



# MAPS

## CSE 332

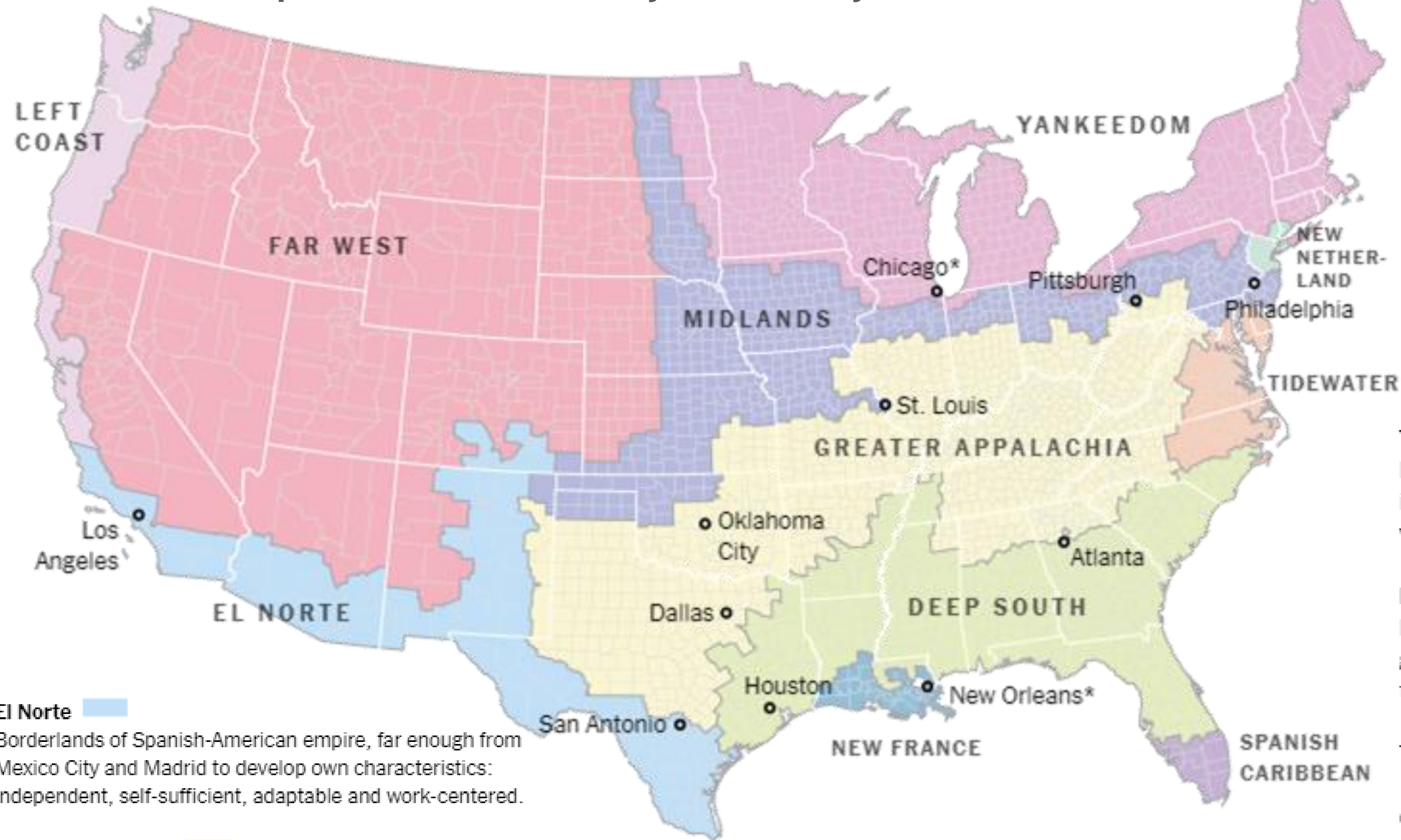
# ROAD MAP



# WITH OVERLAID TERRAIN



# NYT: 7/18 The Maps That Show That City vs. Country Is Not Our Political Fault Line



- Midlands** 

Culturally pluralistic, founded by English Quakers. Ethnic and religious purity were never priorities; community-oriented and distrustful of government intervention.
- Left Coast** 

New Englanders (by ship) and farmers, prospectors and fur traders from Appalachian Midwest (by wagon). Yankee utopianism meets individual self-expression and exploration.
- Far West** 

Settlement largely controlled by corporations or government via deployment of railroads, dams, irrigation, mines; exploited as an internal colony, to the lasting resentment of its people.
- Yankeedom** 

Puritan legacy; perfect earthly society with social engineering, individual denial for common good; assimilate outsiders; vigorous government to thwart would-be tyrants.
- New Netherland** 

Dutch-founded; retains traits of 17th-century Amsterdam: a global trading culture; materialistic; multicultural; committed to tolerance and freedom of inquiry and conscience.
- Tidewater** 

17th-century gentry recreated semi-feudal manorial society of English countryside. Conservative; respect for authority and tradition, not equality or political participation.
- Deep South** 

Established by slave lords from English Barbados as a West Indies-style slave society. Modeled on slave states of the ancient world — democracy was the privilege of the few. Fights for rollbacks of federal power, taxes on capital and the wealthy, and environmental, labor and consumer protections.

**El Norte**   
 Borderlands of Spanish-American empire, far enough from Mexico City and Madrid to develop own characteristics: independent, self-sufficient, adaptable and work-centered.

**Greater Appalachia**   
 Settlers from war-ravaged Ulster, northern England, lowland Scotland. Deep commitment to personal sovereignty and individual liberty; intense suspicion of external authority.

