Information Visualization

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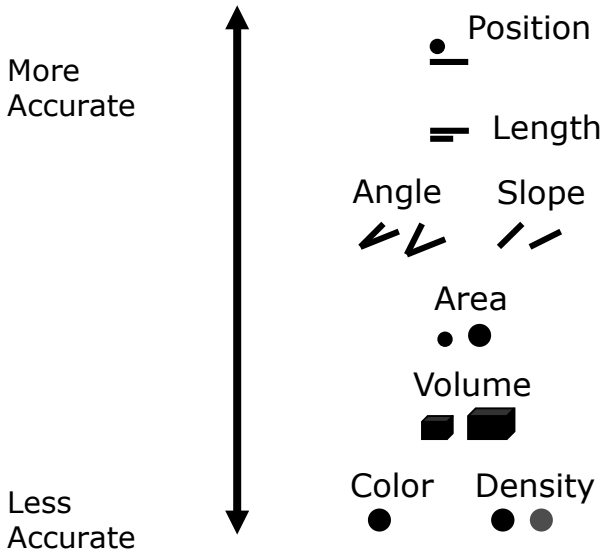
aspoerri@rutgers.edu

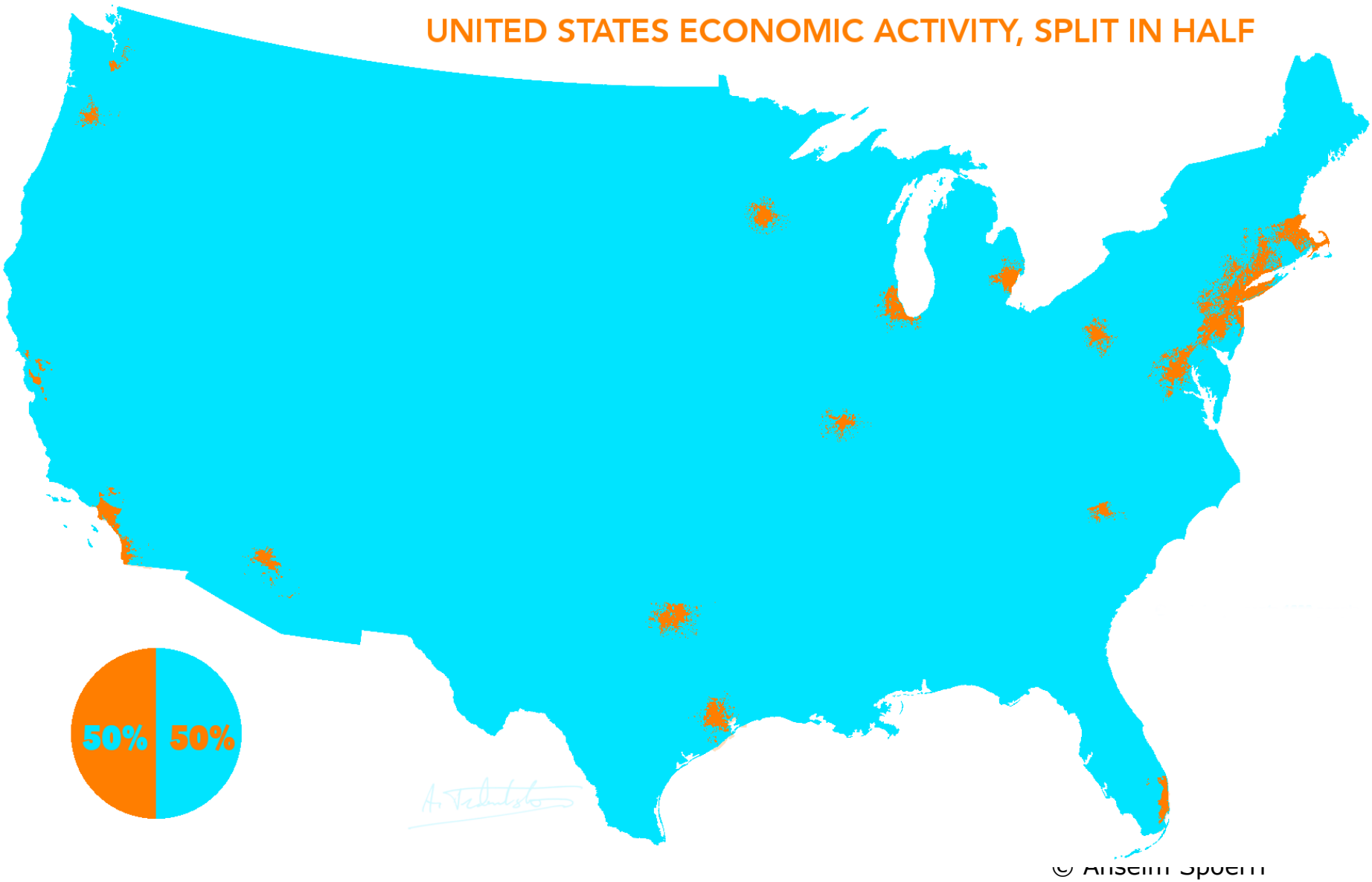
Lecture 6 – Overview

- **Map & Geographic Visualization**
  - Definition and Examples

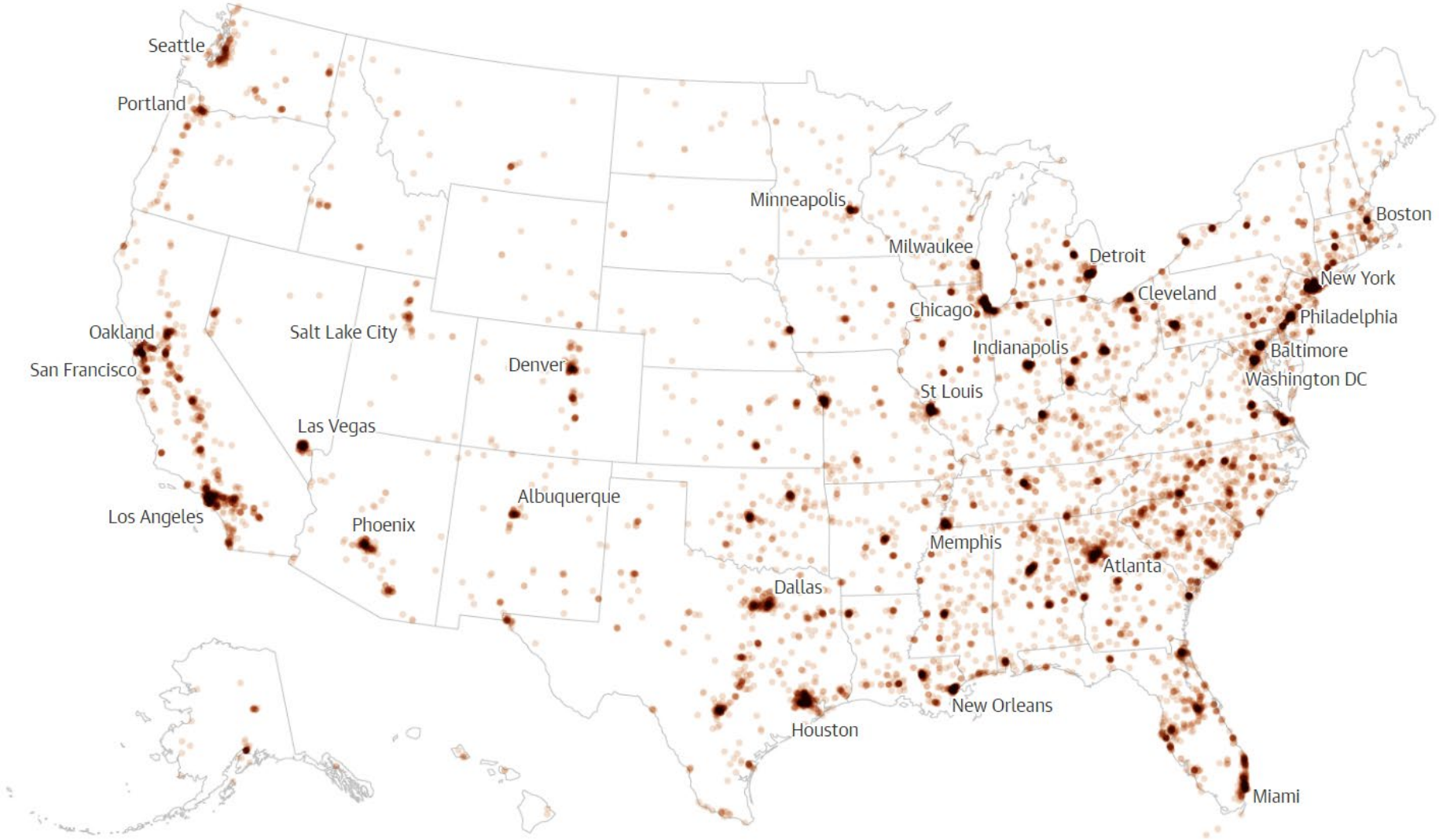
How can we visualize data in a map?



US – Economic Activity – 50% / 50%



Guardian – Gun Violence in USA



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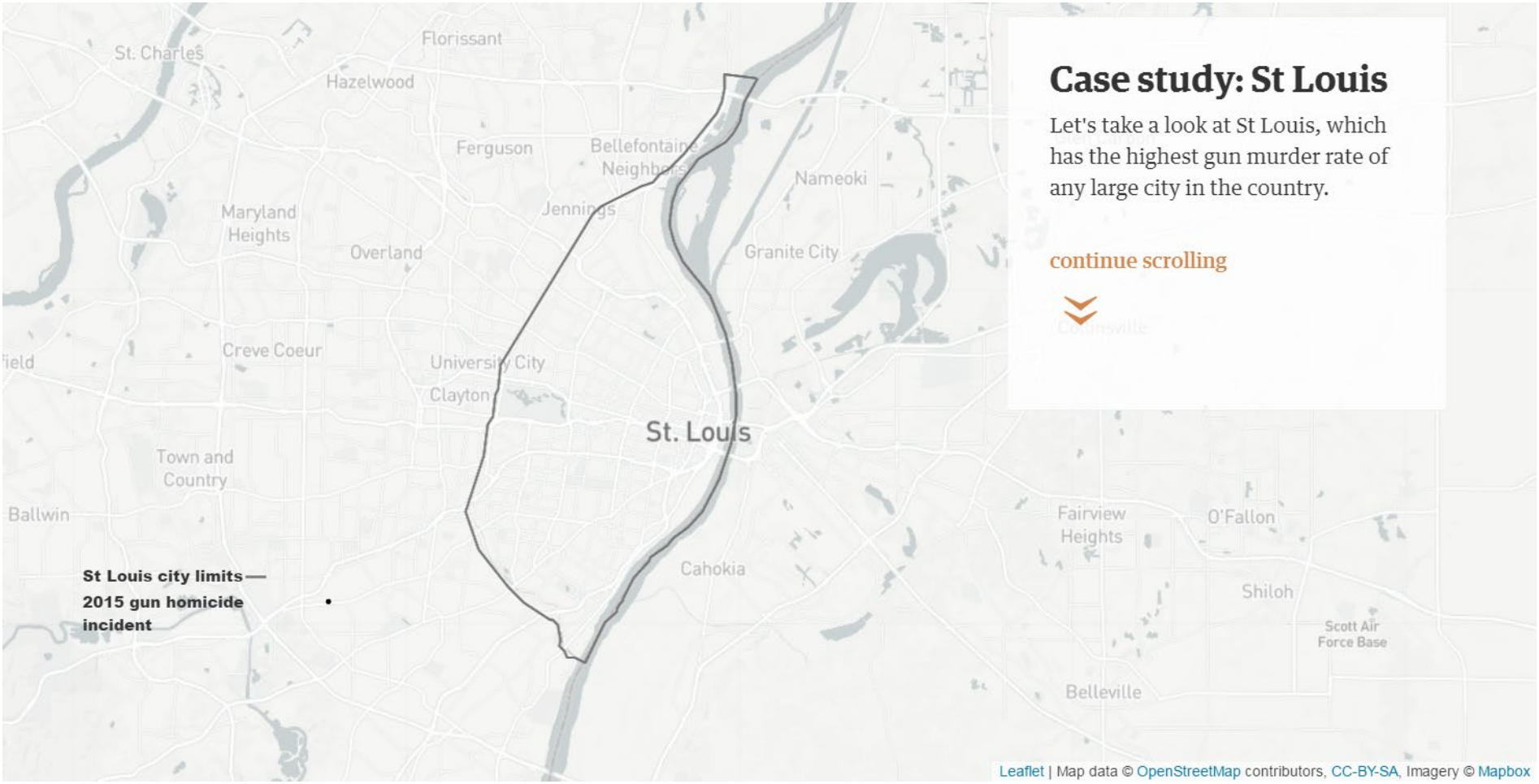

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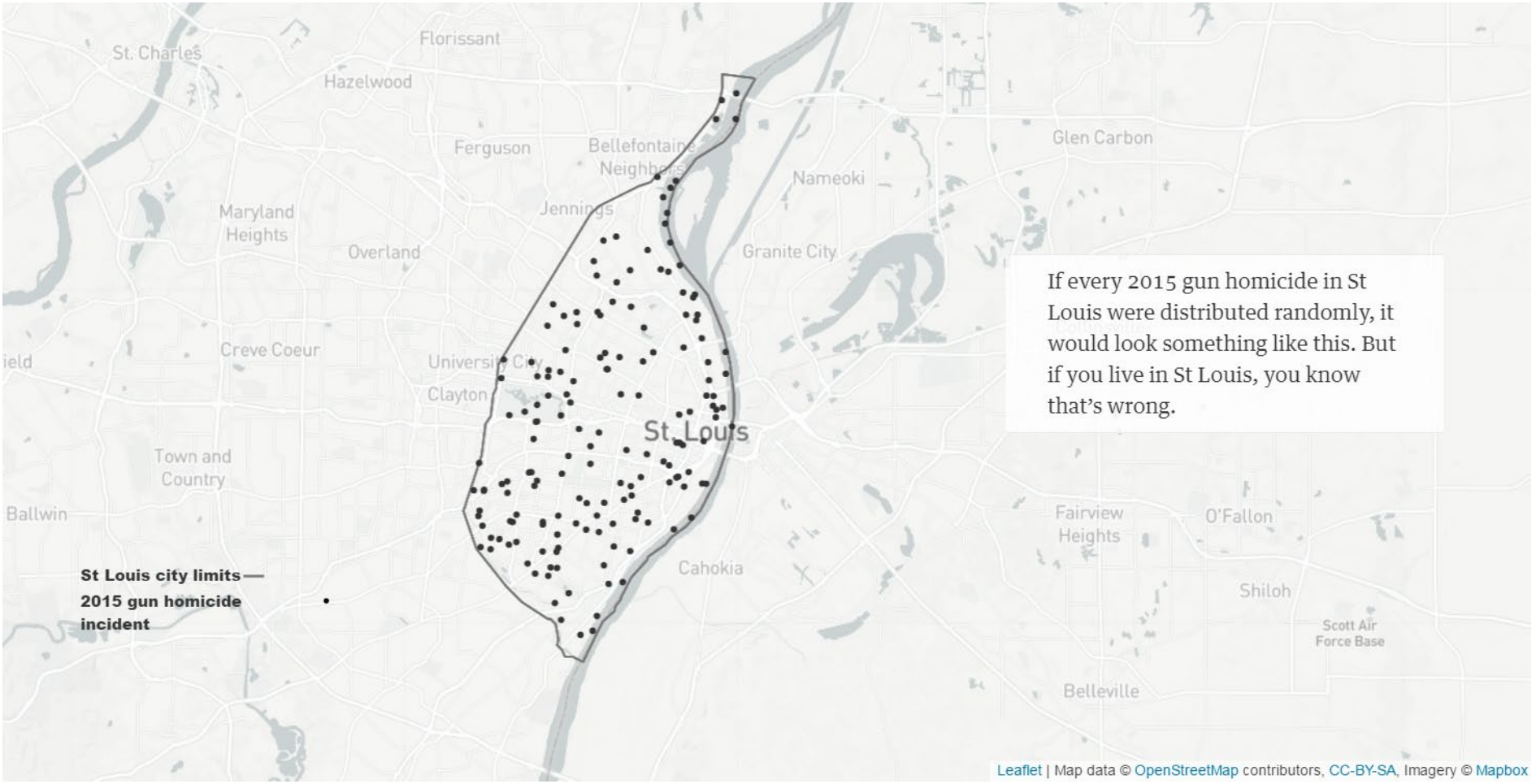

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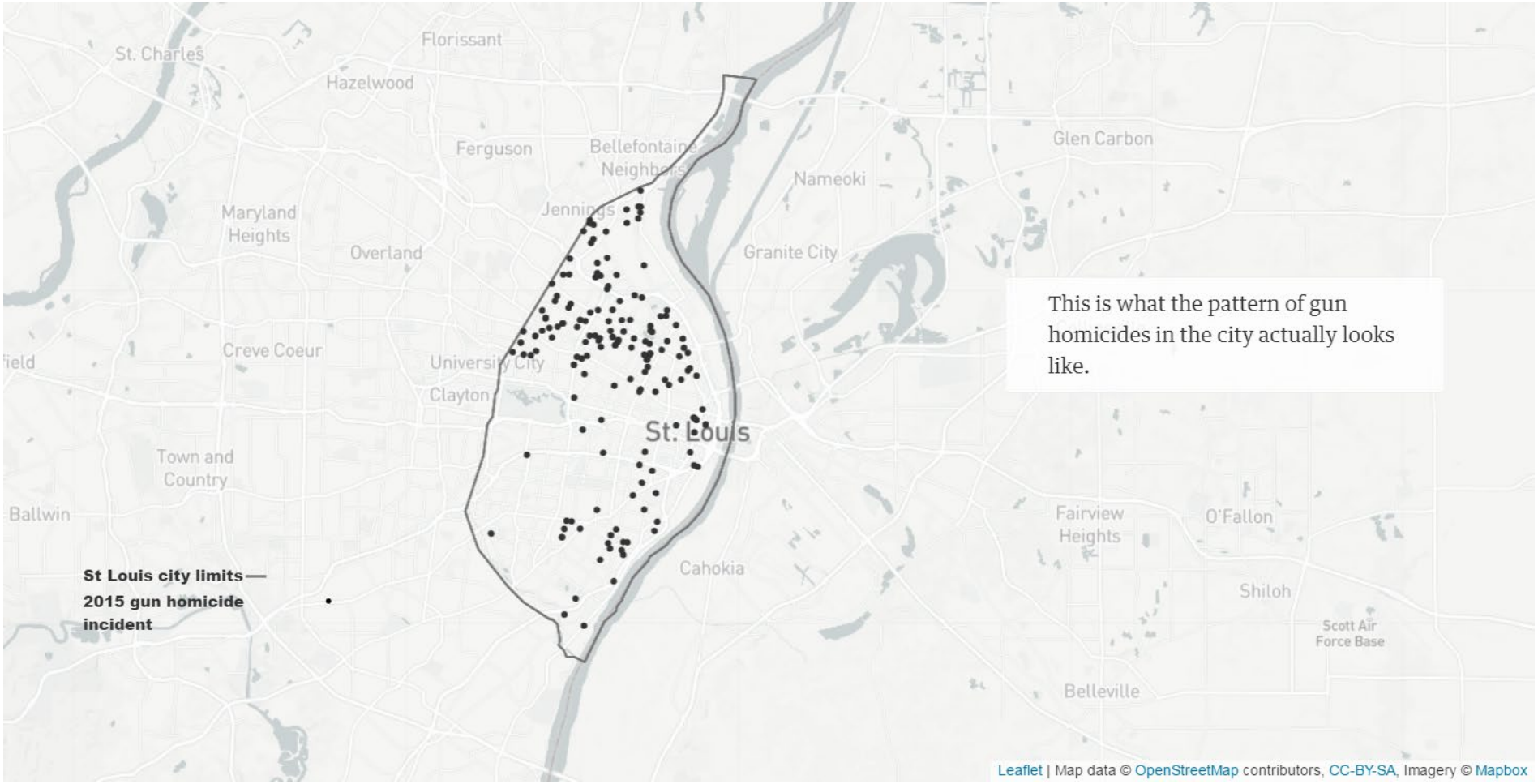

