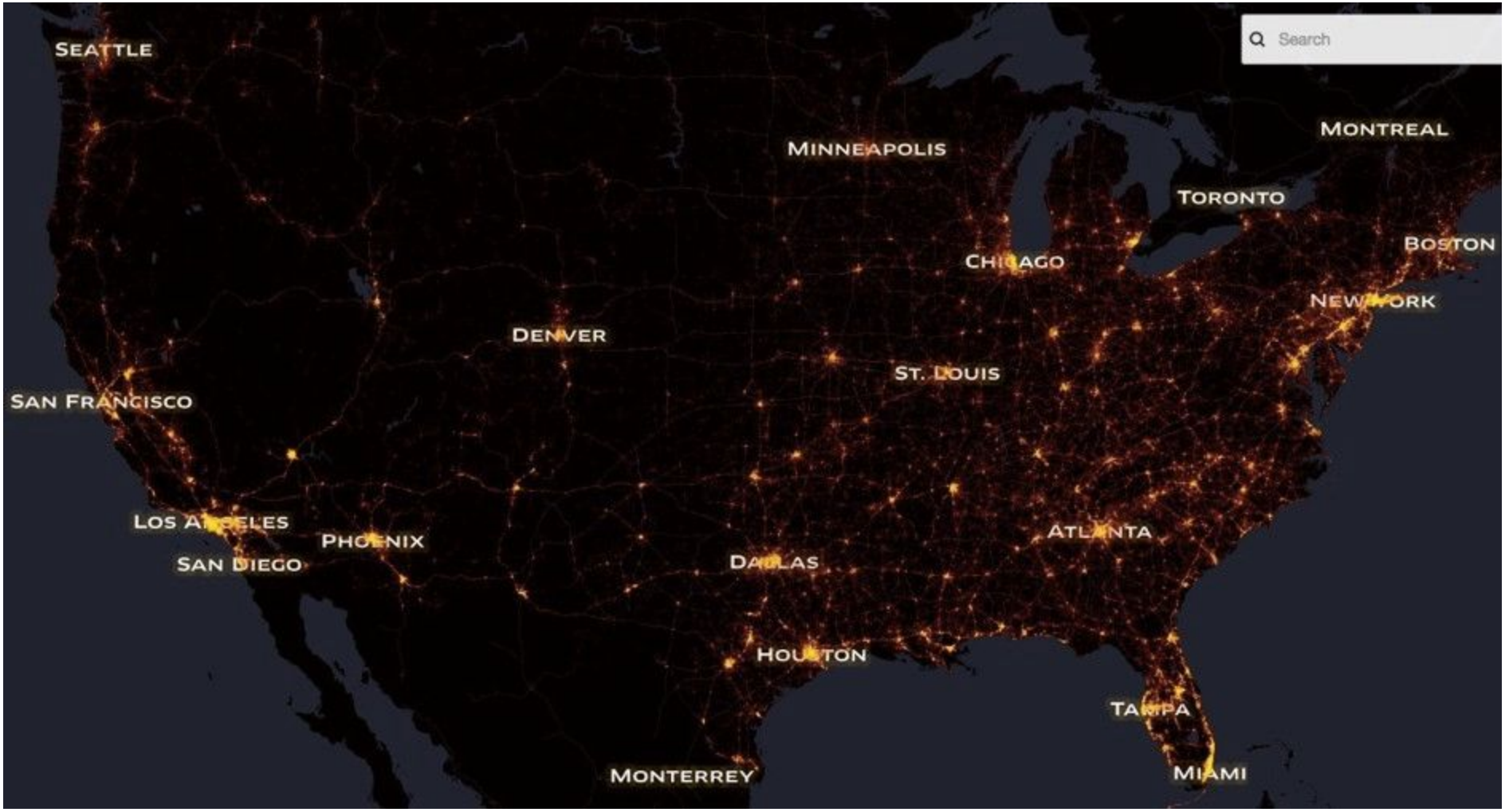
Spatial data

Definition: located data

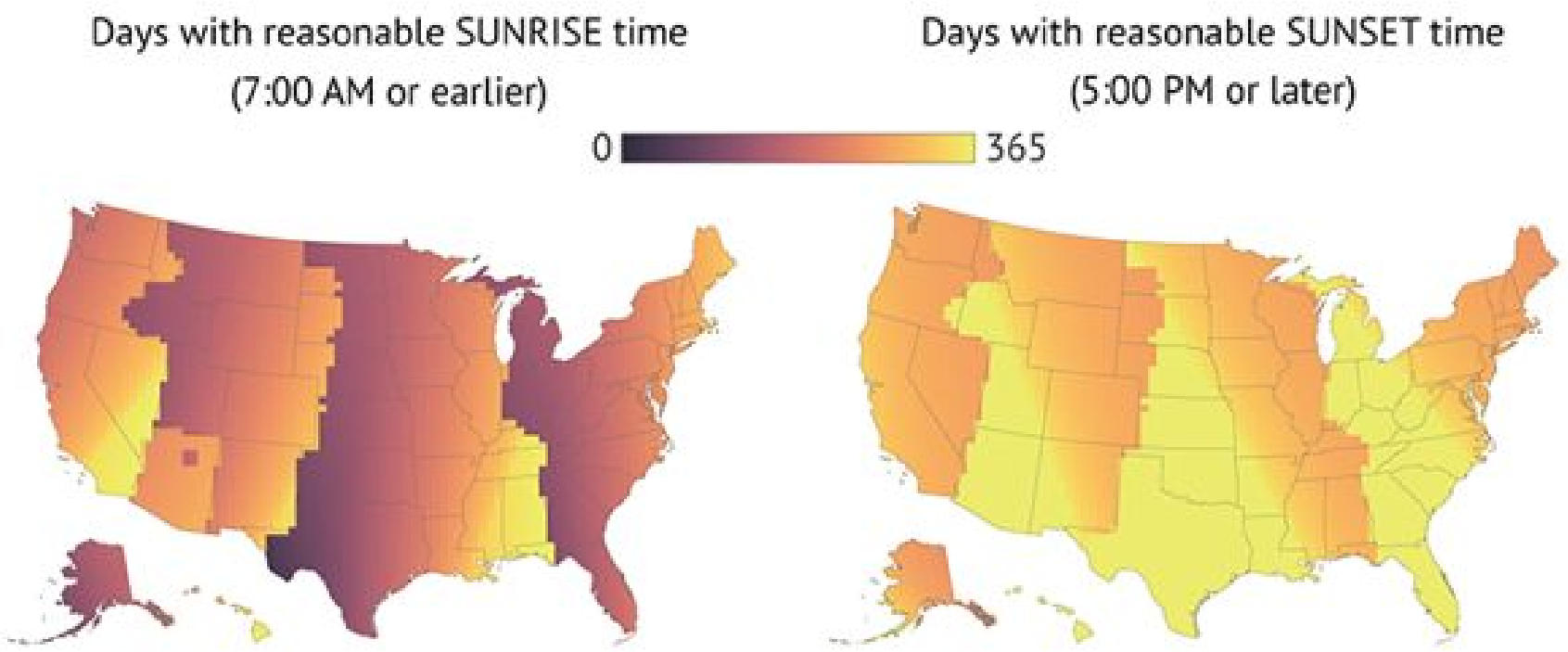
- data tagged with location info
- locations may be abstract
- charting data based on those locations

Why?

- when locations are well grounded in