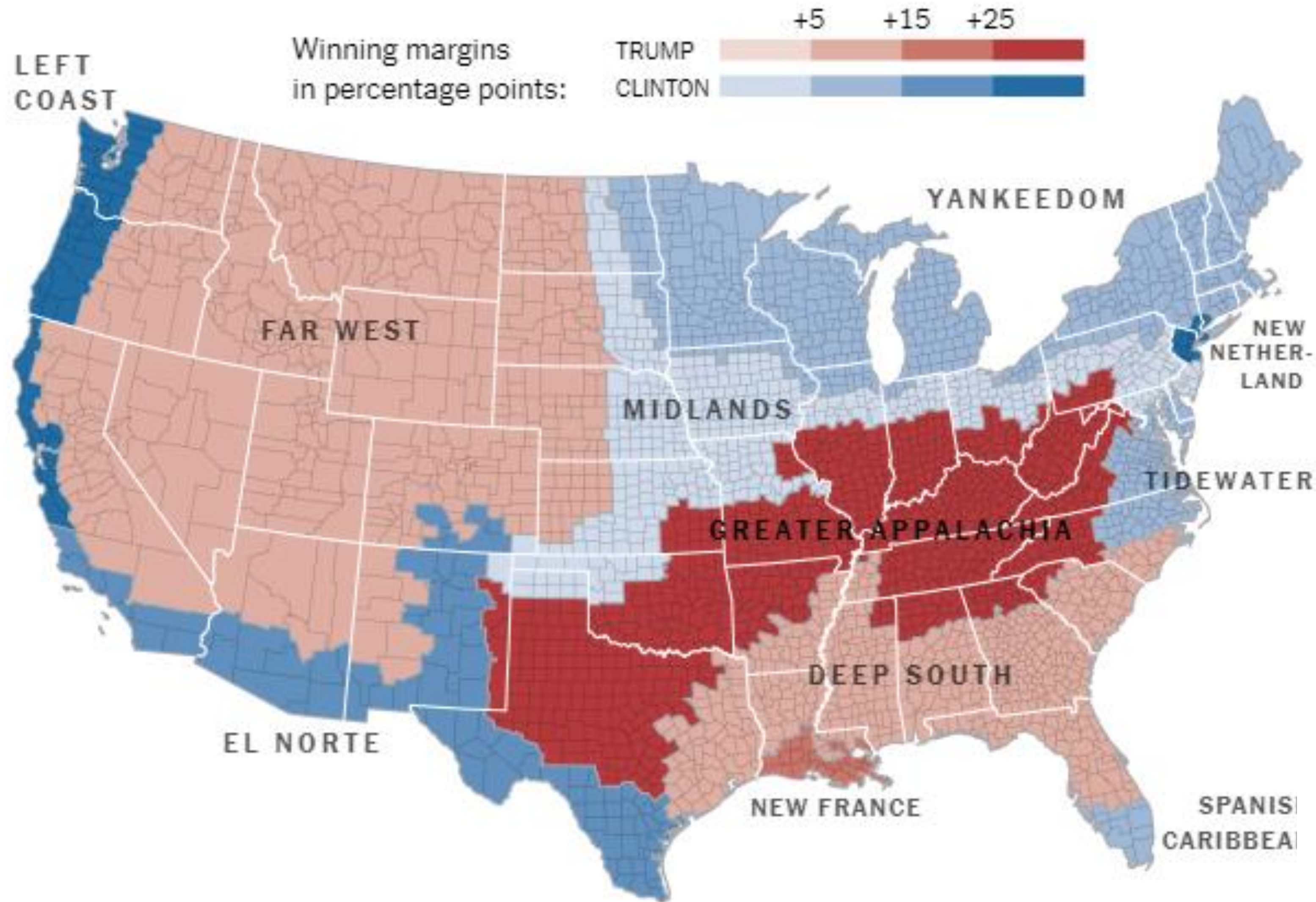
**New France**   
 Folkways of French peasantry blended with traditions of Algonquin-speaking people of what is now Eastern Canada. Down-to-earth, egalitarian, consensus-driven.

**Spanish Caribbean**   
 Legacy of the maritime component of Spain's New World empire with hub in Havana. Includes Puerto Rico and other territories in Caribbean basin.

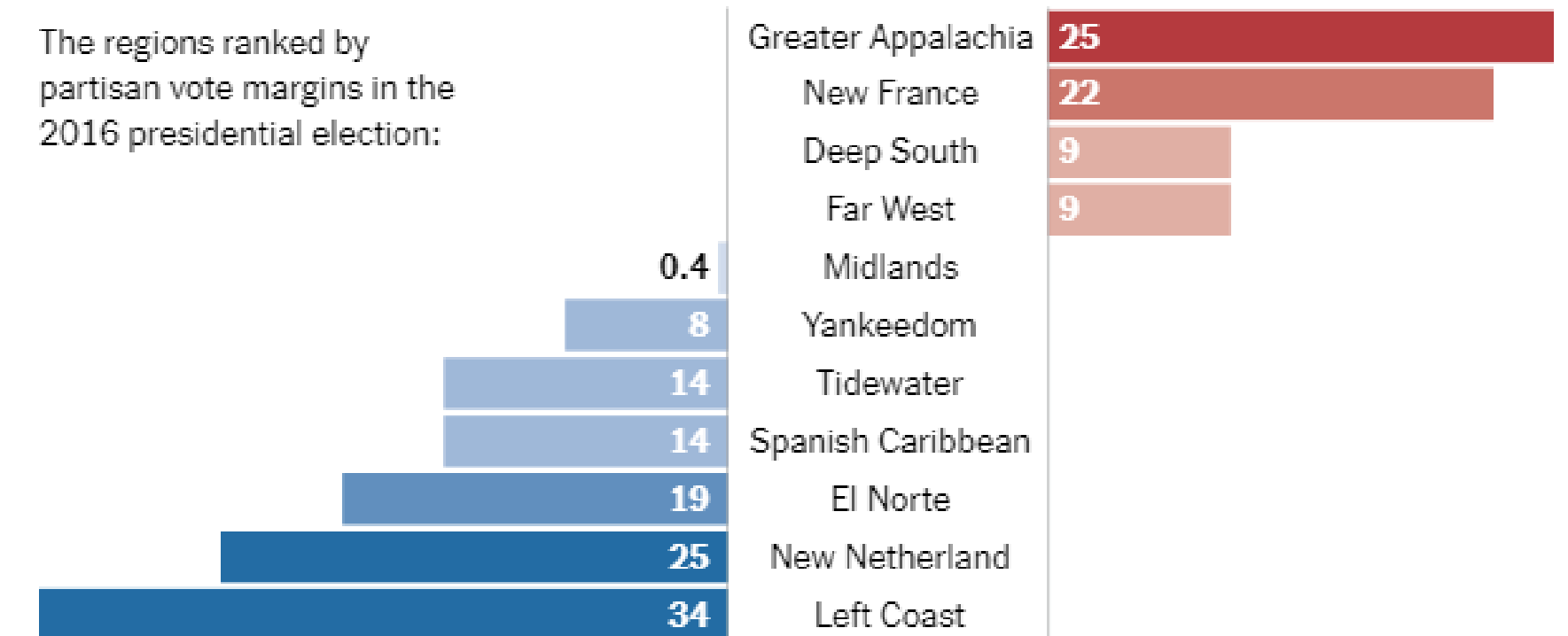
# The Partisan Landscape

2016 presidential vote by region.