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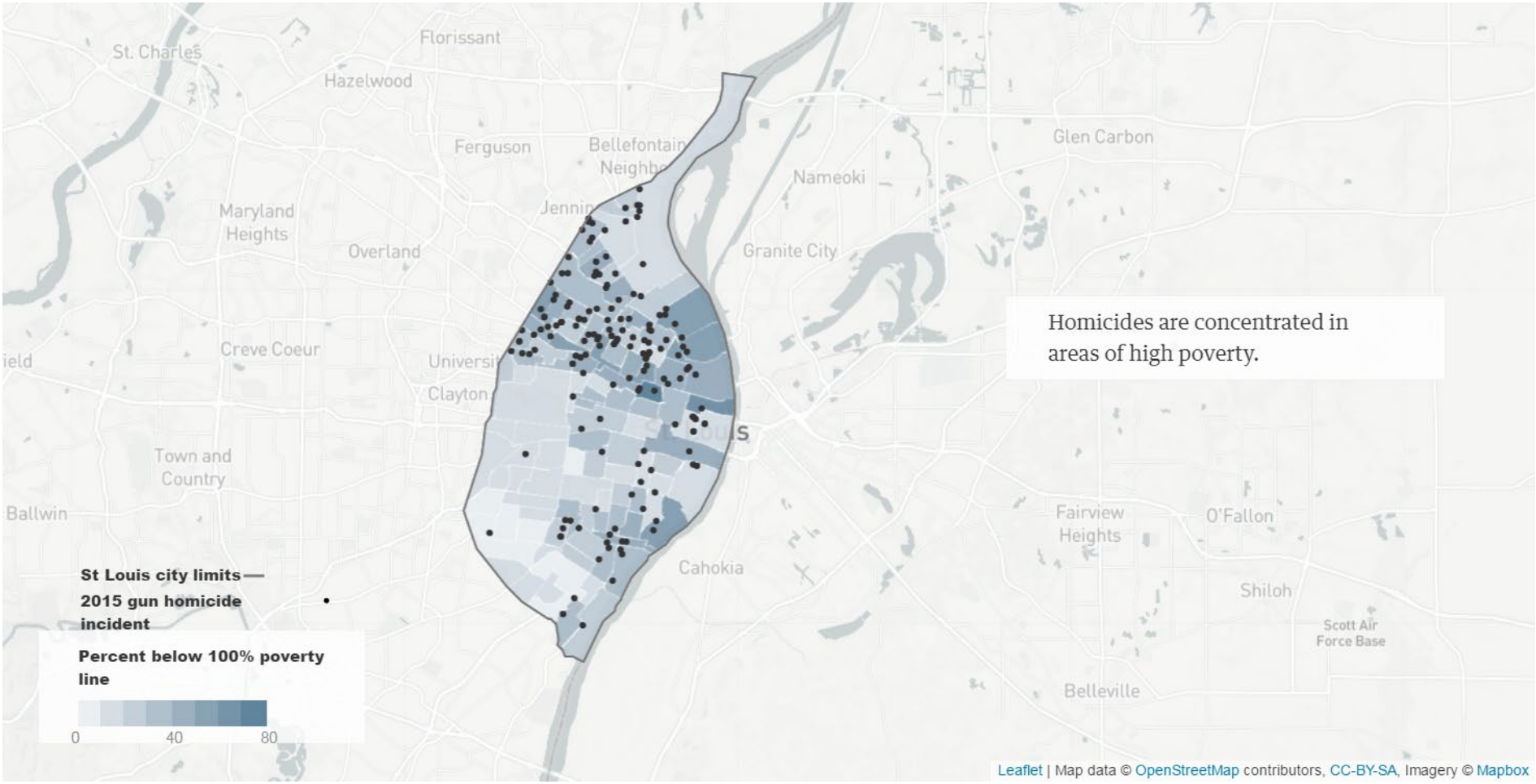

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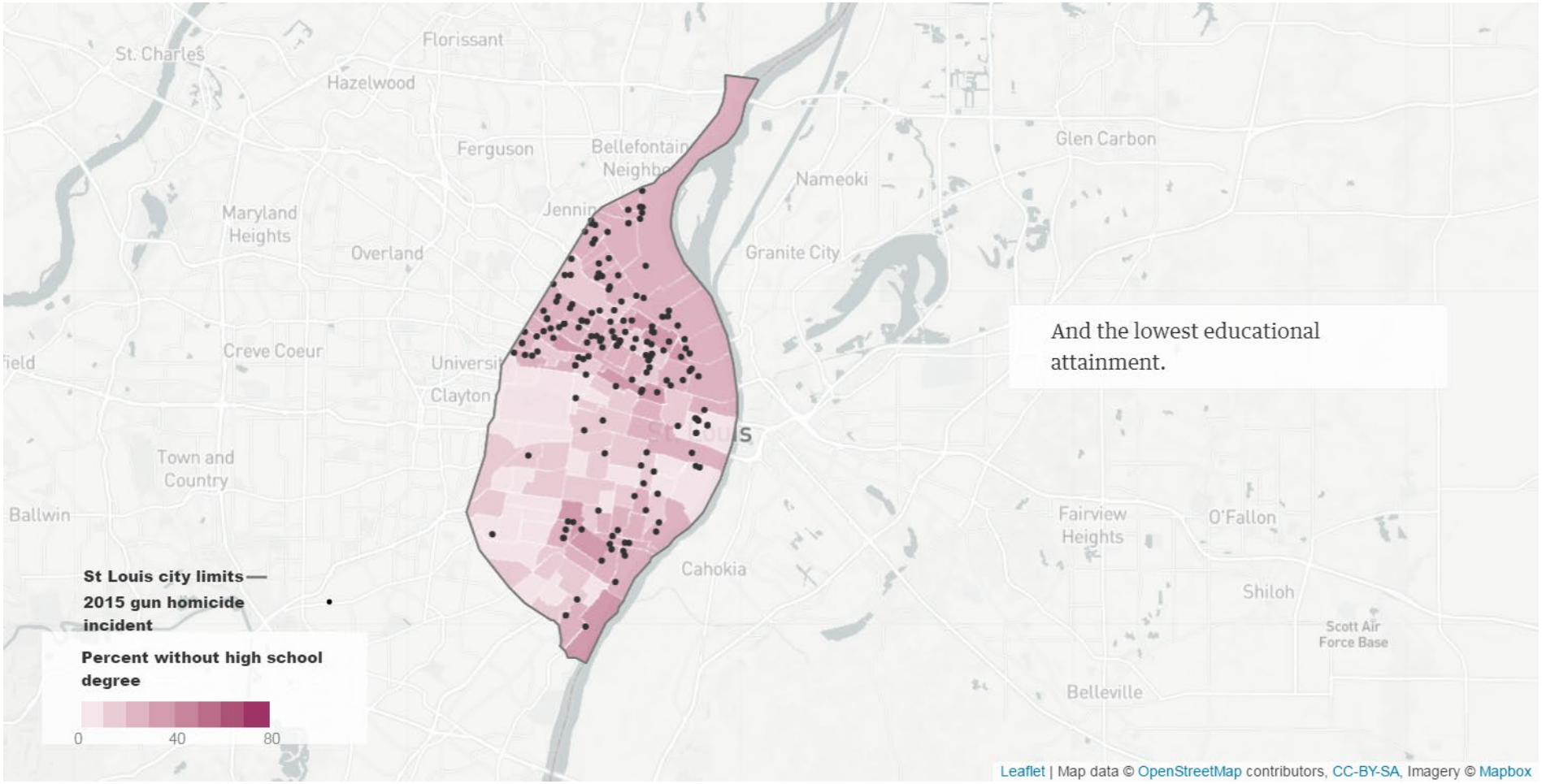

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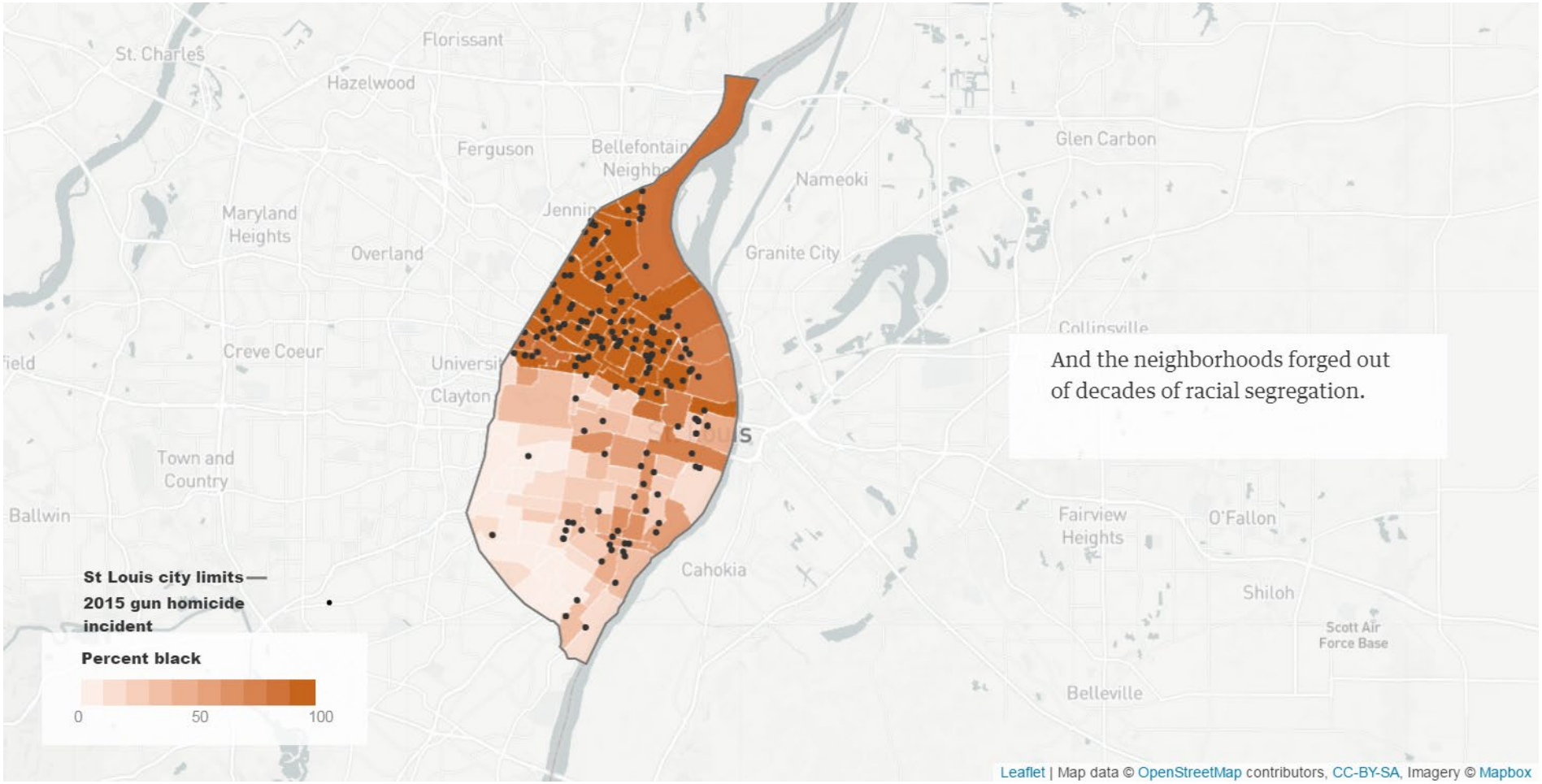
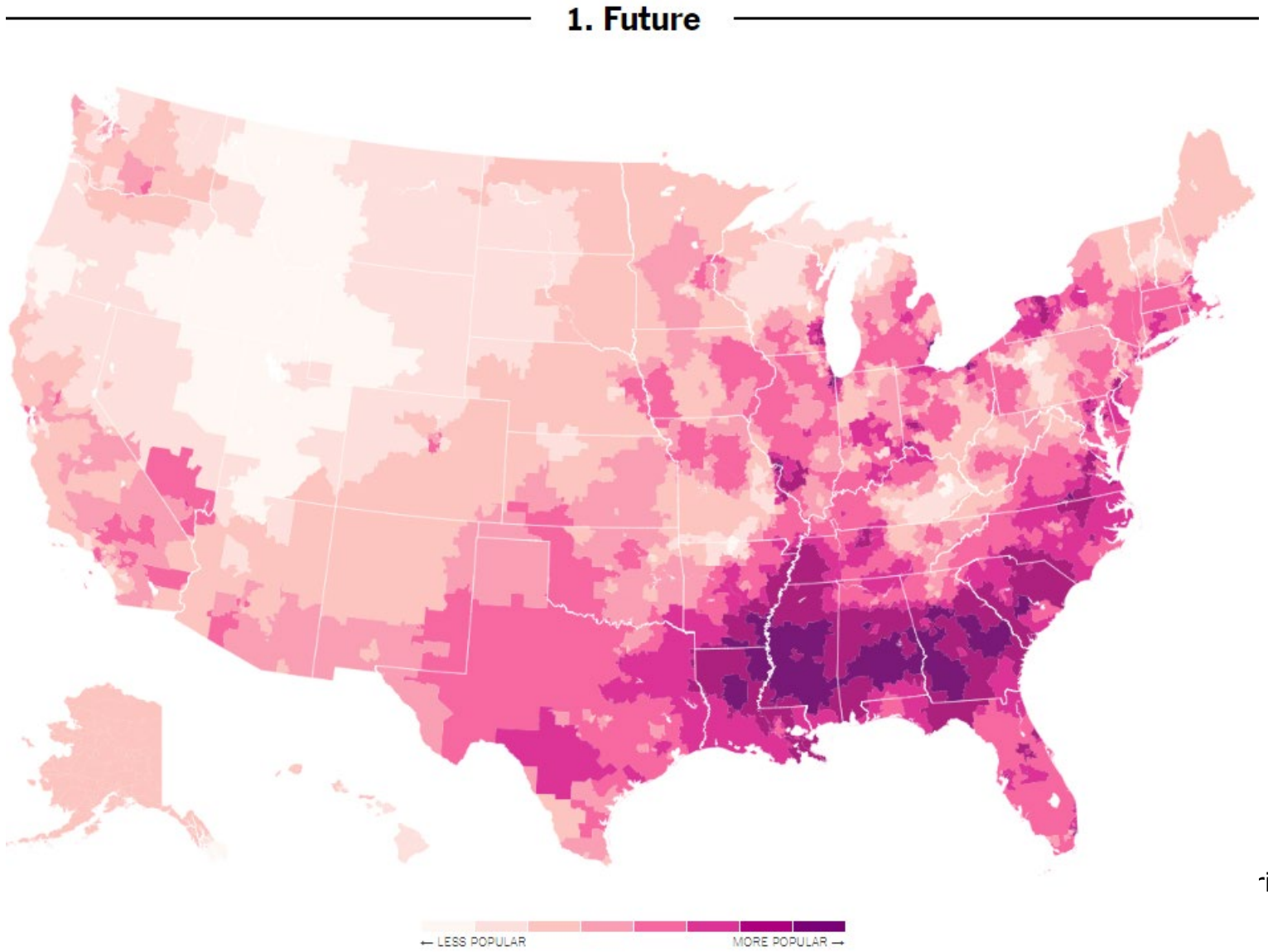


What Music Do Americans Love the Most?

- https://www.nytimes.com/interactive/2017/08/07/upshot/music-fandom-maps.html



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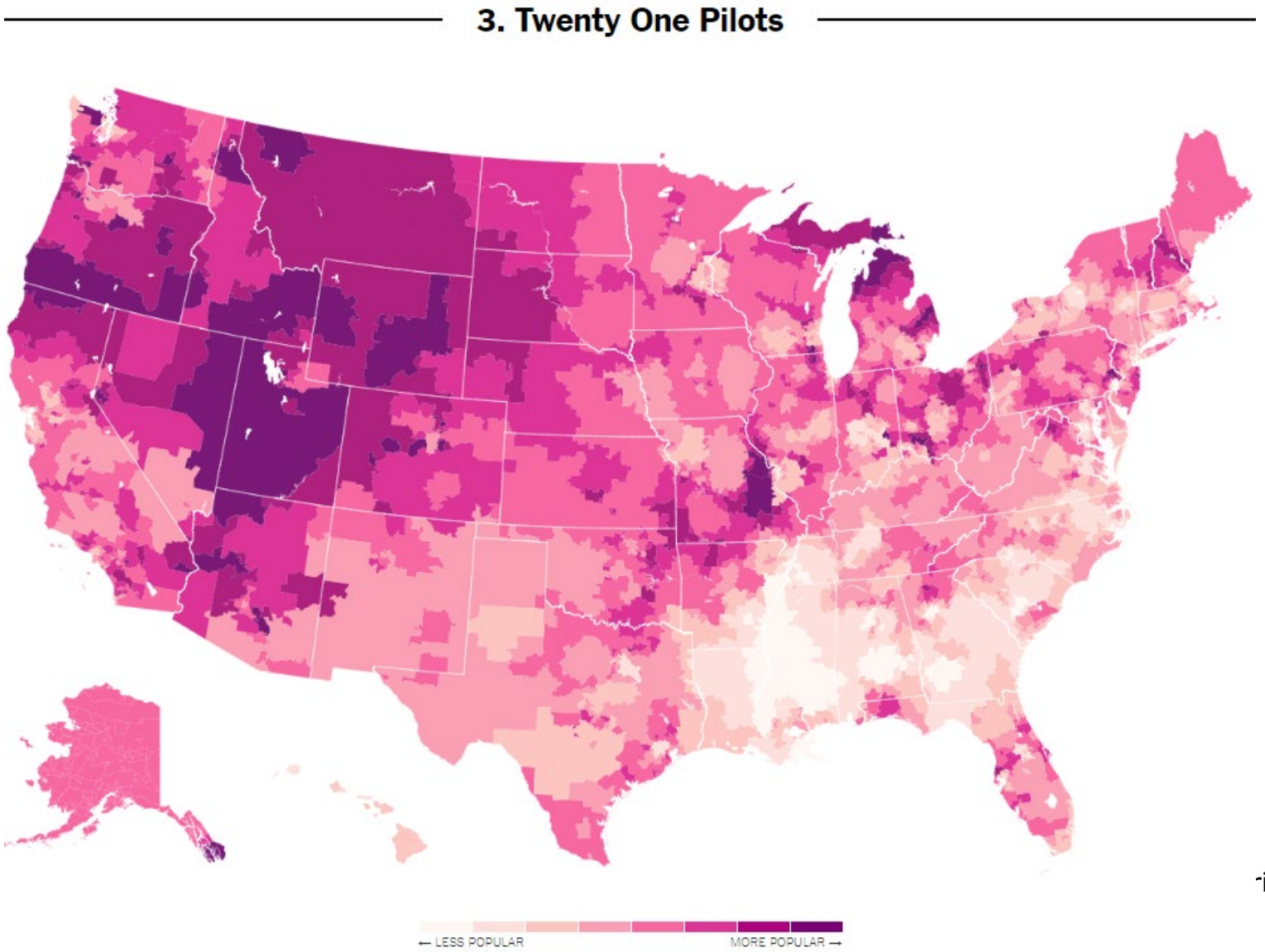

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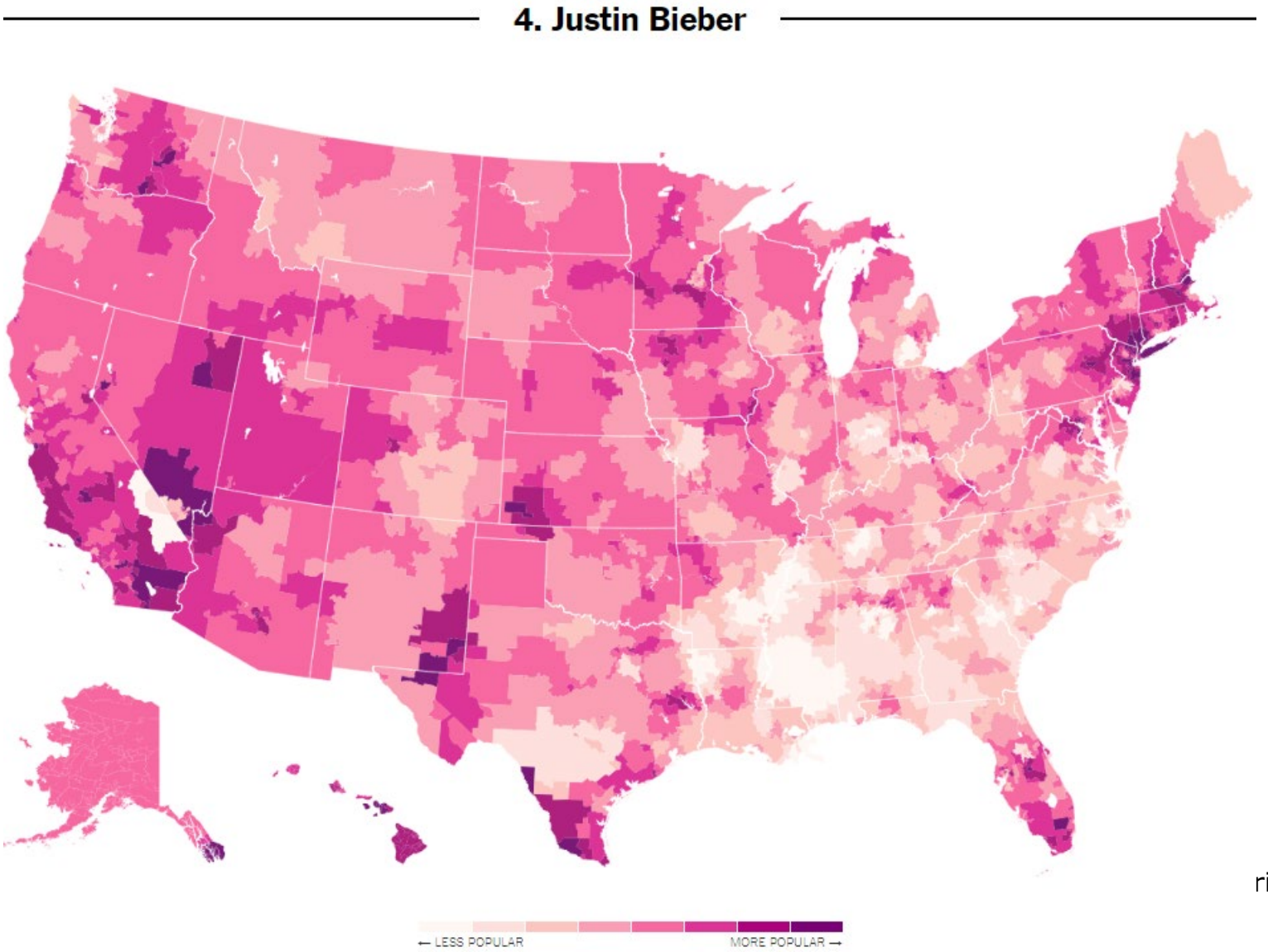

