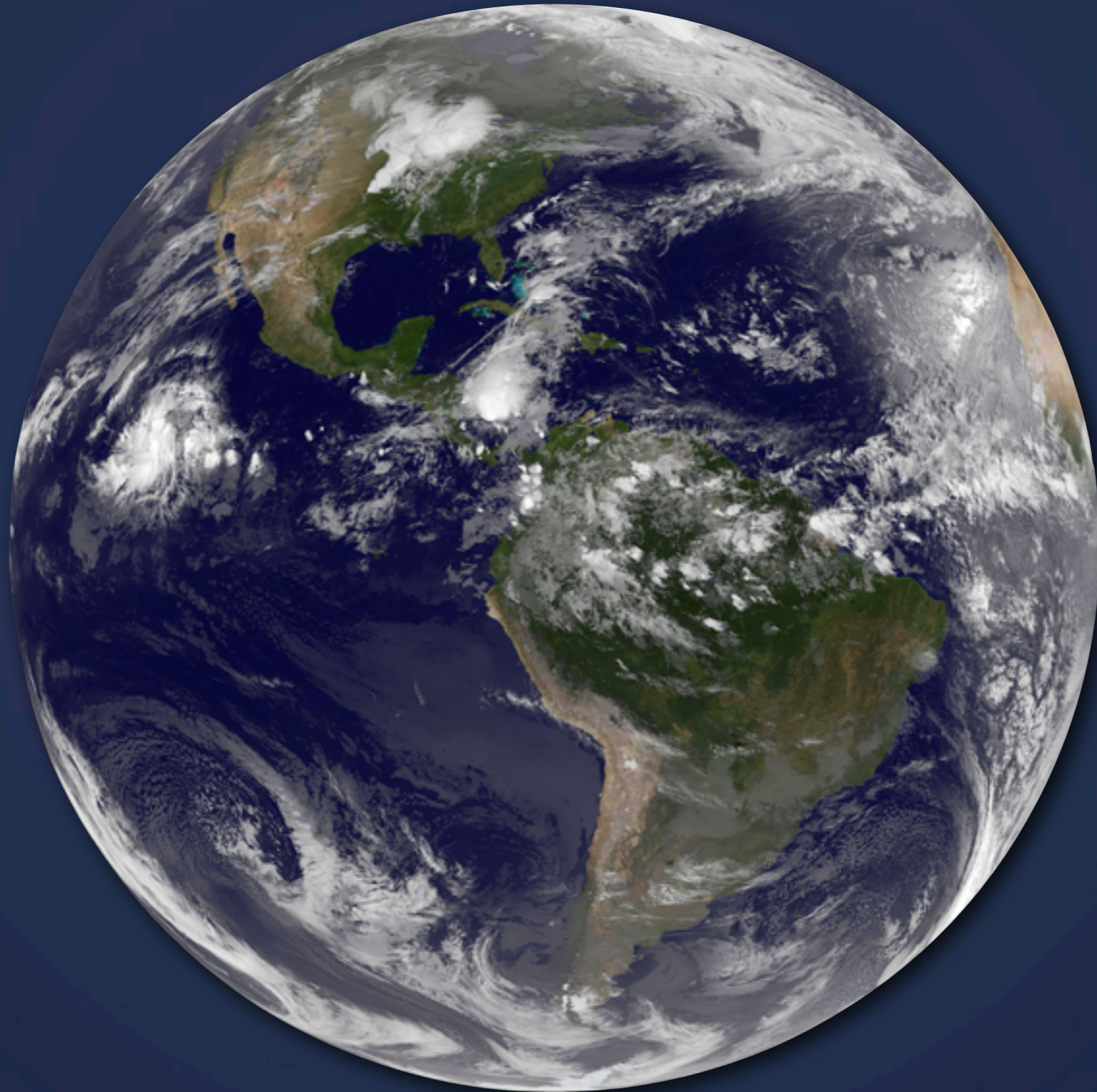


Visualization Types IV

Geospatial Visualization

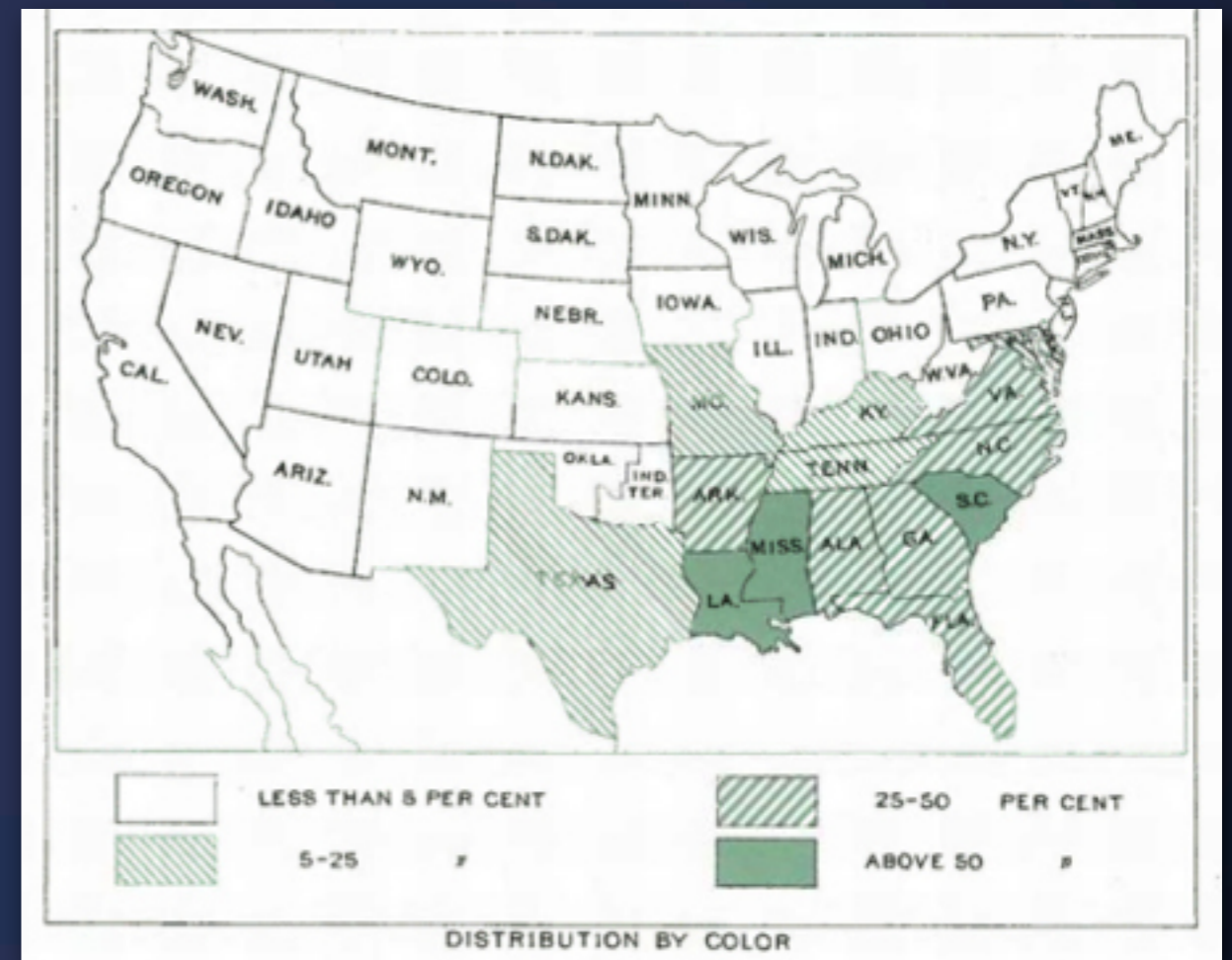
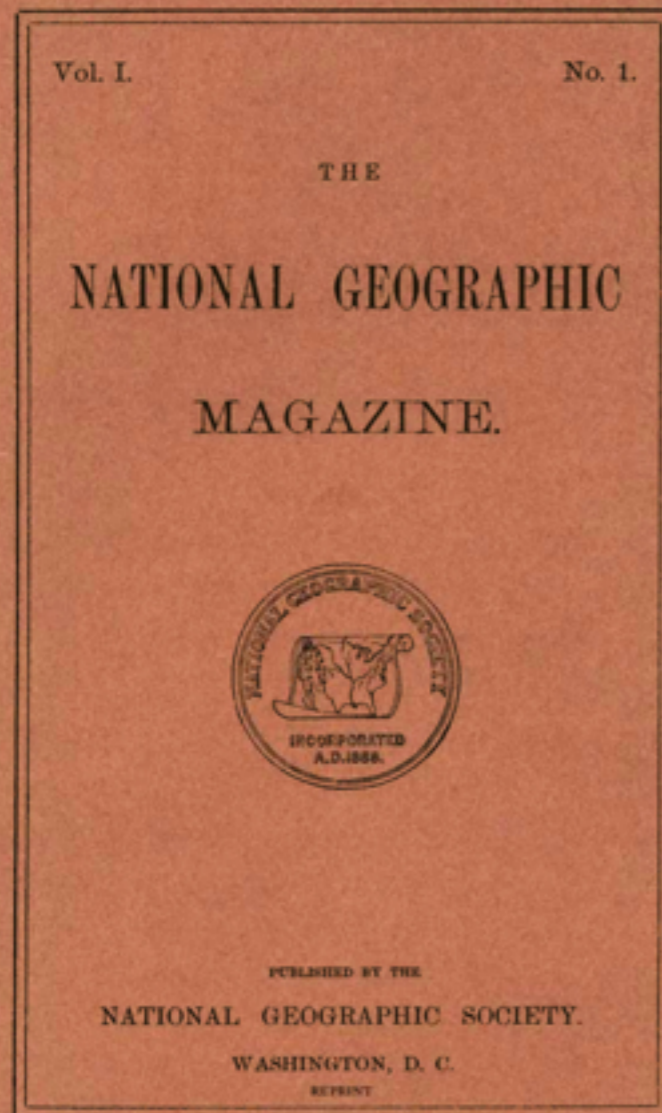
April 23, 2013 – Michael Porath (@poezn)

The Earth



Cartography

National Geographic, around 1900



Cartography

The mother of all visualizations

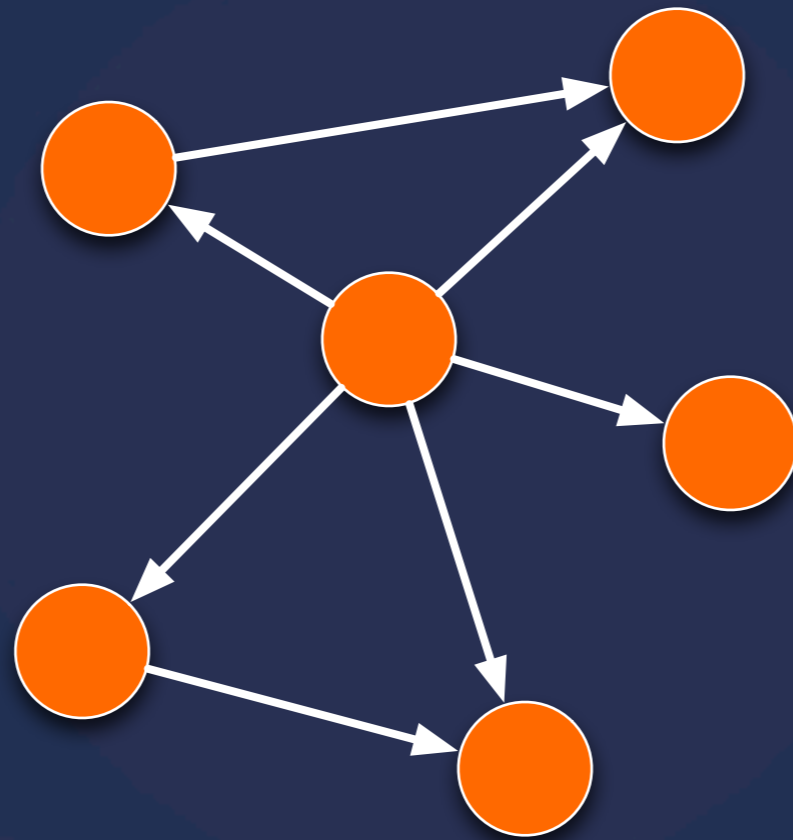


What makes maps effective?



Spatial layout driven by quantitative metrics

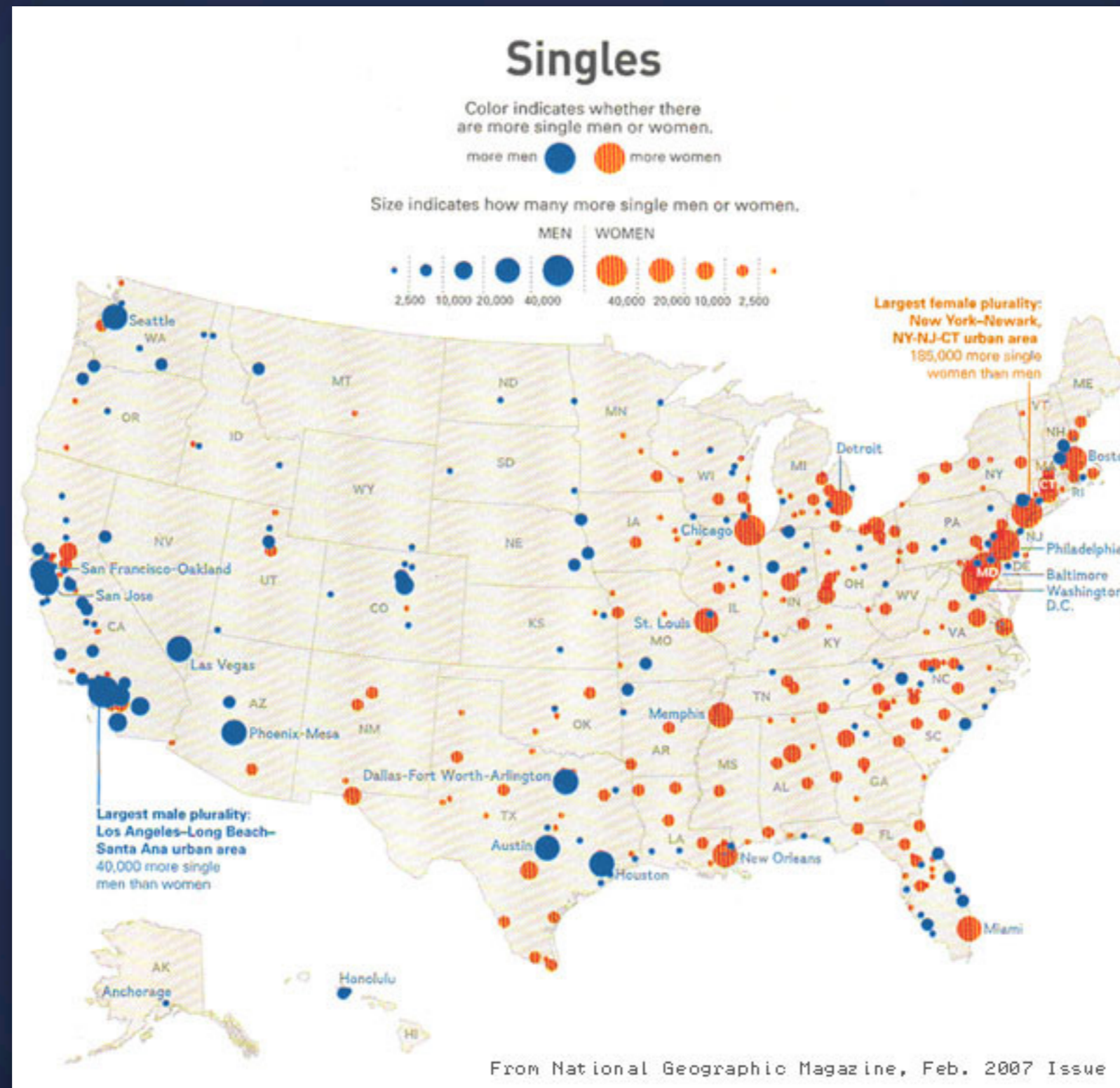
What makes maps effective?



*Spatial layout driven by relationships
or author's choice*

What makes maps effective?

Inherent emotional, qualitative meaning in how things are laid out



What tasks? Discuss.

**What is the reader's task/objective when
looking at a visualization of geospatial data?**

Tasks

Once again: objective and intent

How close to one another are different features?

How dense are a number of observations?

Where can I find X?

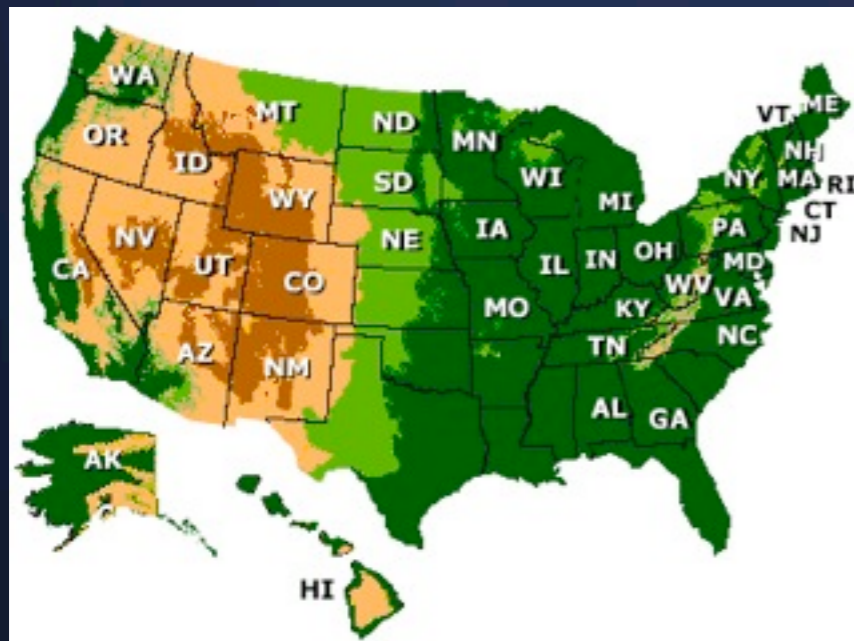
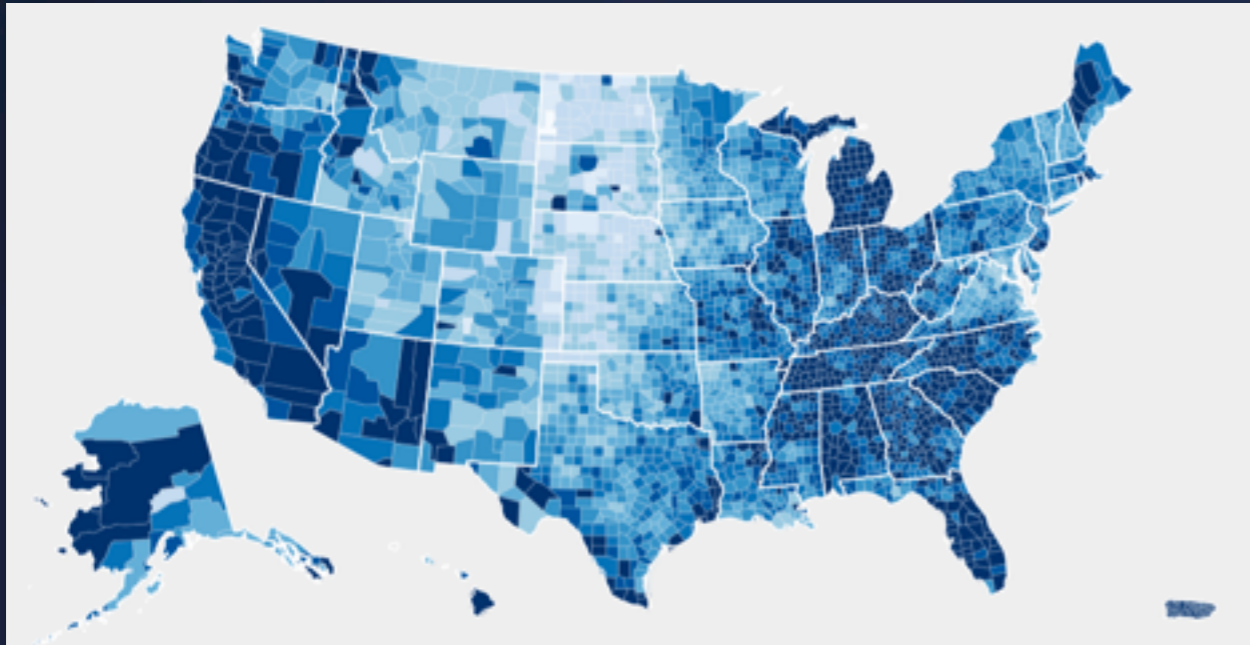
What is *adjacent* to each other?