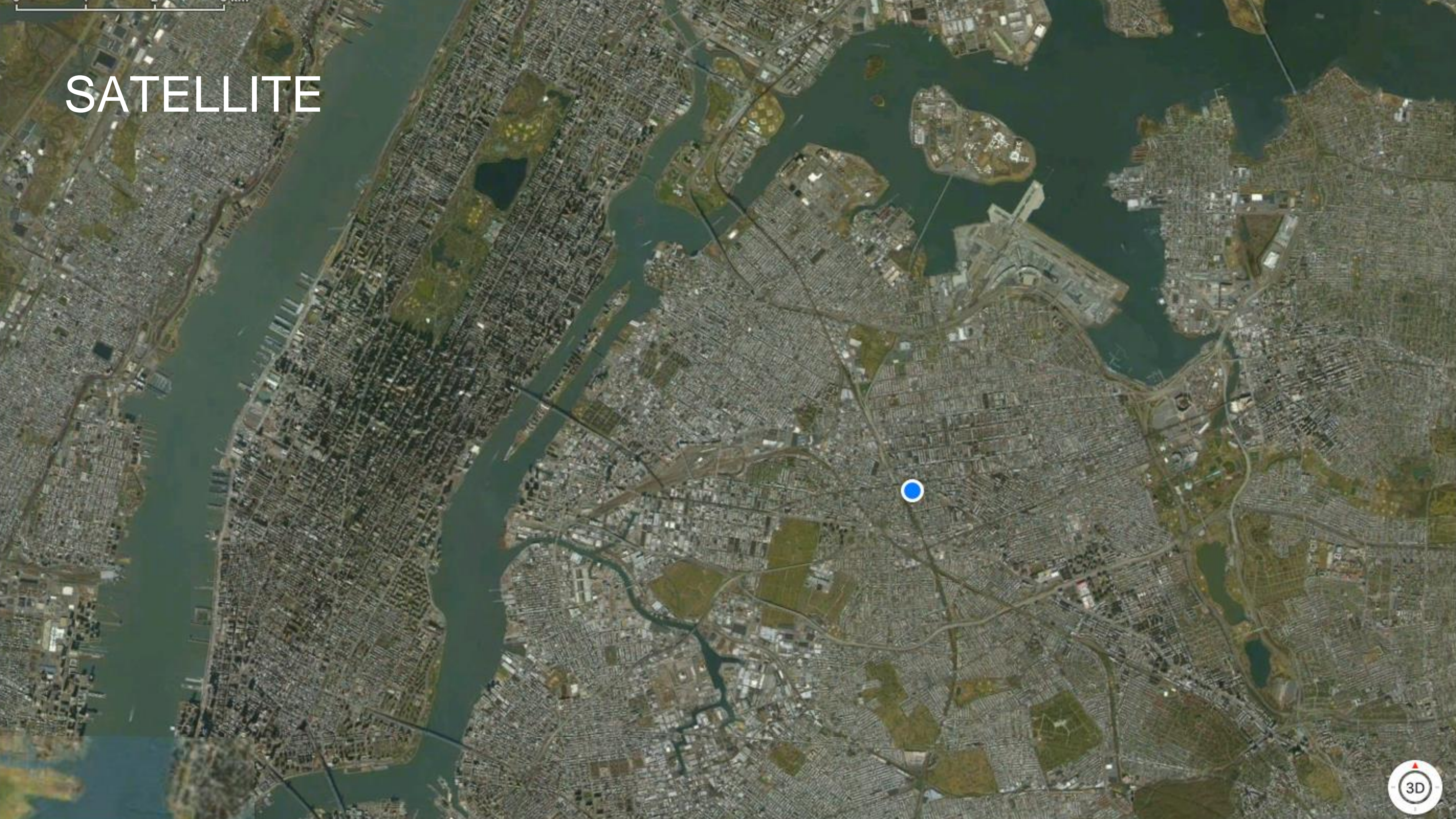
Compare this with the map on the previous page and observe the correlations



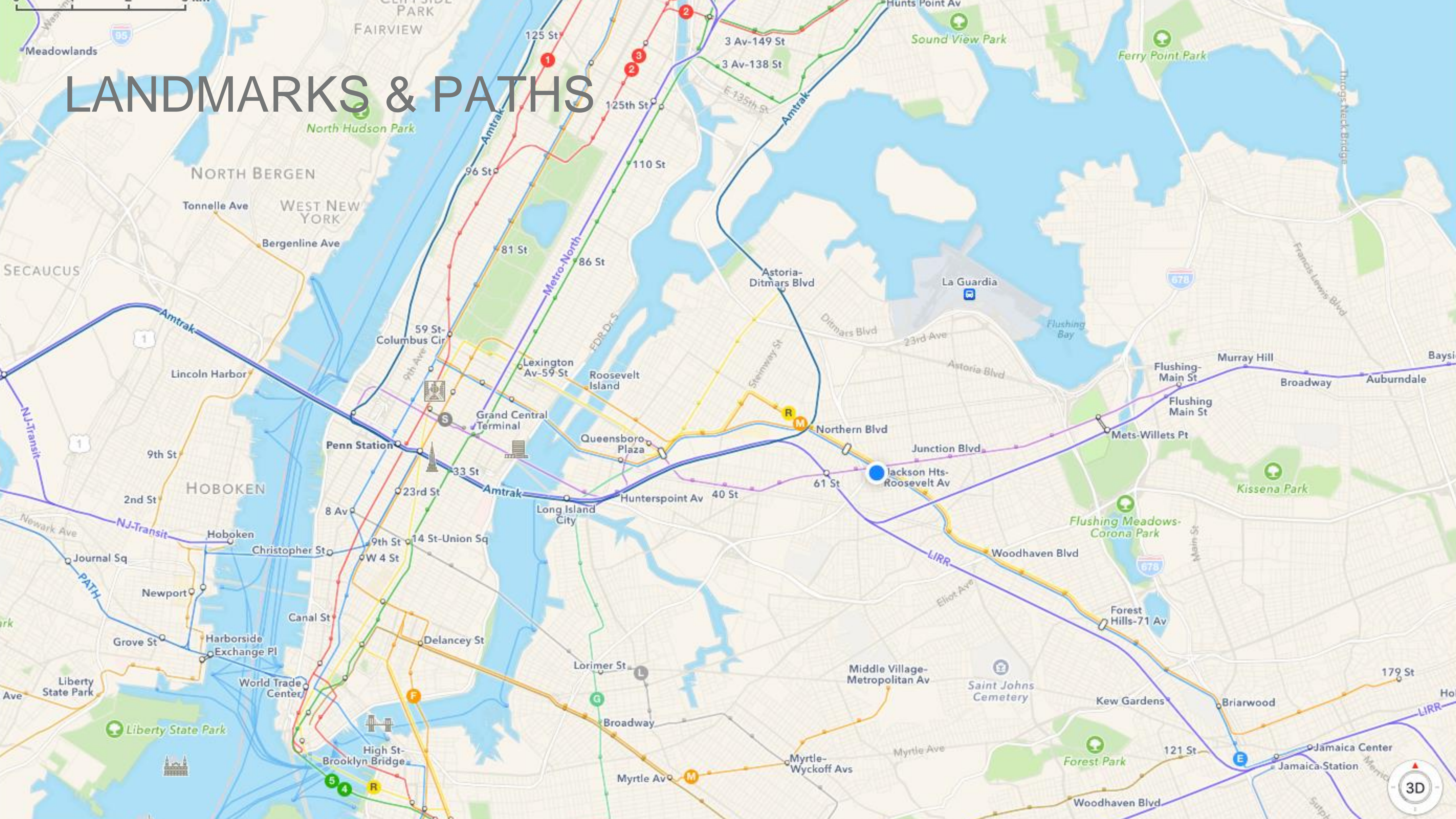
The regions ranked by partisan vote margins in the 2016 presidential election:



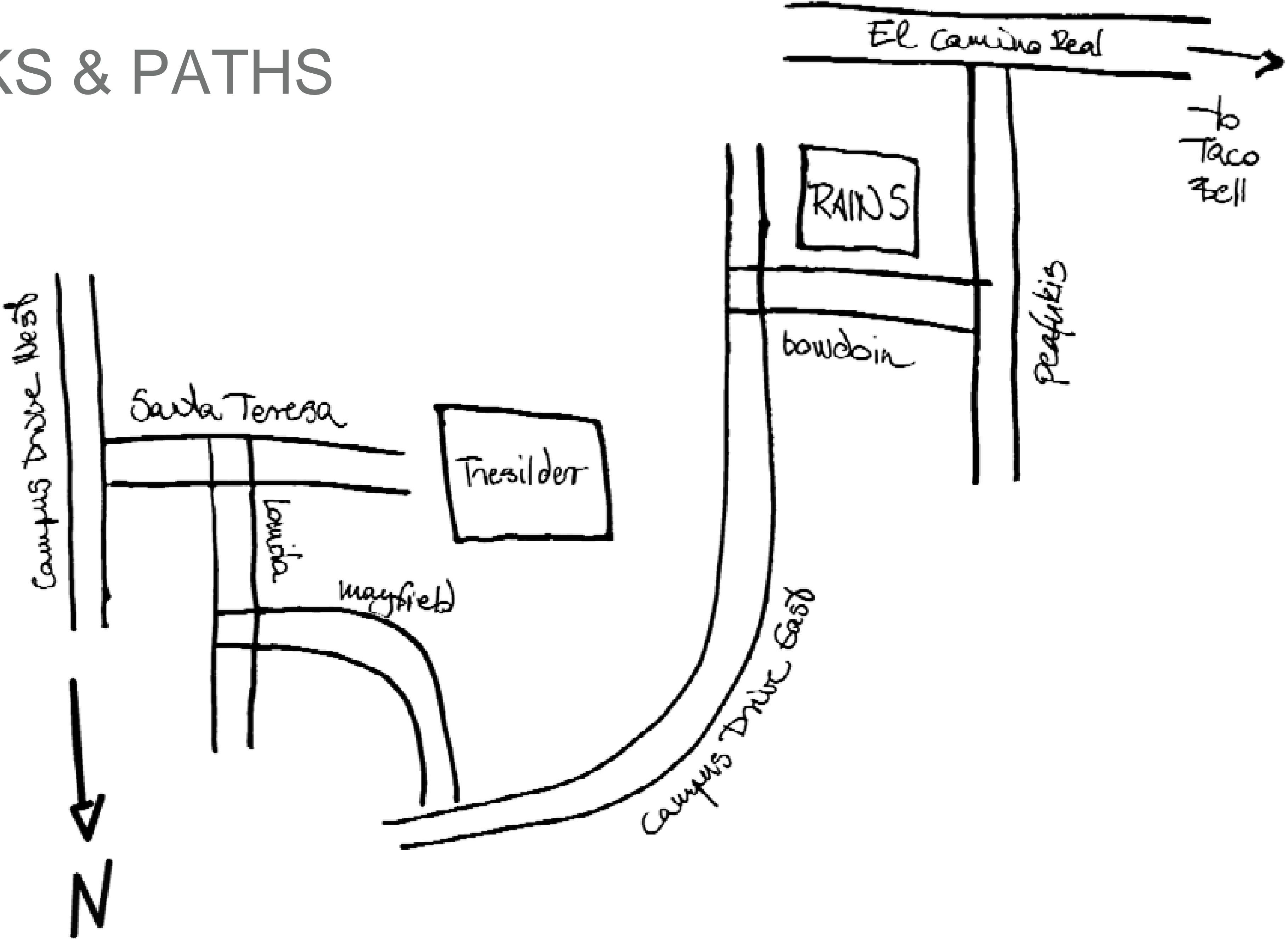
SATELLITE



# LANDMARKS & PATHS

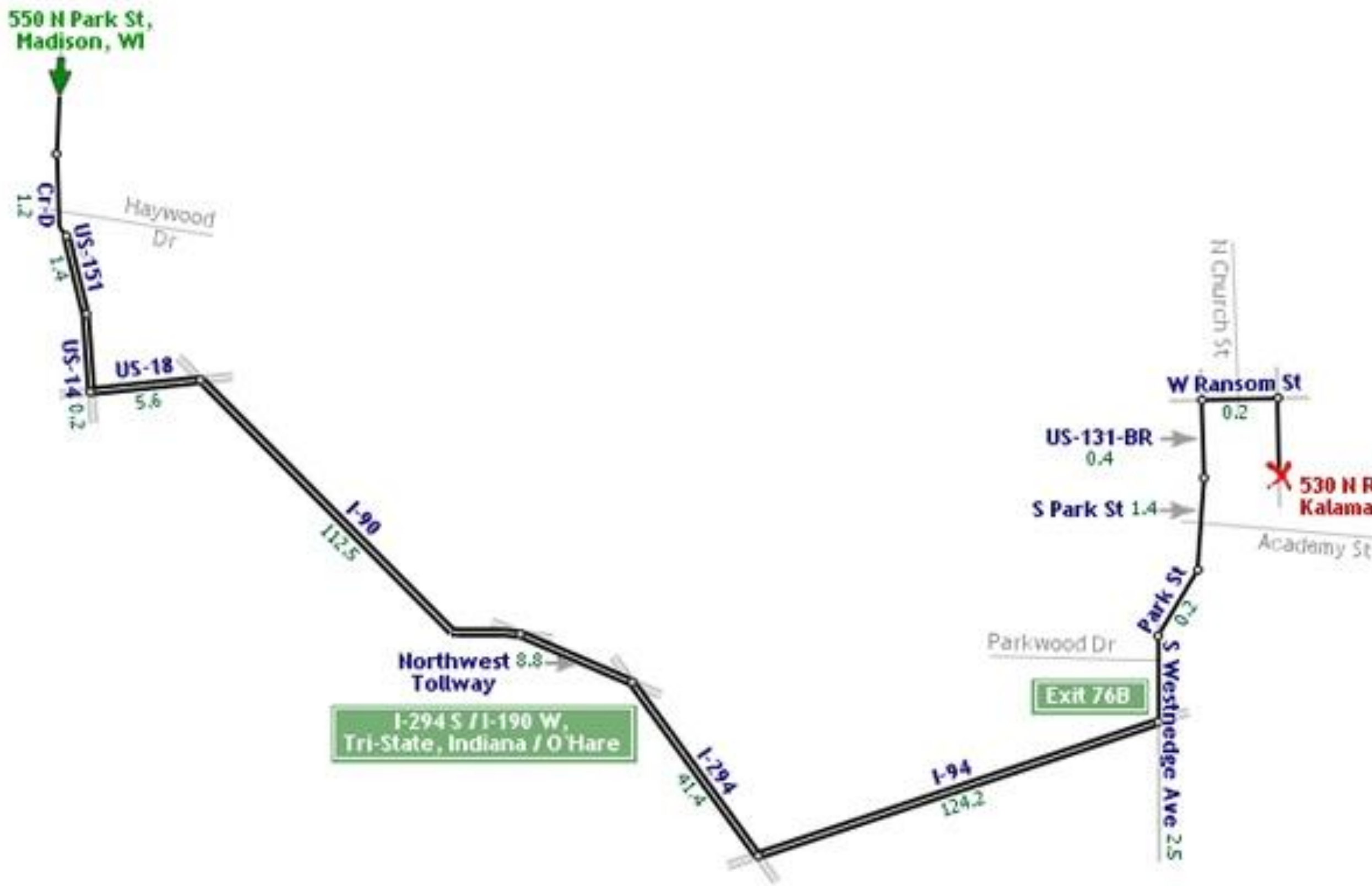


# LANDMARKS & PATHS

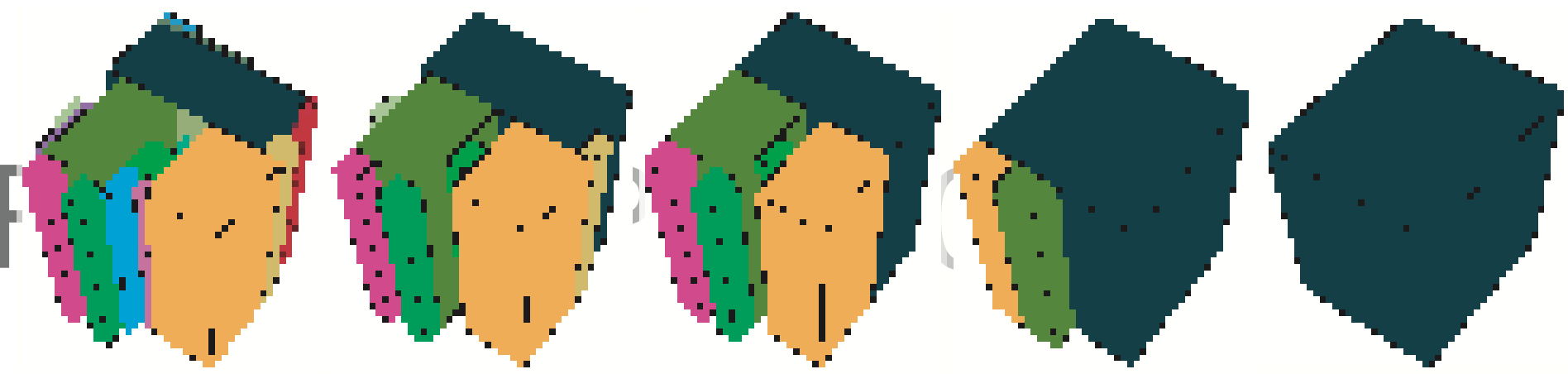