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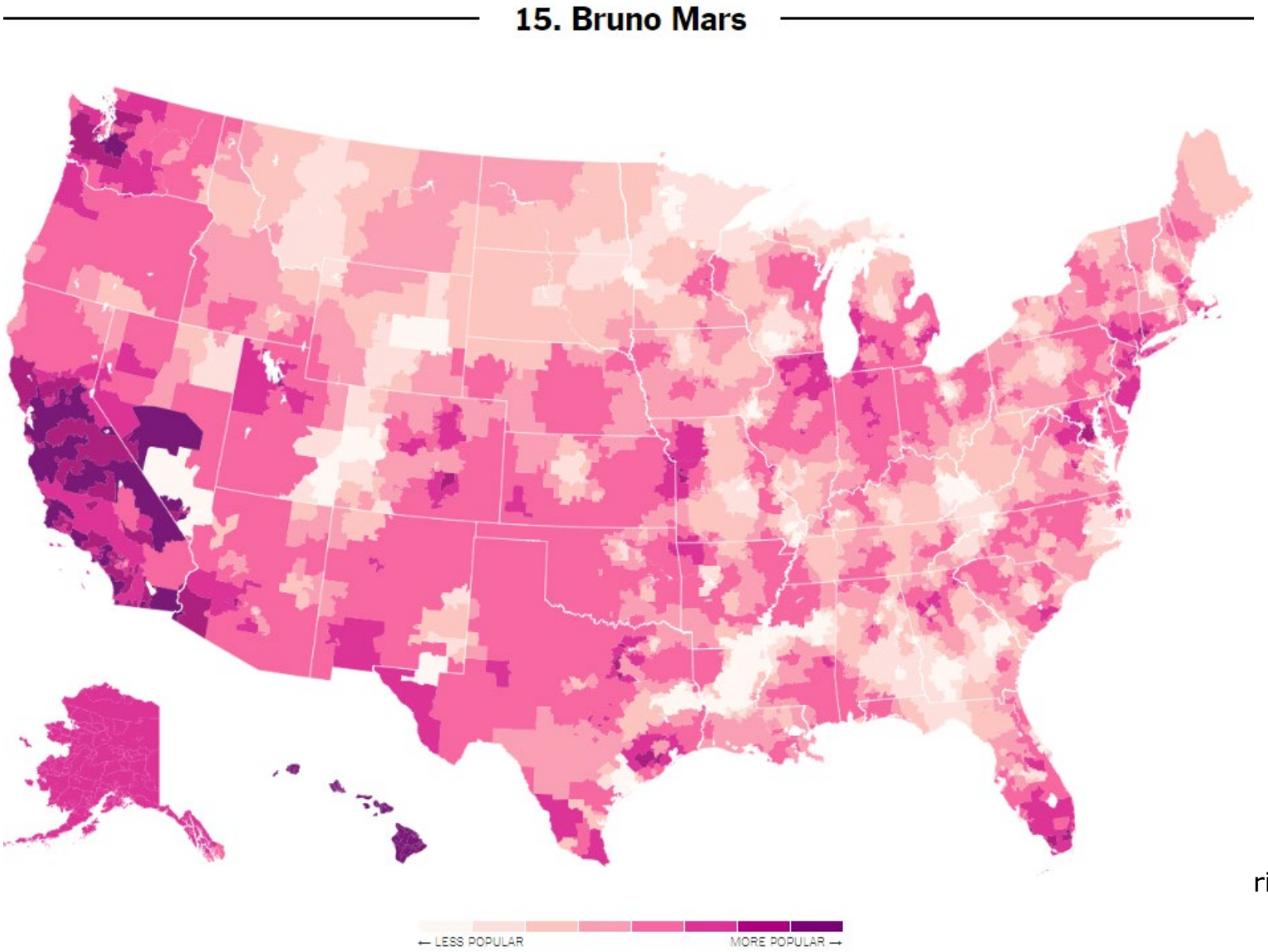

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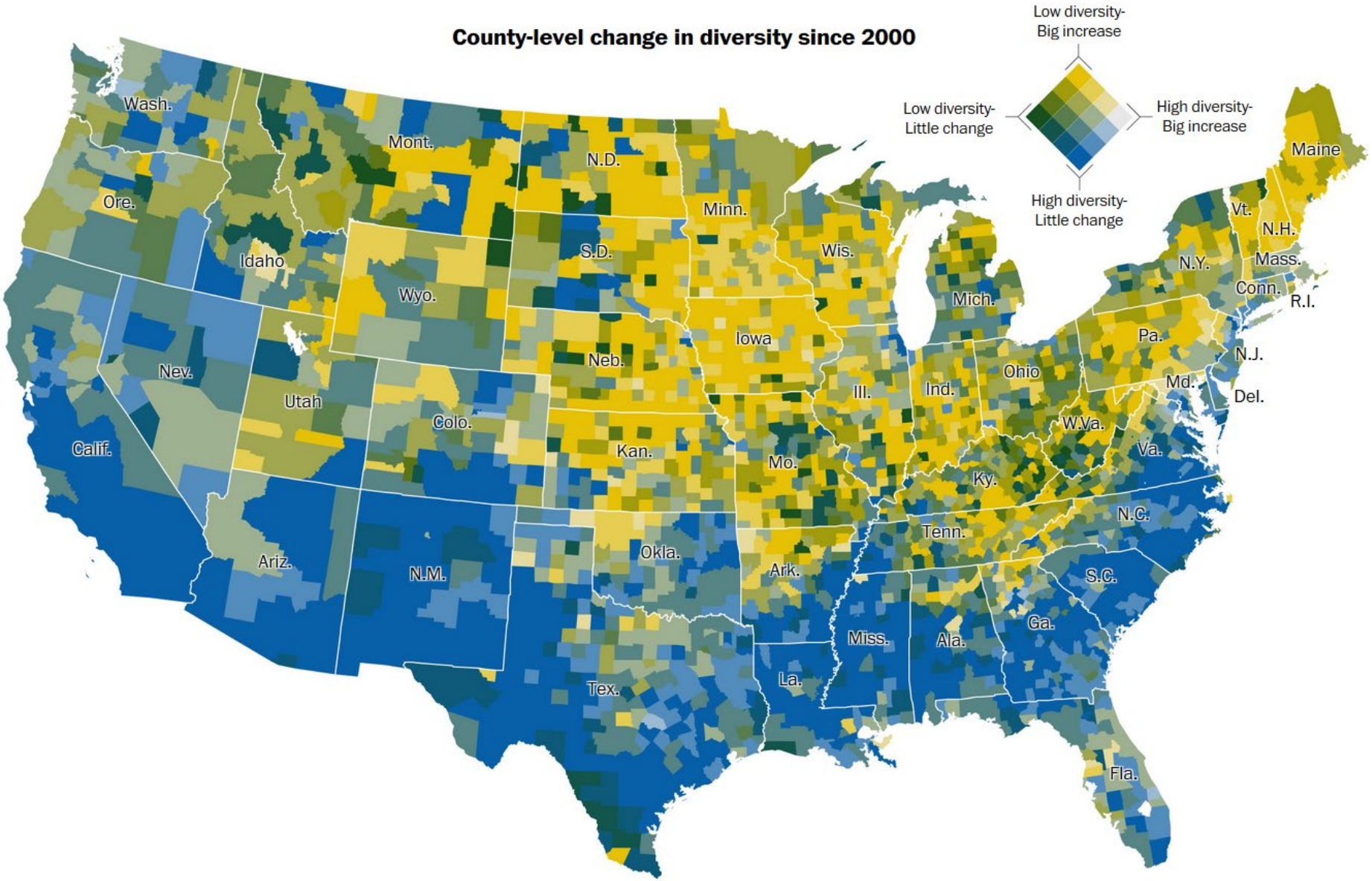
US – Diversity

- https://www.washingtonpost.com/graphics/national/how-diverse-is-america/



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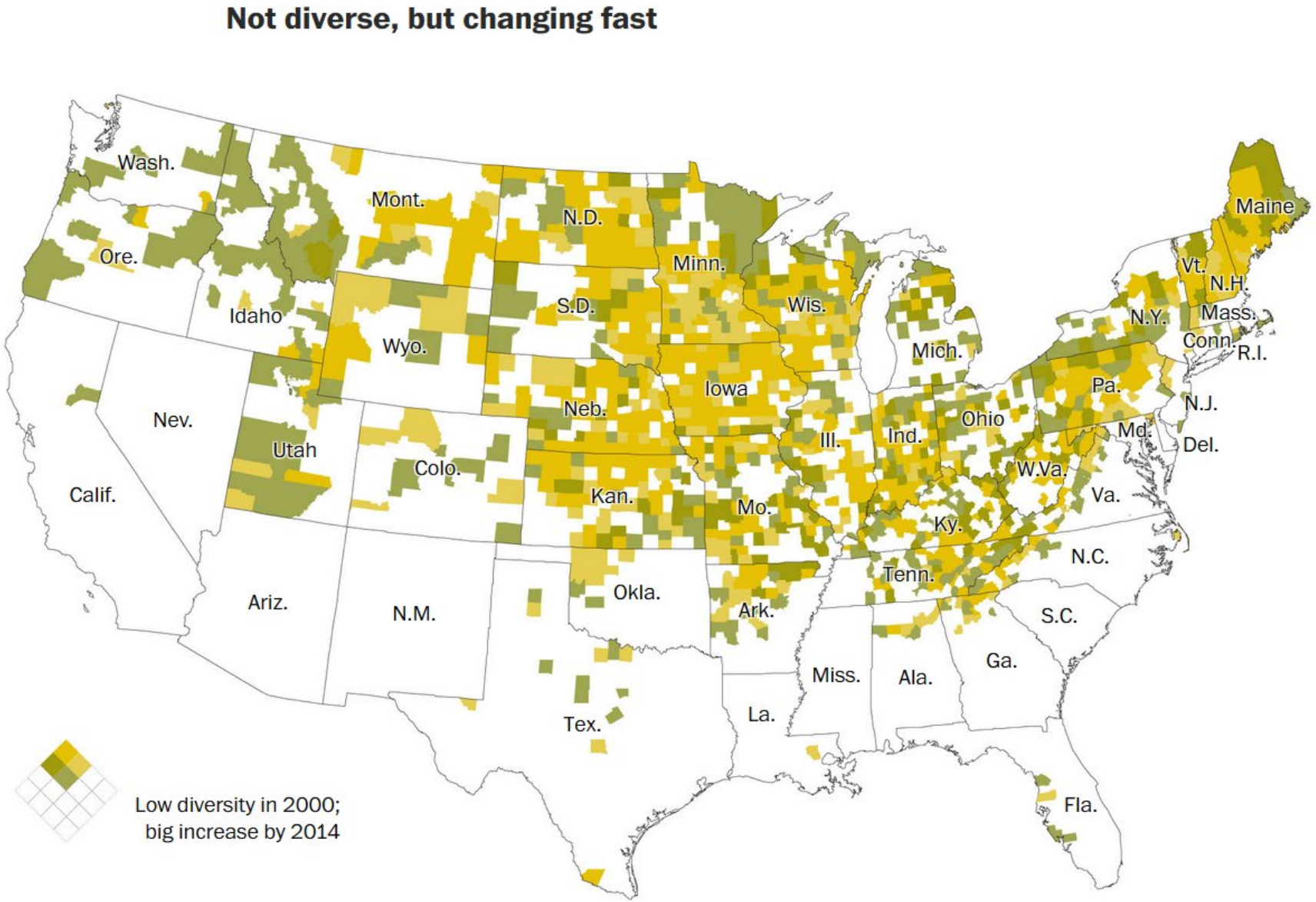

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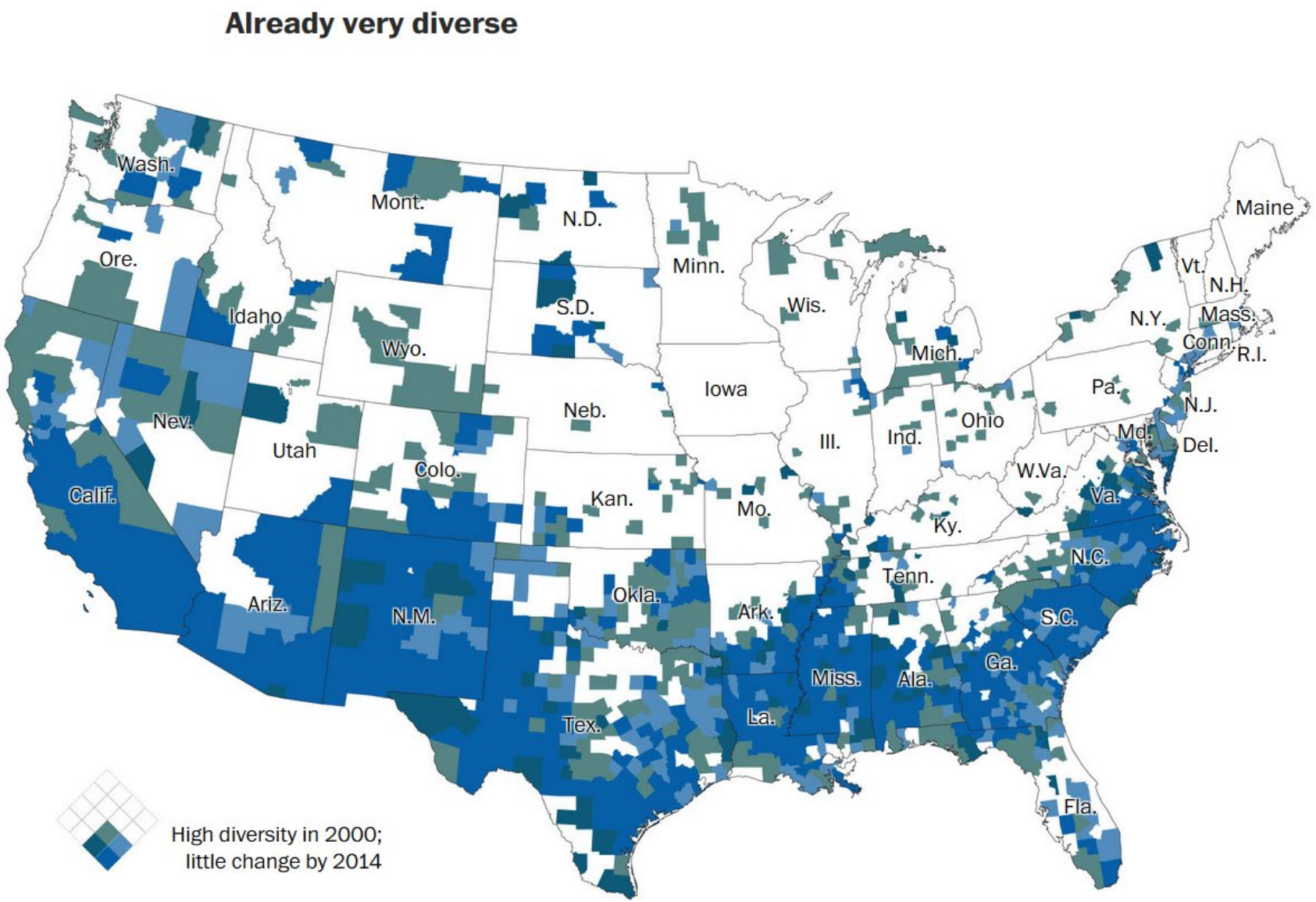

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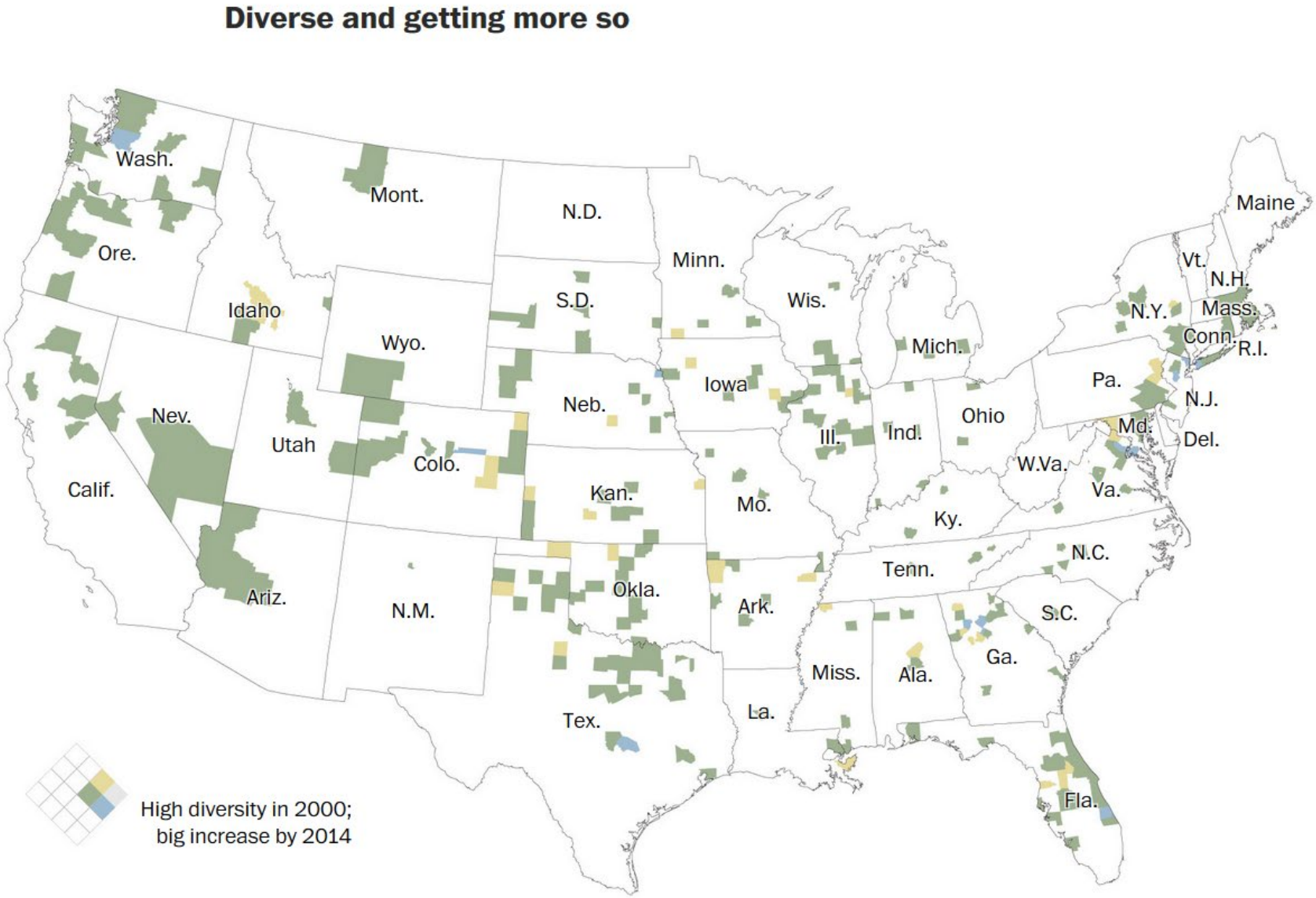

US Election – **2016**

- http://www.nytimes.com/interactive/2016/11/16/us/politics/the-two-americas-of-2016.html