Are there any recognizable *clusters* of observations?

Are there any *patterns*?

Categories of Maps

4 Types



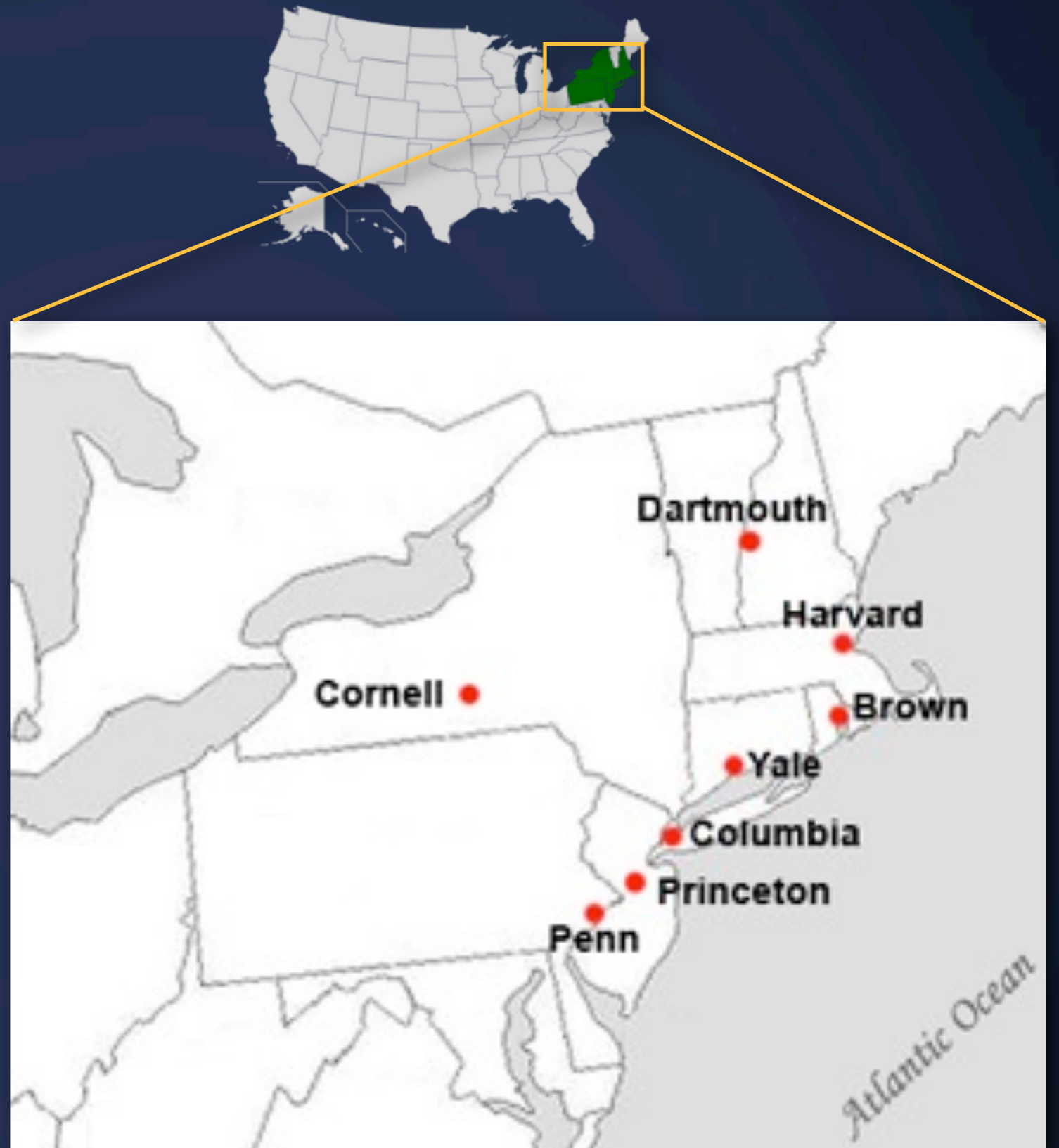
Dot Map

Visualizing specific points

Nominal data

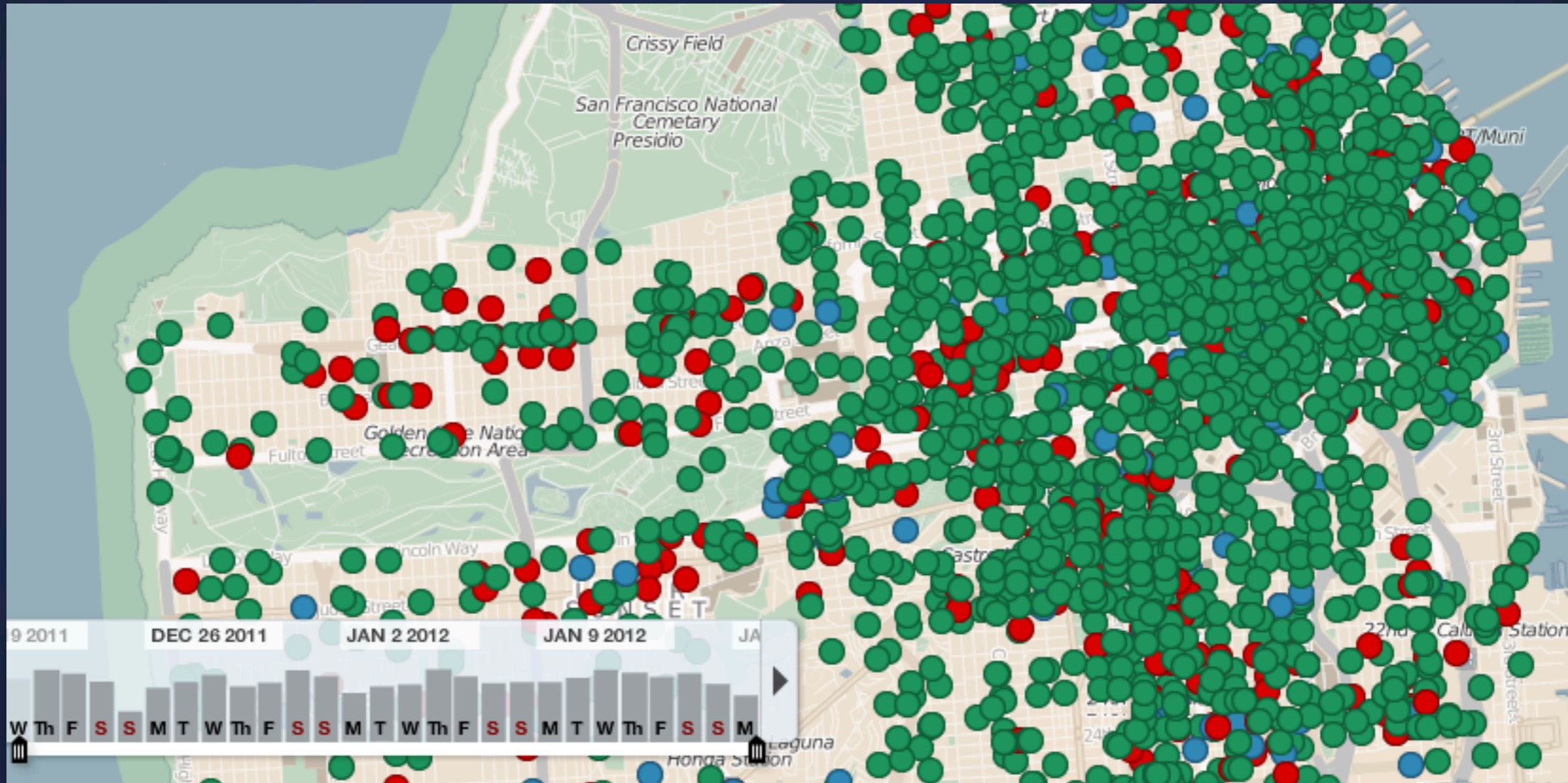
Arranged by
Latitude/Longitude

Each point has an
exact location



Dot Map

Example: Crimespotting

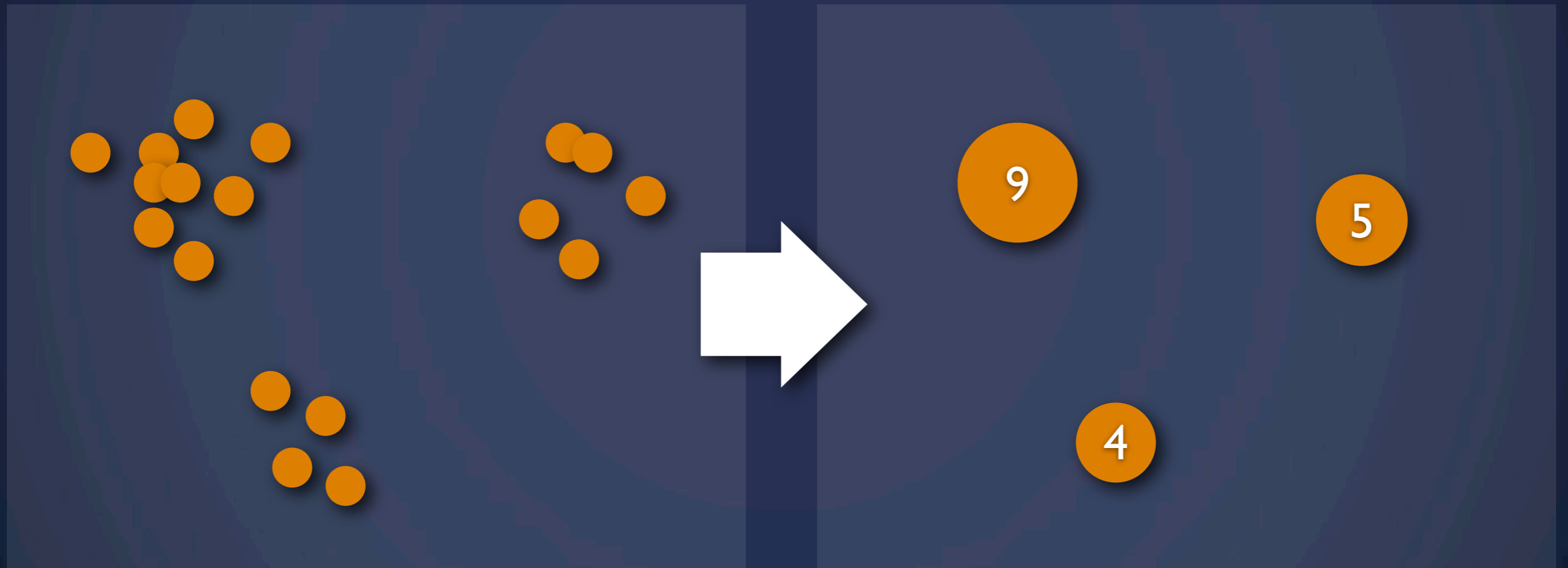


<http://sanfrancisco.crimespotting.org>

Problem?