physical reality, this is an easily grasped representation

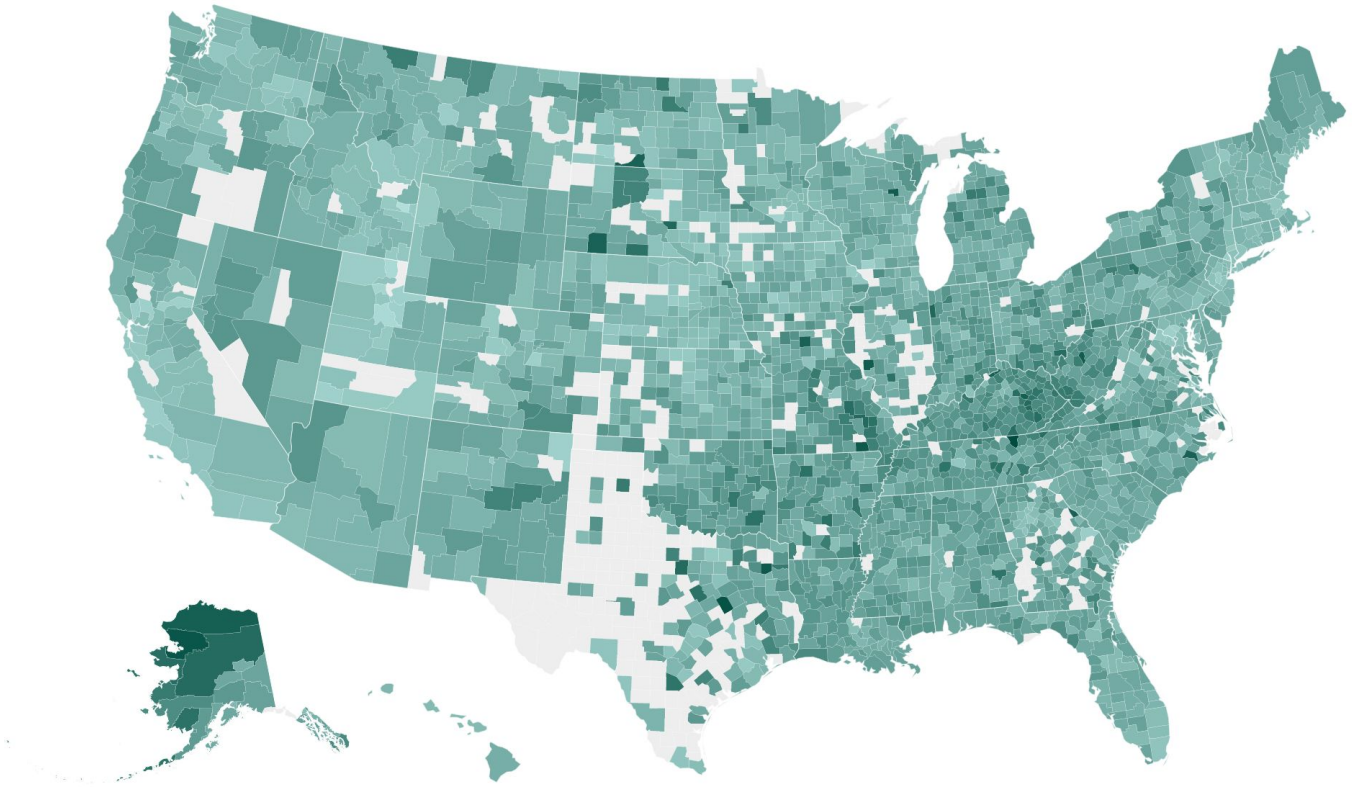

Search
SEATTLE
MINNEAPOLIS
MONTREAL
TORONTO
BOSTON
CHICAGO
NEW YORK
DENVER
ST. LOUIS
SAN FRANCISCO
LOS ANGELES
PHOENIX
SAN DIEGO
ATLANTA
DALLAS
HOUSTON
TAMPA
MONTERREY
MIAMI