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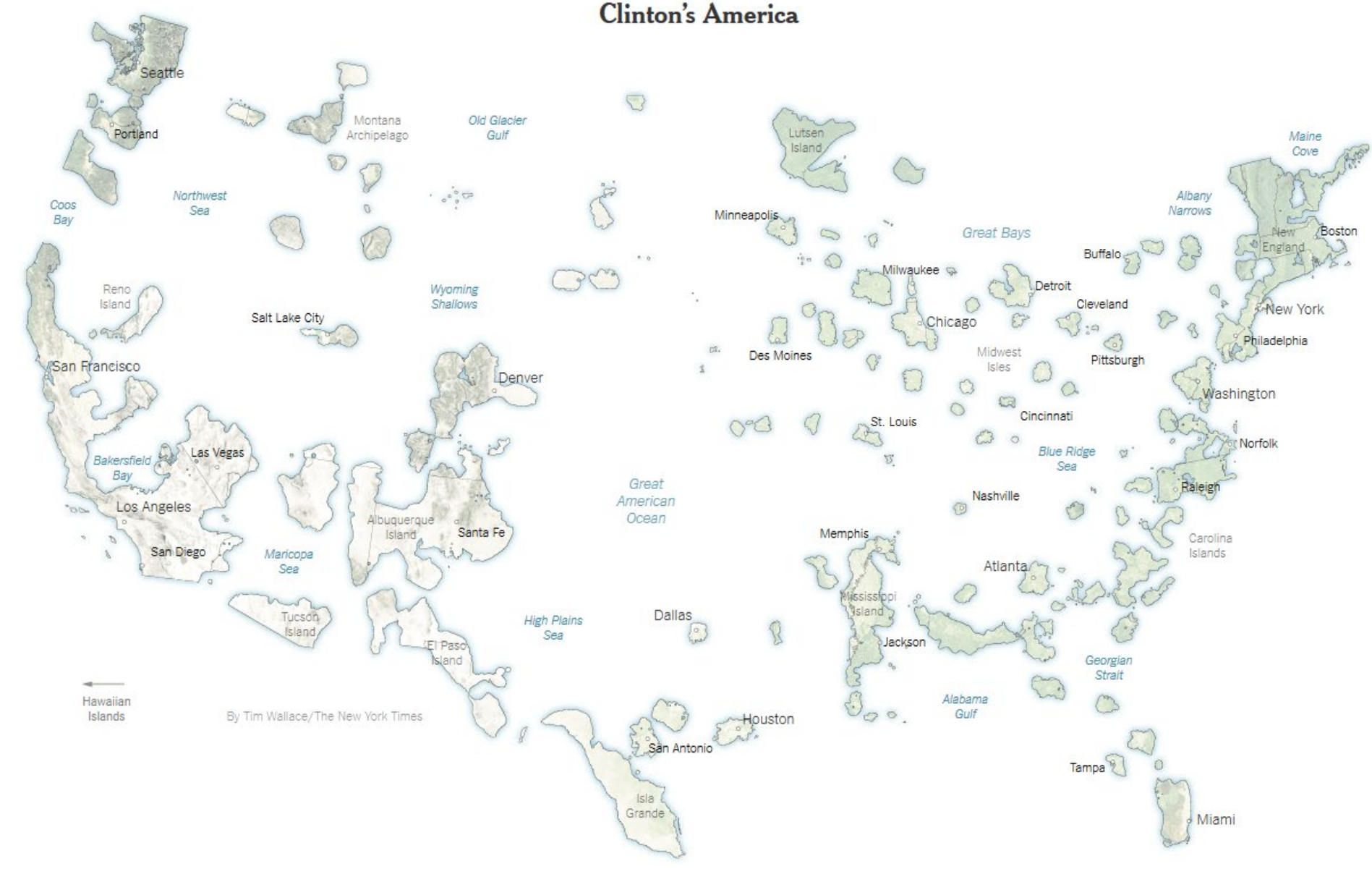
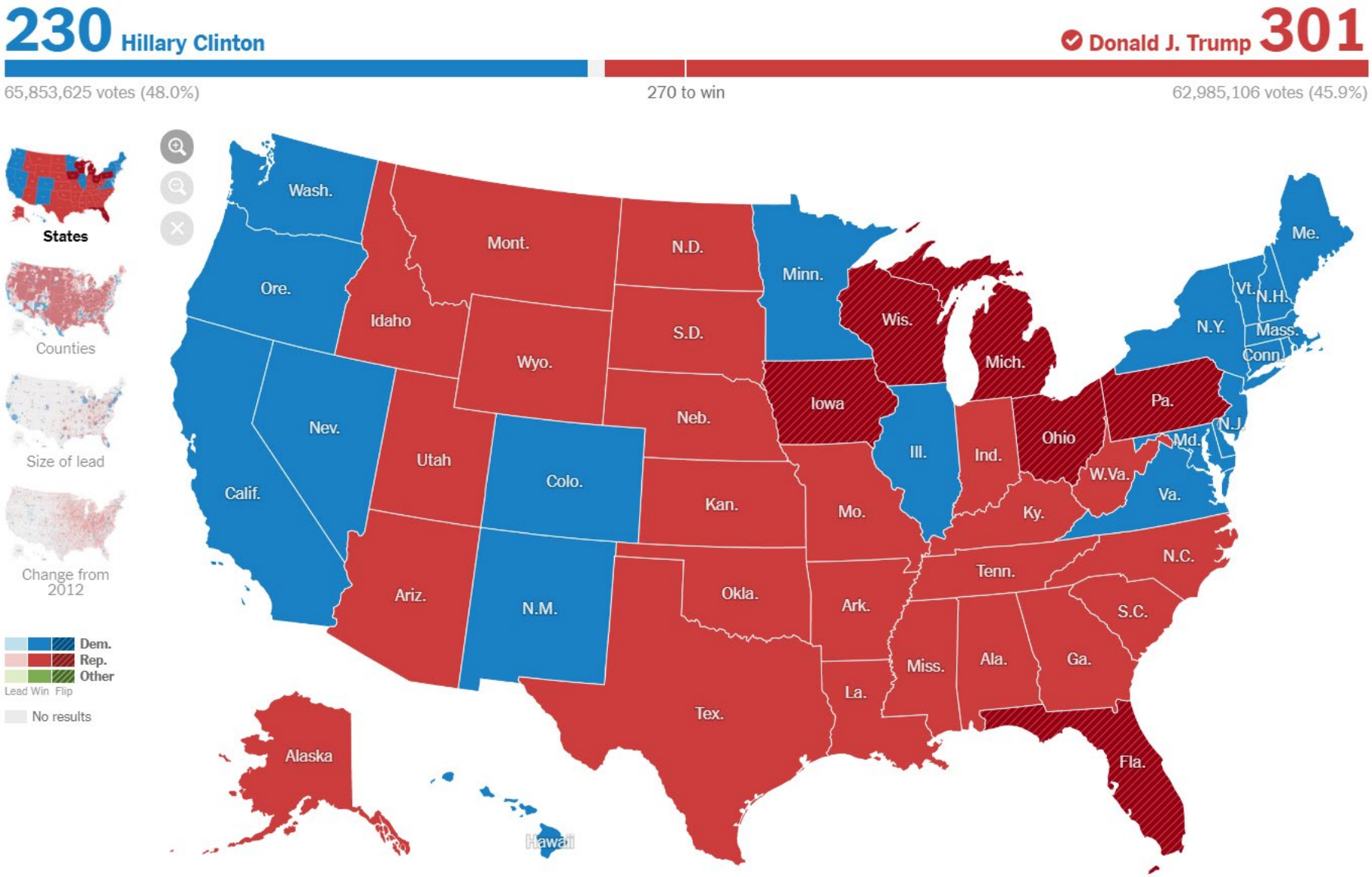


US Election – **2016**

- https://www.nytimes.com/elections/results/president



US Election – **2016**

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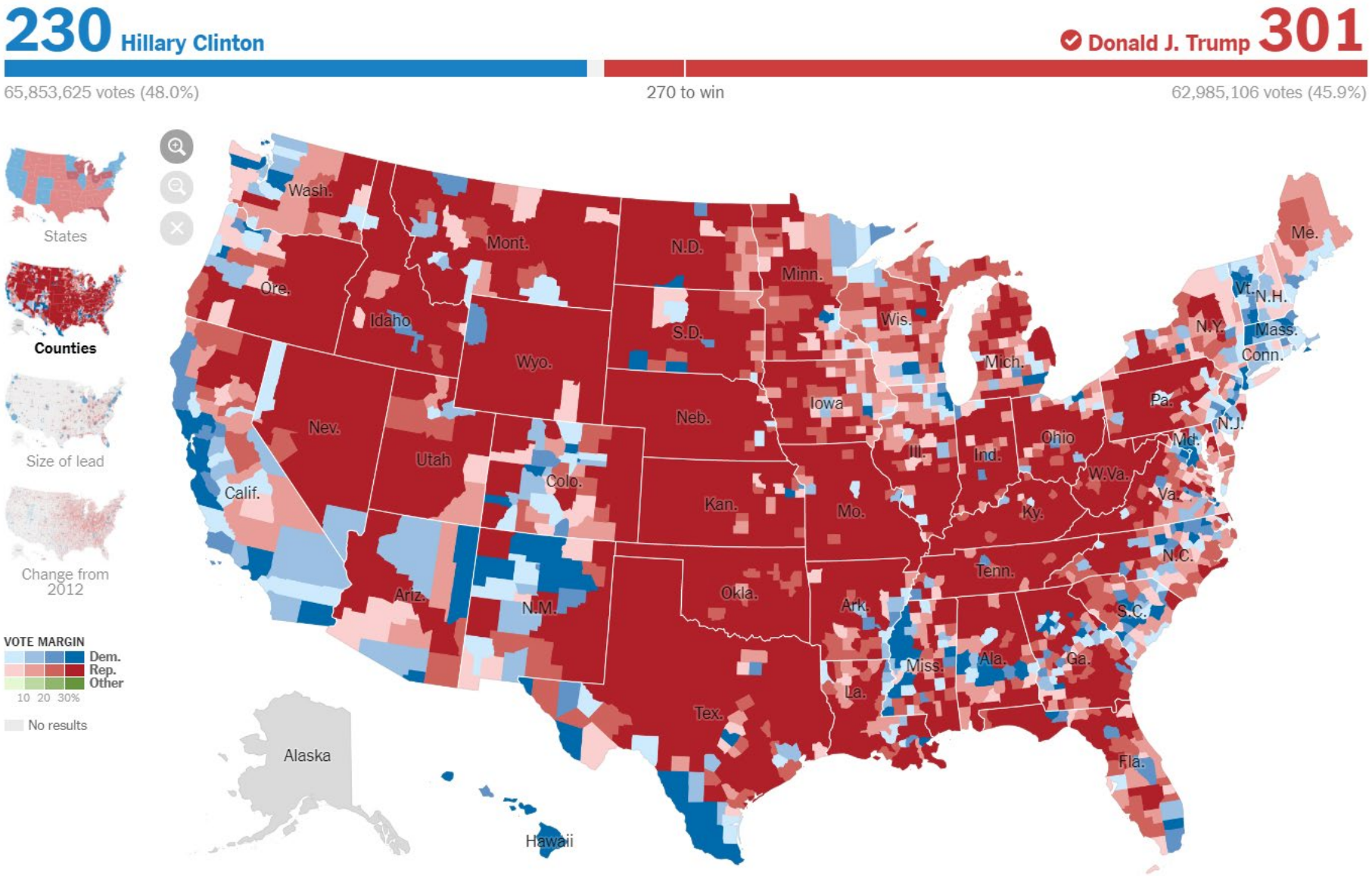

US Election – **2016**

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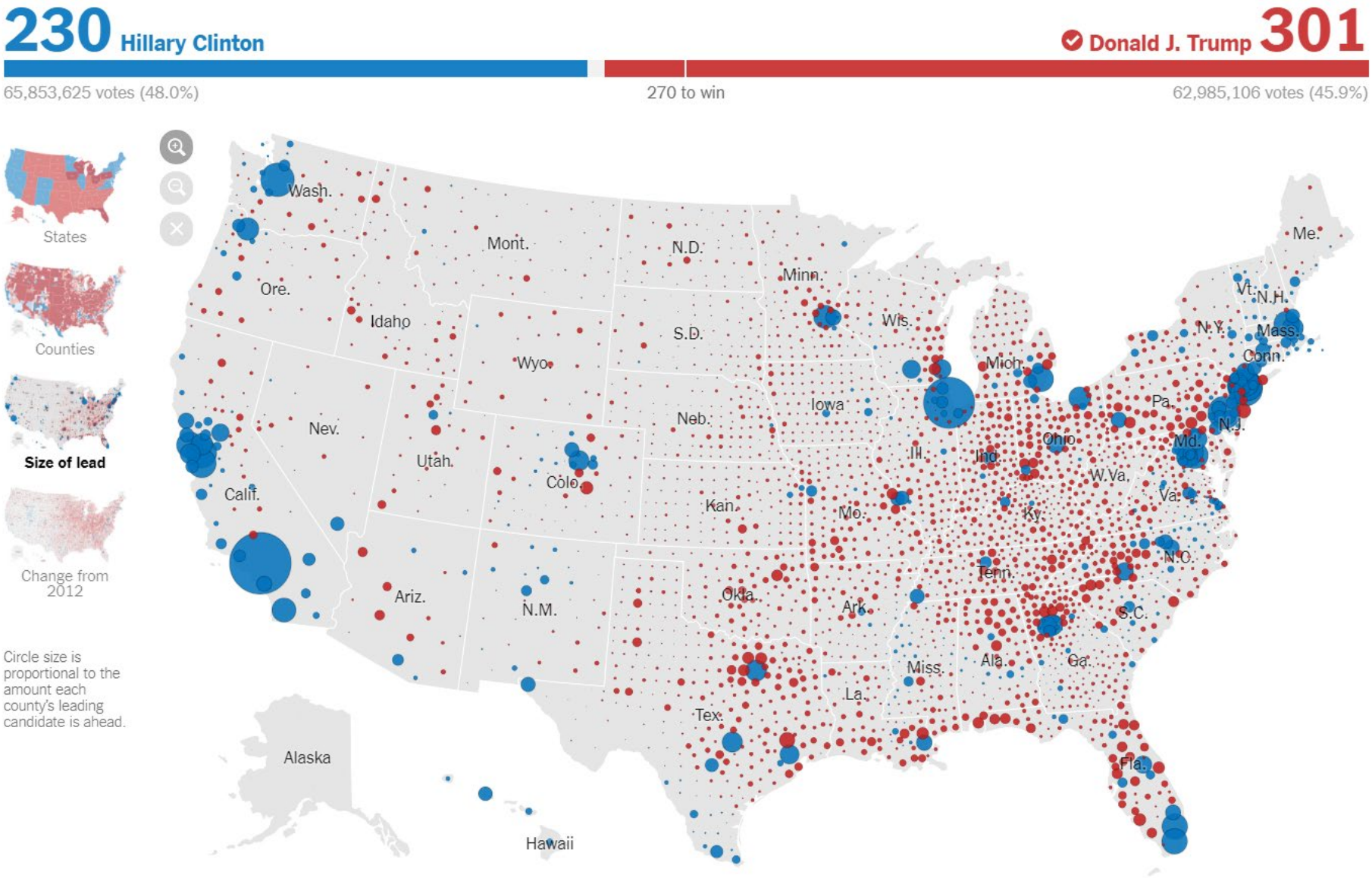

US Election – **2016**

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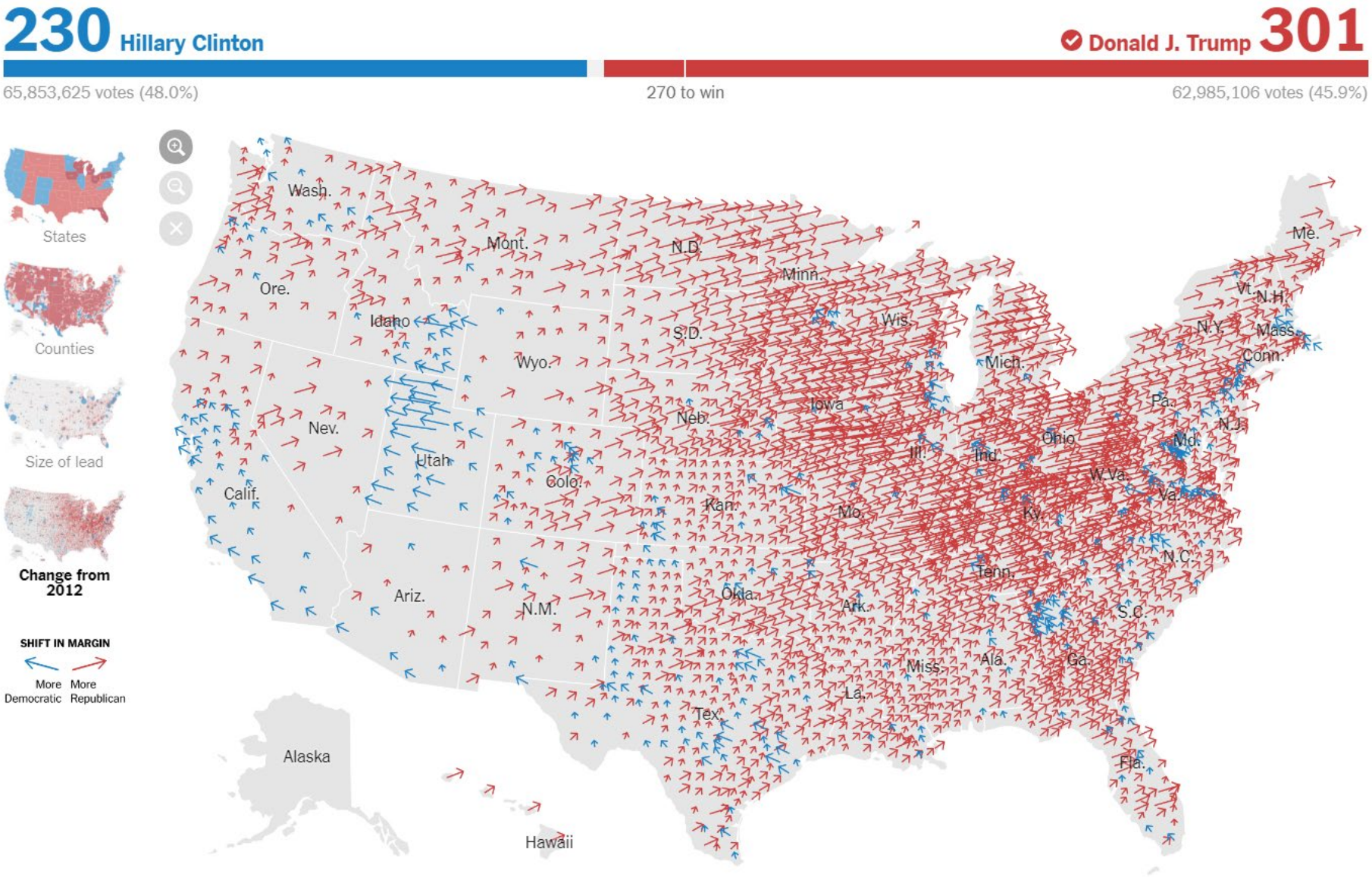
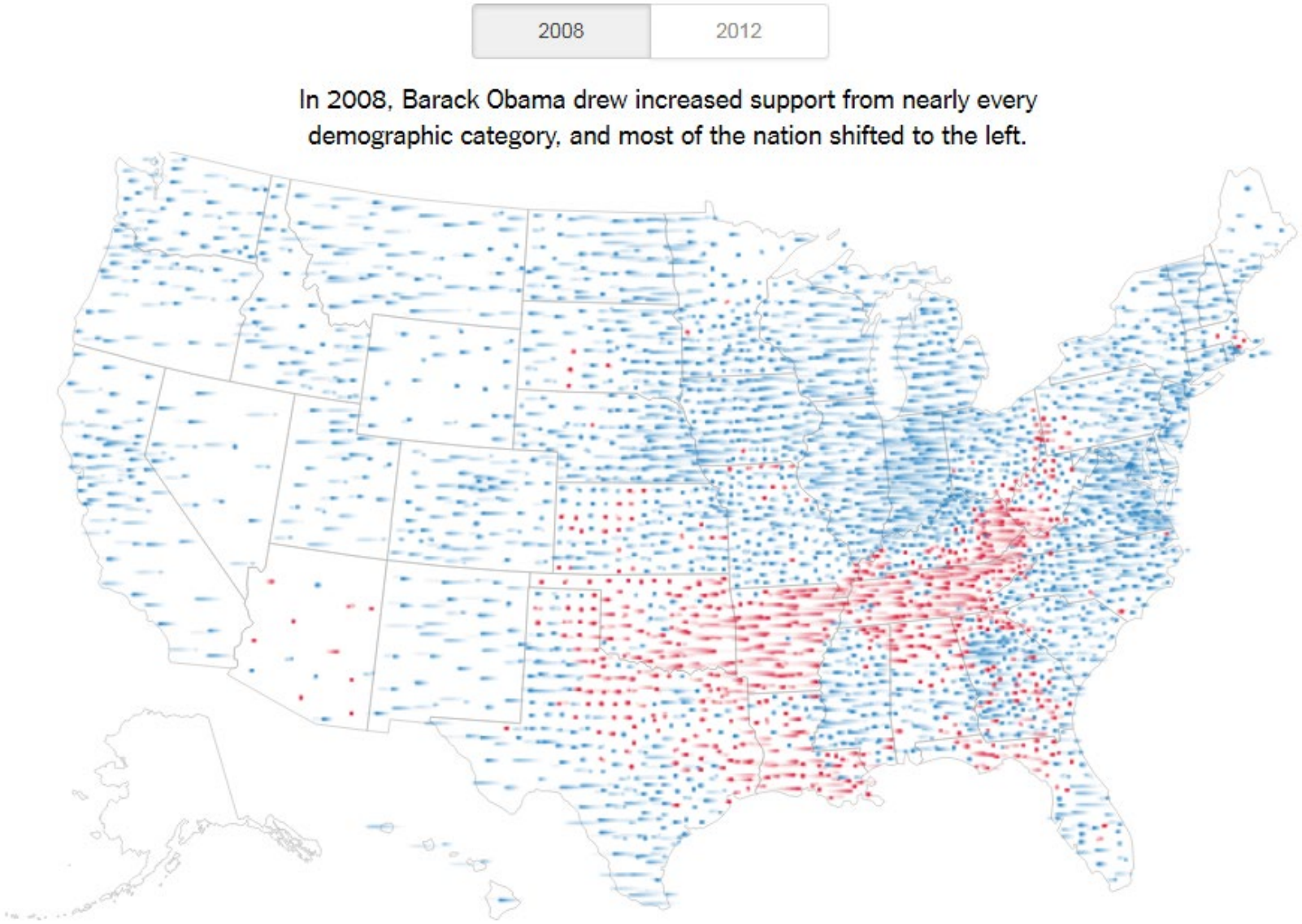