# LINEDRIVE (2001)



# AUTOMATIC GENERATION OF TOUR



# STREET VIEW



Broadway

Broadway



# STREETSIDE VIEW (2010)

## 4th Avenue

1313 1321 1329 1401 1411 1415 1423



# STREET LIGHT VIEW (2010)

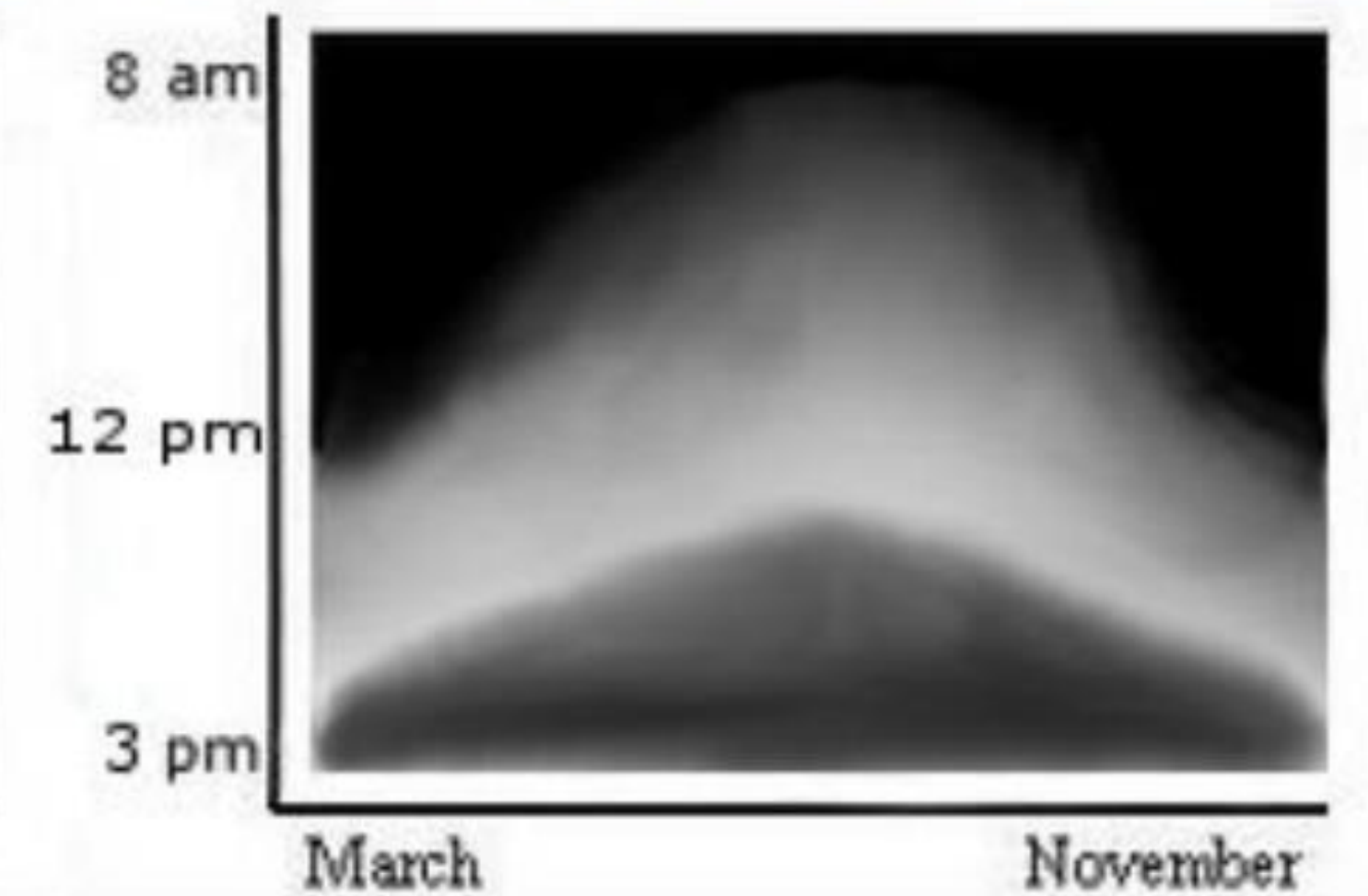
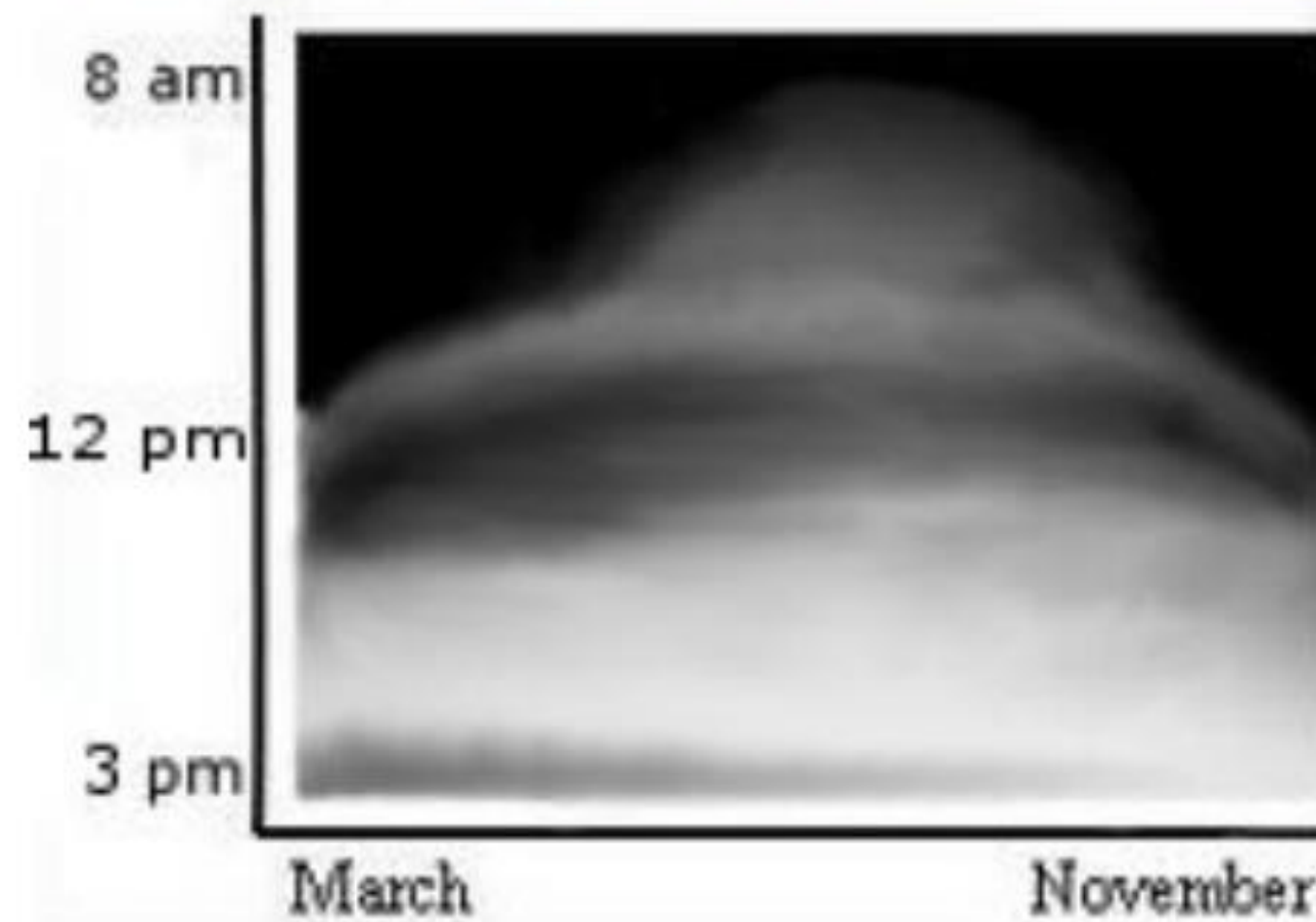
Illumination of two apartments (above) compared with *illumination thumbnails* (below)