Daylight Saving Time as currently observed



% of adults smoking

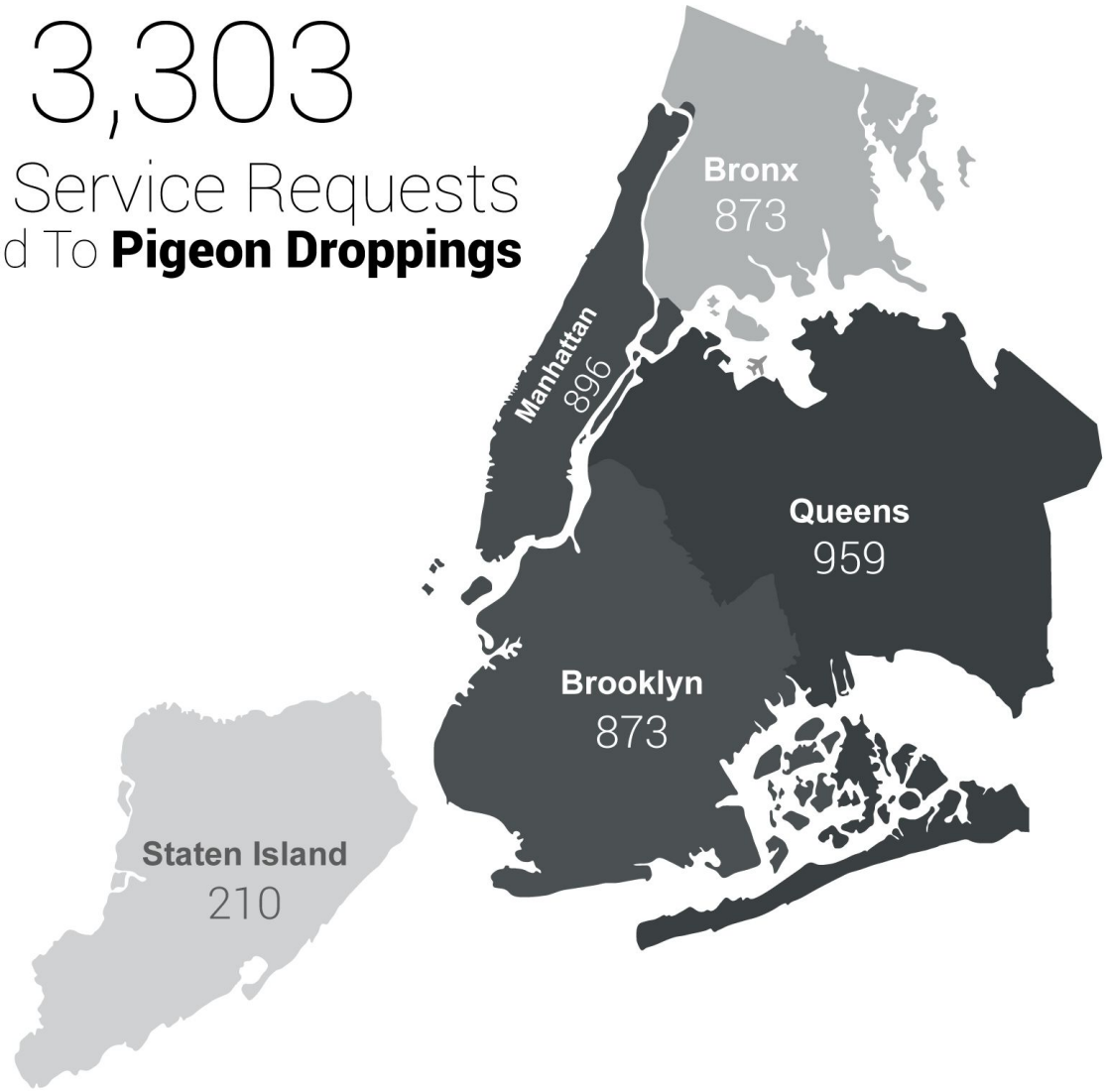
3% 51%



counties with no data available

3,303

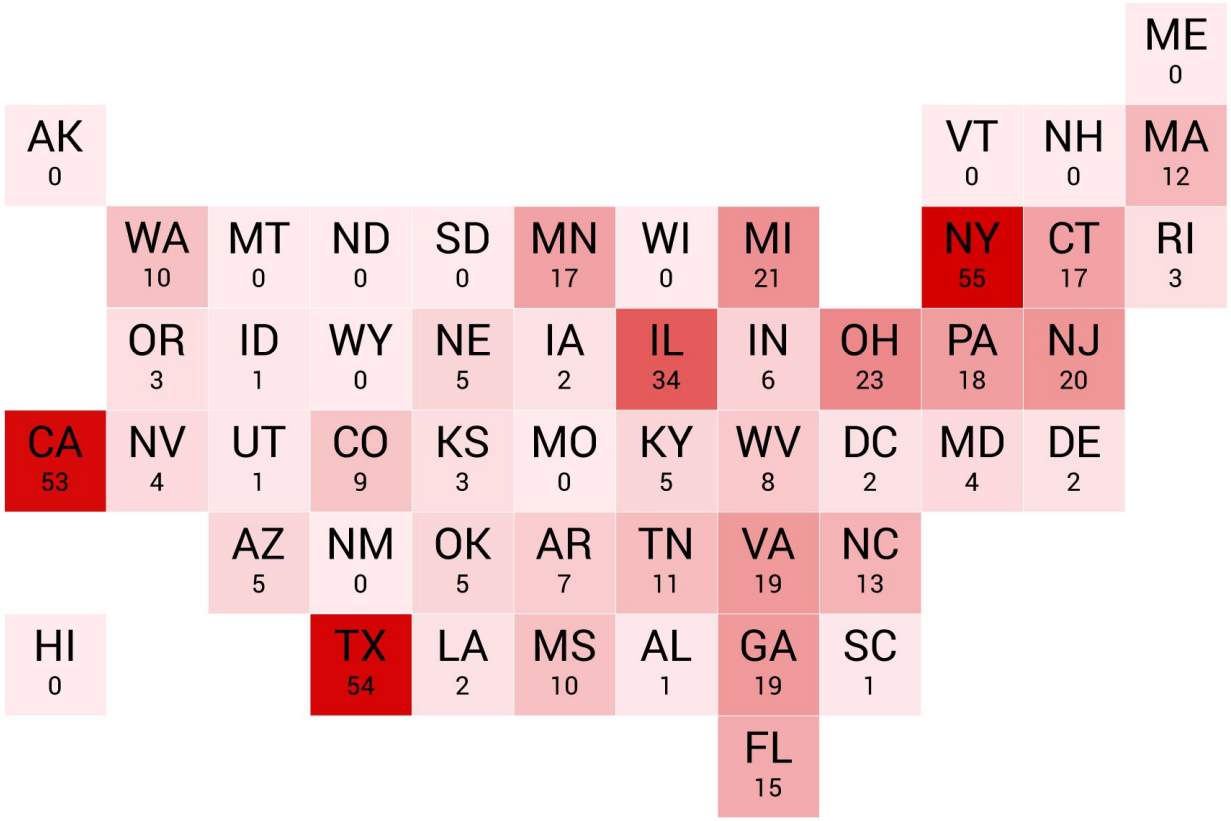
NYC Service Requests Related To **Pigeon Droppings**