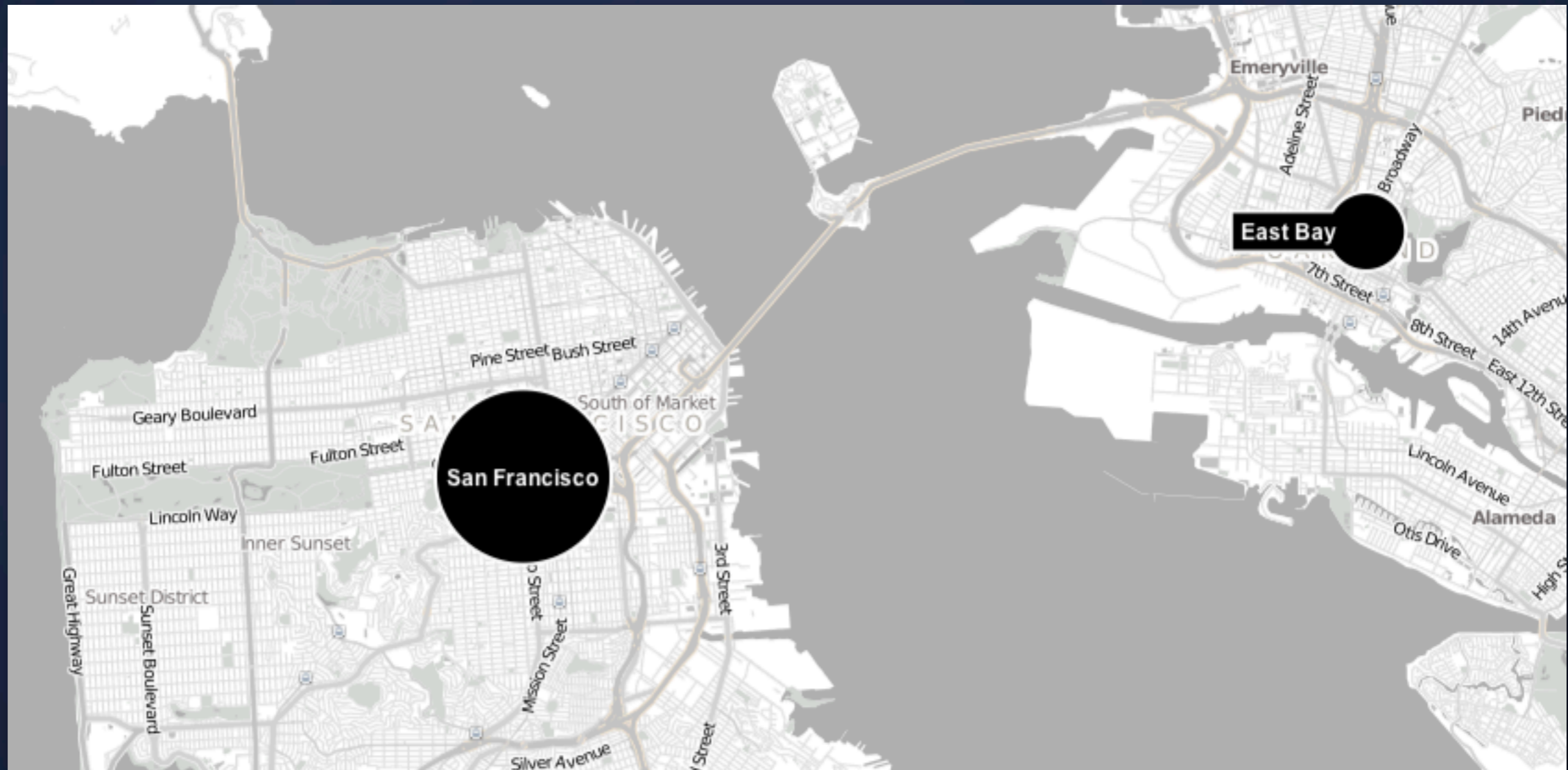
Dot Map

Solution: Clustering. Here: k-means algorithm



Dot Map

Using k-means Clustering



<http://www.trulia.com/crime/>

Dot Map

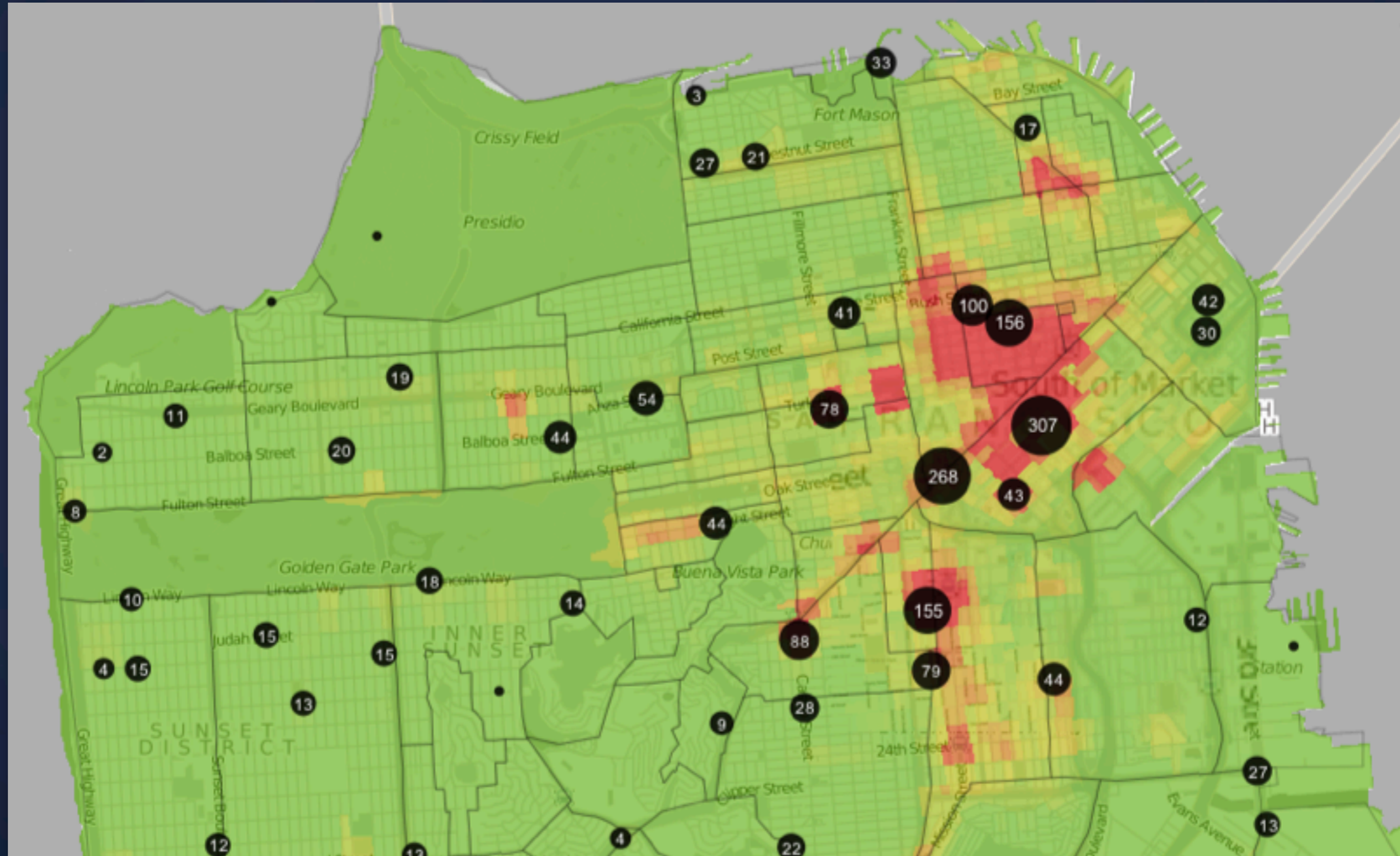
Using k-means Clustering



<http://www.trulia.com/crime/>

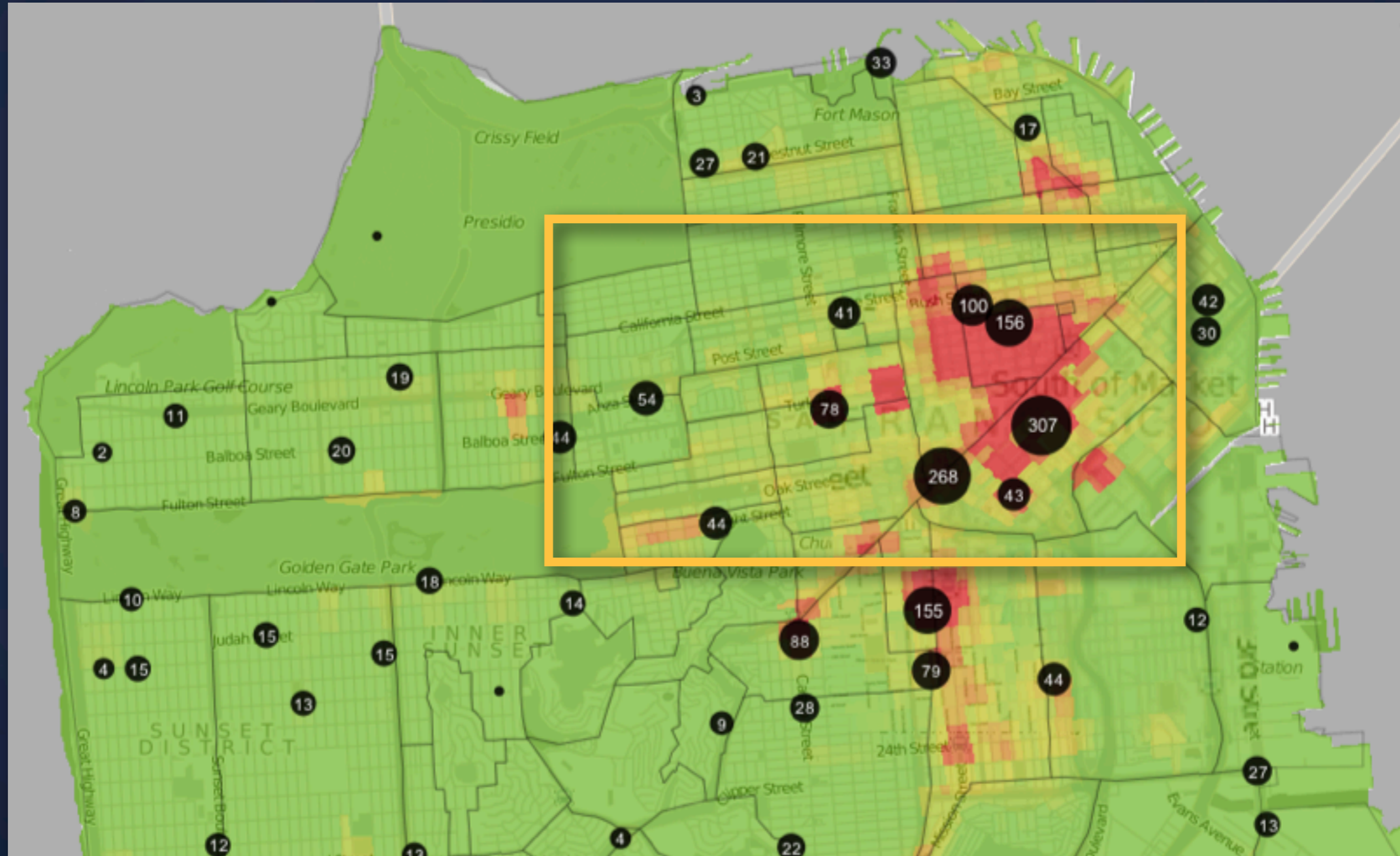
Dot Map

Using k-means Clustering



Dot Map

Using k-means Clustering



Dot Map

Using k-means Clustering



<http://www.trulia.com/crime/>

Dot Map

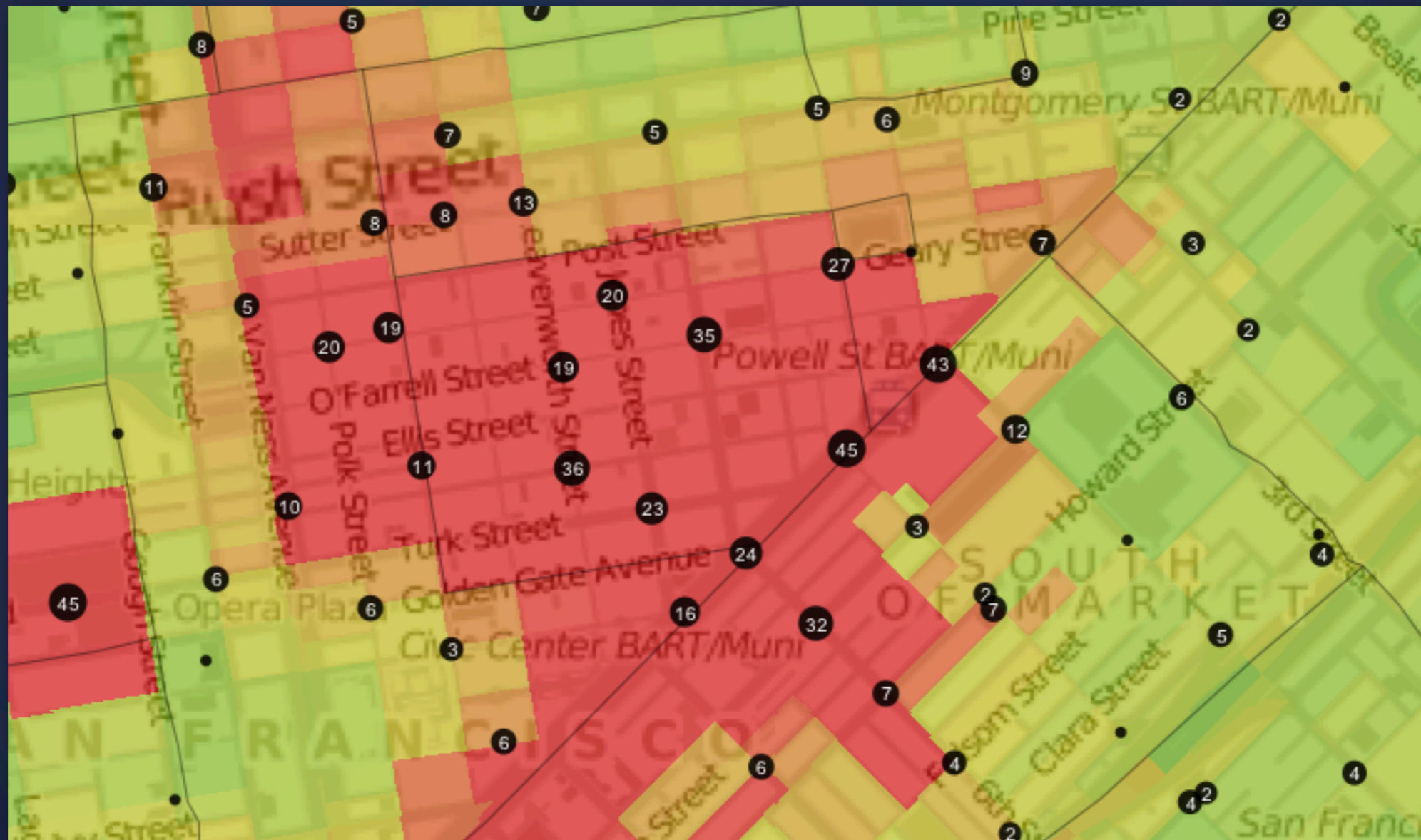
Using k-means Clustering



<http://www.trulia.com/crime/>

Dot Map

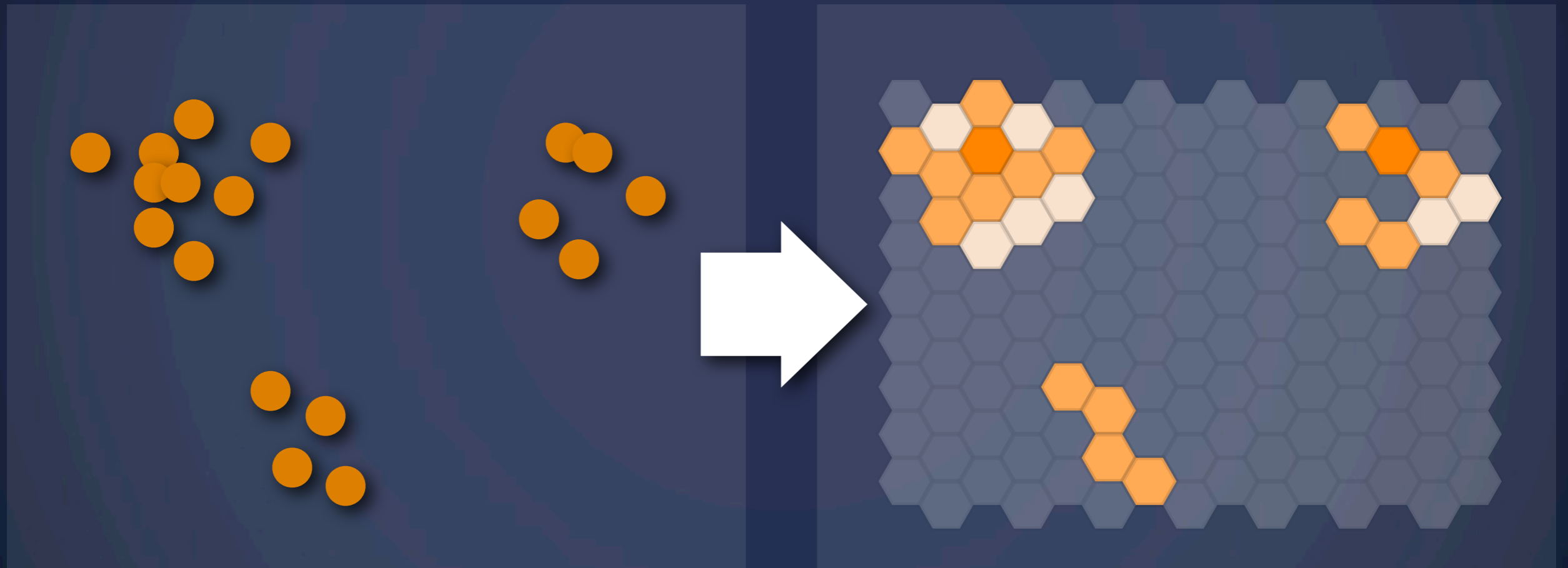
k-means Clustering



<http://www.trulia.com/crime/>

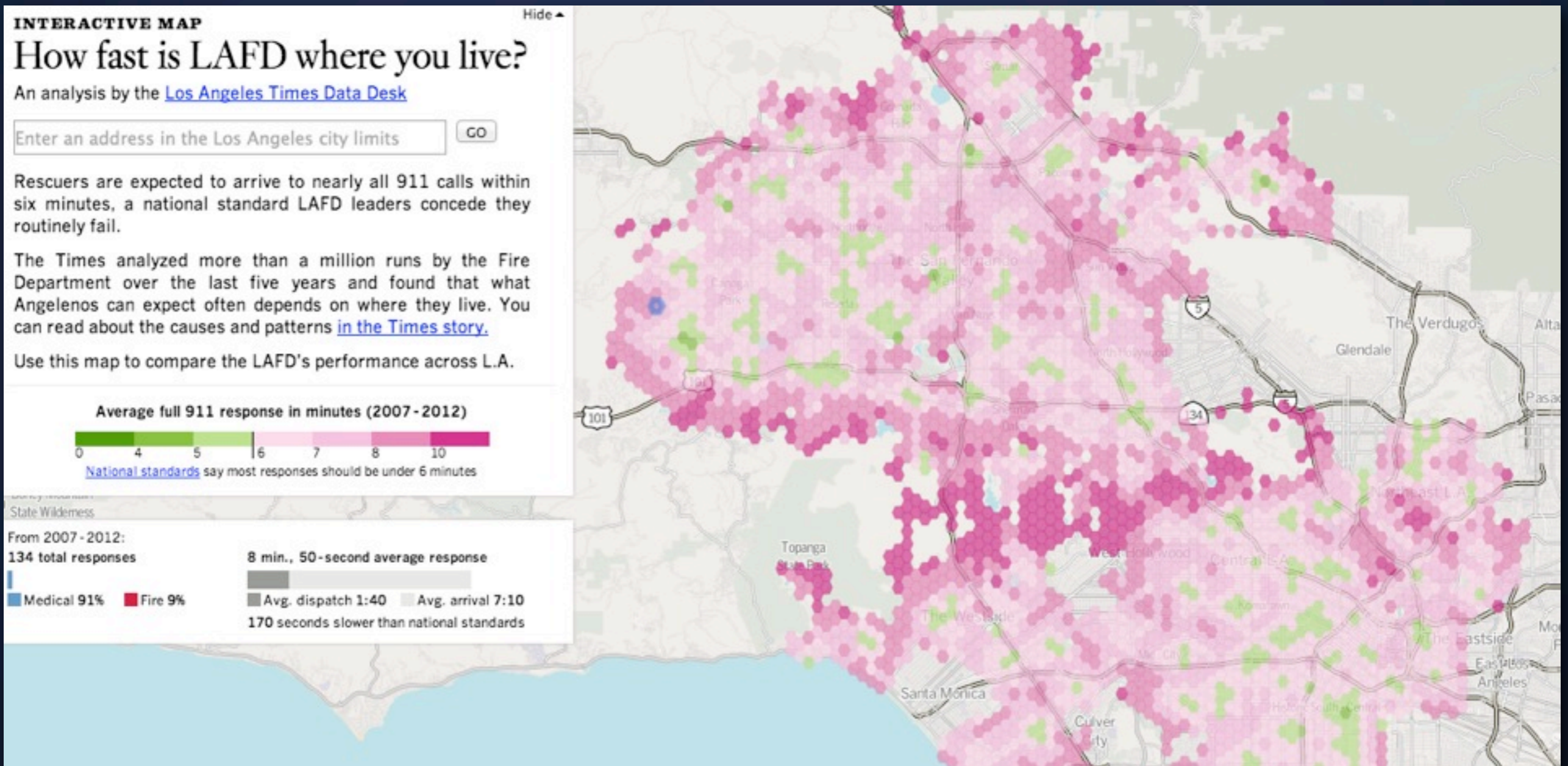
Dot Map

Solution: Clustering. Here: Hexagonal bins



Dot Map

Hexagonal bins

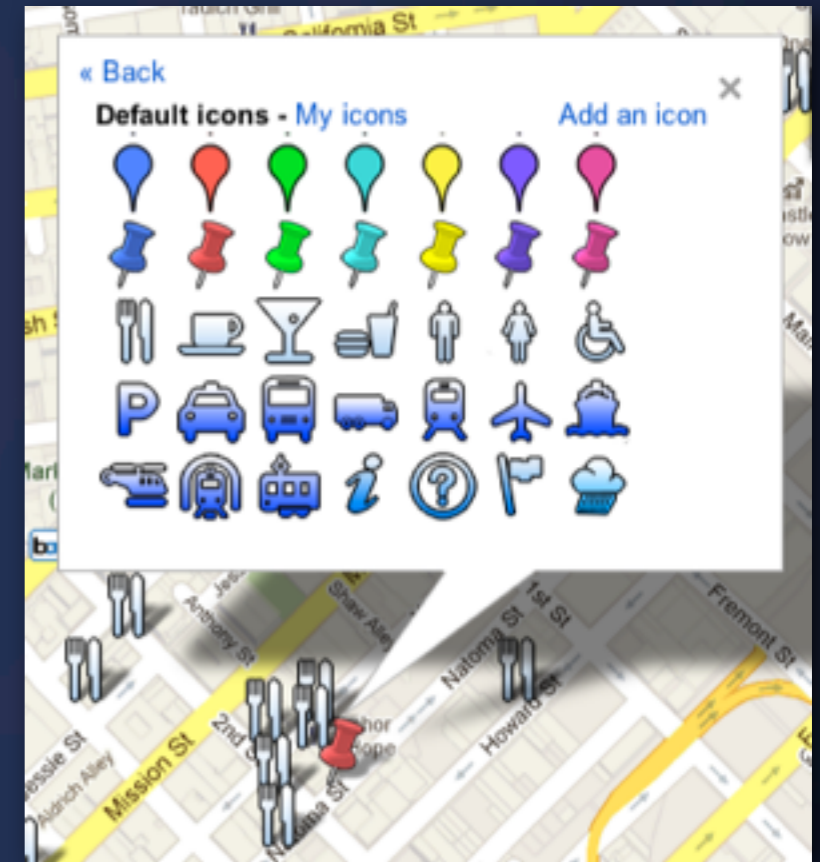
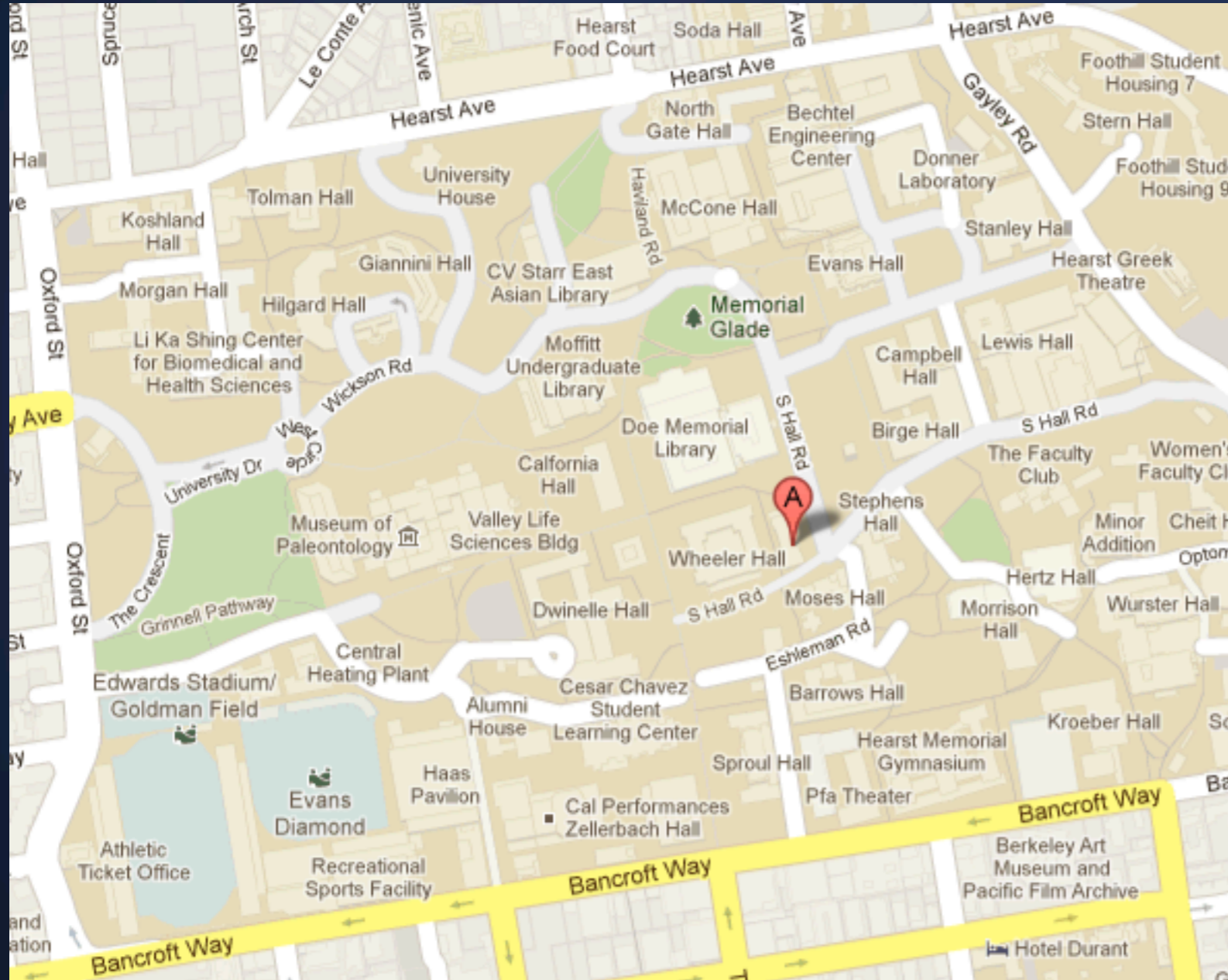


Markers

Which ones?