The difference in lighting is apparent on the thumbnail

- the first apartment area suffers from light occlusion at around noon, and again toward the evening
- the second apartment area is occluded only toward the evening, nearing 3pm

The buyer's daily routine and preferences will decide which apartment to choose.

C. Rojo, W. Xu, K. Mueller, "Street Light View: Enriching Navigable Panoramic Street View Maps with Informative Illumination Thumbnails," *IEEE Visualization Conference*, Salt Lake City, October, 2010

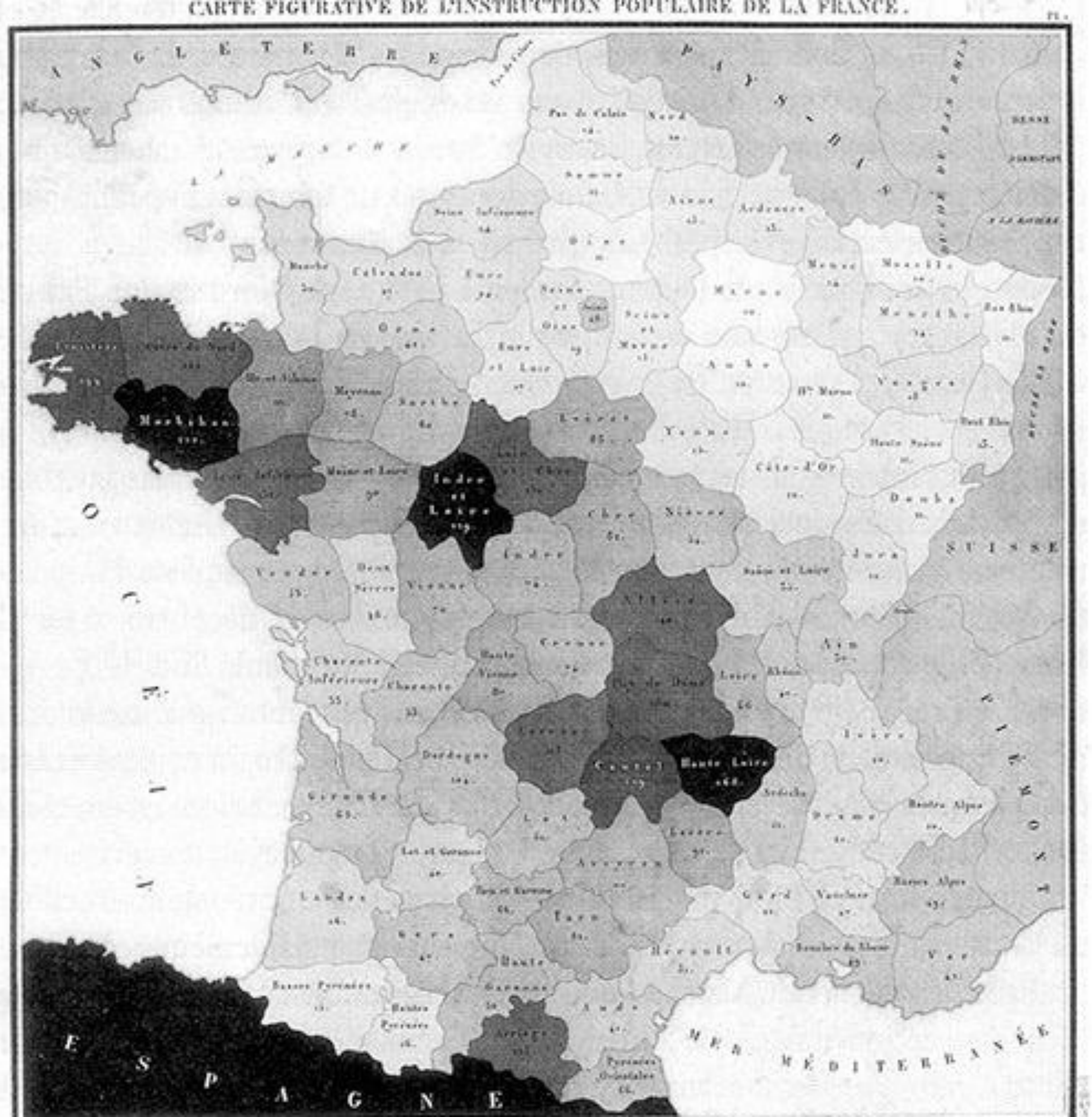


# Elevation (topographic) map



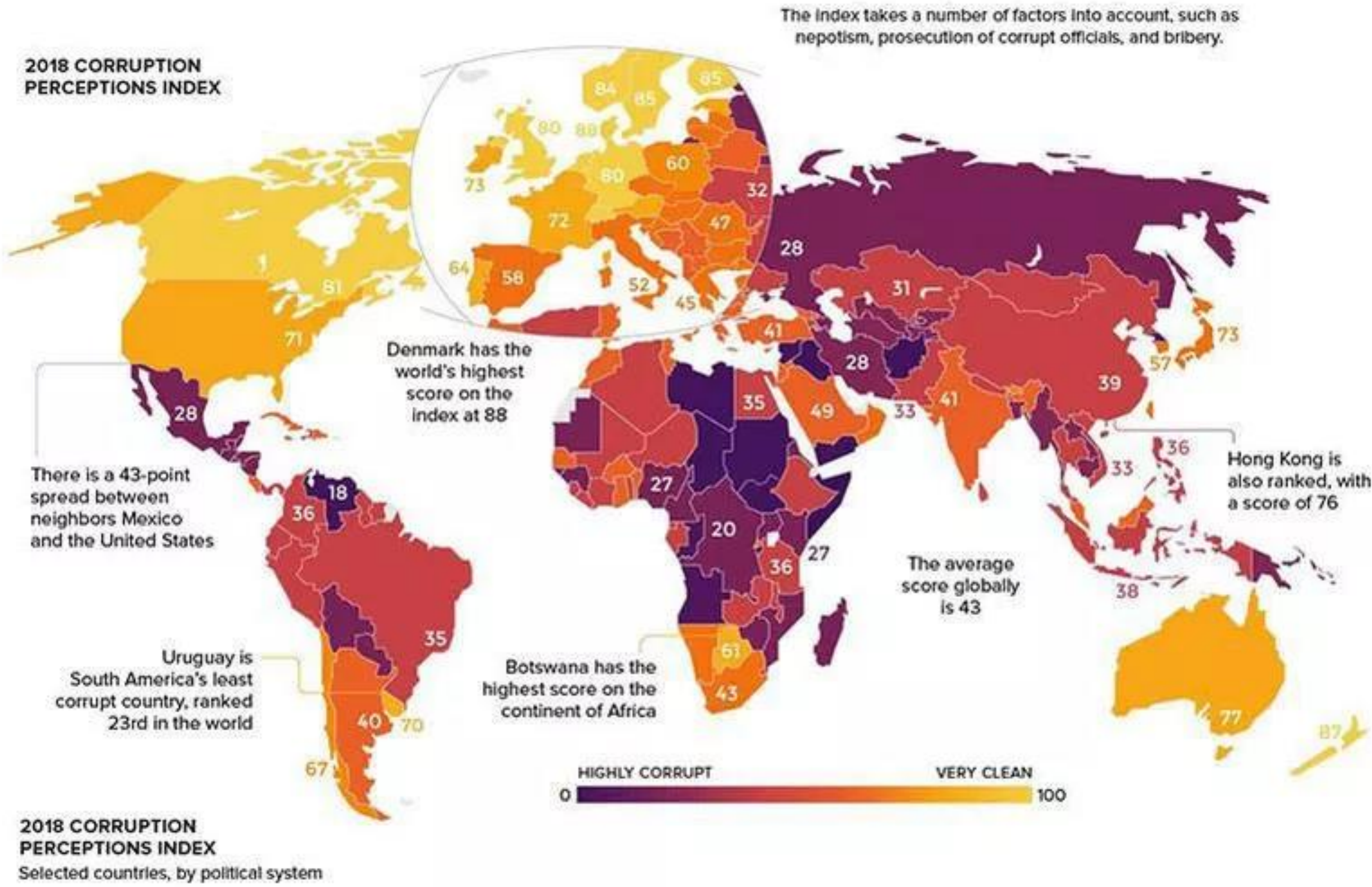
# CHOROPLETH MAPS

- Use colors/shadings to show data
- based on Greek words meaning “area/region” and “multitude”
- First in 1826 (by Charles Dupin)
  - Illiteracy in France
  - darker regions mean higher illiteracy
- Perception problems?



# MORE CHOROPLETH MAPS

## The Most Corrupt Nations



## THE WORLD'S POPULATION, CONCENTRATED

If the world's 6.9 billion people lived in one city, how large would that city be if it were as dense as...