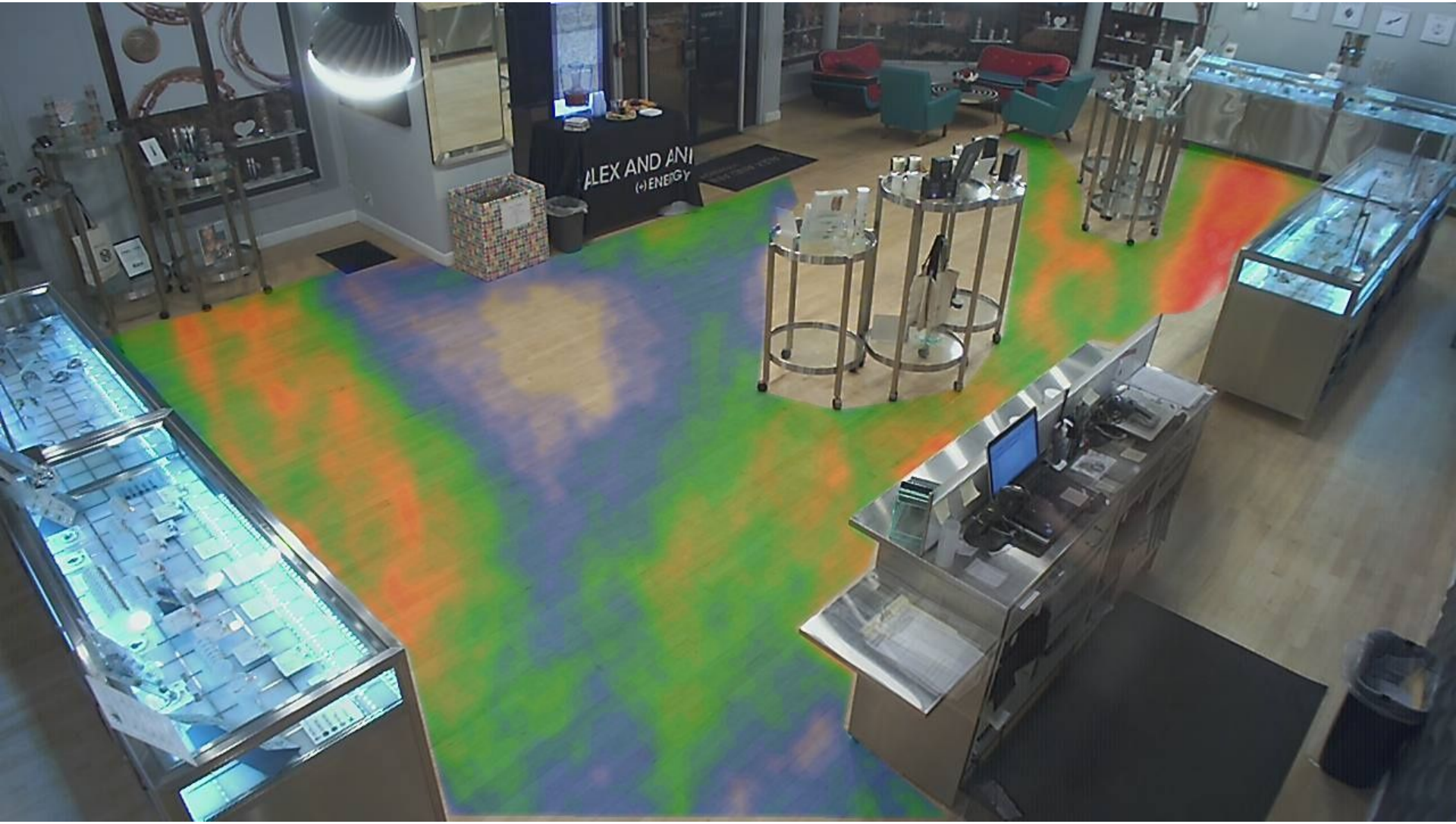
since 2010

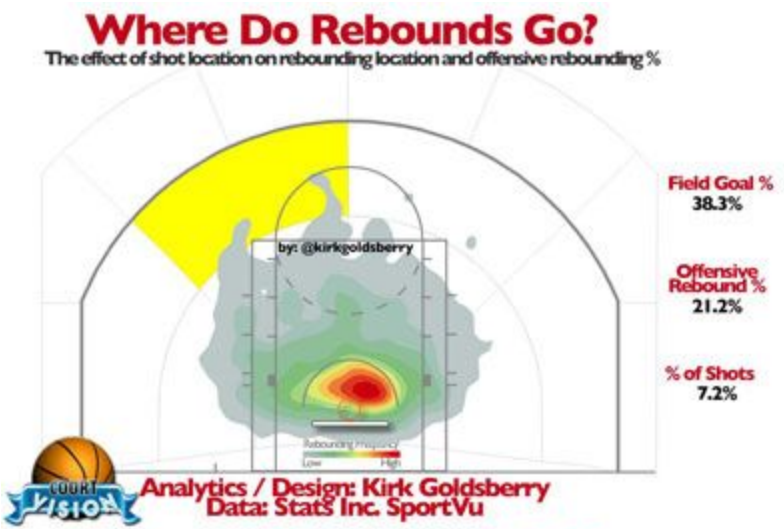
FORTUNE

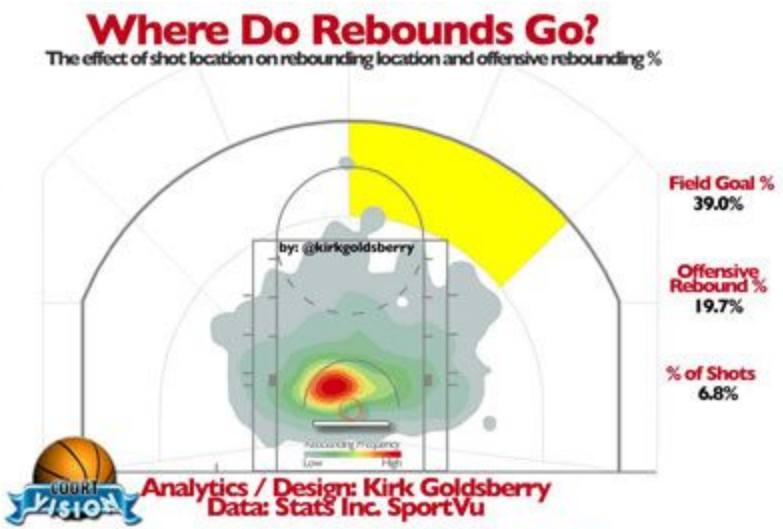
WHERE THE FORTUNE 500 COMPANIES ARE

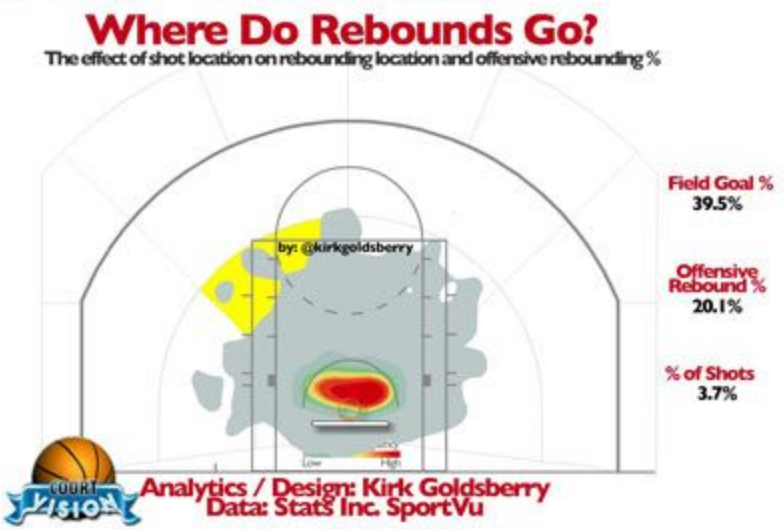