Google Maps Markers

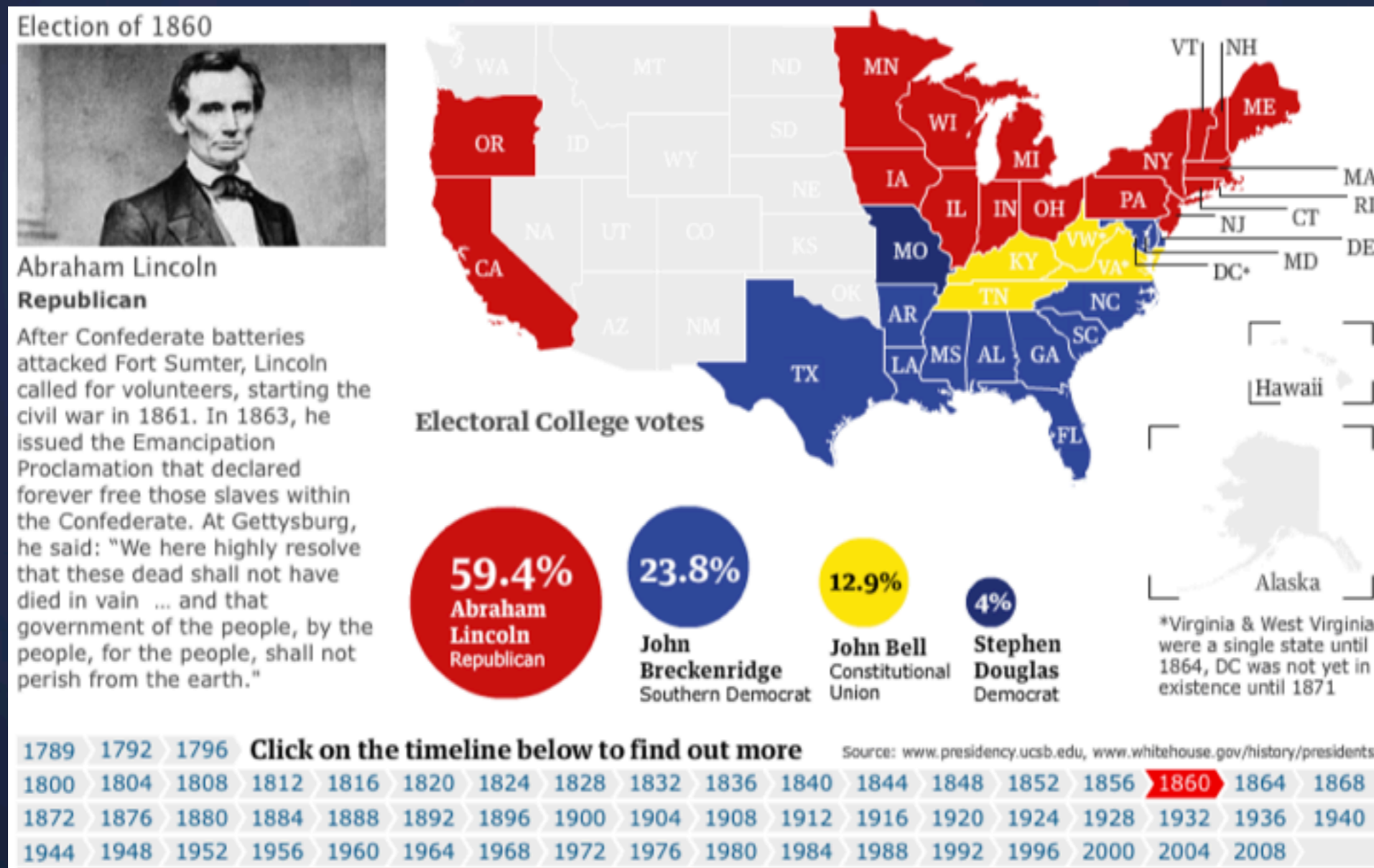


Choropleth Maps

Choropleth Map

Definition

“areas are shaded or patterned in proportion to the measurement of the statistical variable being displayed on the map” (Wikipedia)



Choropleth Map

Problems

Total Population of 2000 Block Groups



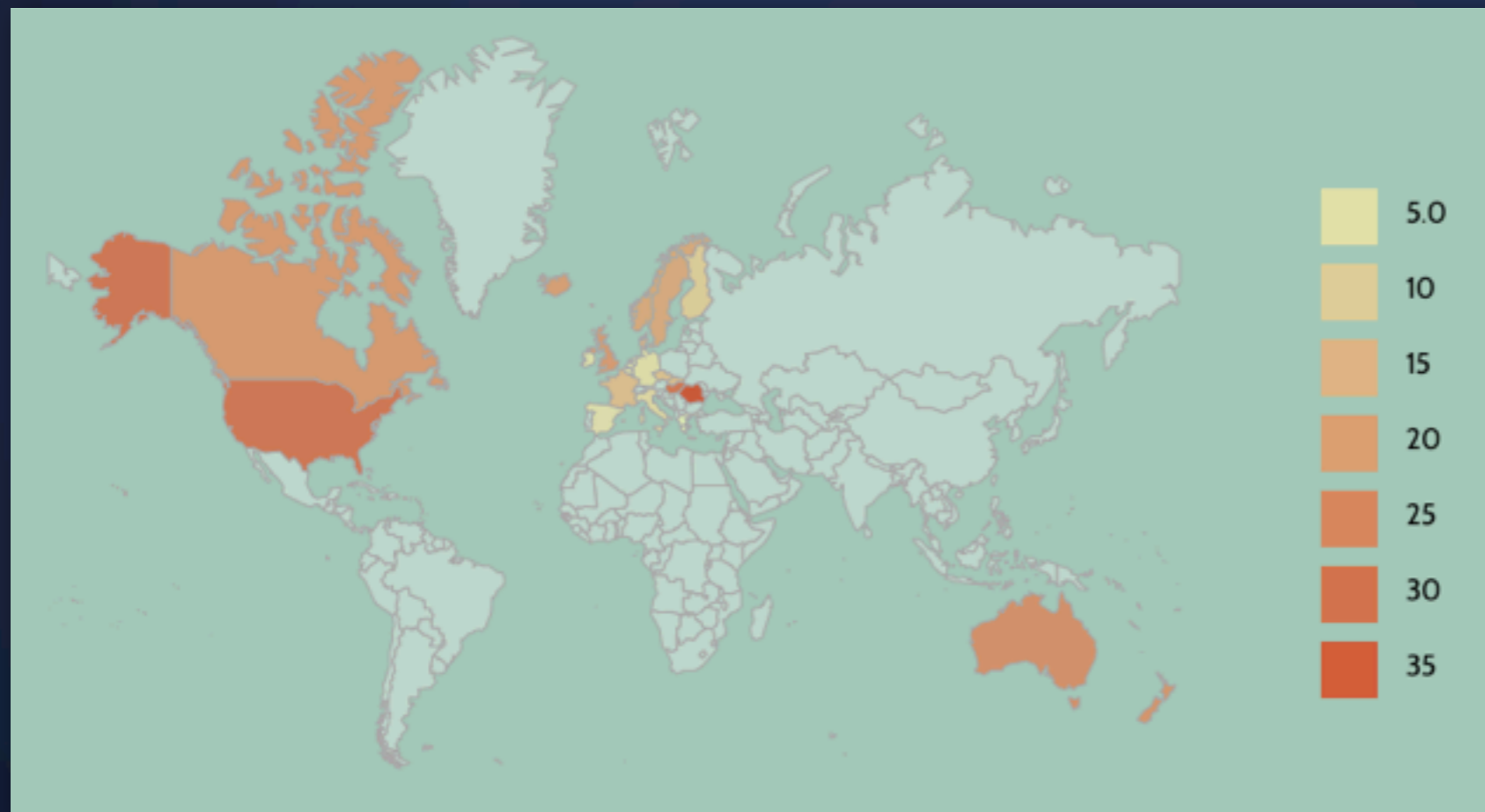
Density

http://en.wikipedia.org/wiki/Choropleth_map

Choropleth Map

Problems

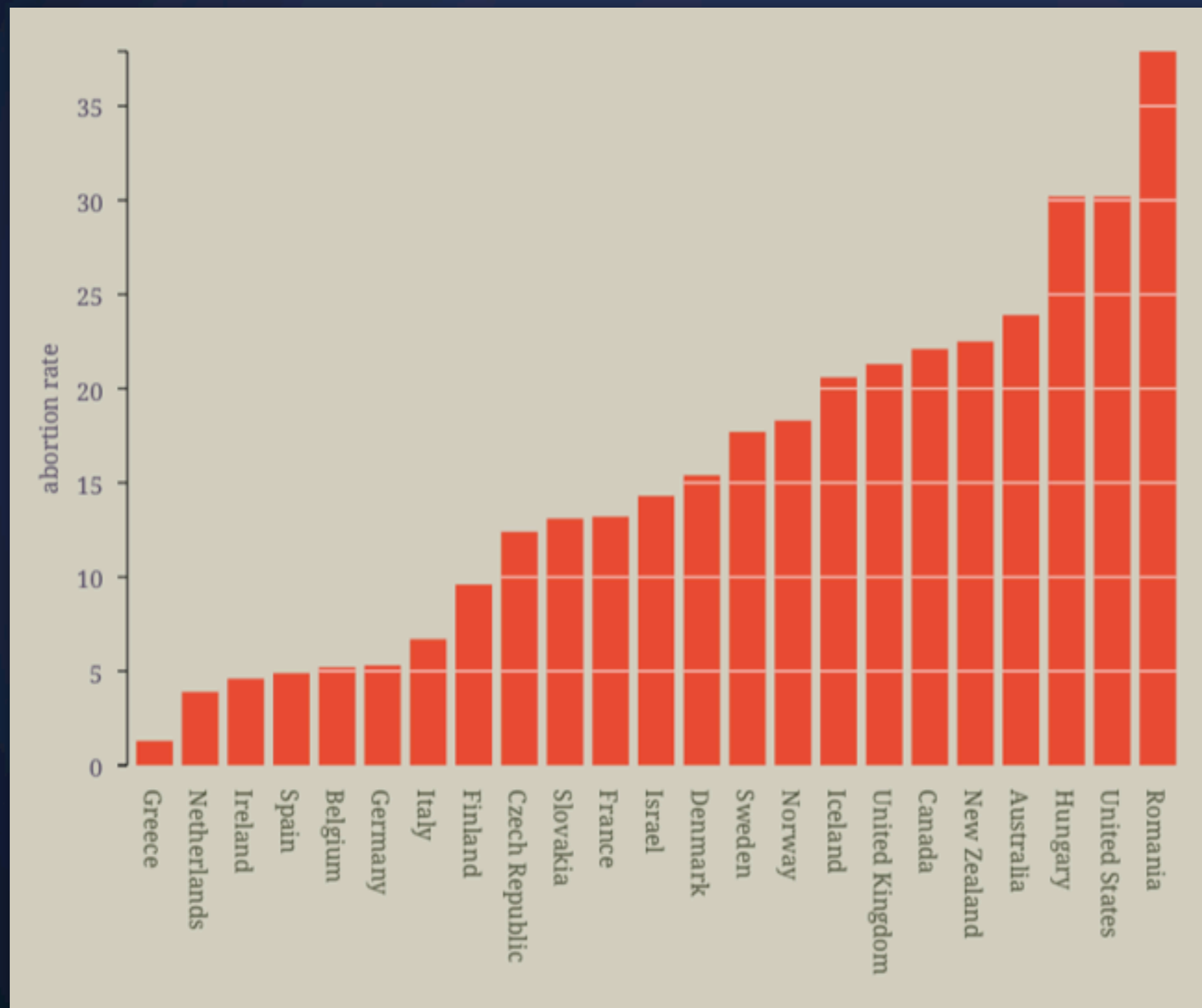
Teen Abortion Rates (%), 1996



Density
Whitespace
Different sizes

Choropleth Map Alternatives

Teen Abortion Rates (%), 1996

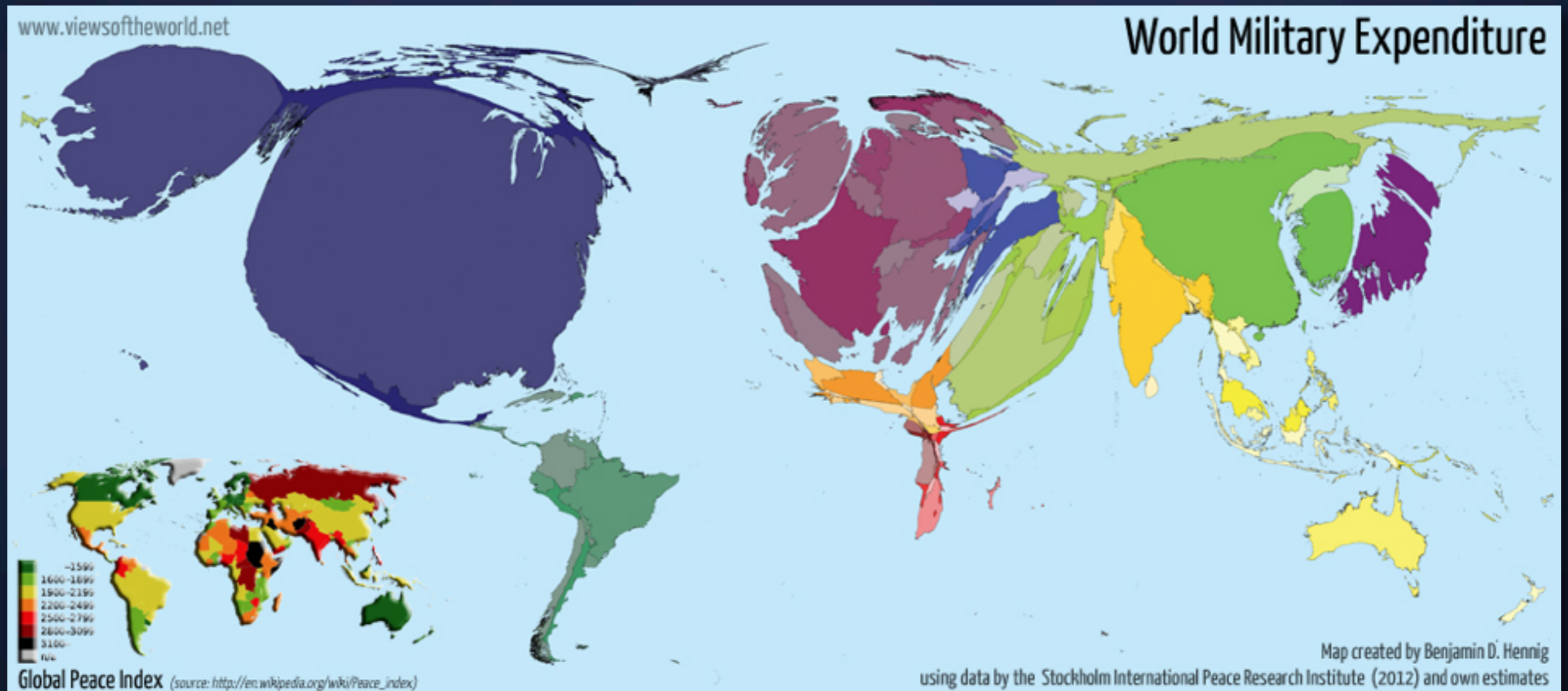


Better, but not
as engaging

Alternatives?
Improvements?

Choropleth Map: Alternatives

Cartogram

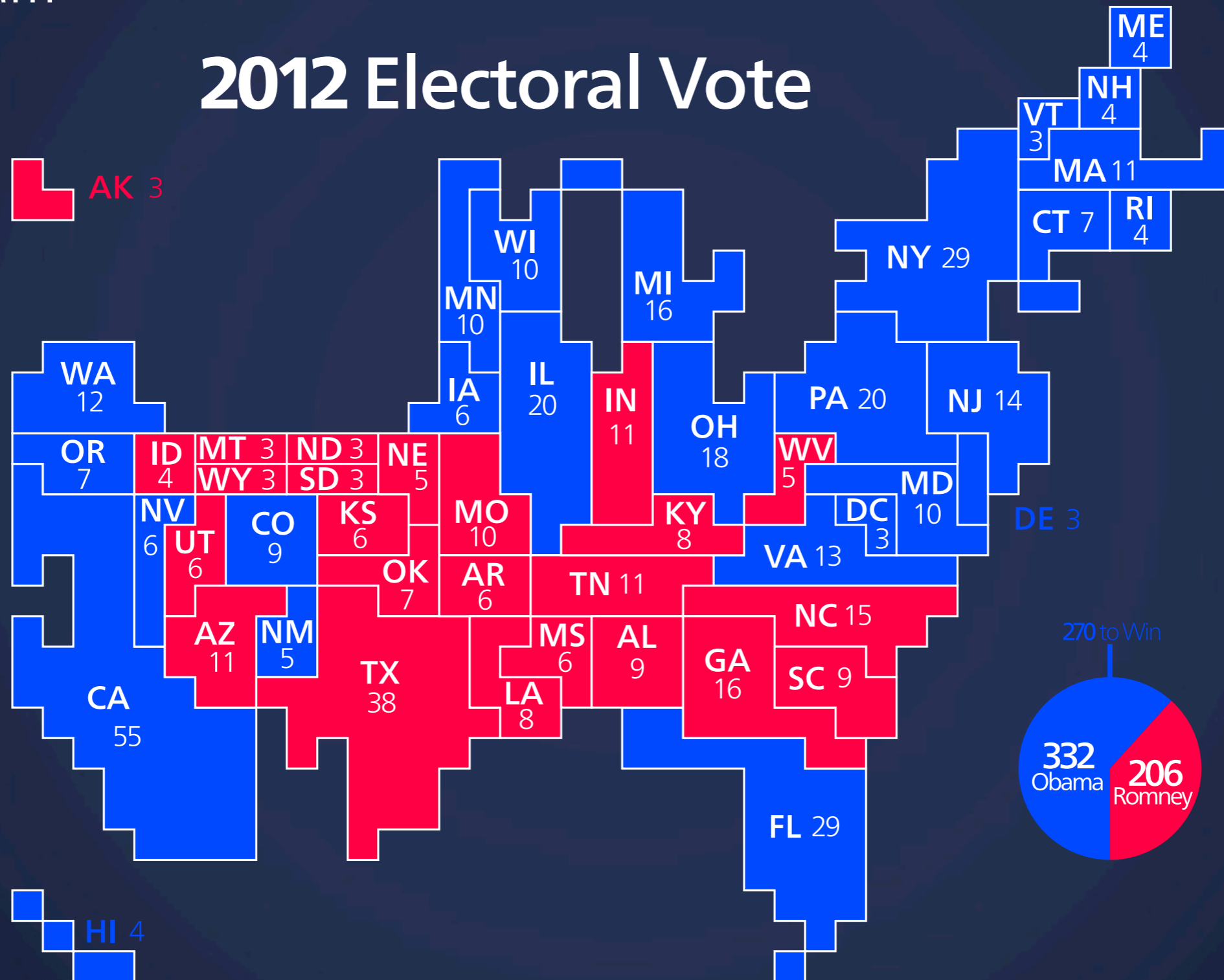


<http://www.viewsoftheworld.net/wp-content/uploads/2013/03/WorldMilitarySpendingMap.jpg>