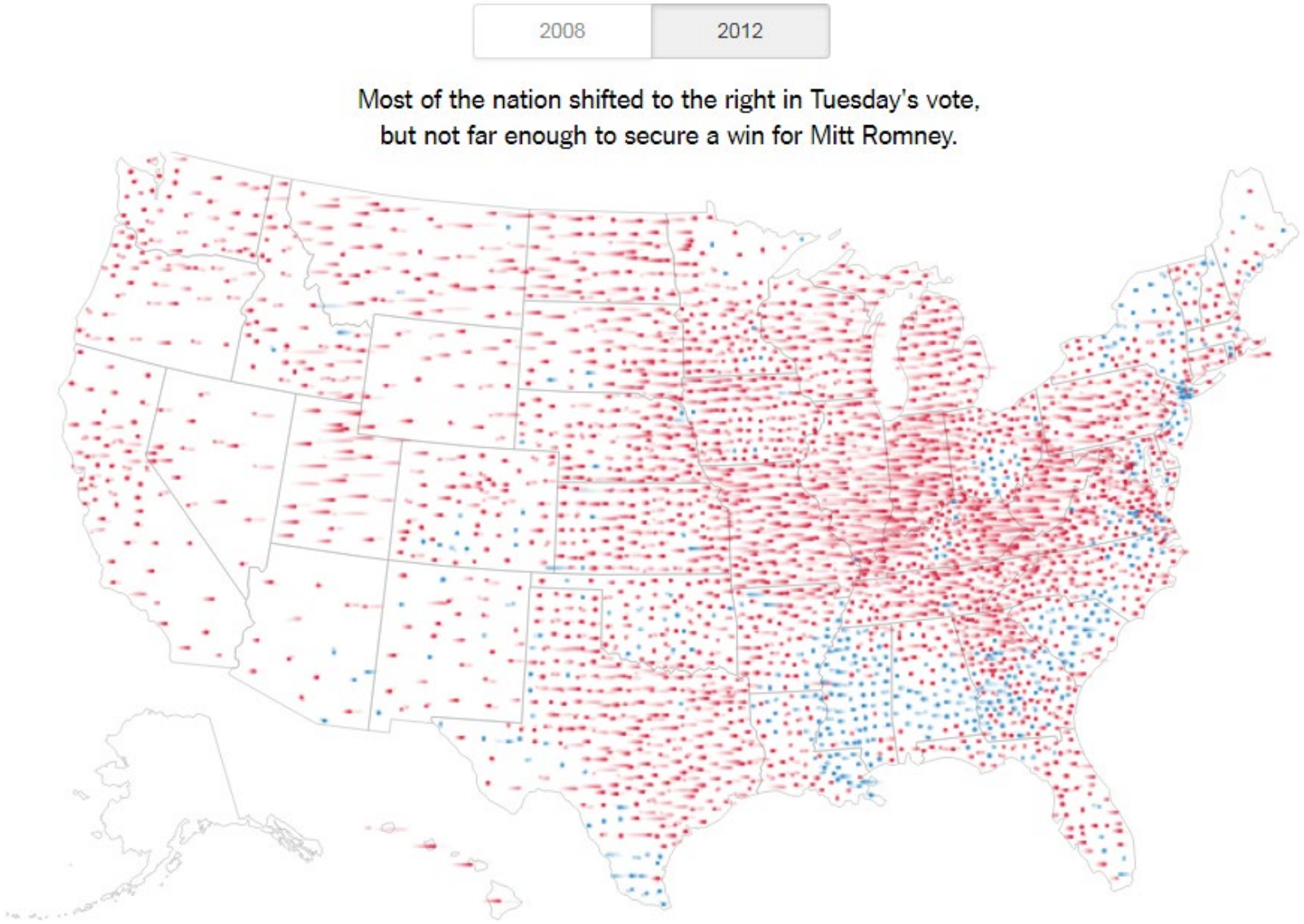
US Election – **2008**

- http://www.nytimes.com/interactive/2012/11/07/us/politics/obamas-diverse-base-of-support.html



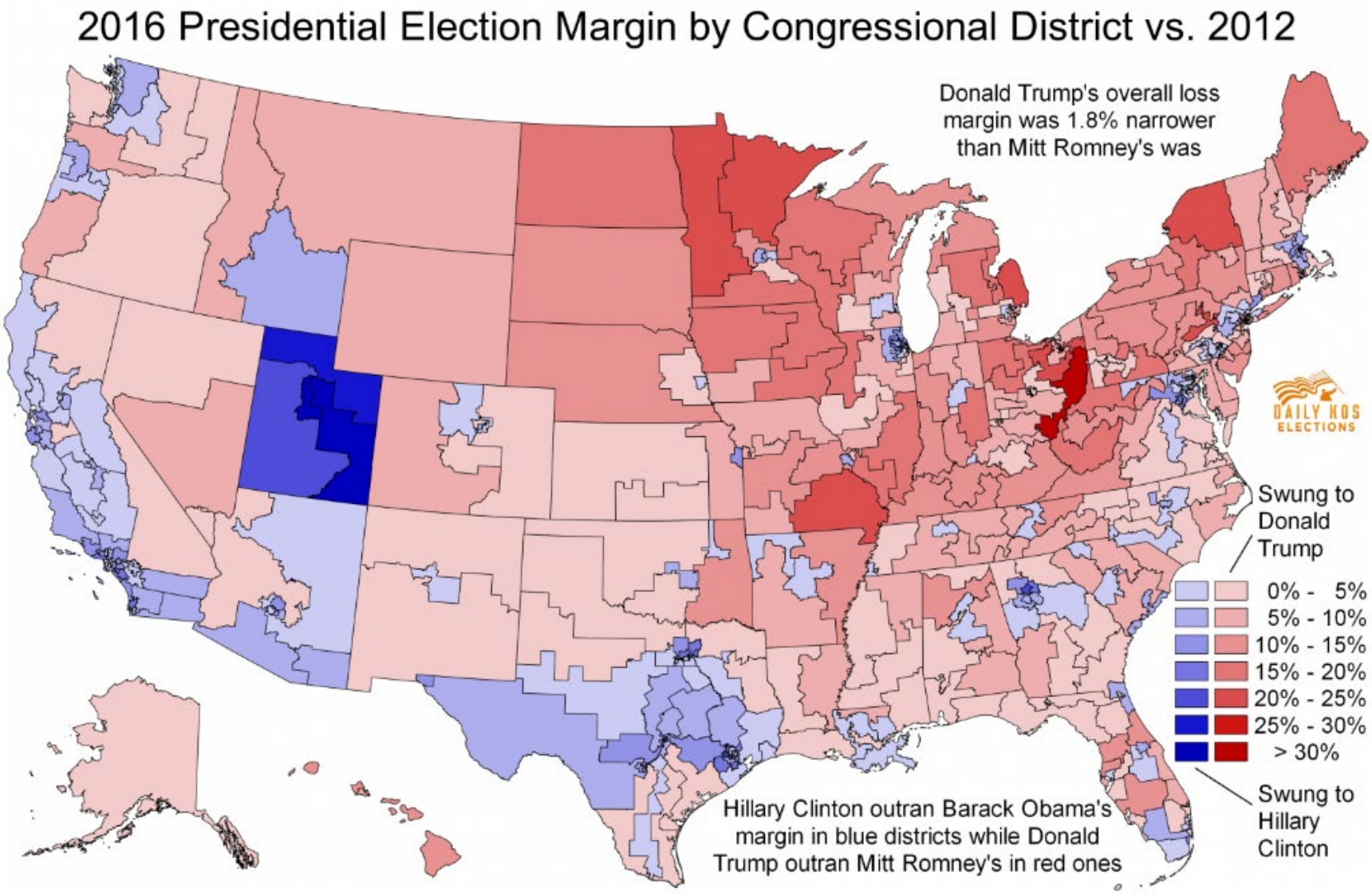
US Election – **2012**

- http://www.nytimes.com/interactive/2012/11/07/us/politics/obamas-diverse-base-of-support.html



US Presidential Election – Shift from 2012 to 2016

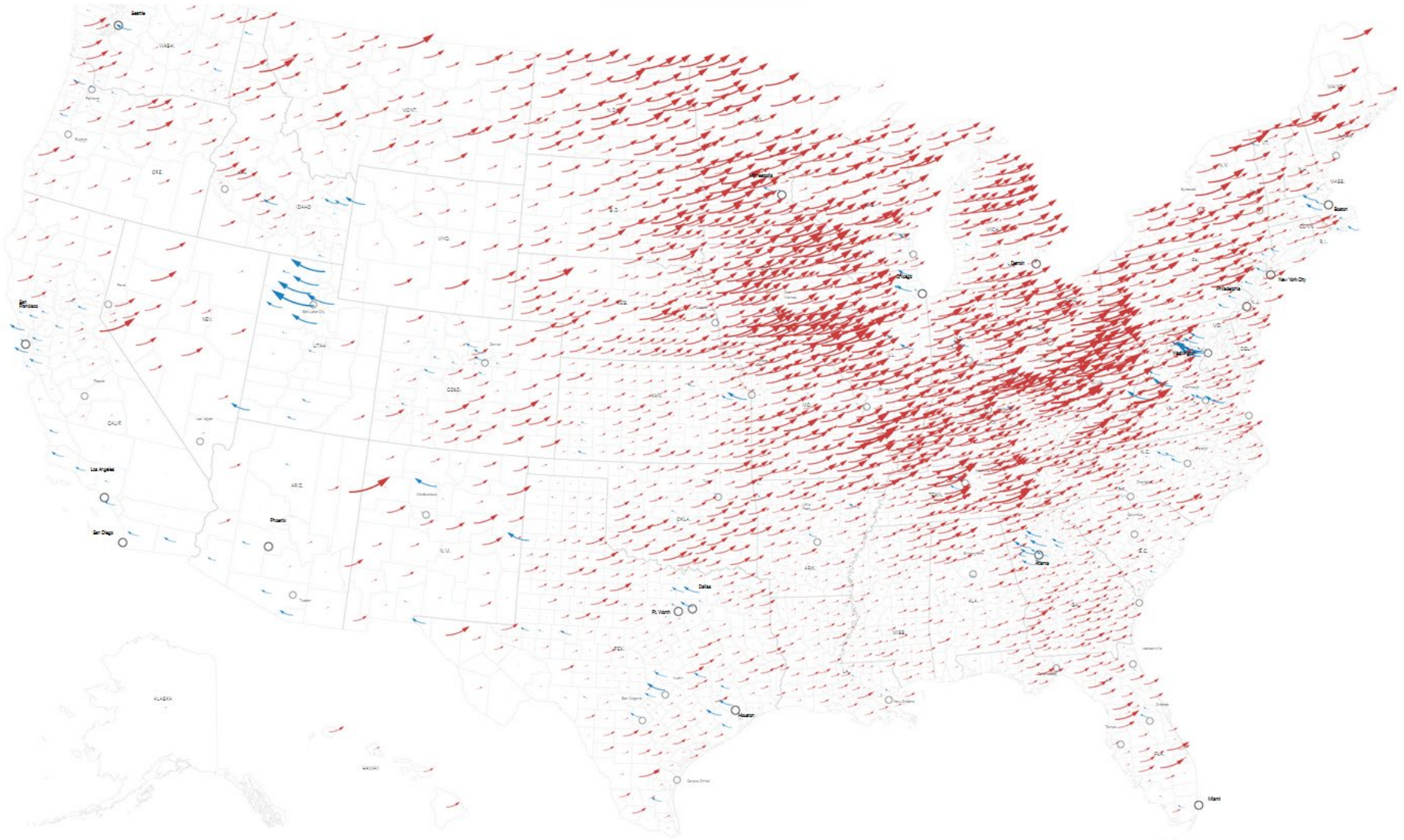
- https://www.washingtonpost.com/news/the-fix/wp/2017/02/03/how-donald-trump-totally-re-drew-the-political-map

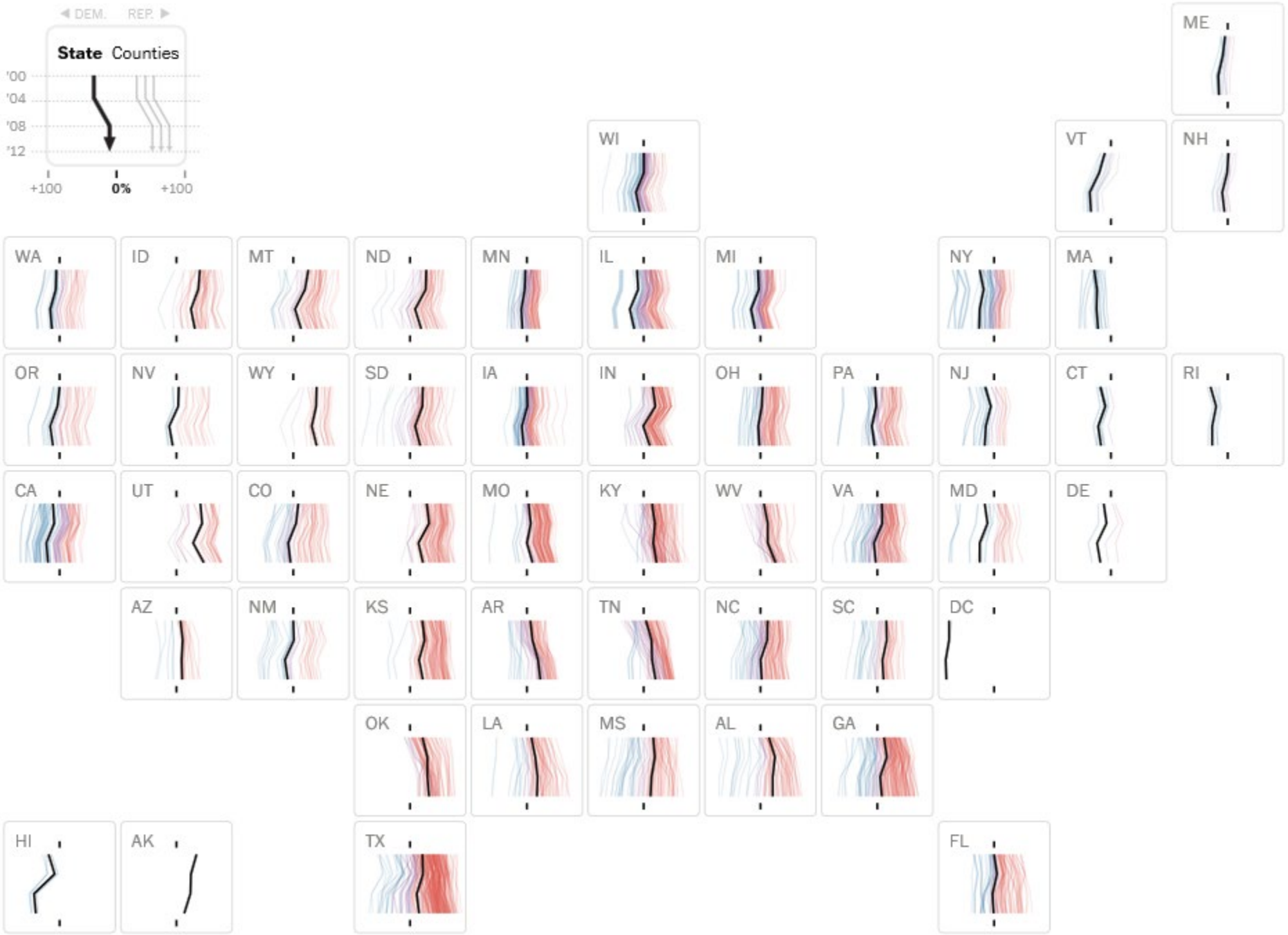


Source: Stephen Wolf

US Presidential Election – Shift from 2012 to 2016

- http://www.nytimes.com/interactive/2016/11/08/us/elections/how-trump-pushed-the-election-map-to-the-right.html