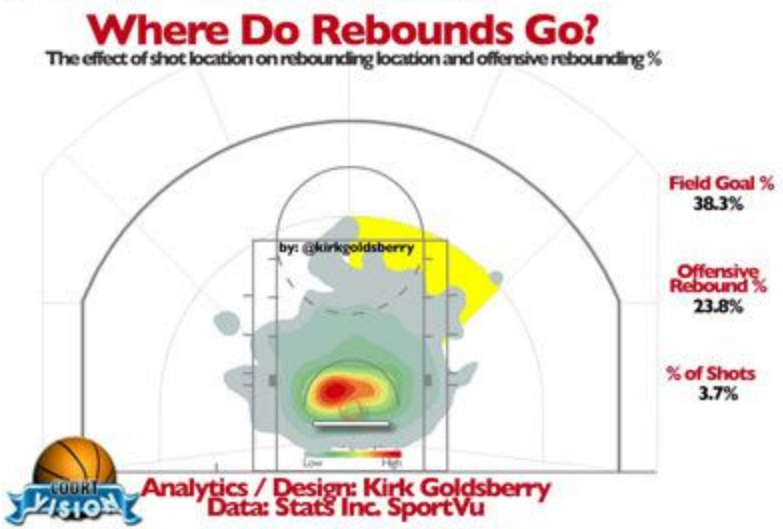

Senior High/
Hunnewell
Field
Seaver St
BABSON PARK
Wellesley Country Club
Wellesley Ave
Wellesley Ave
Babson College
Forest St
135
Central Ave
Franklin W. Olin
College of Engineering
Brook St
Google
135