Choropleth Map: Alternatives

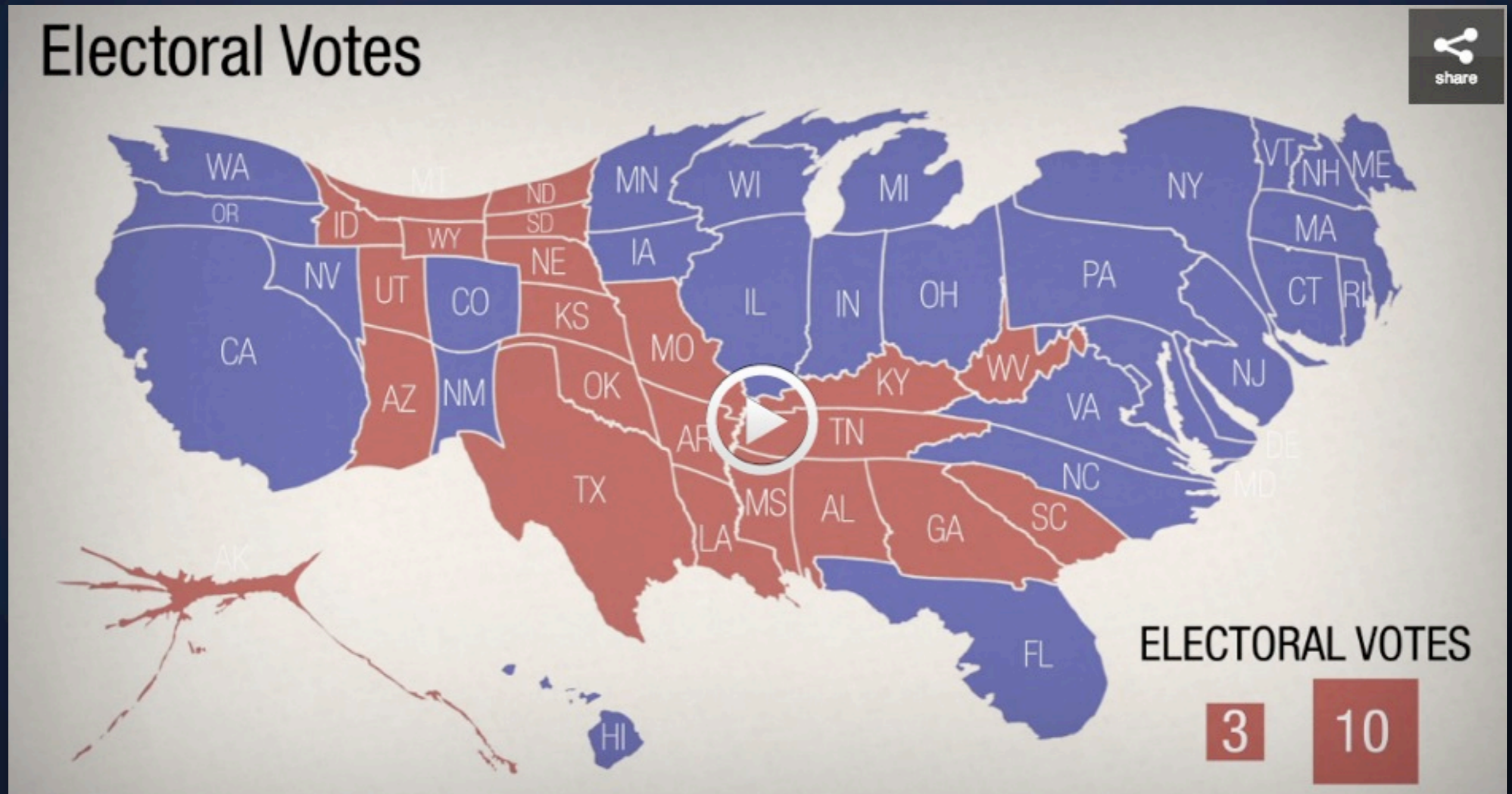
Cartogram

2012 Electoral Vote



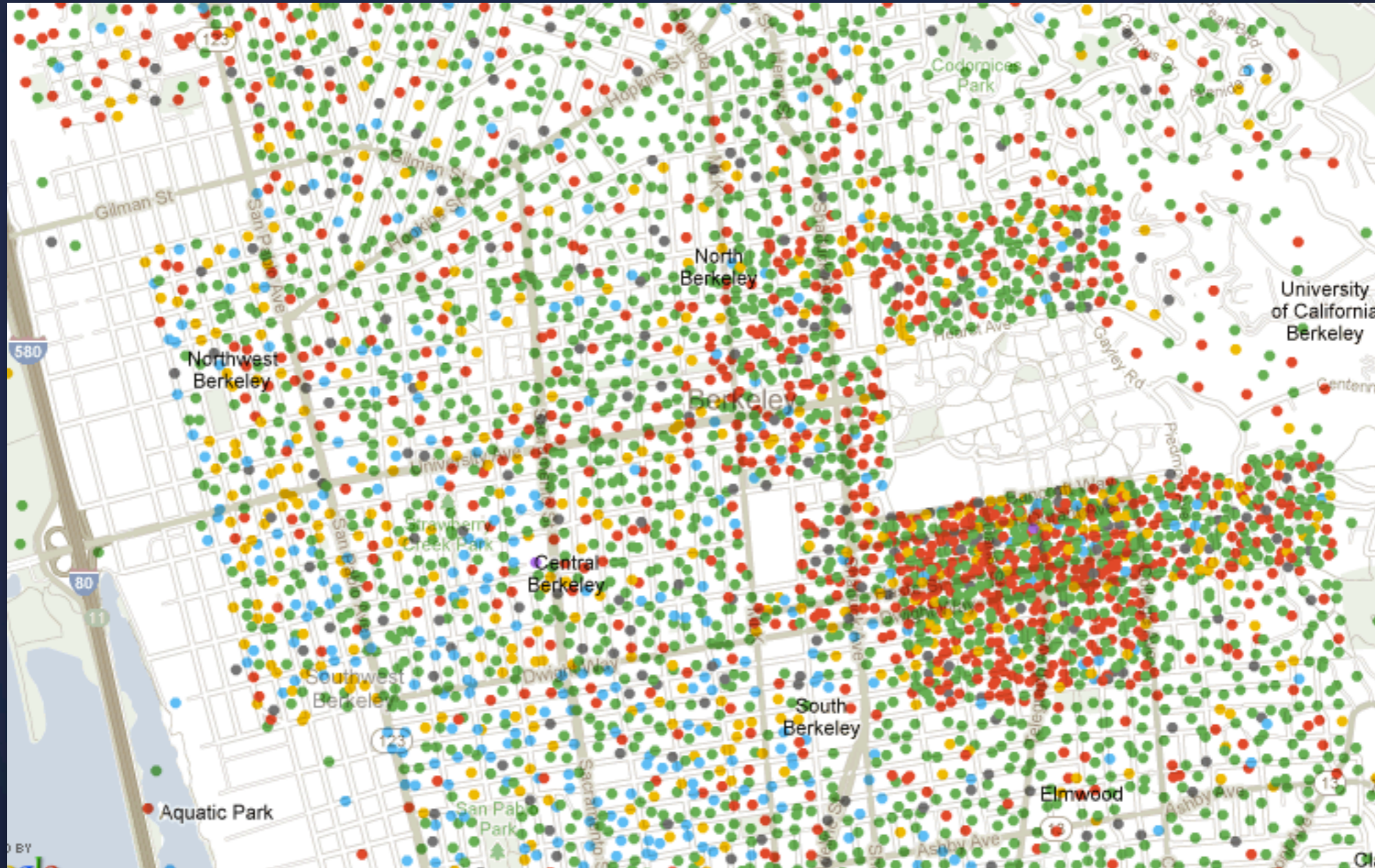
Choropleth Map: Alternatives

Cartogram



NY Times 2010 Census Map

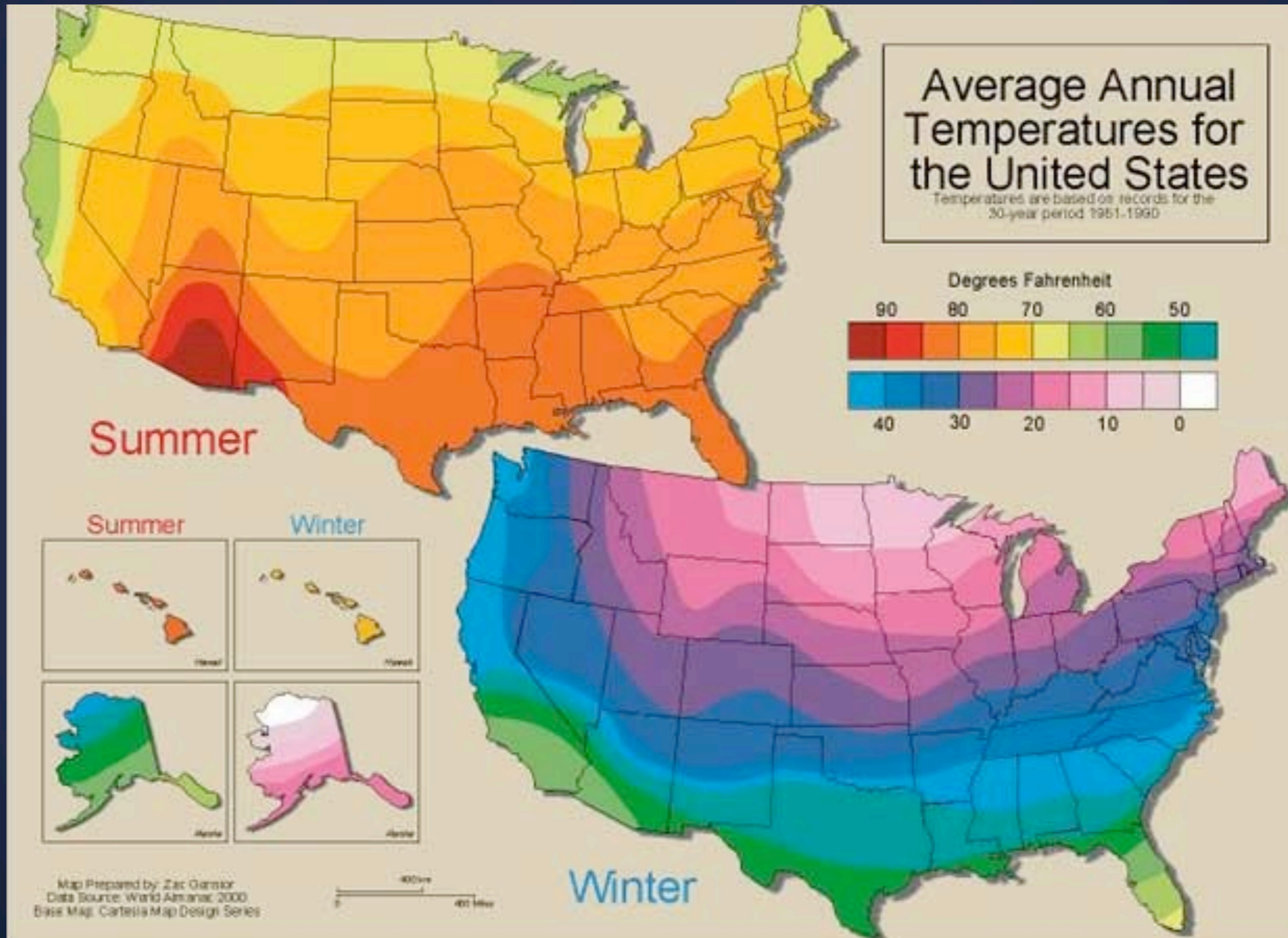
Hybrid between Choropleth and Dot Map



Isarithmic Map

Isarithmic / Isopleth Map

Drawing borders of same intervals



Mental Map

New Yorker

Mental Maps



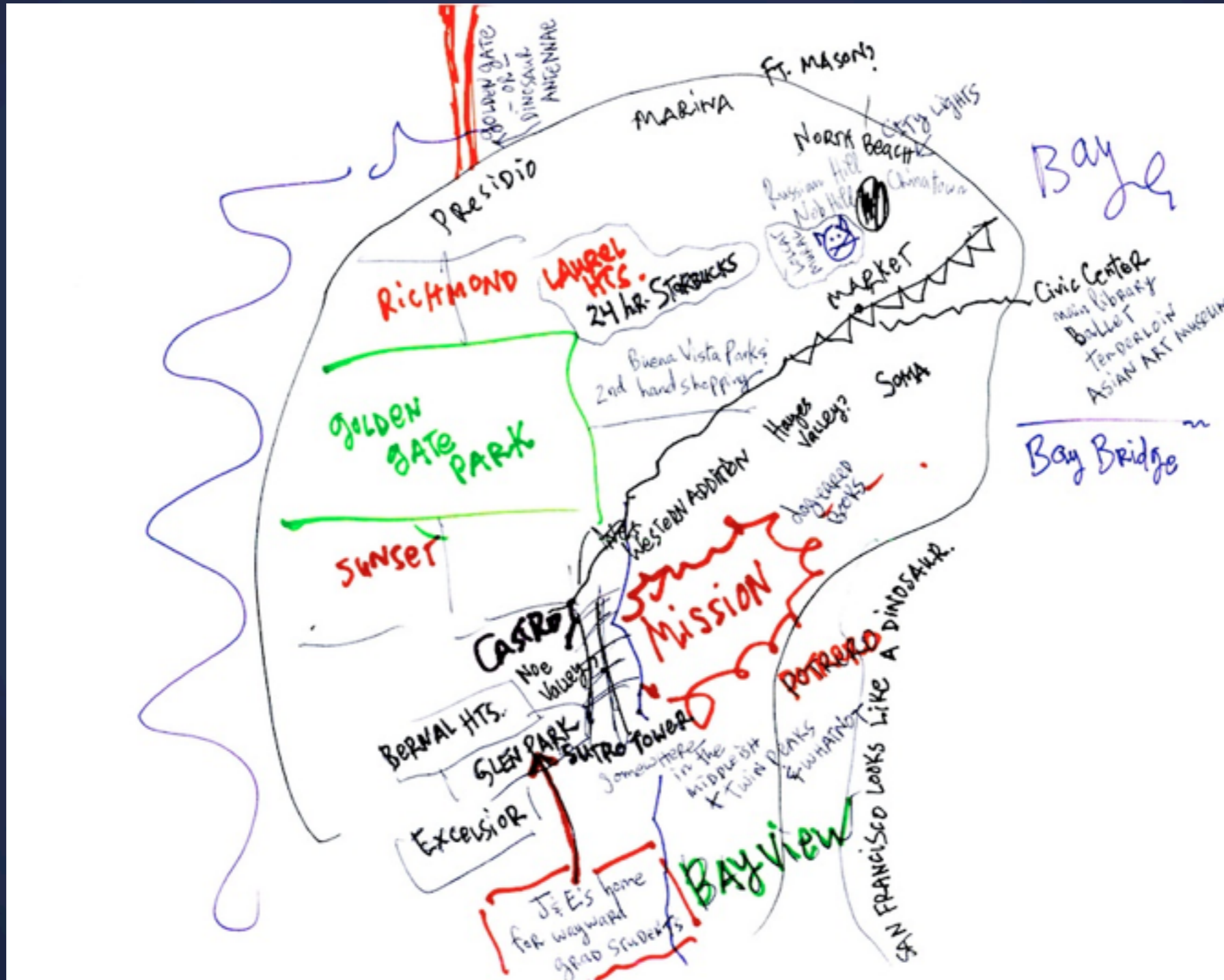
The Economist

Mental Maps



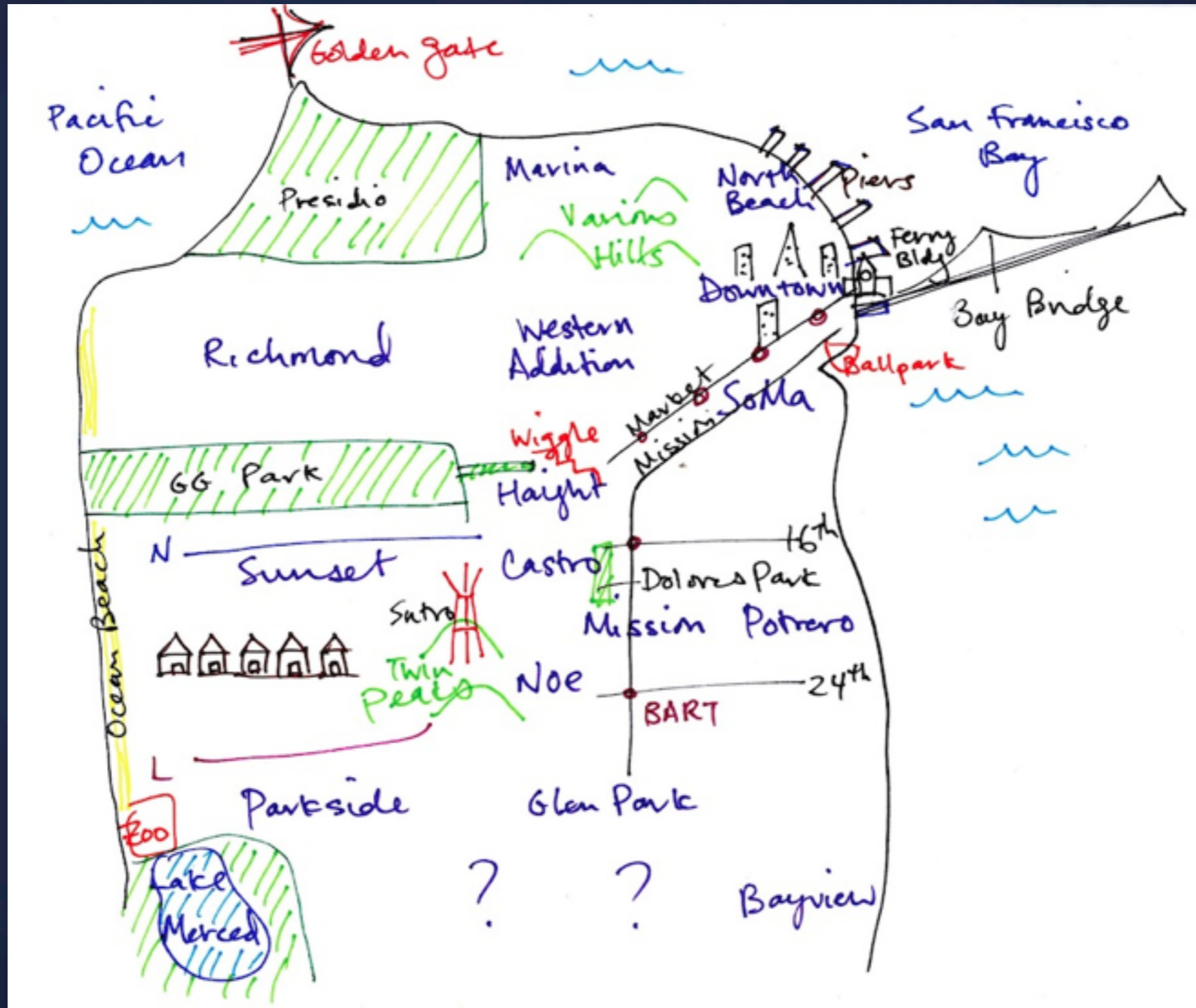
Mental Maps

How do people think about spaciality?