◀ DEM. REP. ▶
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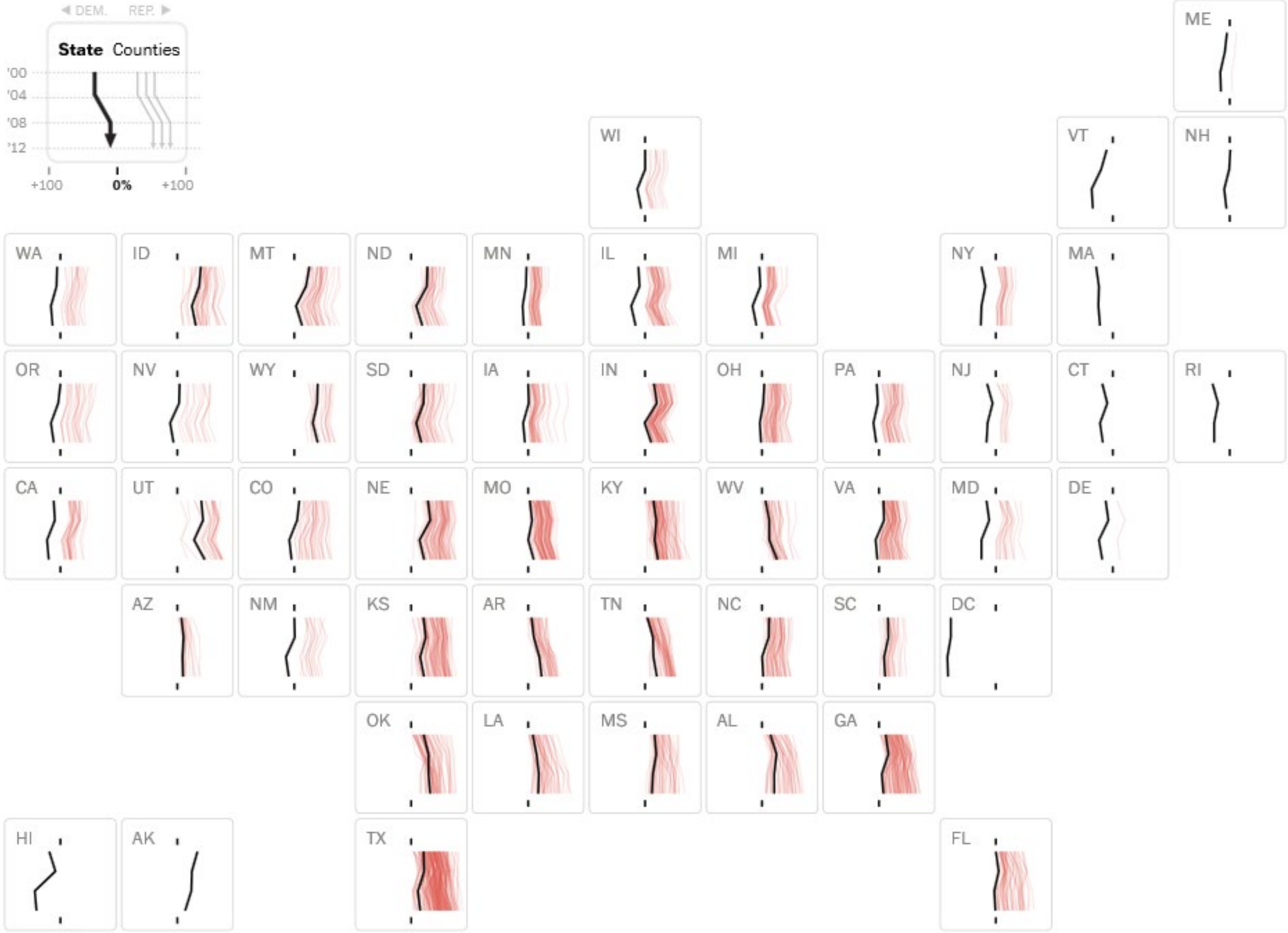
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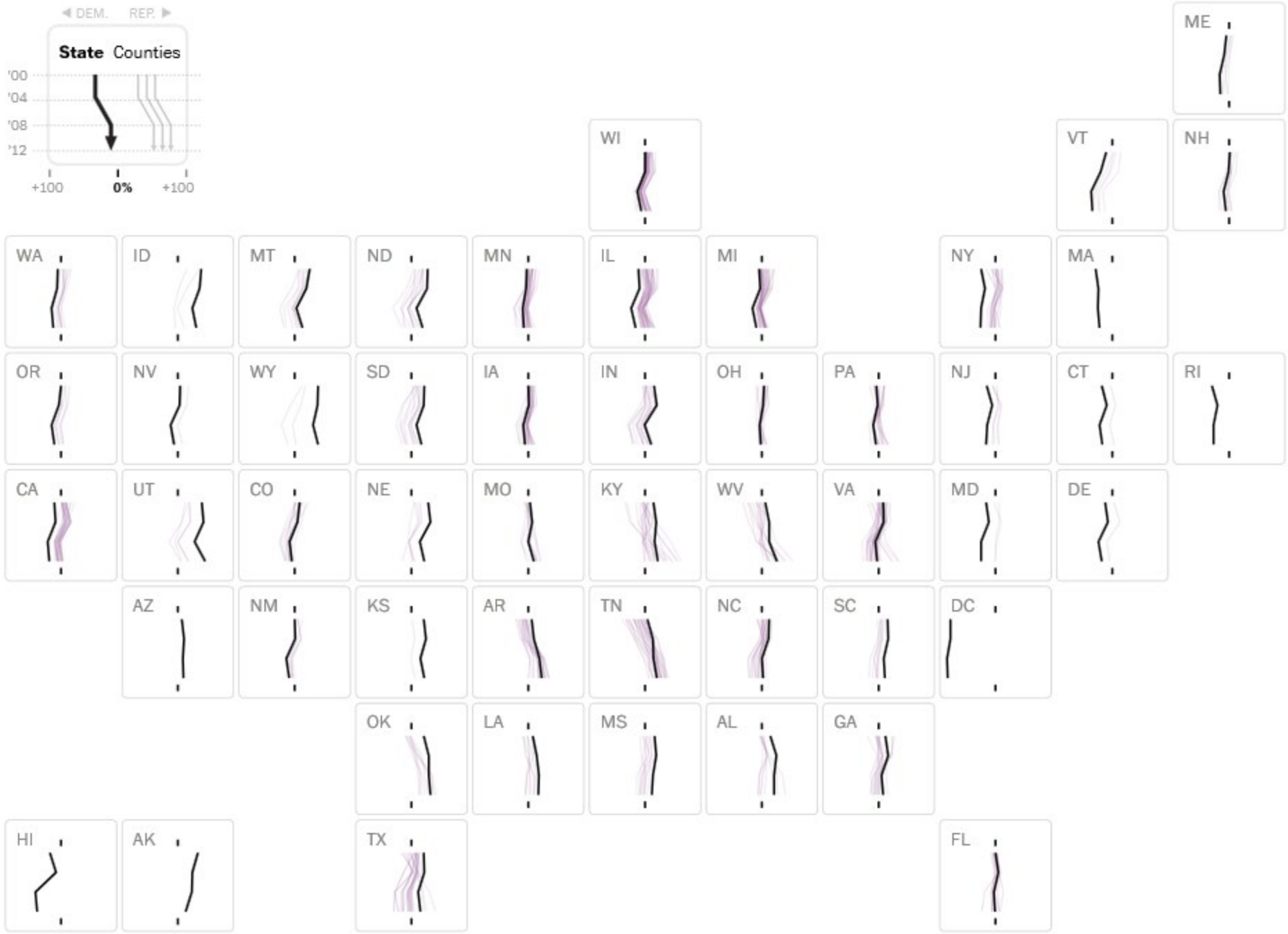
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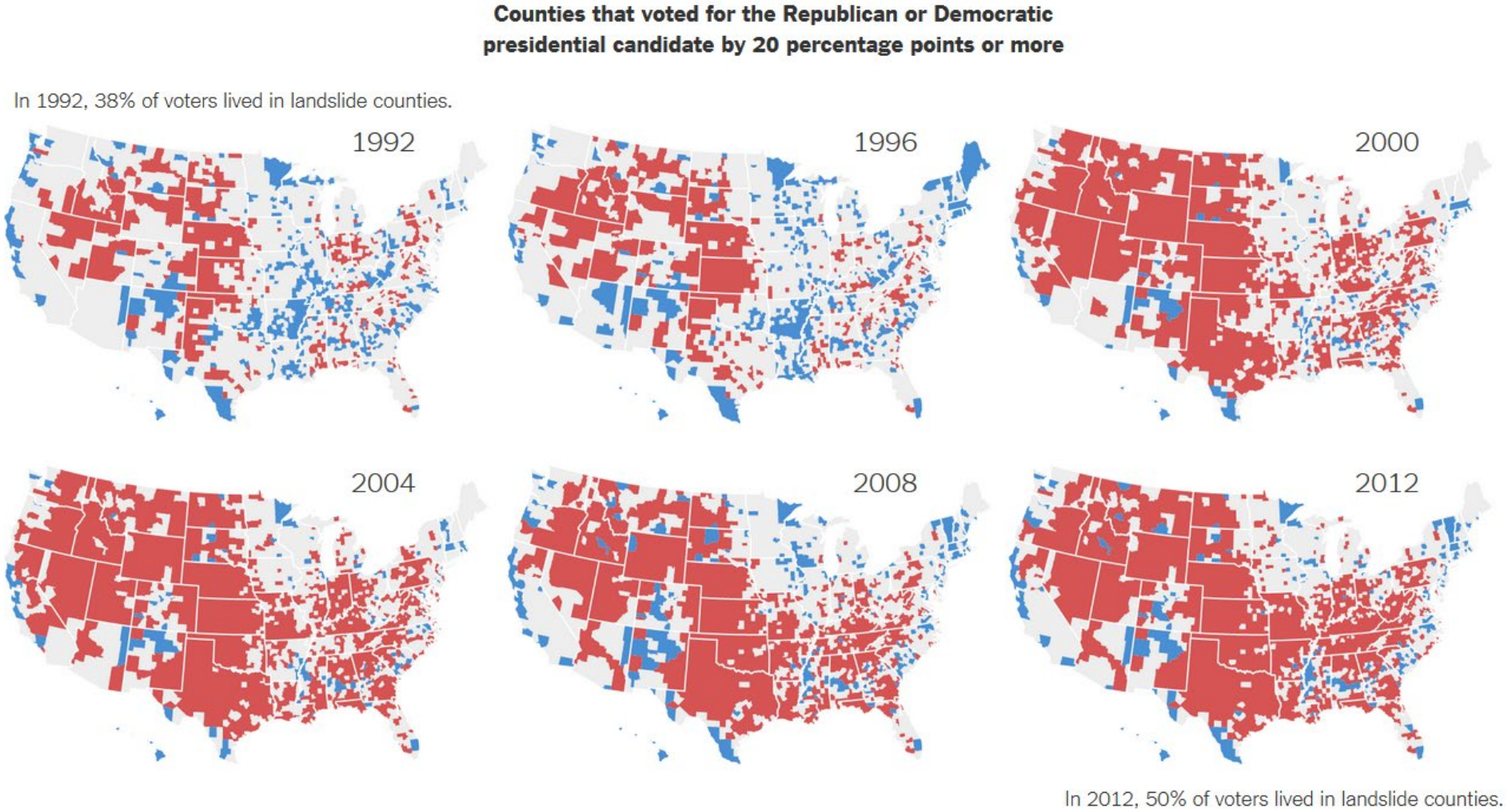
US – Growing Divide between Red and Blue

- http://www.nytimes.com/interactive/2016/11/04/us/politics/growing-divide-between-red-and-blue-america.html



US – Growing Divide between Red and Blue

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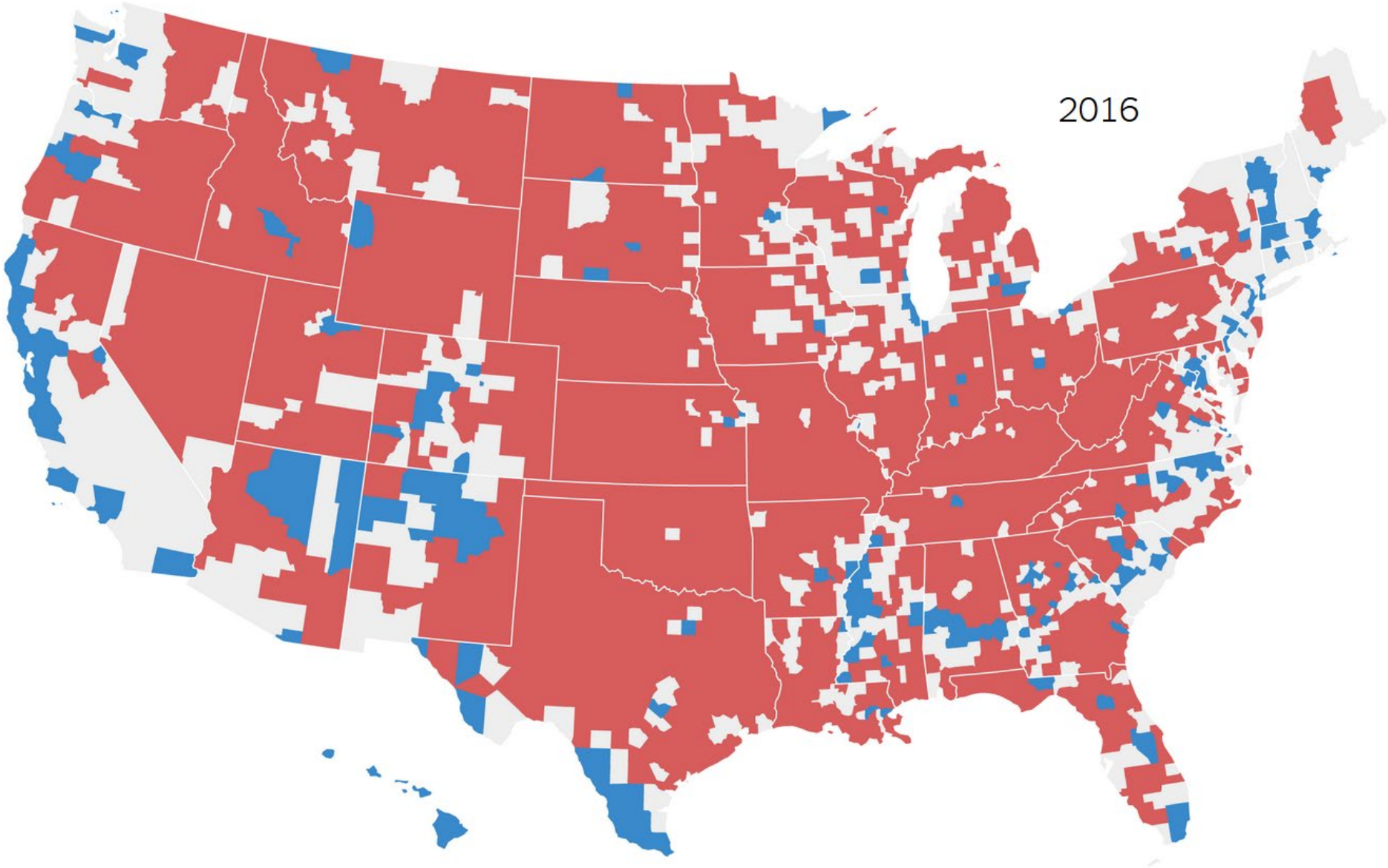
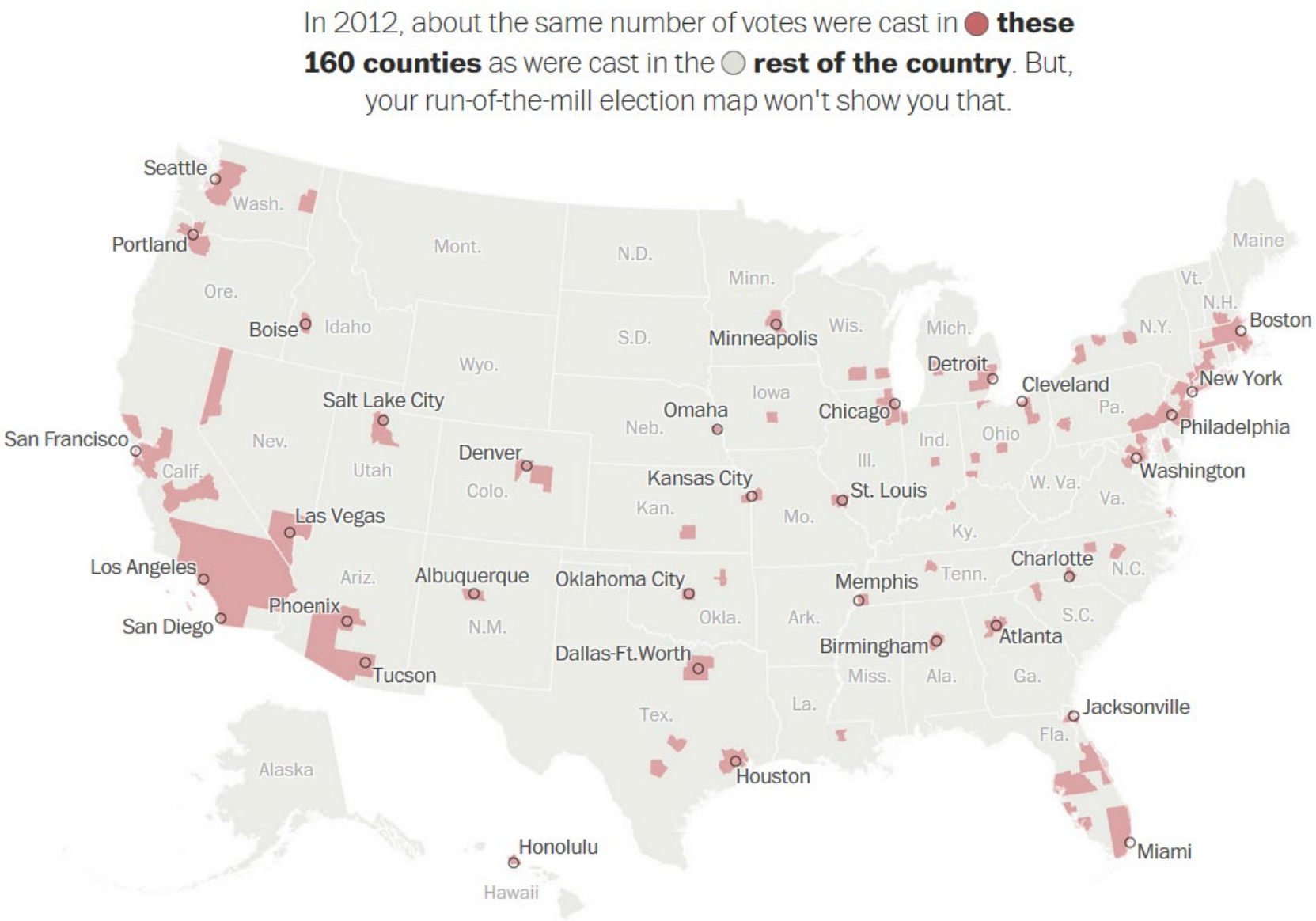


How Intensity / Choropleth Maps Can Distort Data

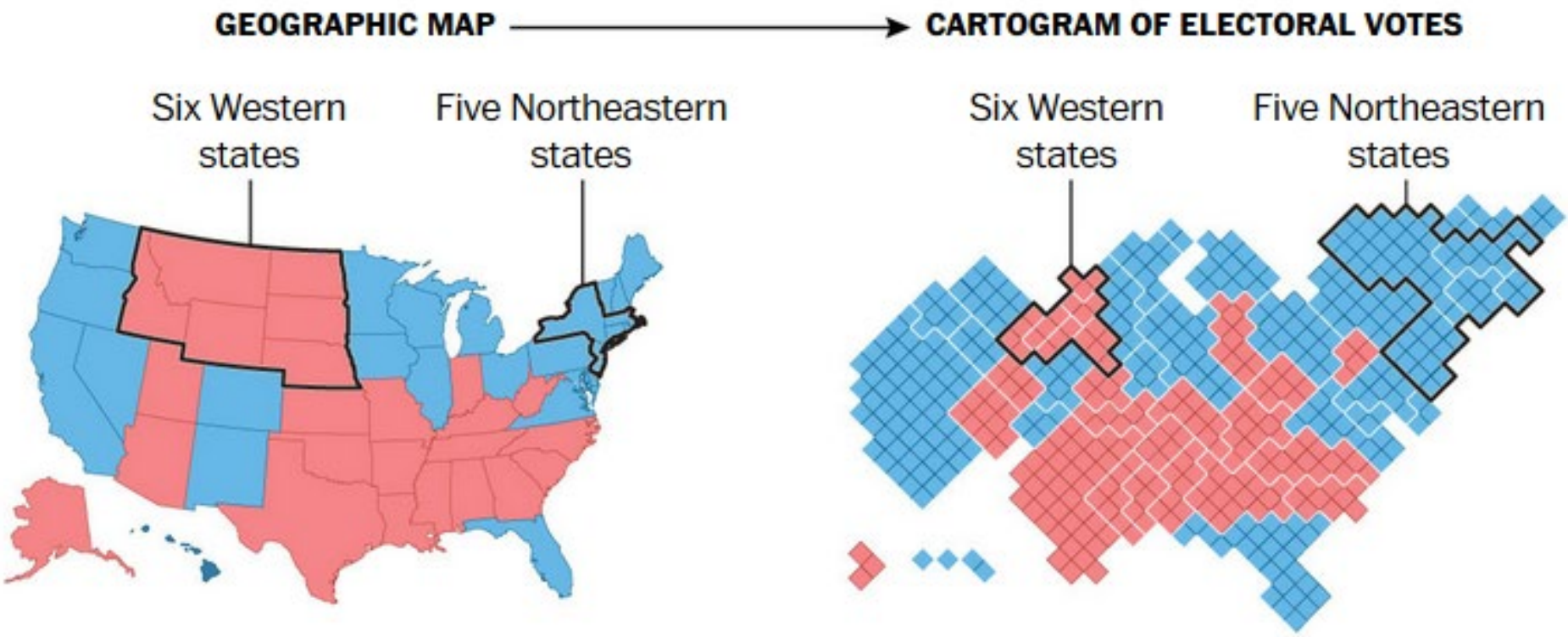
- https://www.washingtonpost.com/graphics/politics/2016-election/how-election-maps-lie/



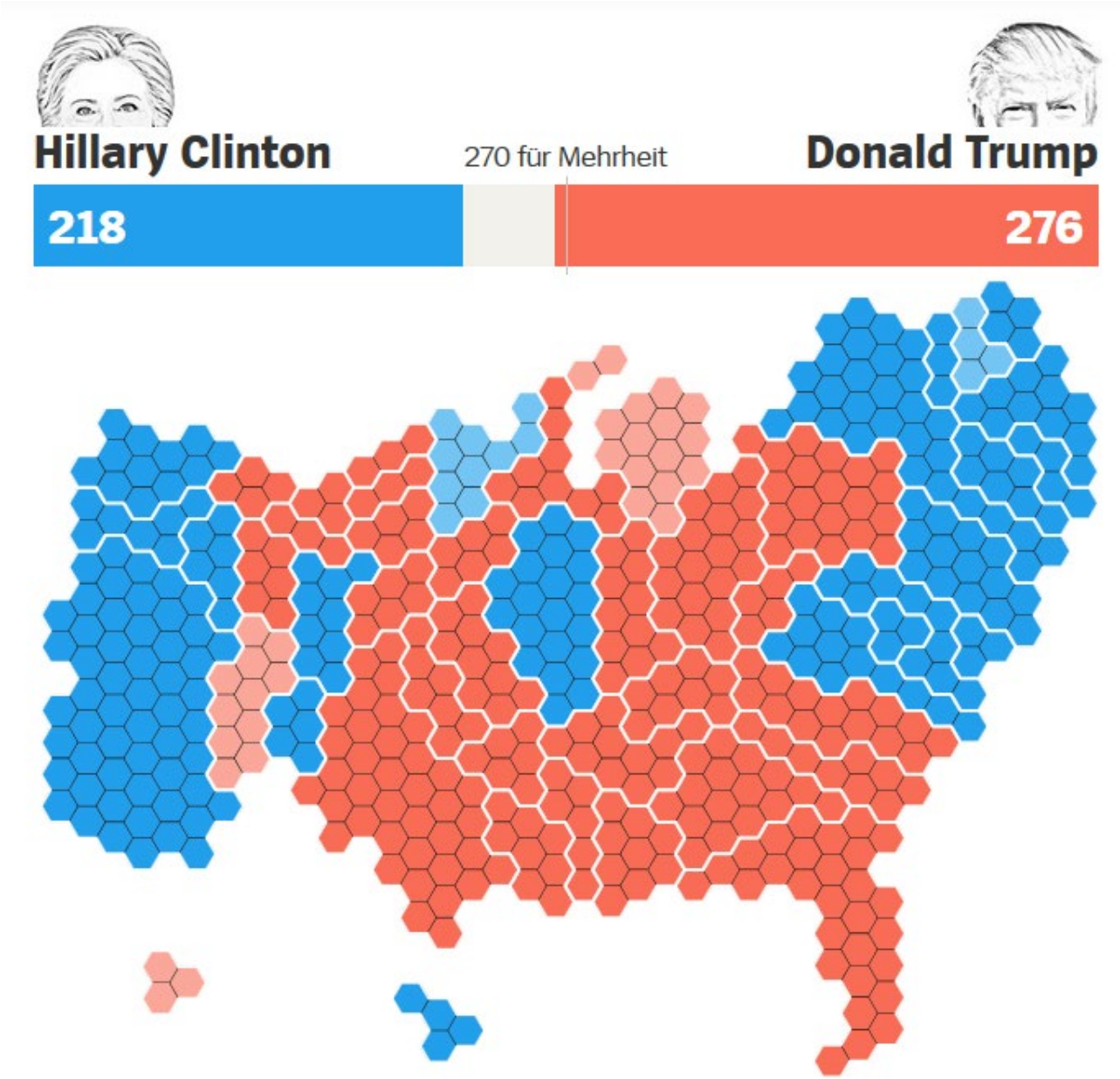
How Intensity / Choropleth Maps Can Distort Data

The votes cast in these seven states total just 250,000 more votes than in New Jersey.