ALEX AND ANI
(+) ENERGY

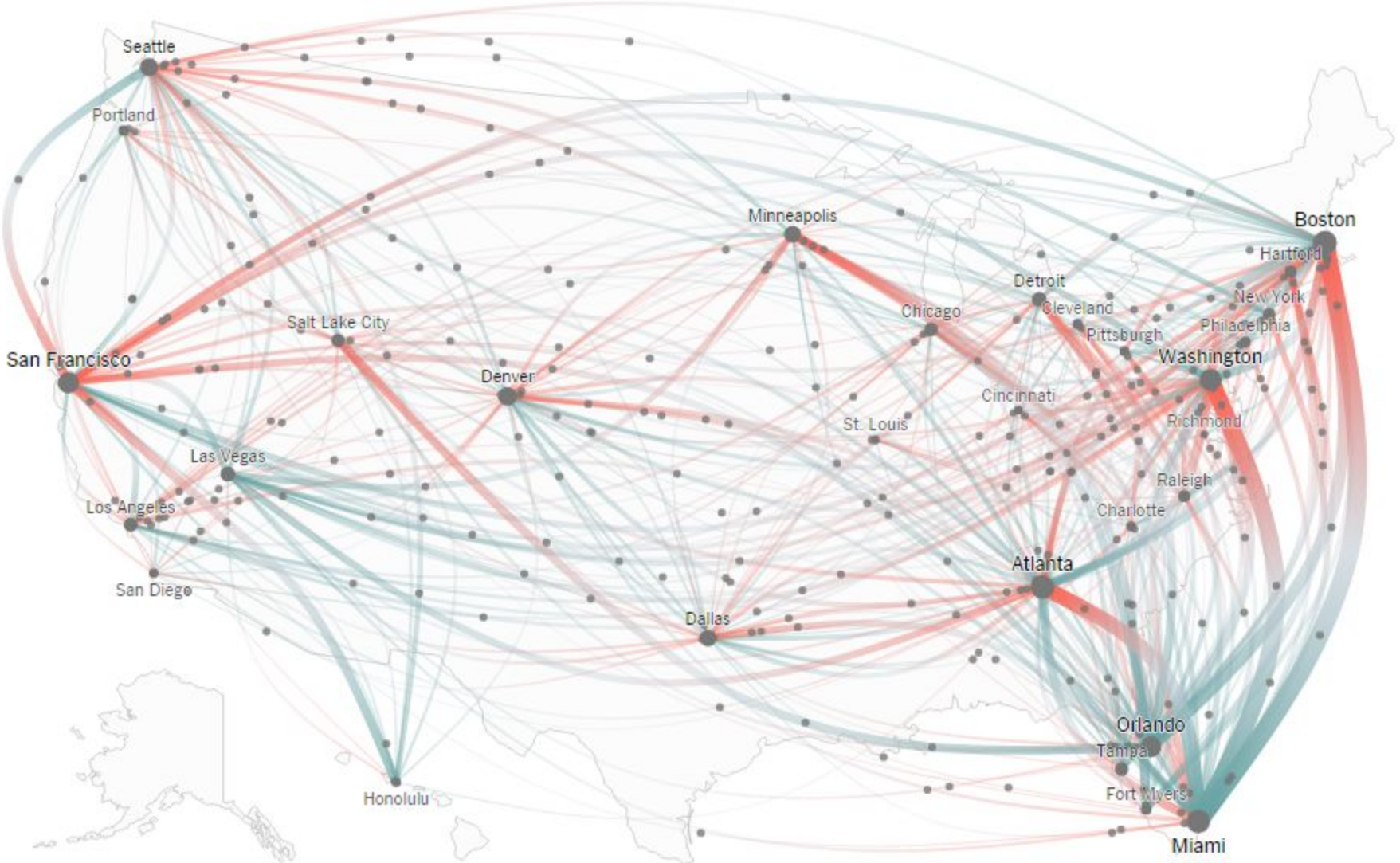




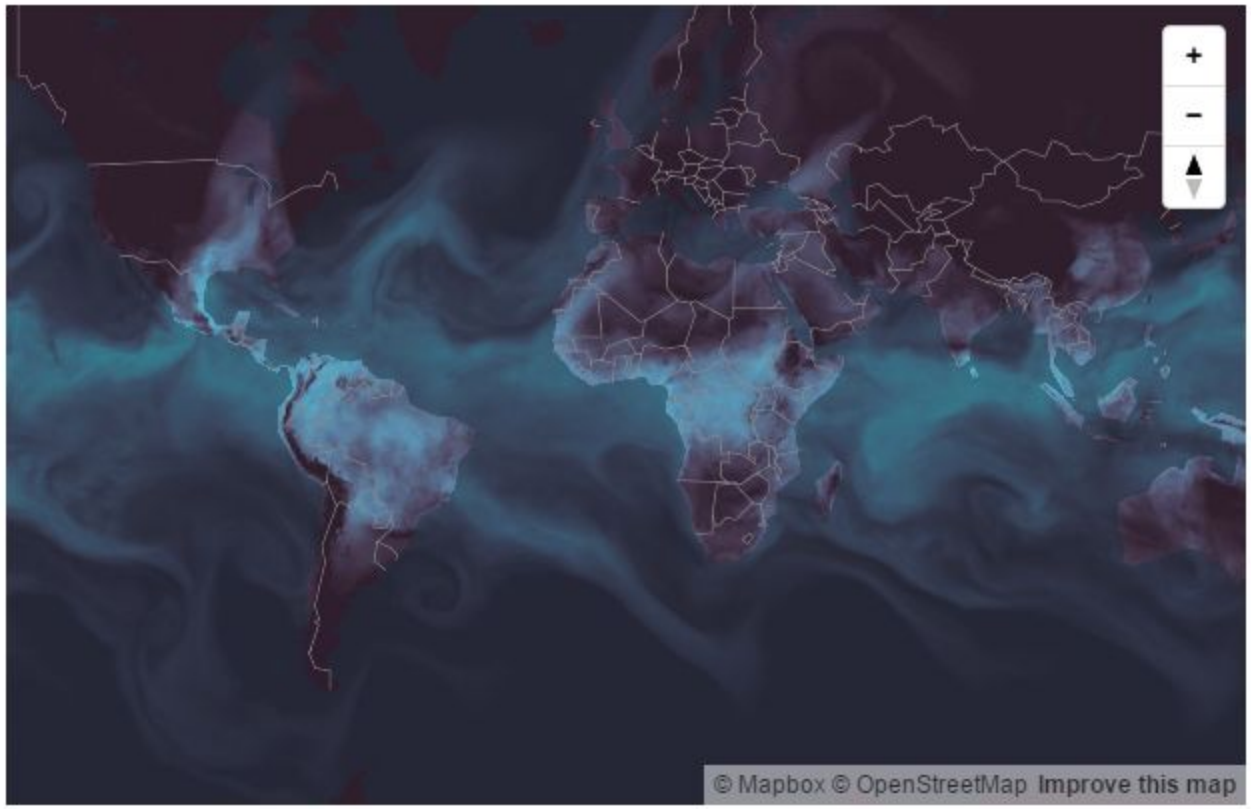




http://courtvisionanalytics.com/where-do-rebounds-go/



http://www.nytimes.com/interactive/2015/11/24/upshot/thanksgiving-flight-patterns.html