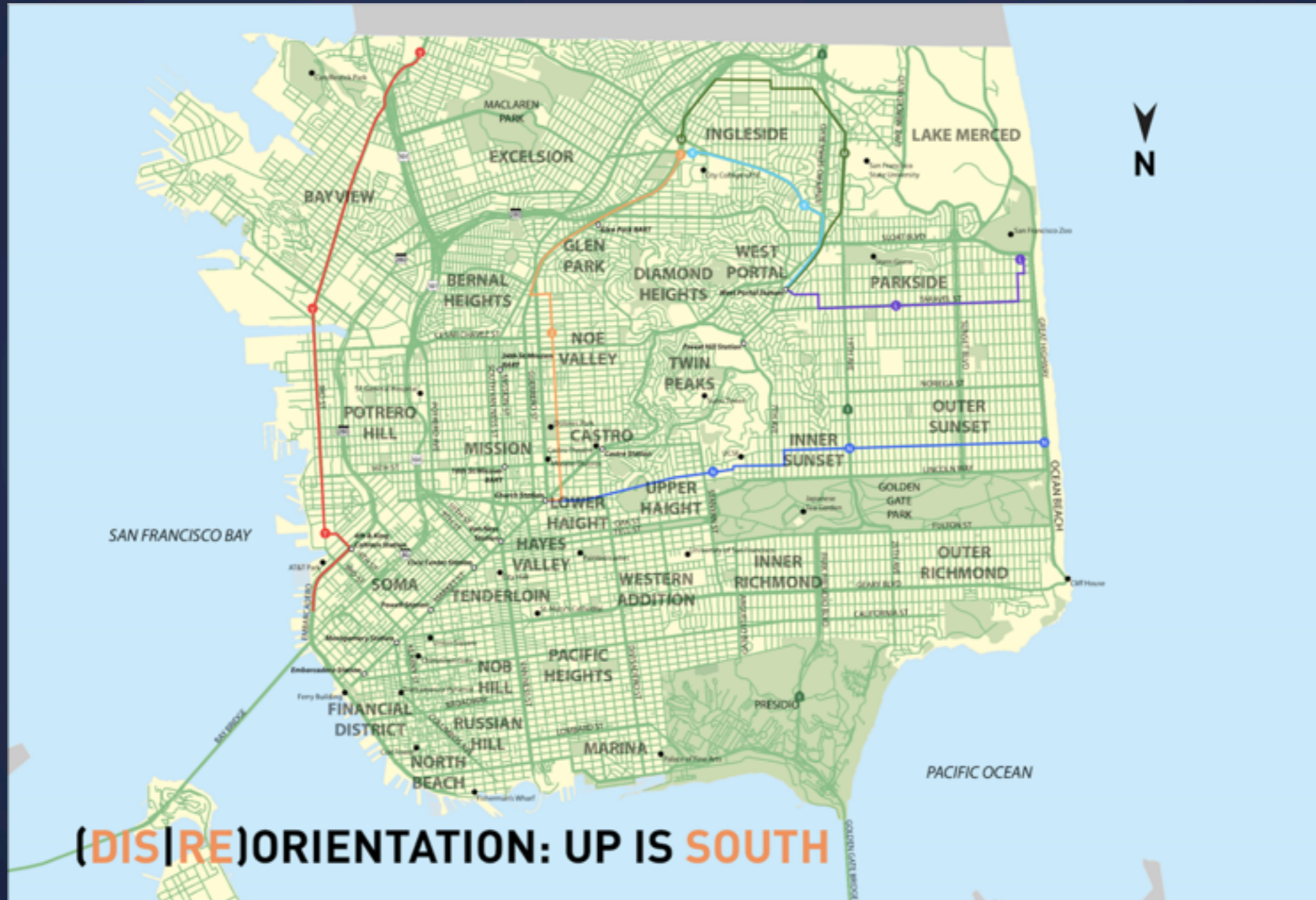
Mental Maps

How do people think about spaciality?



Mental Maps

How do people think about spaciality?