Mapping Data to Cartogram



Cartogram – Electoral Votes 2016



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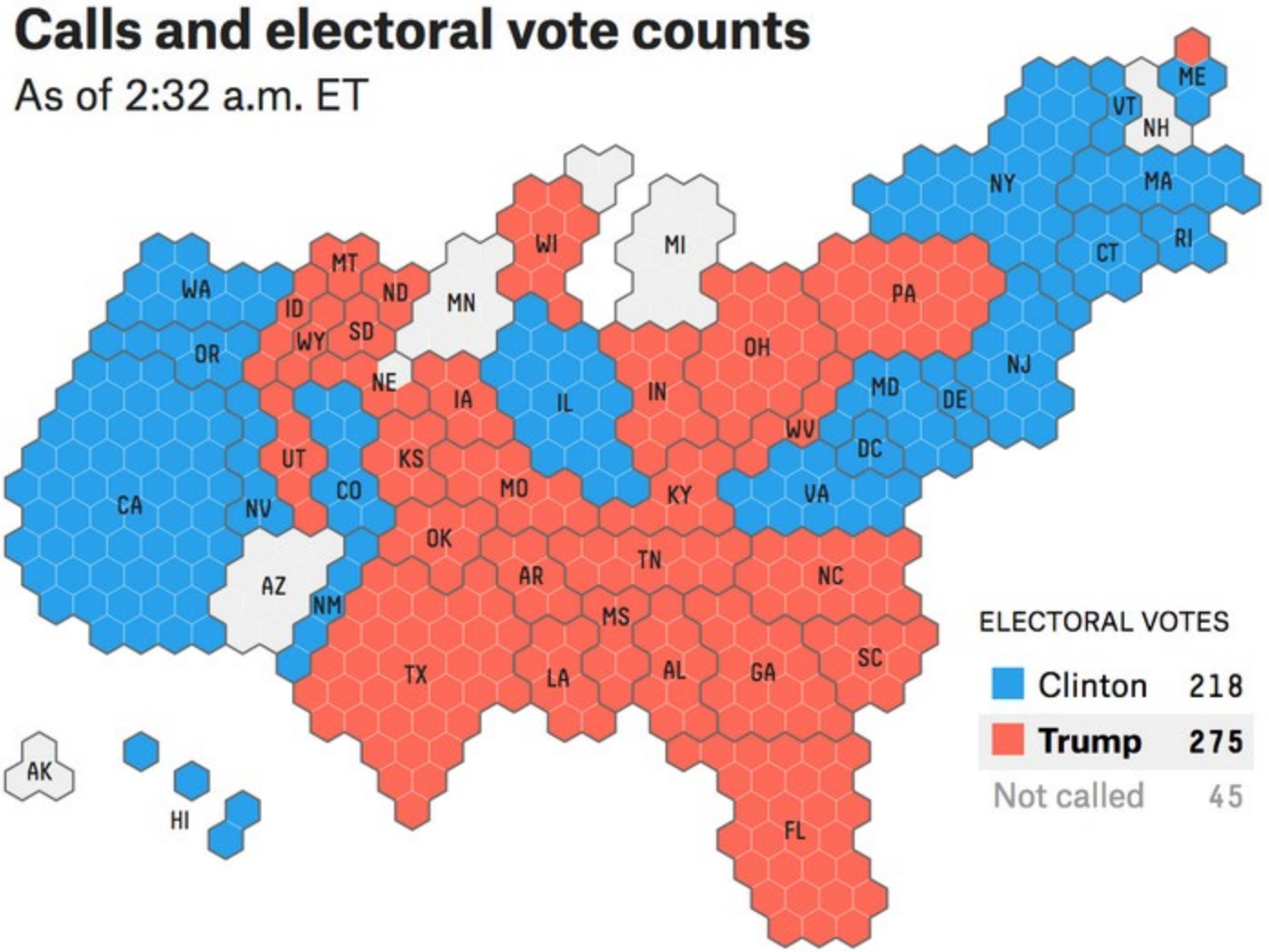
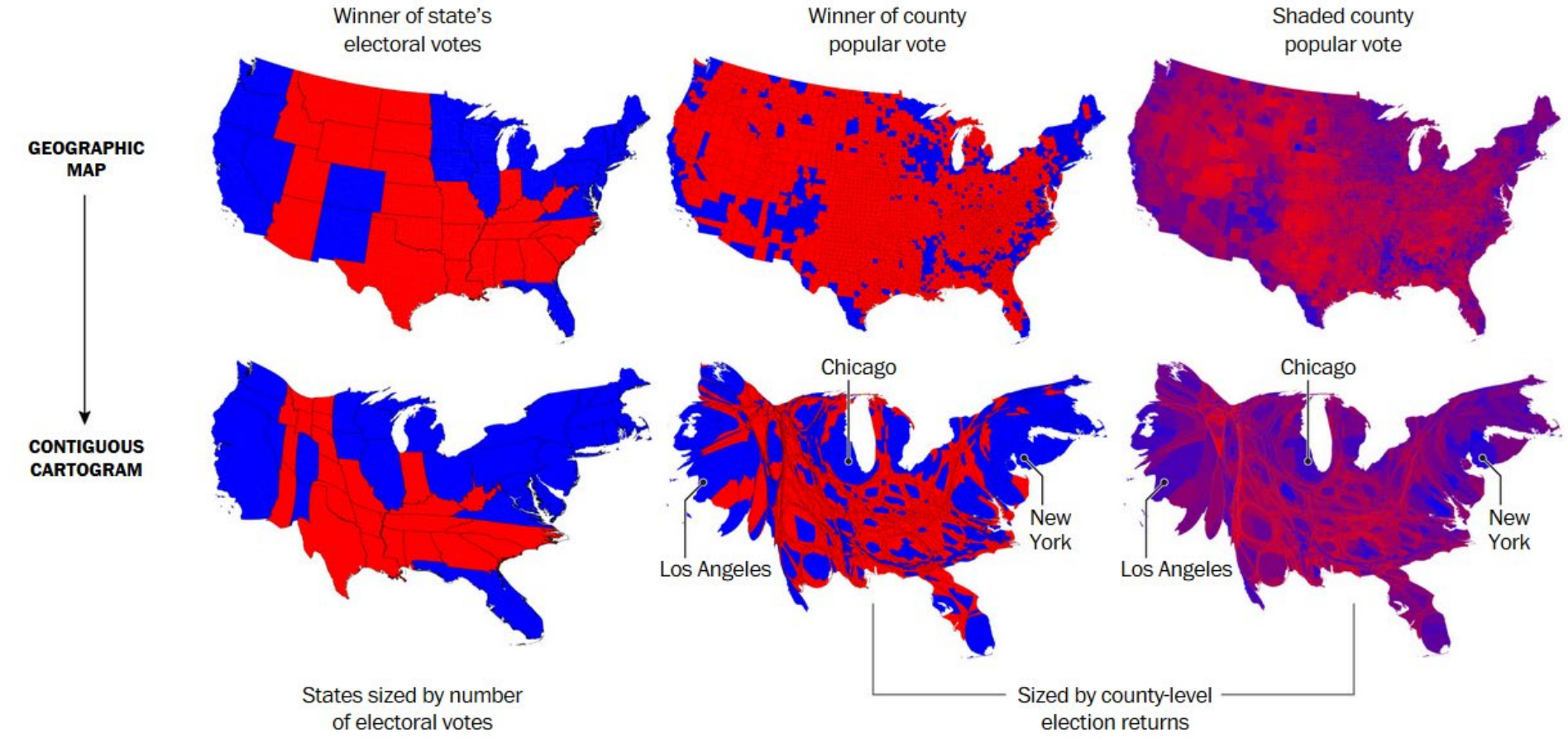
Cartogram – Electoral Votes 2016



US Elections 2000 – Voting and Population



Maps courtesy of Mark Newman

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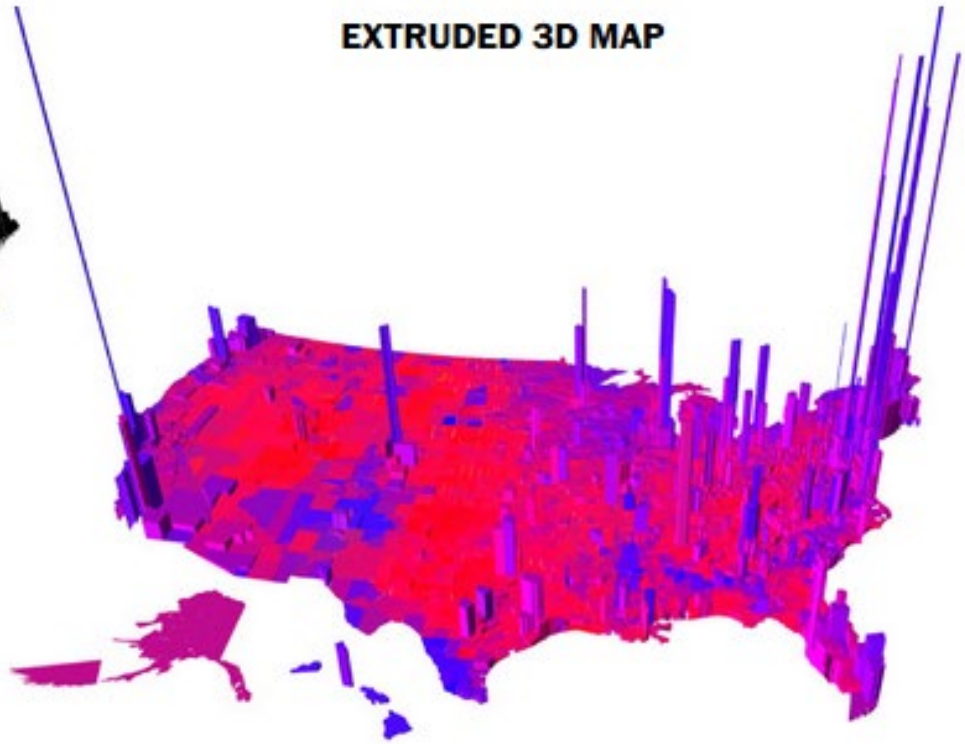
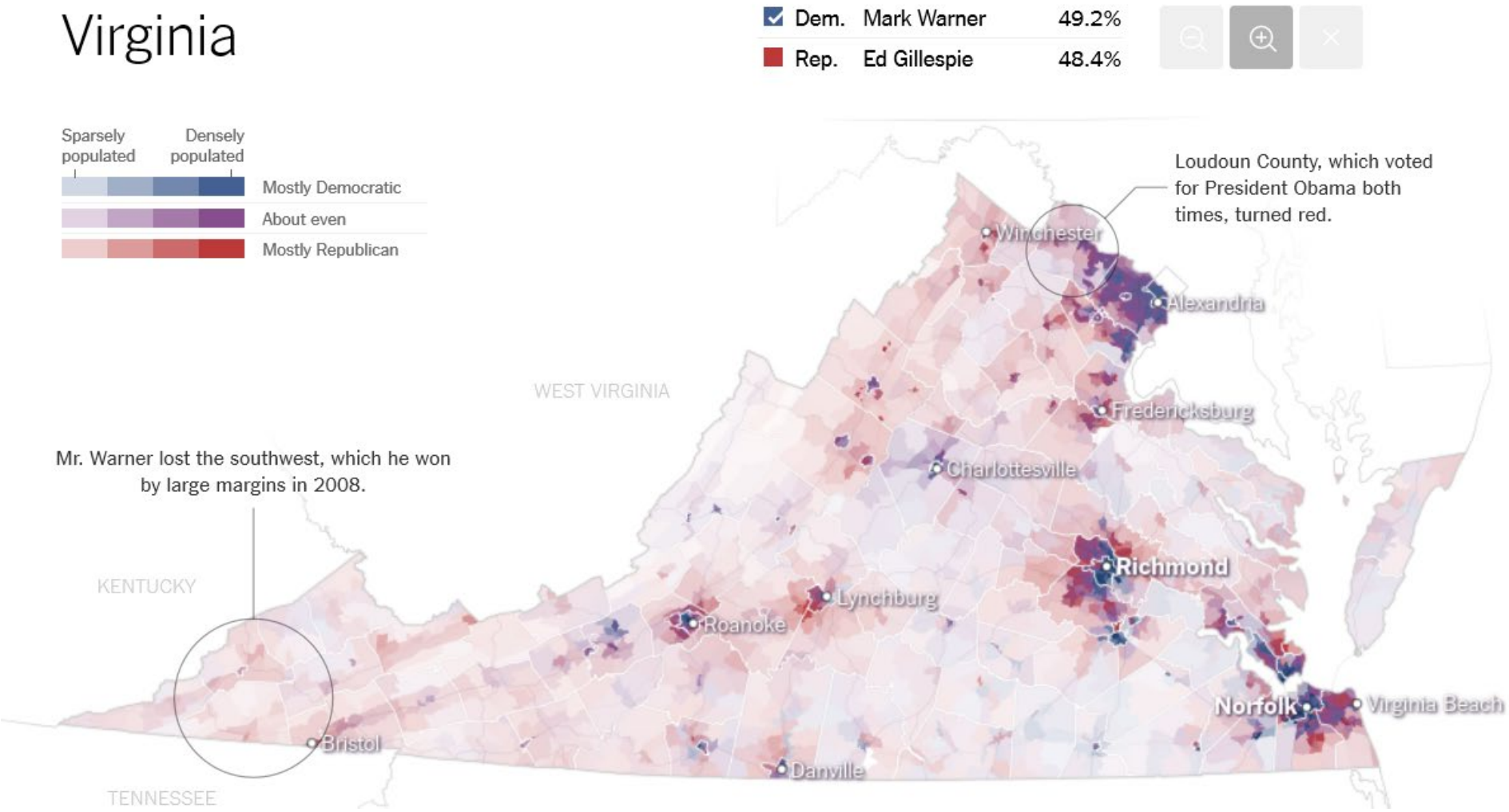