http://www.citylab.com/weather/2015/11/a-mesmerizing-map-of-rainfall-on-earth/413992/

Taxonomy

Underlying map:

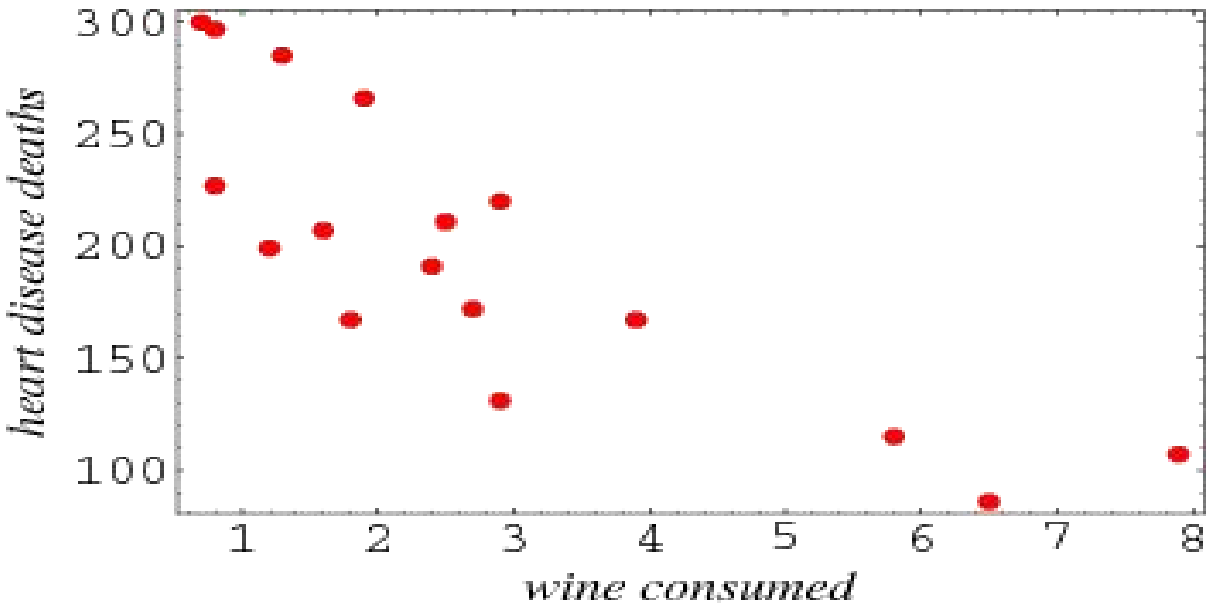
- pictures (Google Maps)
- rendered (various degrees of realism)

Visualization abstraction:

- scatter plot
- heat map

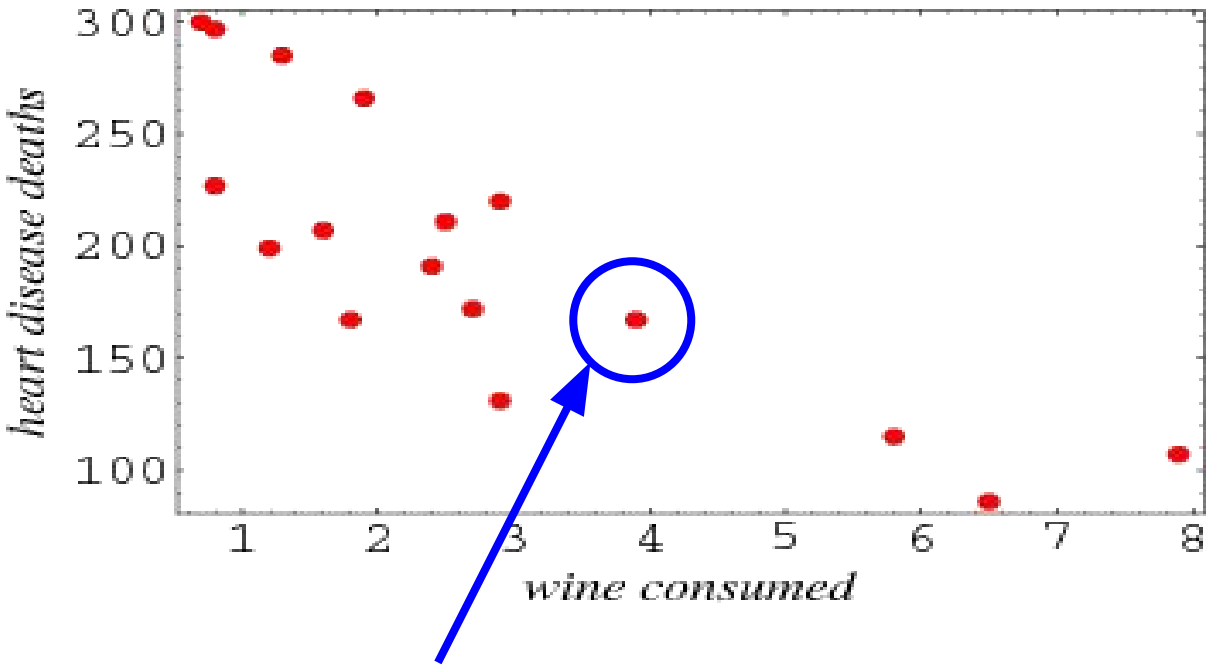
Scatter plot abstraction

A scatter plot:



Scatter plot abstraction

A scatter plot:



Plot a point at some (x,y) coordinate based on X and Y dimensions

Scatter plot abstraction

A scatter plot:

Plot a point at some (x,y) coordinate based on map grid (e.g., latitude/longitude)

Scatter plot abstraction

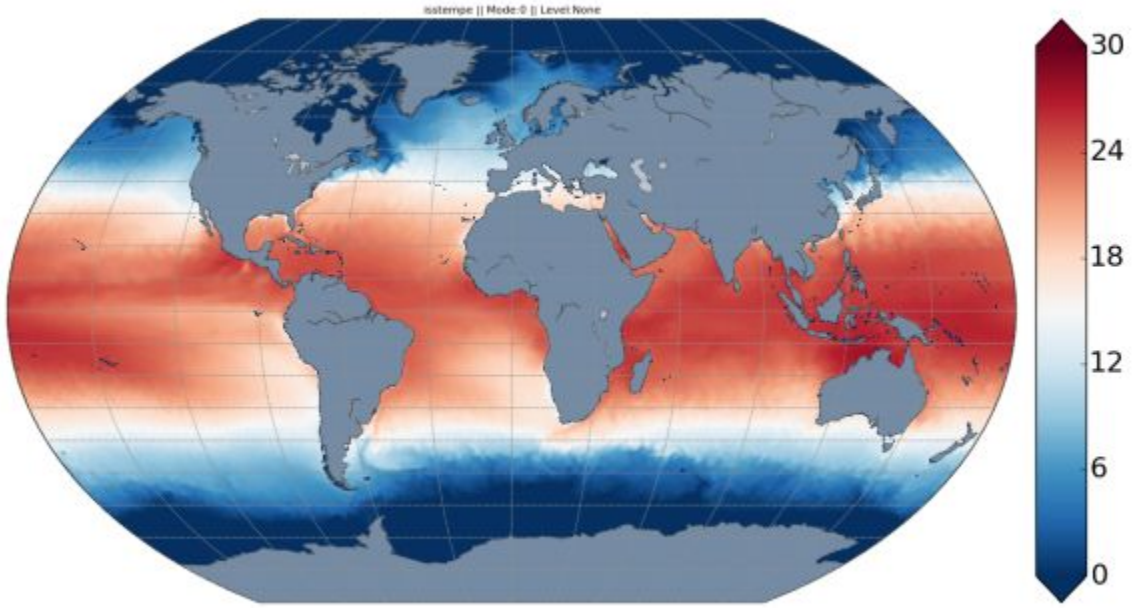
A scatter plot:

Indirect: “Plot at Tulsa, OK”

Obtain coordinates via lookup table

Scatter plot abstraction

Can get tricky with different projections



Thankfully, people developed libraries for this

Heat map abstraction

- Collection of cells
- Each cell is assigned a number
- A cell is colored according to its number

For maps, cells can be any area on the map.

- to be able to style it, each cell needs to be its own element
- each cell should be addressable

E.g., a cell may be a country

Finding geometry

A map is ultimately described by a set of lines describing boundaries of the cells.

Where do you find such geometry?

- The rabbit hole of all rabbit holes

GeoJSON is a JSON format for encoding geographic data

- many maps available

TopoJSON

D3 understands GeoJSON

- via the d3.geo module

D3 also supports TopoJSON, a more space-efficient map representation

Basic process to render a map:

- create a projection (world data is 3D)
- create a path generator (to transform projected data to SVG <path> elements)

Demo