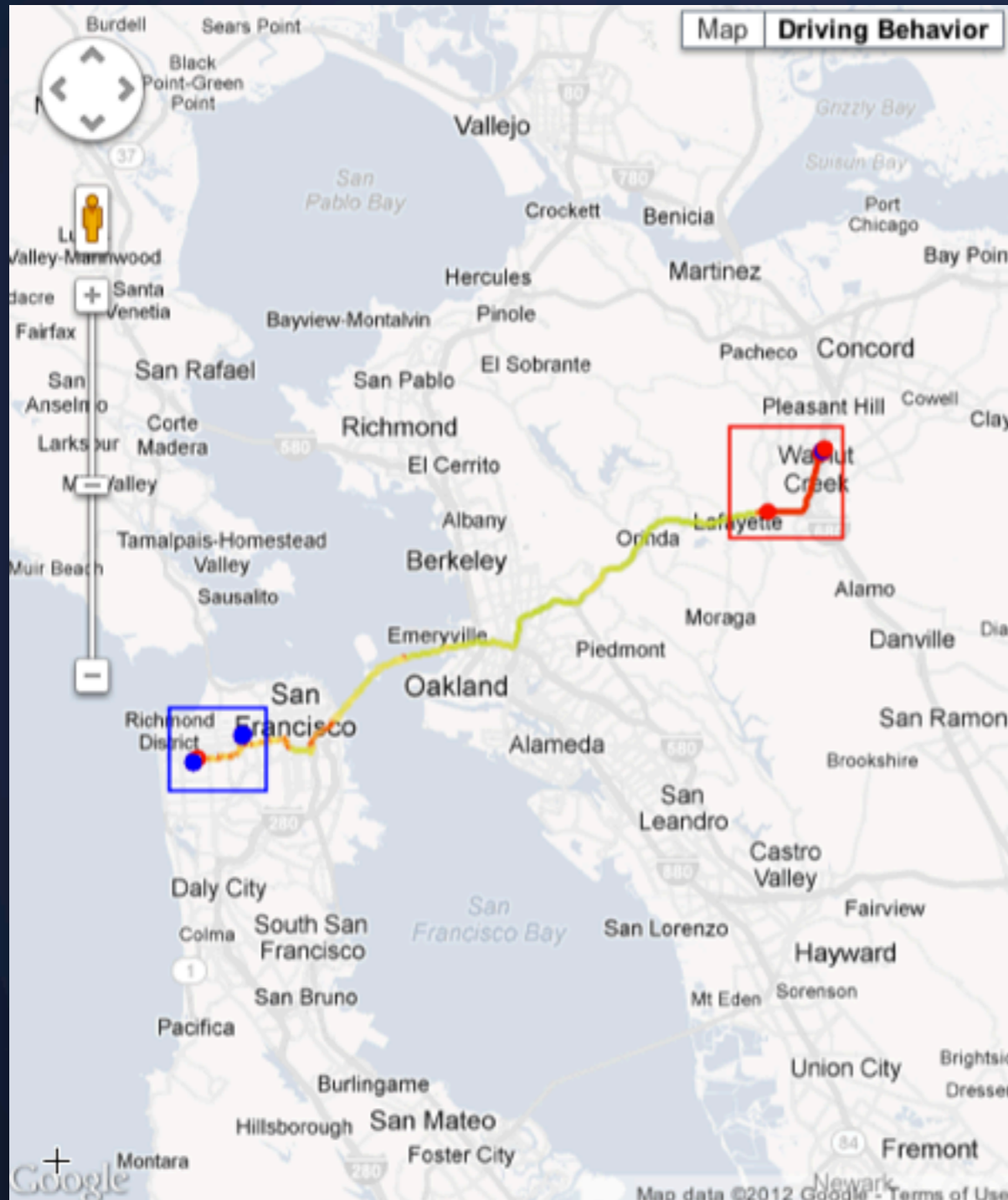
Yo-Shang Chen and Rachele Annechino

<http://groups.ischool.berkeley.edu/mentalmaps/>

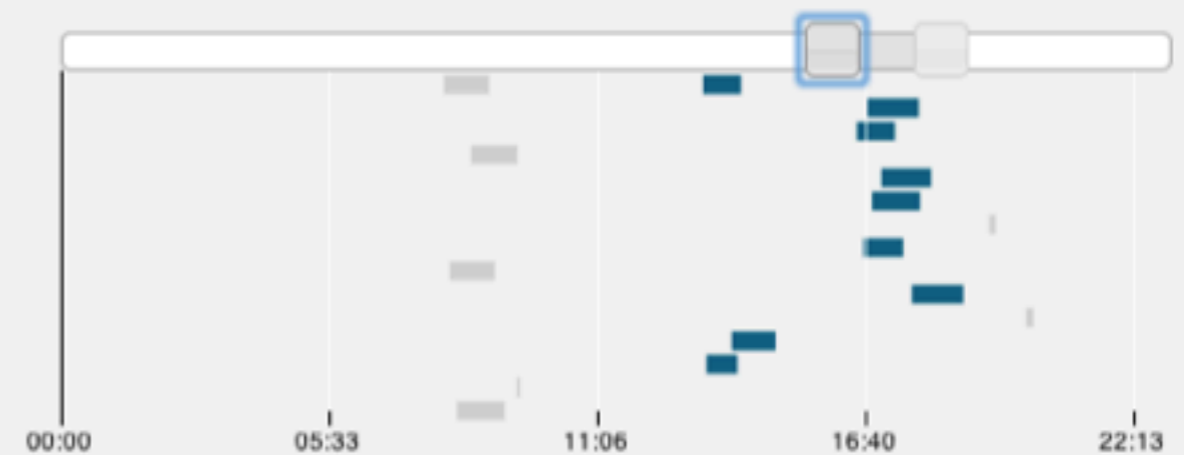
Tips to Improve Your Maps

Feature vs background

Tone down map features if the visualization is in the data



Commute distribution



Trip Lengths and Velocity

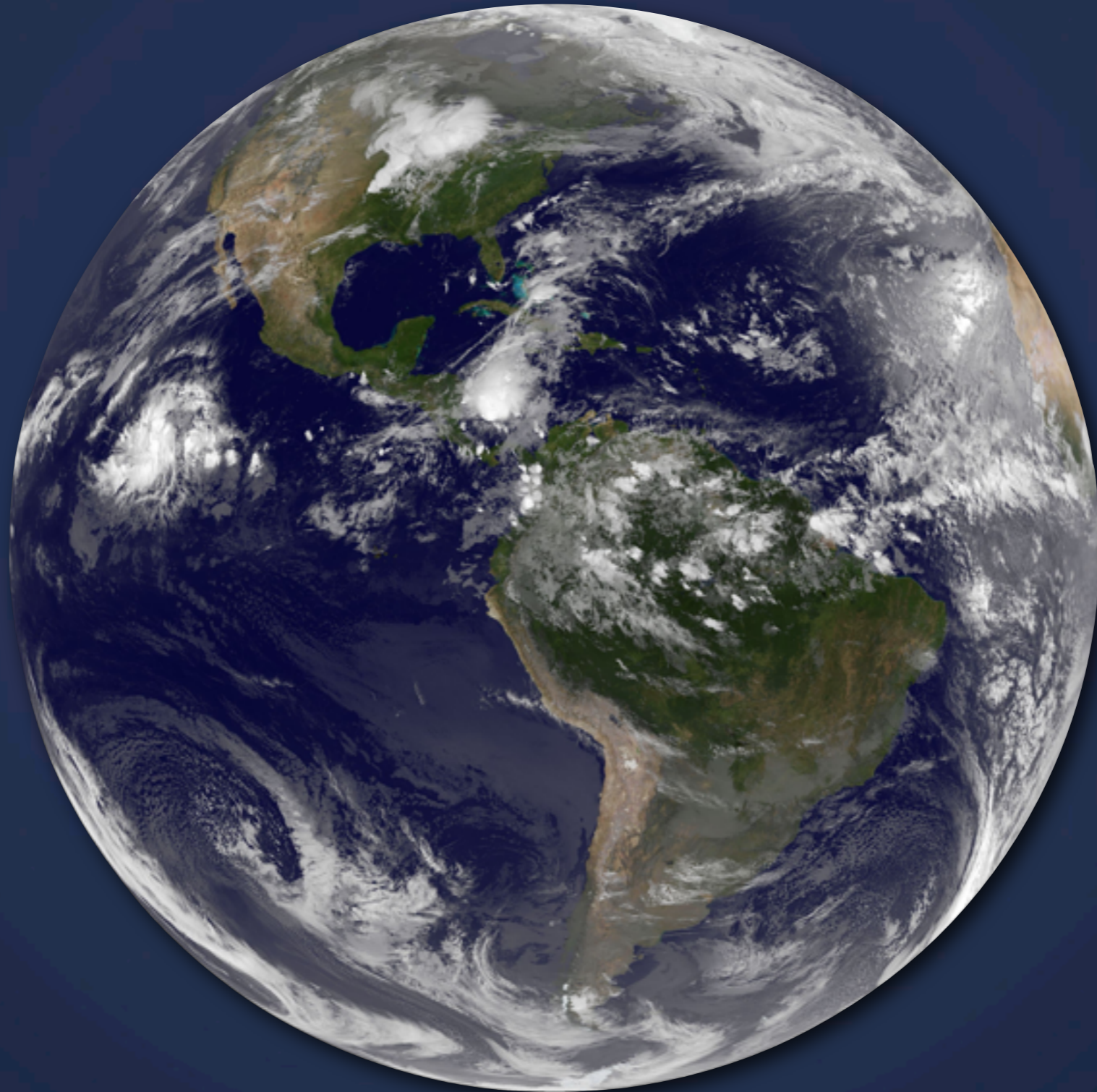


Legend & Start-/Endpoint Selection

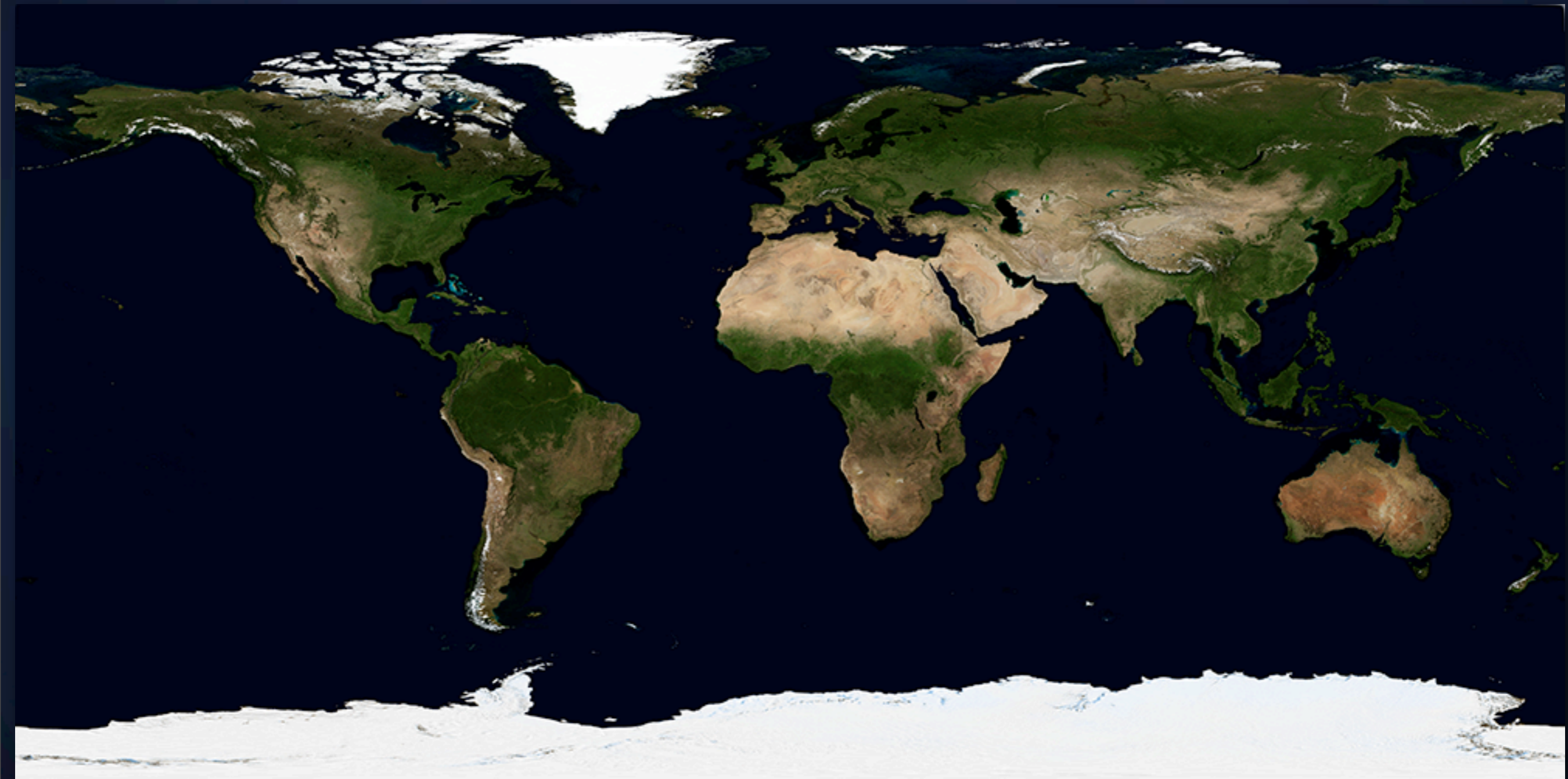
Start: ○ Stop: ● Maps: ○



Projections



The Earth



The Earth is flat

At least on maps



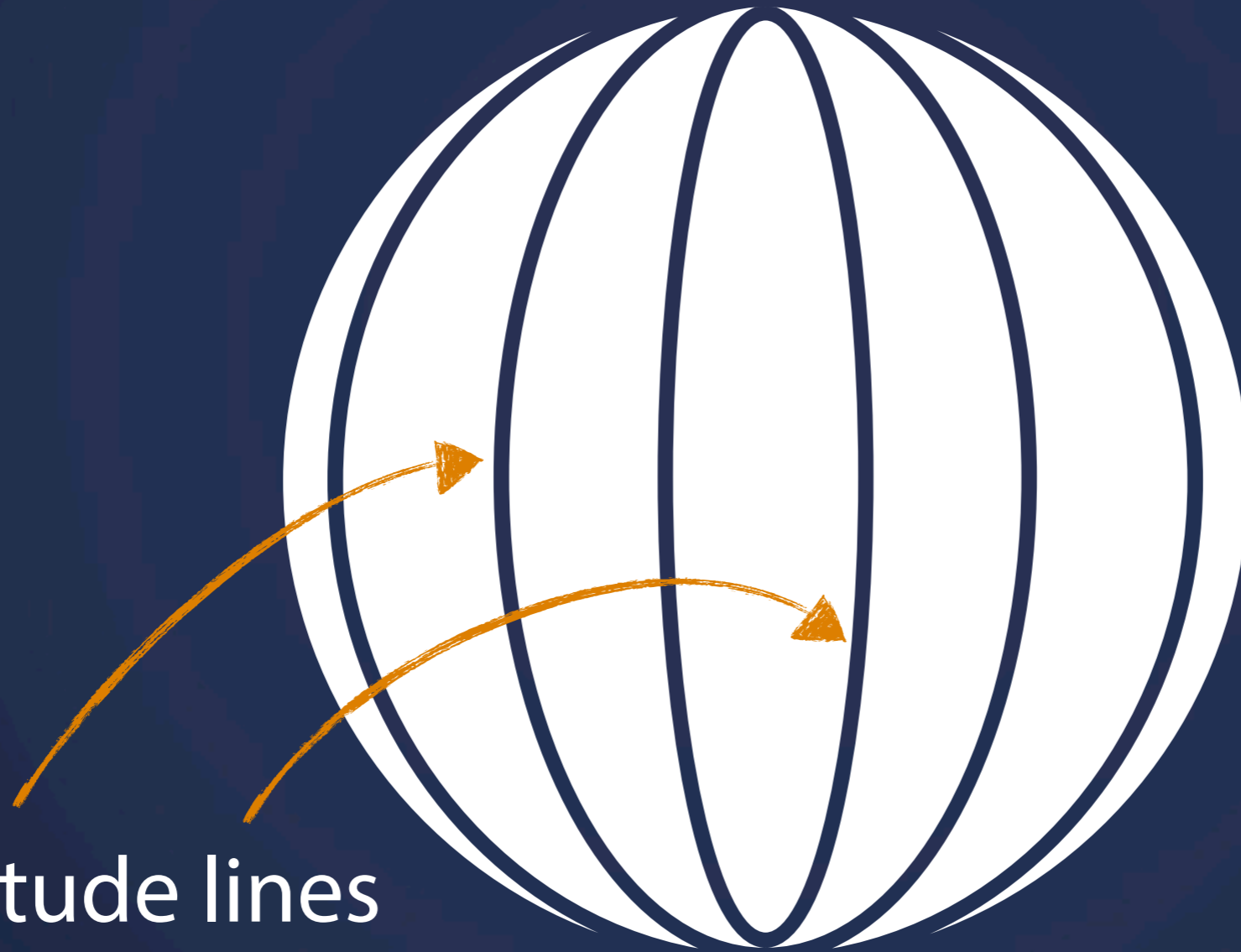
The Earth is flat

At least on maps



The Earth is flat

At least on maps



Longitude lines

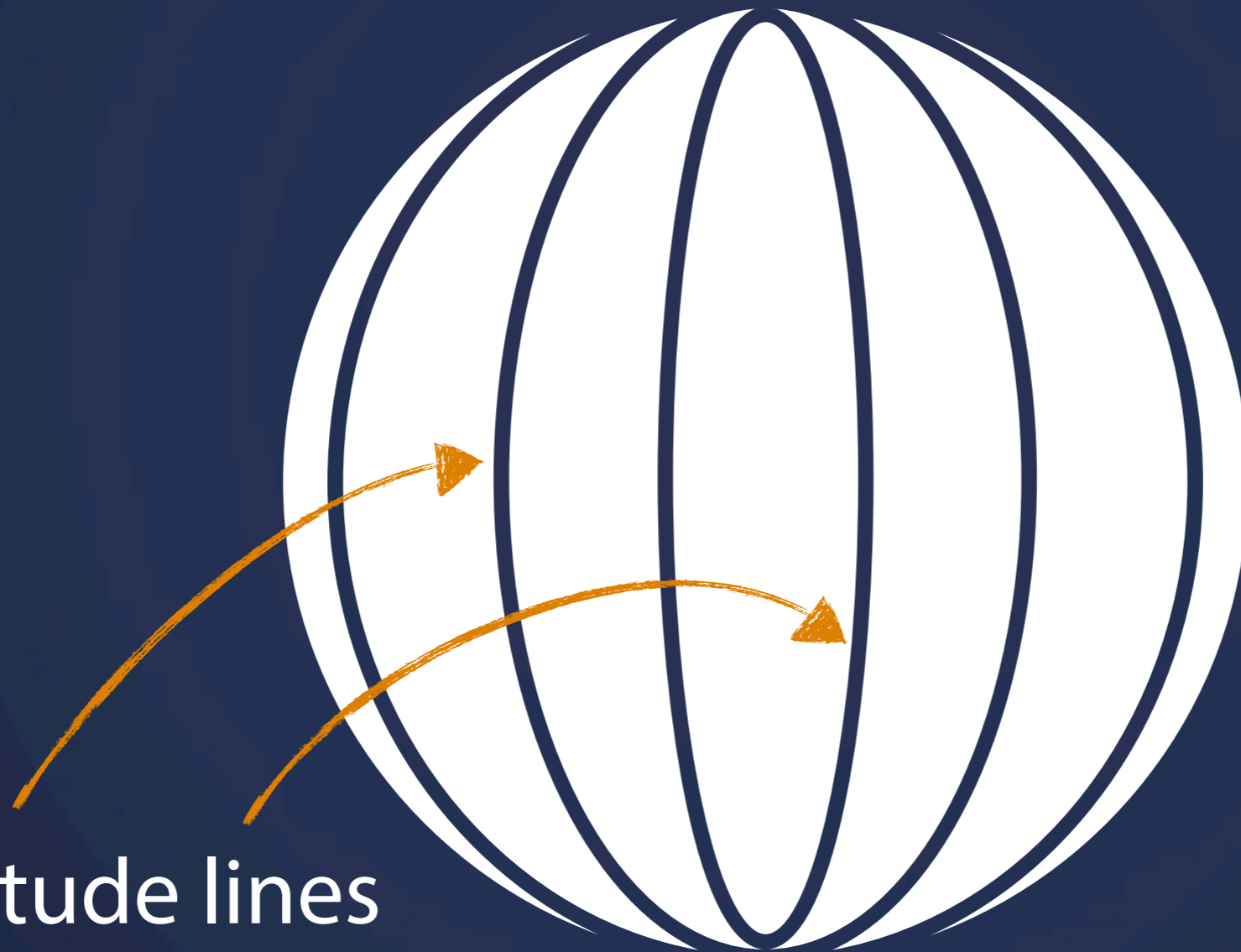
The Earth is flat

At least on maps

-180°

0

180°



Longitude lines

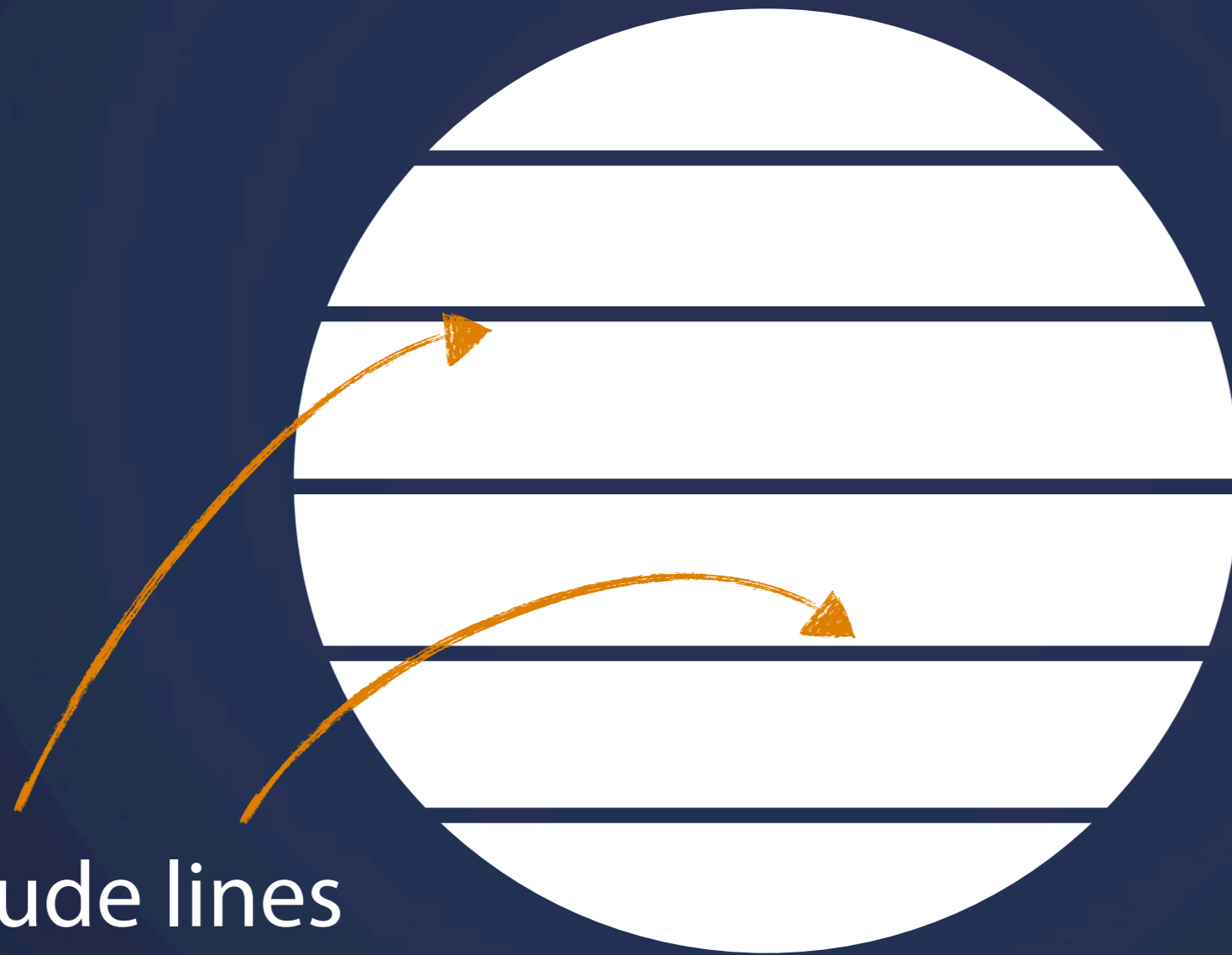
The Earth is flat

At least on maps



The Earth is flat

At least on maps

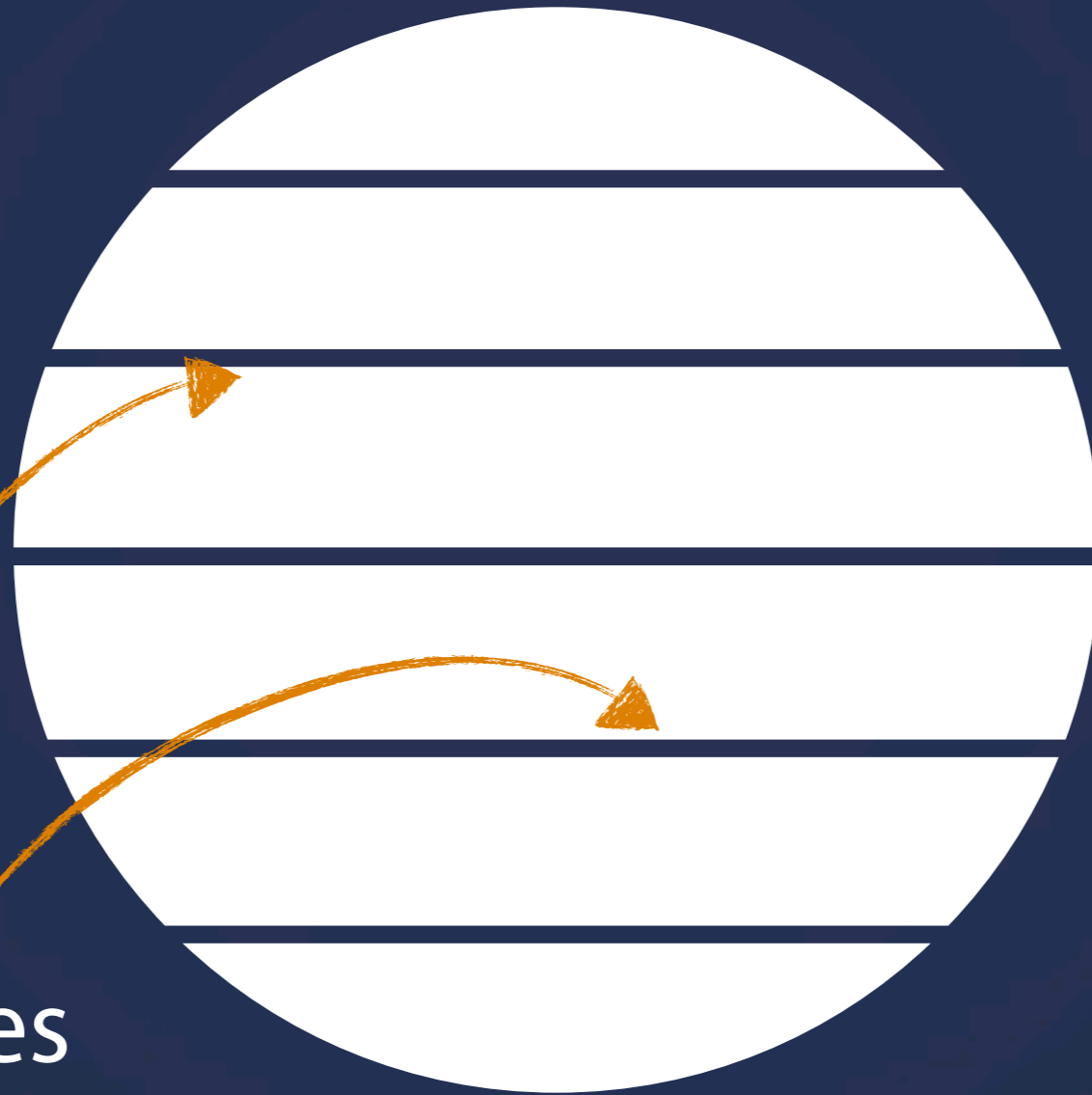


Latitude lines

The Earth is flat

At least on maps

90°

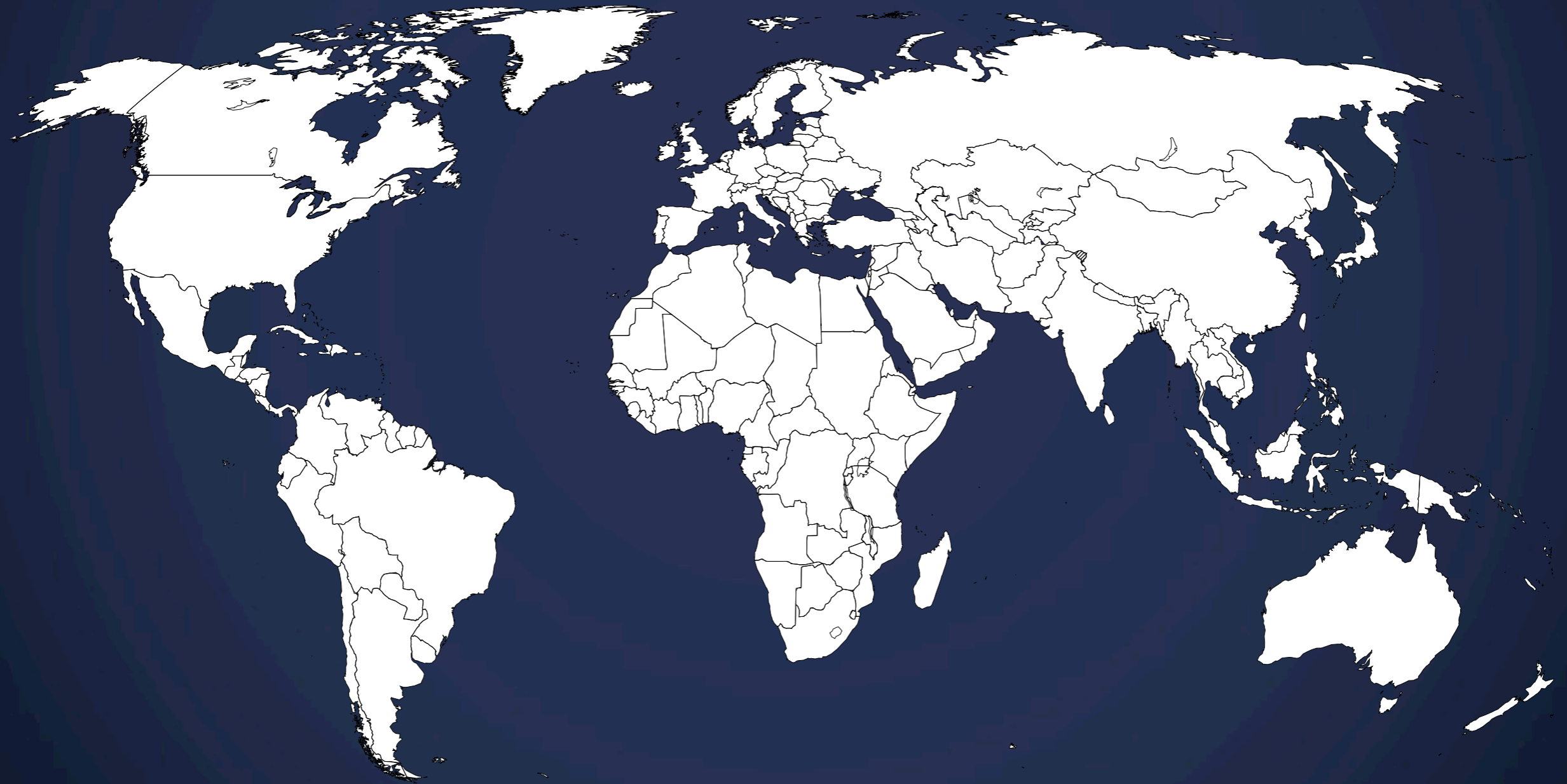


0

-90°

Latitude lines

How do we get here?



Projections



Projections

Orthographic "normal"



Projections

Mercator



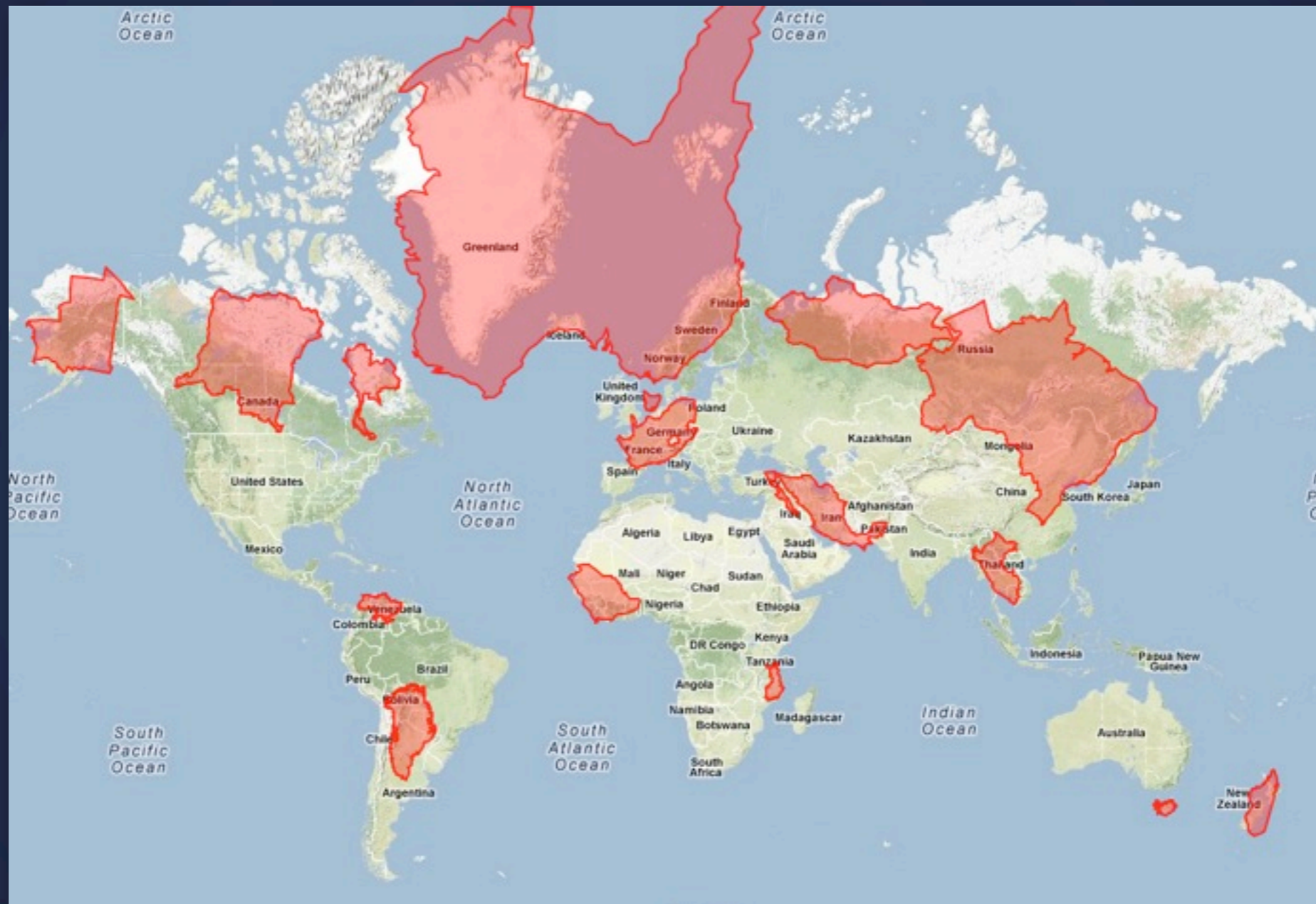
Projections

Mercator



Projections

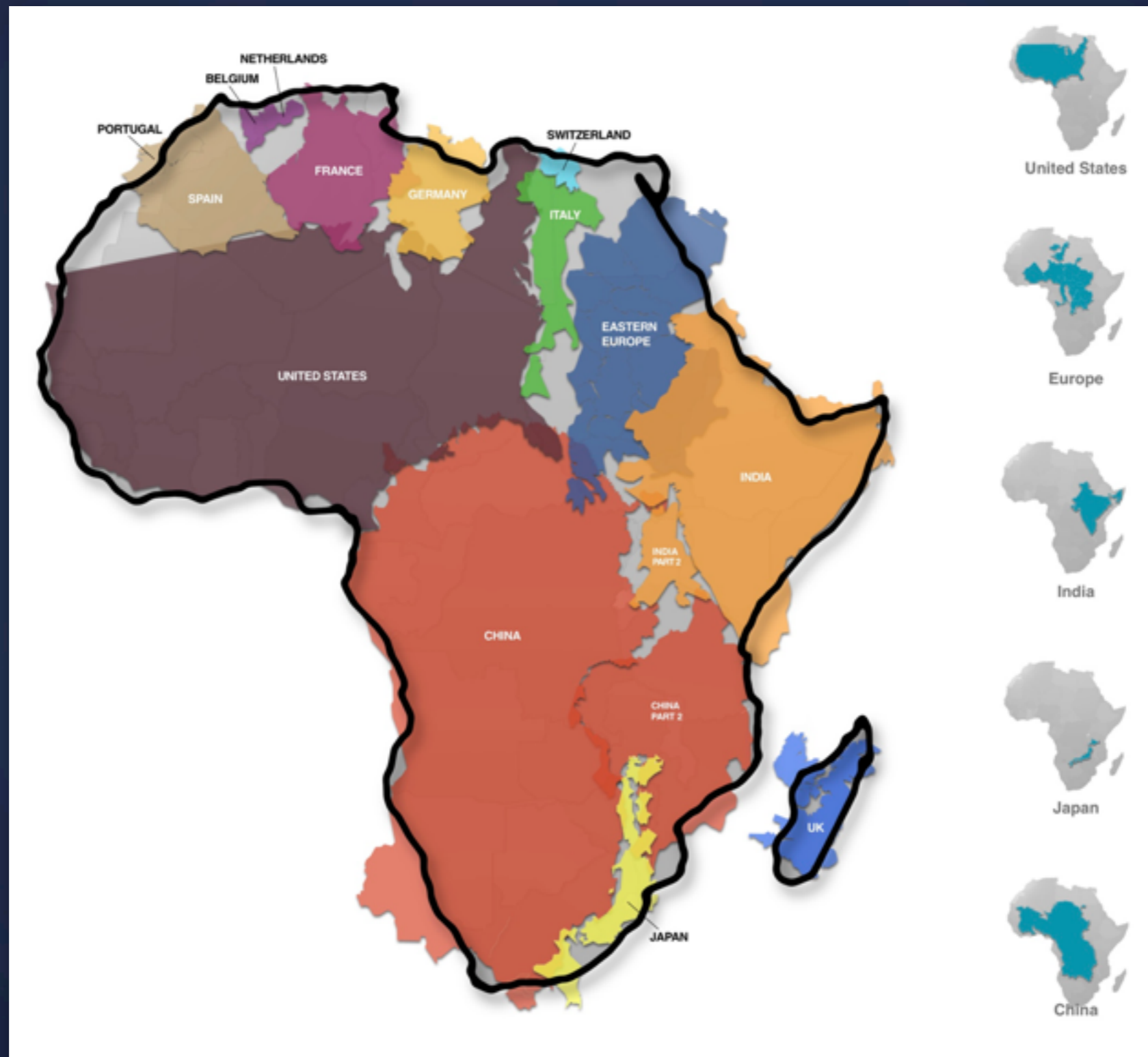
Mercator: Try it!