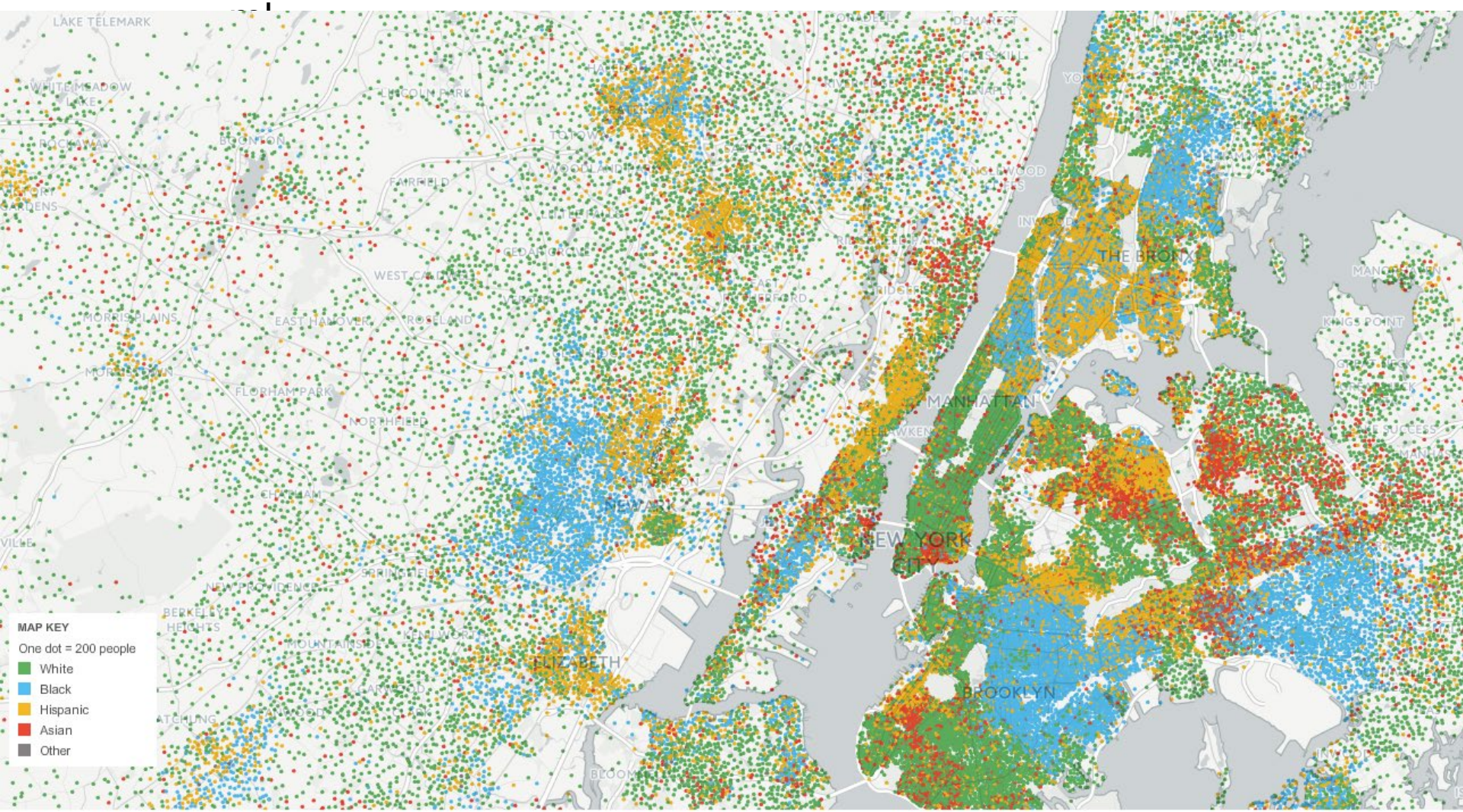
Maps courtesy of Robert J. Vanderbei

2014 Senate Elections



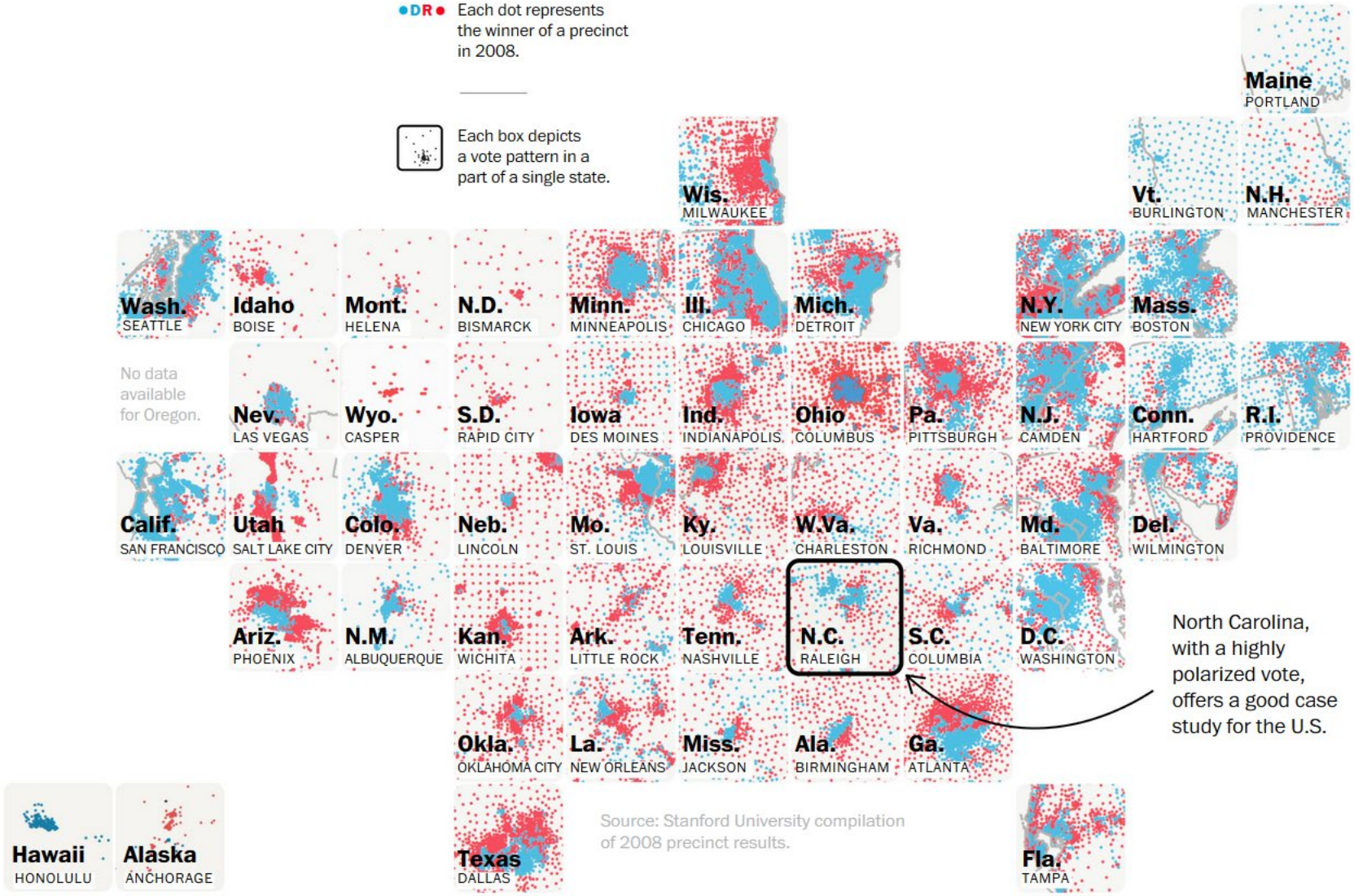
Mapping America – Census Data 2010

- http://www.nytimes.com/projects/census/2010/explorer.ht



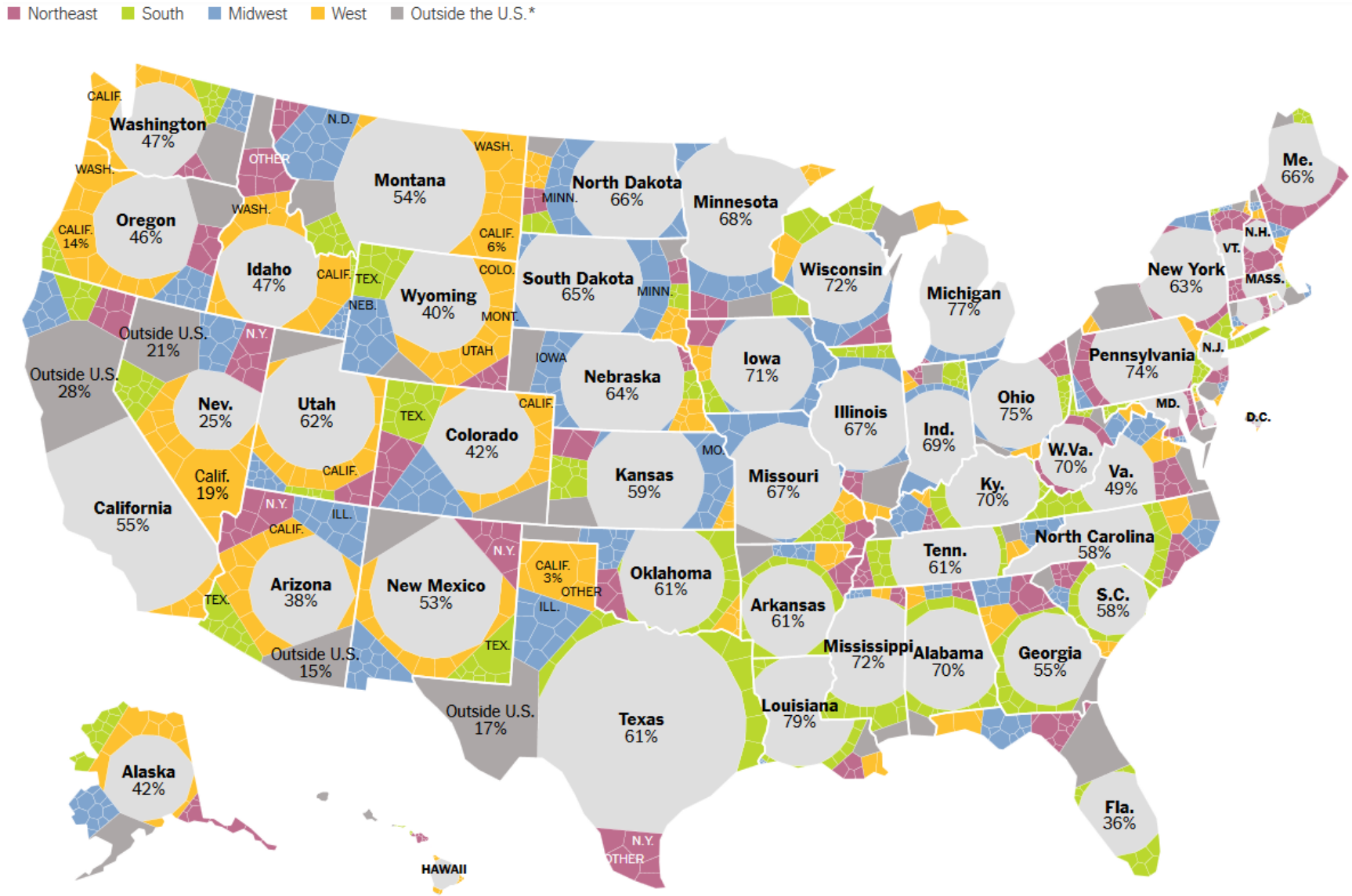
Political Polarization in America

- https://www.washingtonpost.com/graphics/politics/2016-election/nc-precincts/



Mapping Migration in the United States

- http://www.nytimes.com/2014/08/16/upshot/mapping-migration-in-the-united-states-since-1900.html



Mapping Migration in the United States

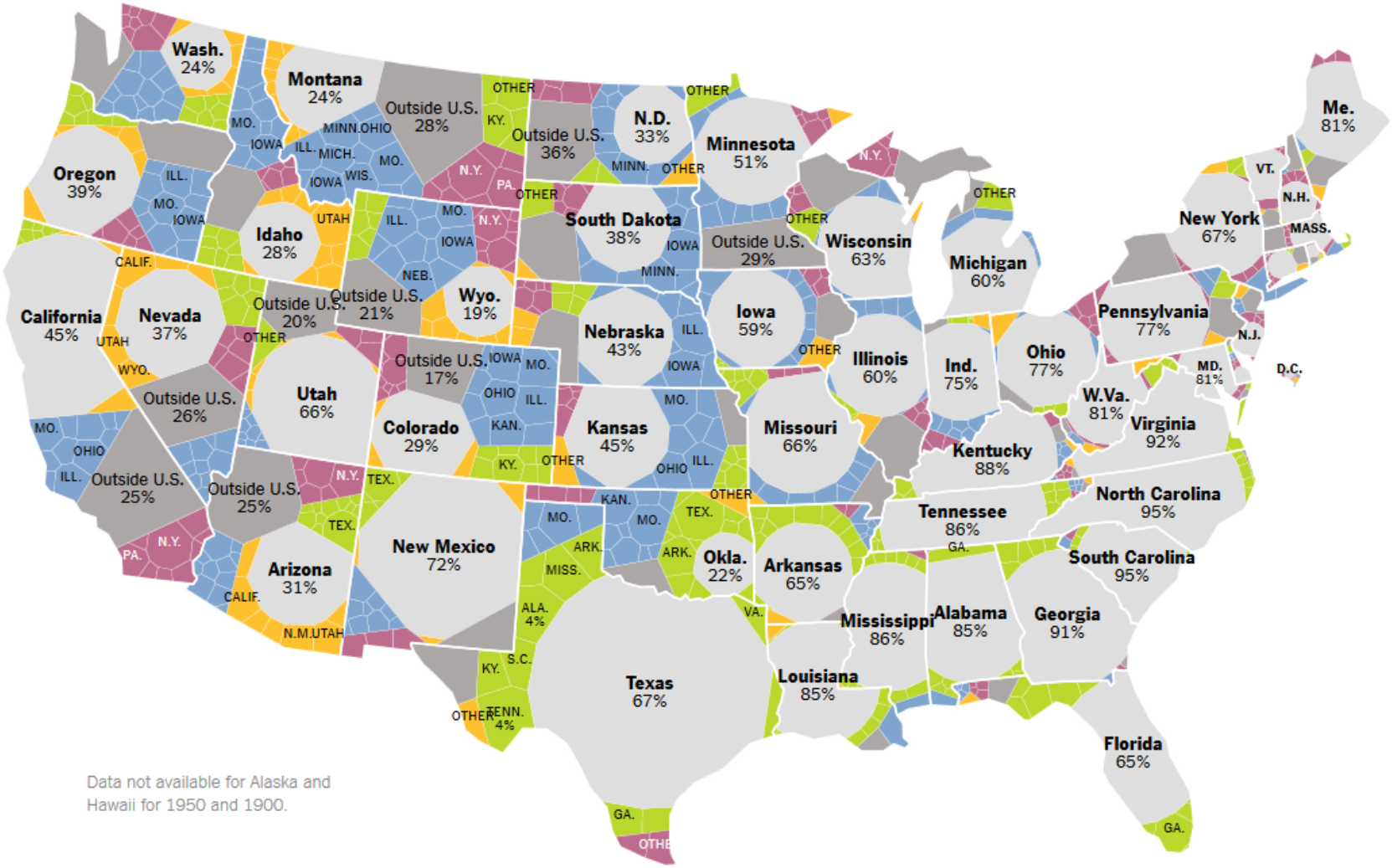
Where people who lived in each state in 1900 were born

Each shape represents where the people living in a state were born. Within a state, larger shapes mean a group makes up a larger share of the population.

SELECT A YEAR

1900 | 1950 | 2012

Northeast South Midwest West Outside the U.S.*



Data not available for Alaska and Hawaii for 1950 and 1900.

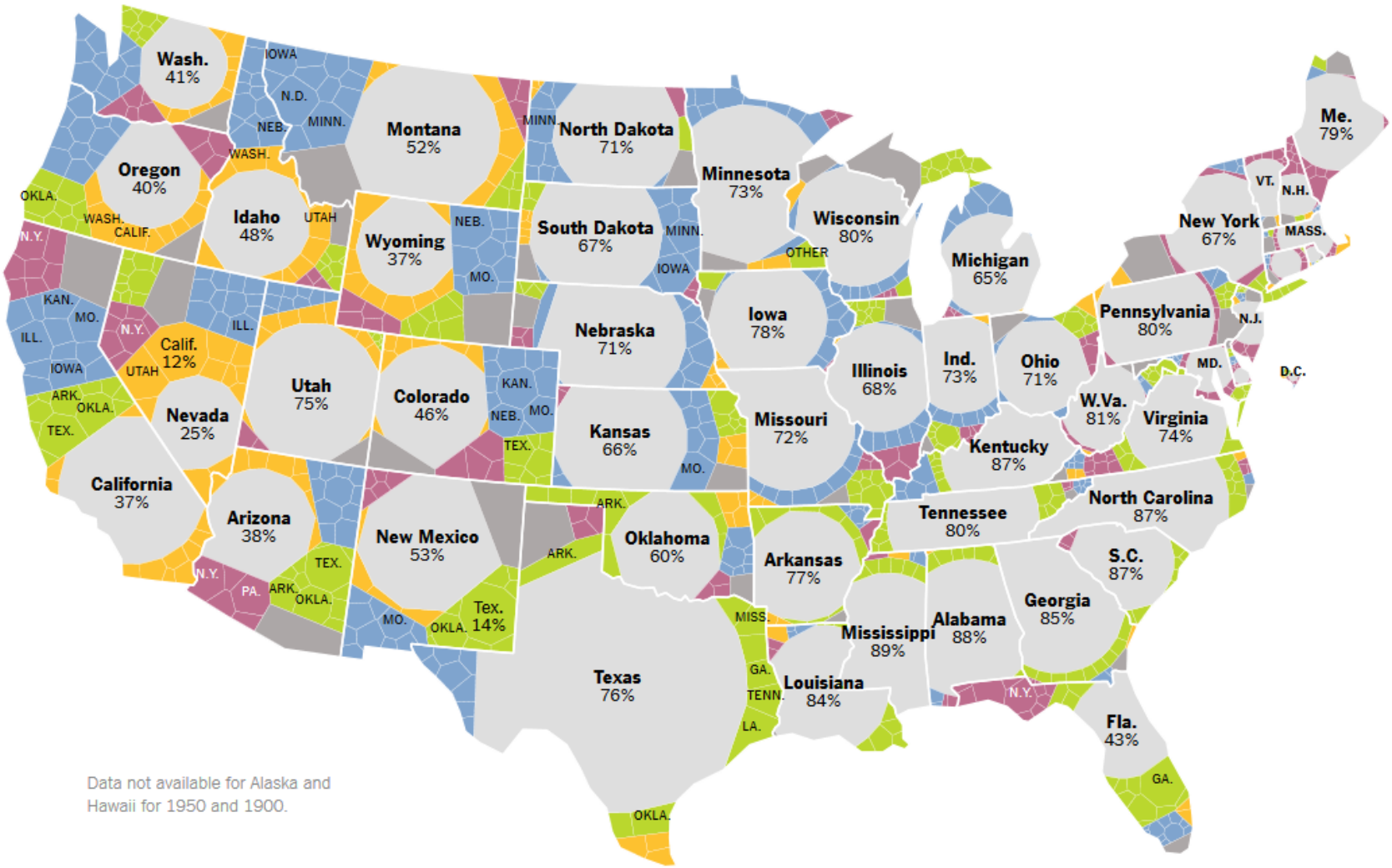
Mapping Migration in the United States

Where people who lived in each state in 1950 were born

Each shape represents where the people living in a state were born. Within a state, larger shapes mean a group makes up a larger share of the population.

SELECT A YEAR
1900 | **1950** | 2012

Northeast | South | Midwest | West | Outside the U.S.*



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1900 | 1950 | **2012**

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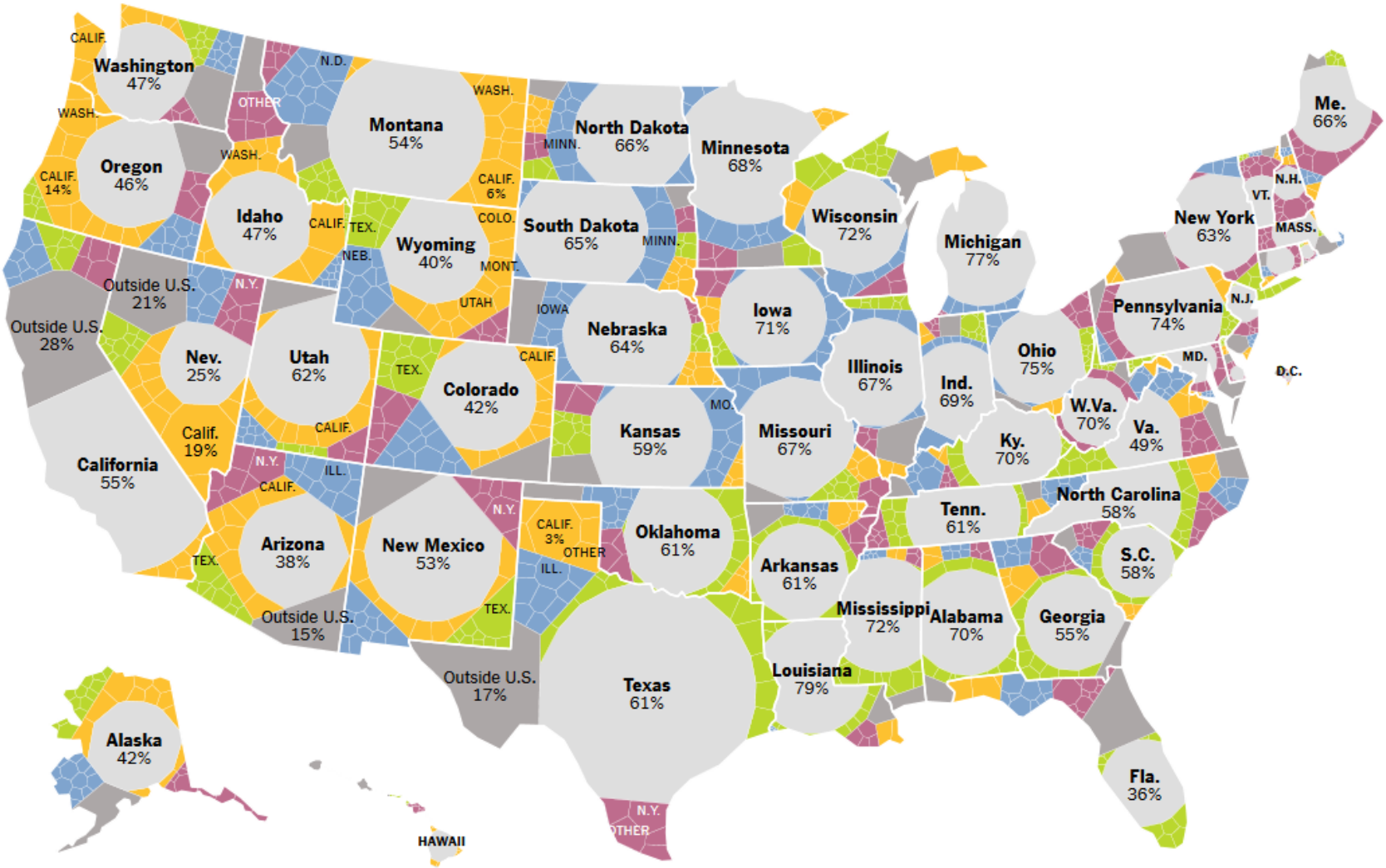


Map & GeoVisualization – Definitions & Some Examples

- **Cartography | Cartogram | GeoVisualization**
- **US Election Visualization**

  2008 – http://elections.nytimes.com/2008/results/president/map.html

  2012 – http://elections.nytimes.com/2012/results/president

  2014 – http://www.nytimes.com/interactive/2014/11/04/upshot/senate-maps.html

  2016 – http://www.nytimes.com/elections/results/president

- **Demographics** http://projects.nytimes.com/census/2010/explorer

Map – Visual DataStory

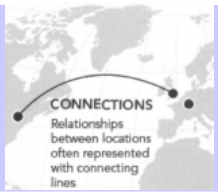
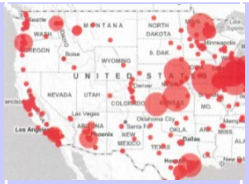
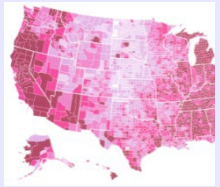
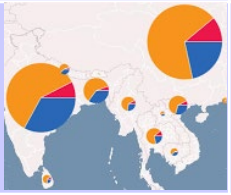
Display Type		Visual Encoding	Variables	**Story Narrative**
Map Path		Location Shape	Location Path **3**	**Distance** Proximity
Map Dots		Location Color Density / Texture	Location Numerical data for location variable **3**	**Proximity** Clustering **Similarity**
Map Size		Location Size Color	Location Numerical data for location variable **3**	**Compare** values **Proximity**
Map Area Choropleth		Location Color Saturation Motion	Location Numerical data for location variable **3+**	**Proximity** Clustering **Similarity**
Map Size & Pie Chart		Location Size Angle	Location Numerical data for location variable **4**	**Compare** totals & values **Proximity**

Tableau – Dimension versus Measure

Dimension

- Tableau treats any field containing **qualitative, categorical** information as a **dimension**.
- Dimensions typically produce headers.

Measure

- Tableau treats any field containing **numeric** (quantitative) information as a **measure**.
- Measures typically produce axes.
- **Measure** is function of **other Dimensions** placed on the worksheet (e.g. Sum of "Sales" for every "State").
- Can convert Measure to Dimension (using drag & drop).

Headers

- Created when you place **dimension** on Rows or Columns shelf.

Axes

- Created when you place **measure** on Rows or Columns shelf.

Tableau – Building Views / Visualizations

Dragging Fields

- Visualize data by dragging fields from Data window to view.
- **Dimensions** add headers while **measures** add continuous axes.

Types of Shelves

- Columns / Rows shelves: create rows and columns of data view.
- Filter shelf: exclude data from view.
- Levels of Detail shelf: show additional data.
- Color / Size / Shape shelf: encode the data in various ways.

Show Me

- Suggests possible display types to use.

Map

- Columns for Longitude | Rows for Latitude

Tableau – **Demo**

Connect to Sample - Superstore - English (Extract) data (Help: Build-It-Yourself Exercises)

Map http://onlinehelp.tableau.com/current/pro/desktop/en-us/help.htm#buildexamples_maps.html

- Notice "globe" icon next to hierarchically organized **Location** dimension (globe icon = geographical role for data dimension)
- Double click Location > City and map is created
  - Columns field = **Longitude** | Rows field = **Latitude**
- From **Measures**, drag **Sales** to **Size** on the **Marks** card
- From **Measures**, drag **Profits** to **Color** on the **Marks** card
- To adjust **circle size**, click **Size** in **Marks** card and drag slider
- To add **circle border**, click **Color** in **Marks** card and click **Border** drop-down to select color

➔ Use Location, Size and Color to encode **4 data variables**.

Choropleth Map

- **Single data point** for area, such as country, state, county, precinct
- Use Area to encode data ➔ Marks = **Map** and **Location > State**
- Visualization tool needs **shape files** for area aggregate to be used