<http://bit.ly/mercator-puzzle>

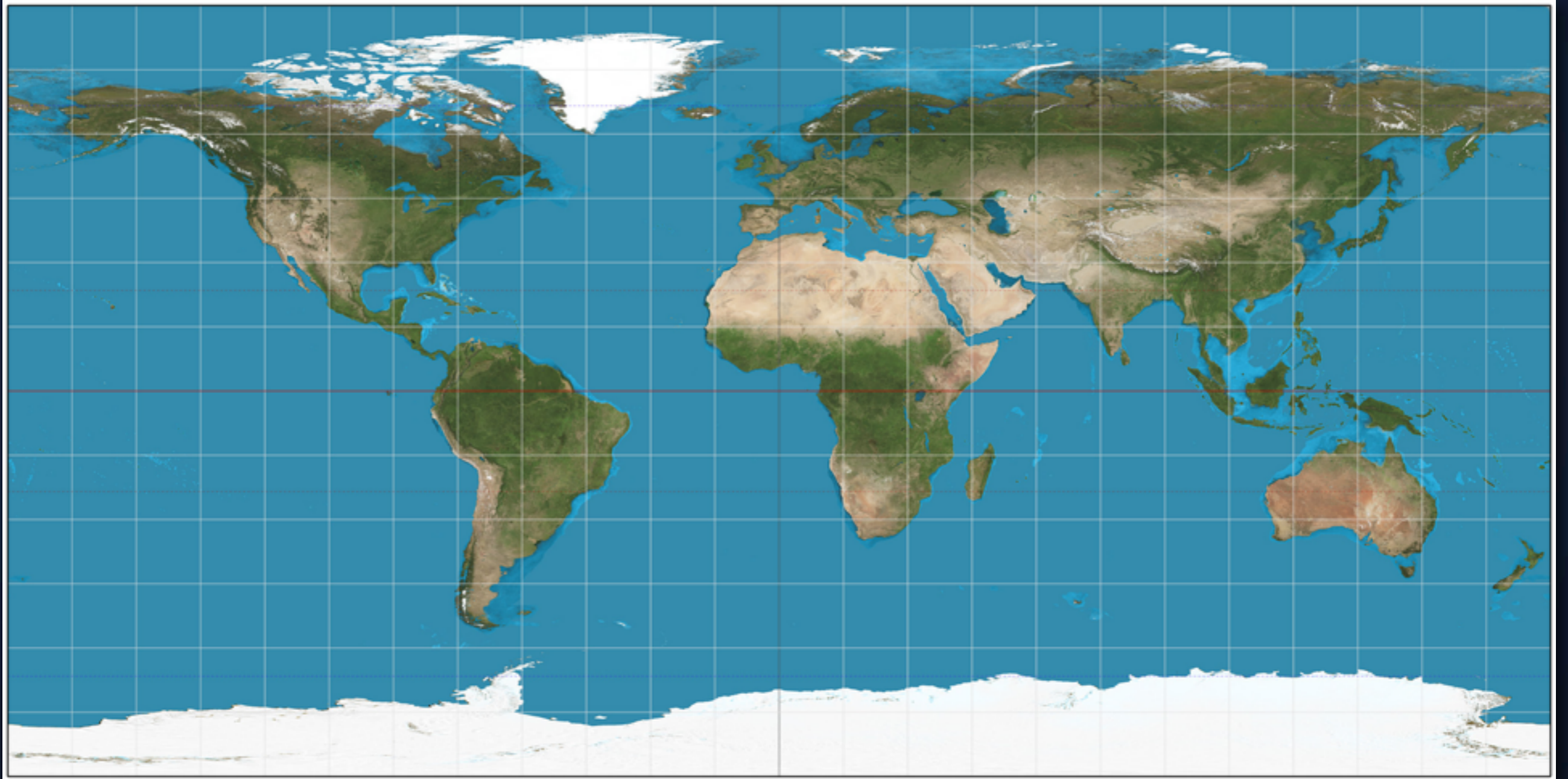
True Size of Africa

Mercator projection changes our perception of size



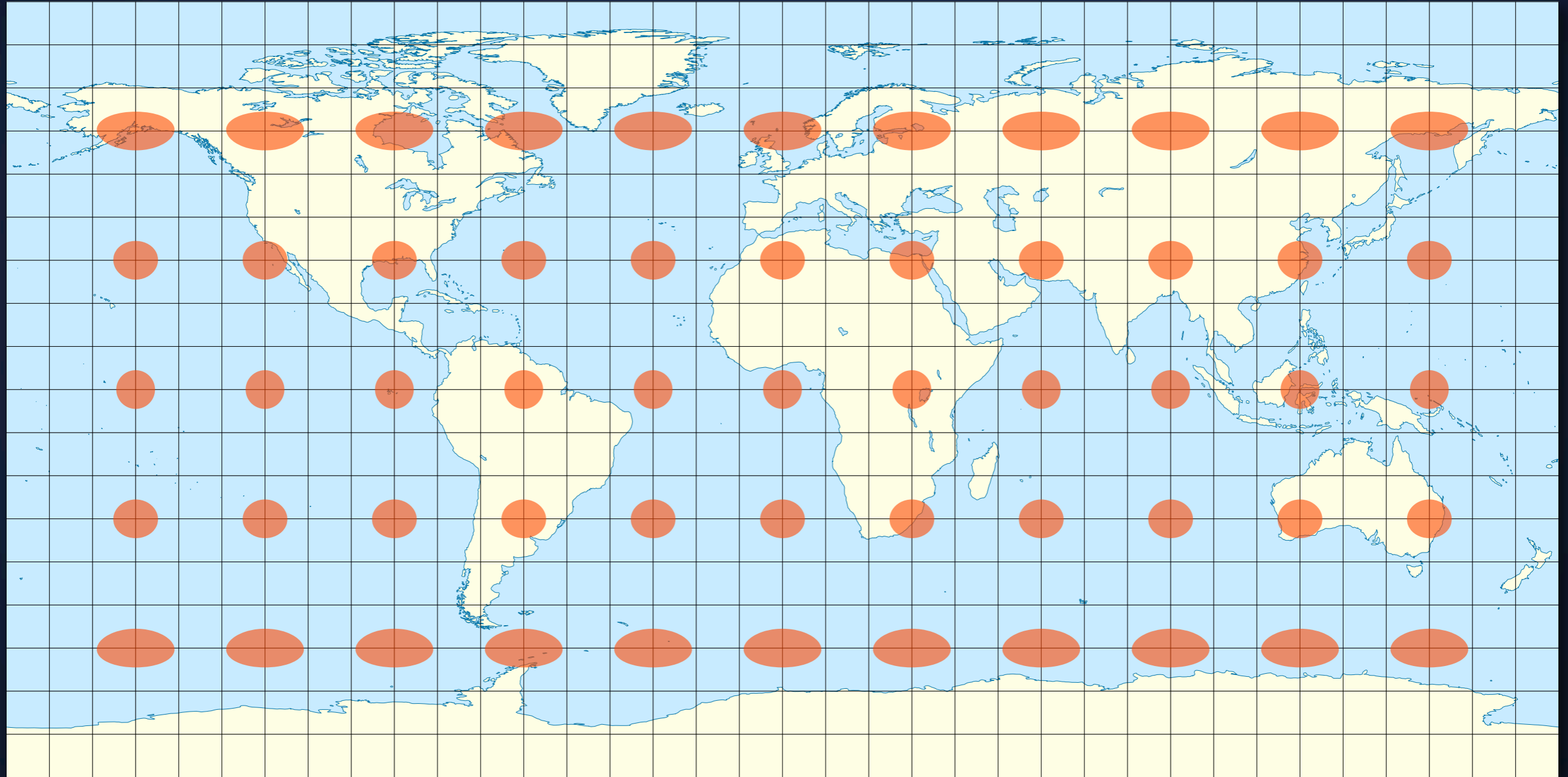
Projections

Equirectangular



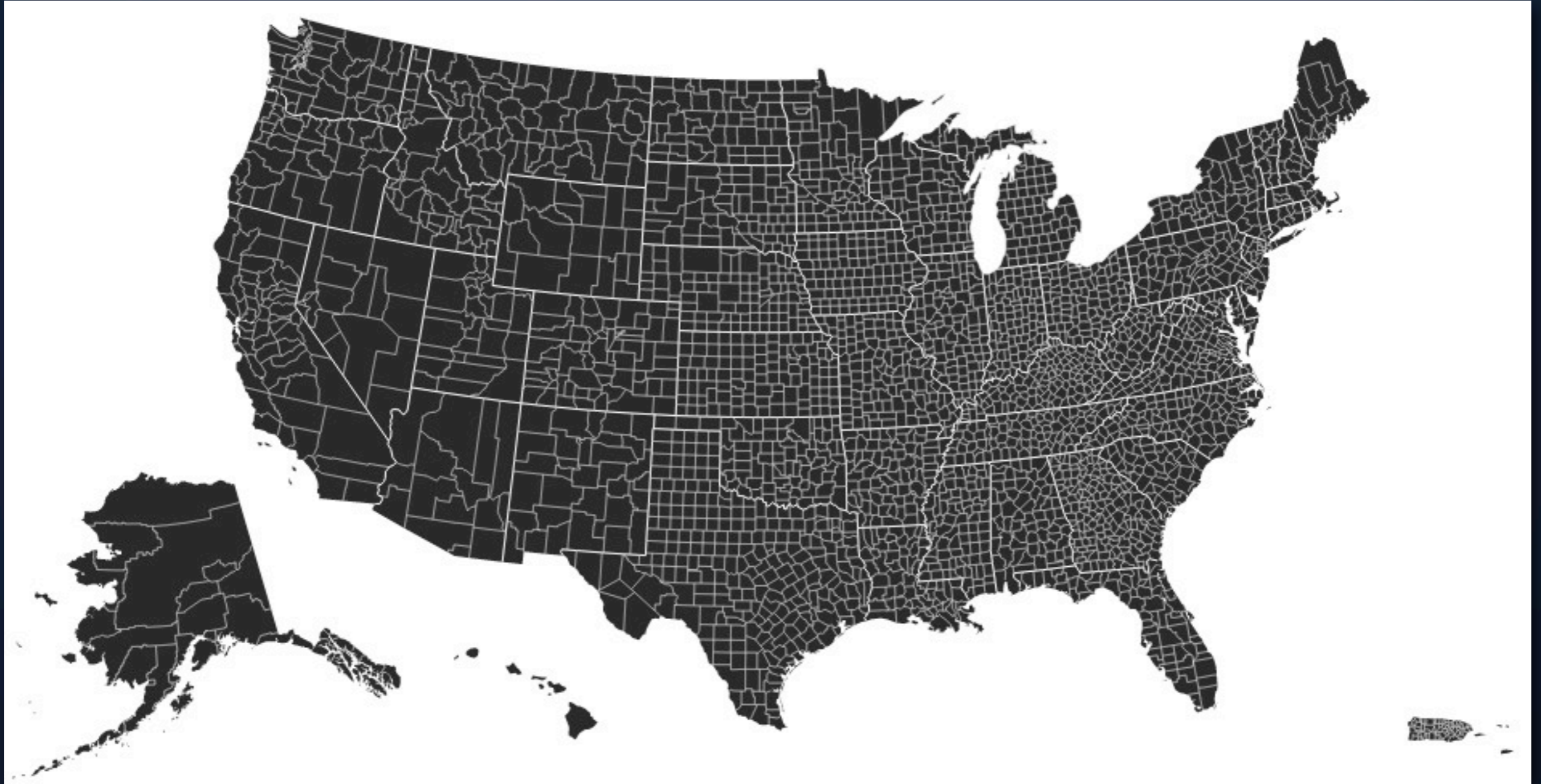
Projections

Equiarectangular: Distortion



Projections

Albers (USA)



Projections

Overview

Orthogonal	Mercator	Equiarectangular	Albers
<p>Looks “real”</p> <p>Distortions increase away from the center</p> <p>Shows only half of the globe (max)</p>	<p>Distortions increase away from the equator</p>	<p>Distorts less than Mercator</p> <p>Good for thematic maps.</p>	<p>Allows for equal area comparisons when showing parts of the world (especially suitable for showing US)</p>

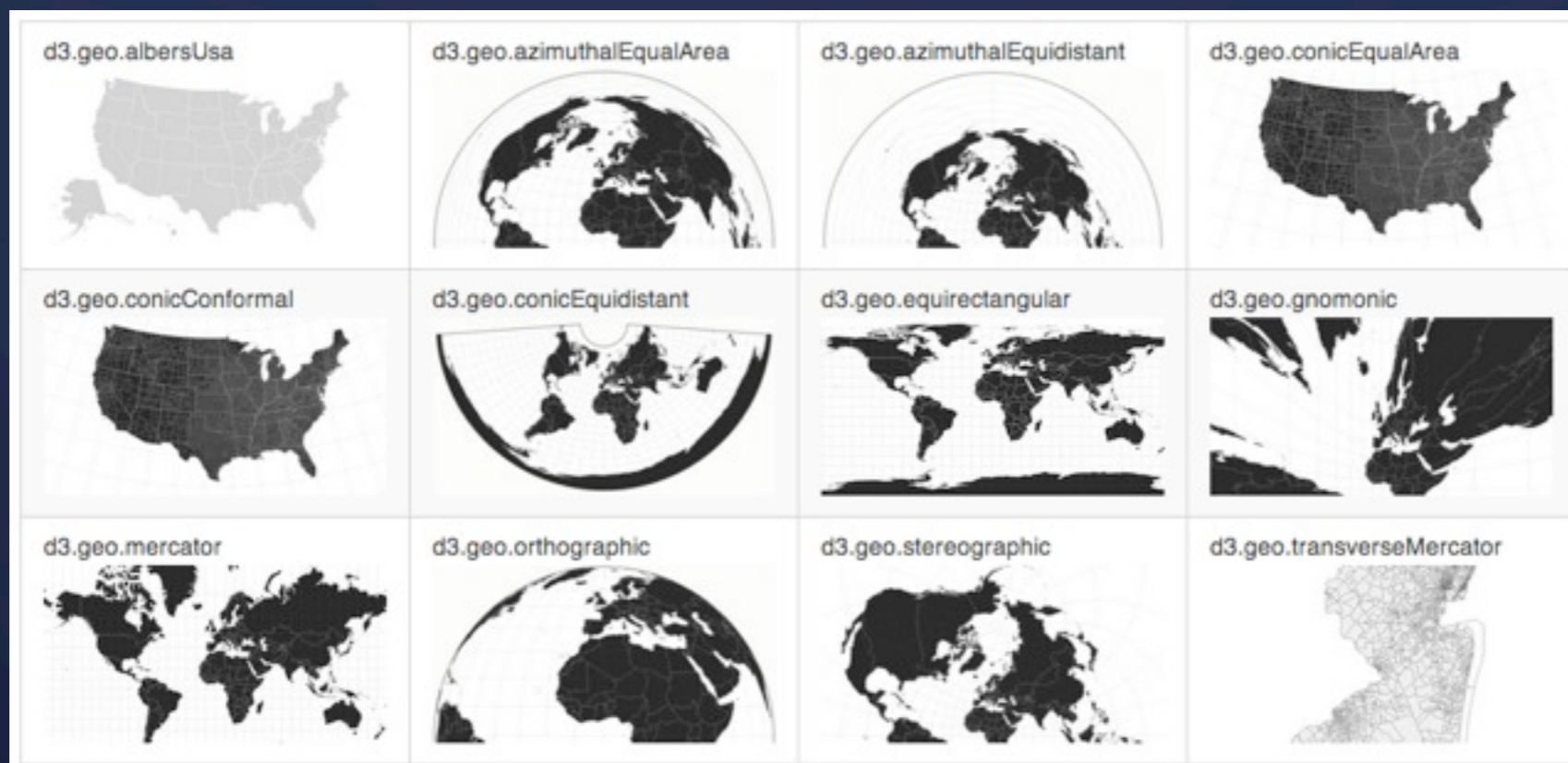
Projections

Resources

<http://egsc.usgs.gov/isb/pubs/MapProjections/projections.html>

<http://www.progonos.com/furuti/MapProj/Normal/ProjTbl/projTbl.html>

<https://github.com/mbostock/d3/wiki/Geo-Projections>



Tools

There are alternatives to Google Maps



API, Image/vector layers, Markers



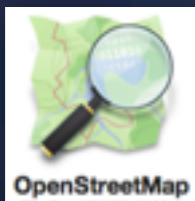
<http://polymaps.org/>

API, Image/vector layers
Open source; Under heavy development



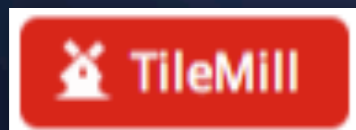
<http://leaflet.cloudmade.com/>

UI, Layers, etc.
Open source; Under heavy development



<http://www.openstreetmap.org/>

Traces, UI, API, etc.
Open source; Under heavy development



<http://mapbox.com/tilemill/>

Creates beautifully styled maps from shape files
Open source

Tools

There are alternatives to Google Maps

d3.geo Create maps with SVG or canvas!

QGIS Open Source GIS tool

Next Lecture

Potpourri. Suggestions?

Bring for next lab

Our Project: Burrito Mapper SF

Topic

Audience

Objective

Variables

- _____
- _____
- _____

Lab Thursday

Design Critique