**PARIS**  
127,930 square miles  
331,336 square kilometers



**SAN FRANCISCO**  
392,975 square miles  
1,030,751 square kilometers



**NEW YORK**  
250,404 square miles  
648,544 square kilometers



**LONDON**  
553,745 square miles  
1,434,193 square kilometers



**SINGAPORE**  
379,069 square miles  
981,789 square kilometers

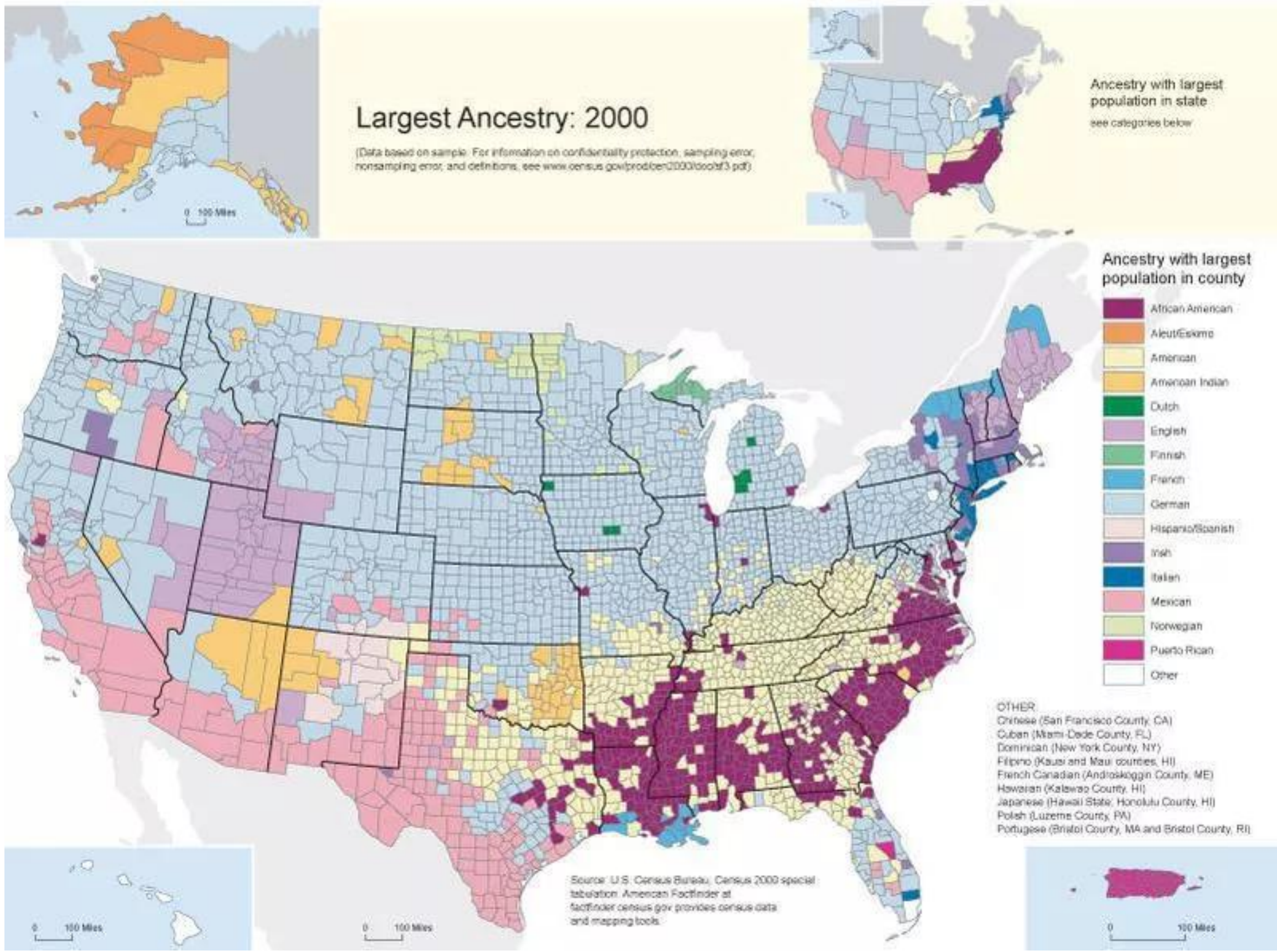


**HOUSTON**  
1,769,085 square miles  
4,581,910 square kilometers

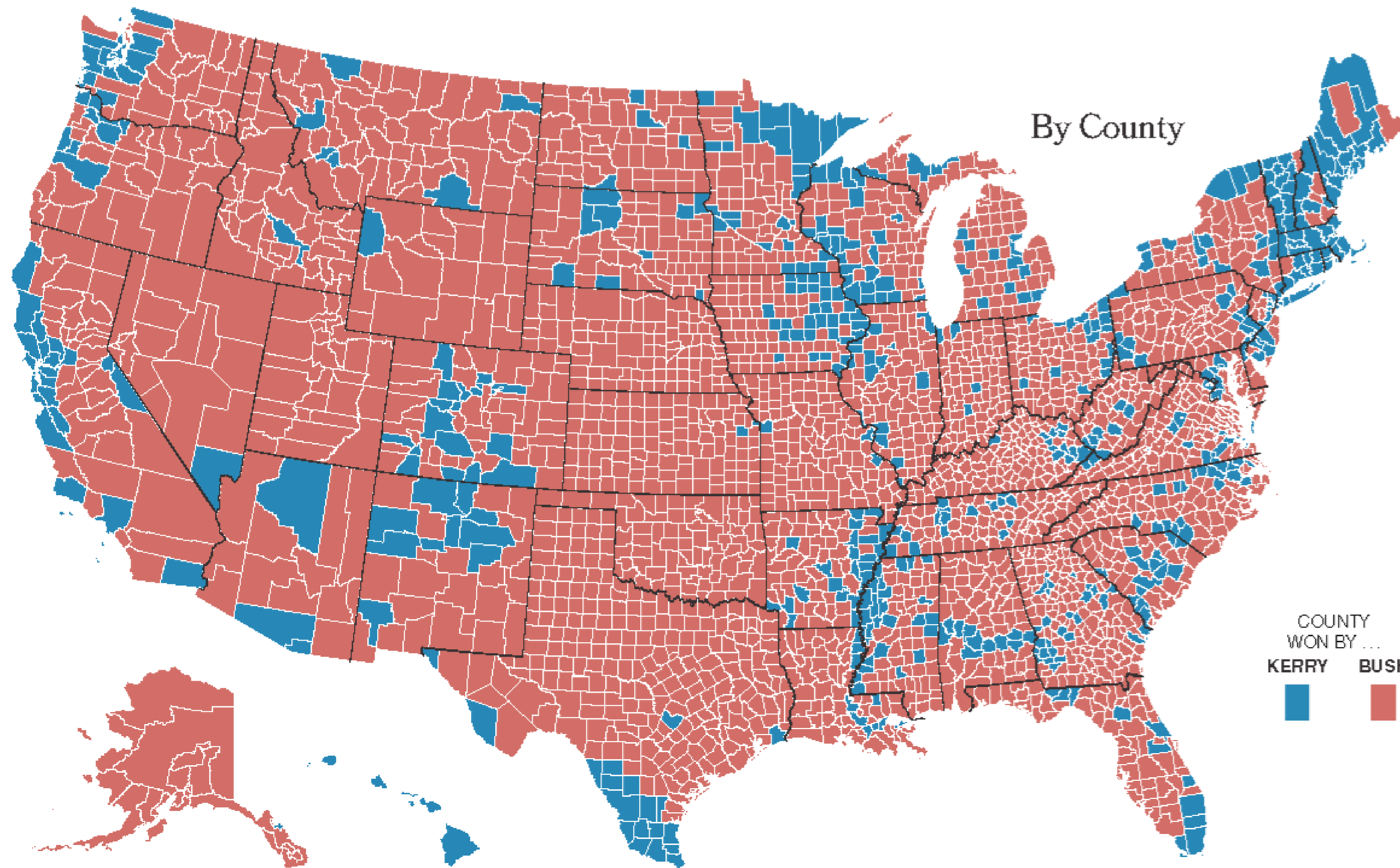


# ANCESTRY MAP

WHO KNEW  
GERMAN  
ANCESTRY WAS  
SO PROMINENT  
IN THE UNITED  
STATES?



# KERRY VS. BUSH (2004) COUNTY LEVEL BY MAJORITY

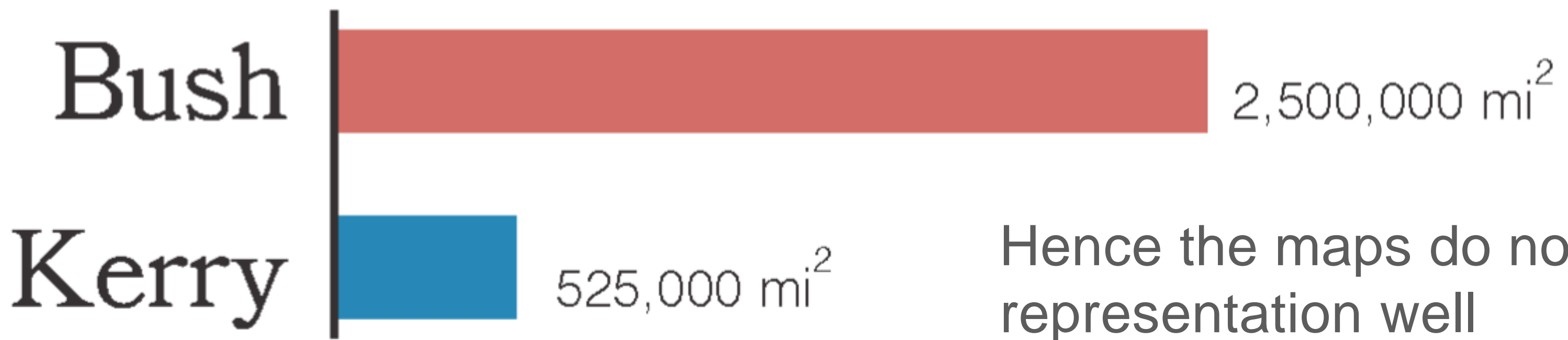


# KERRY VS. BUSH (2004)

2004 Popular Vote



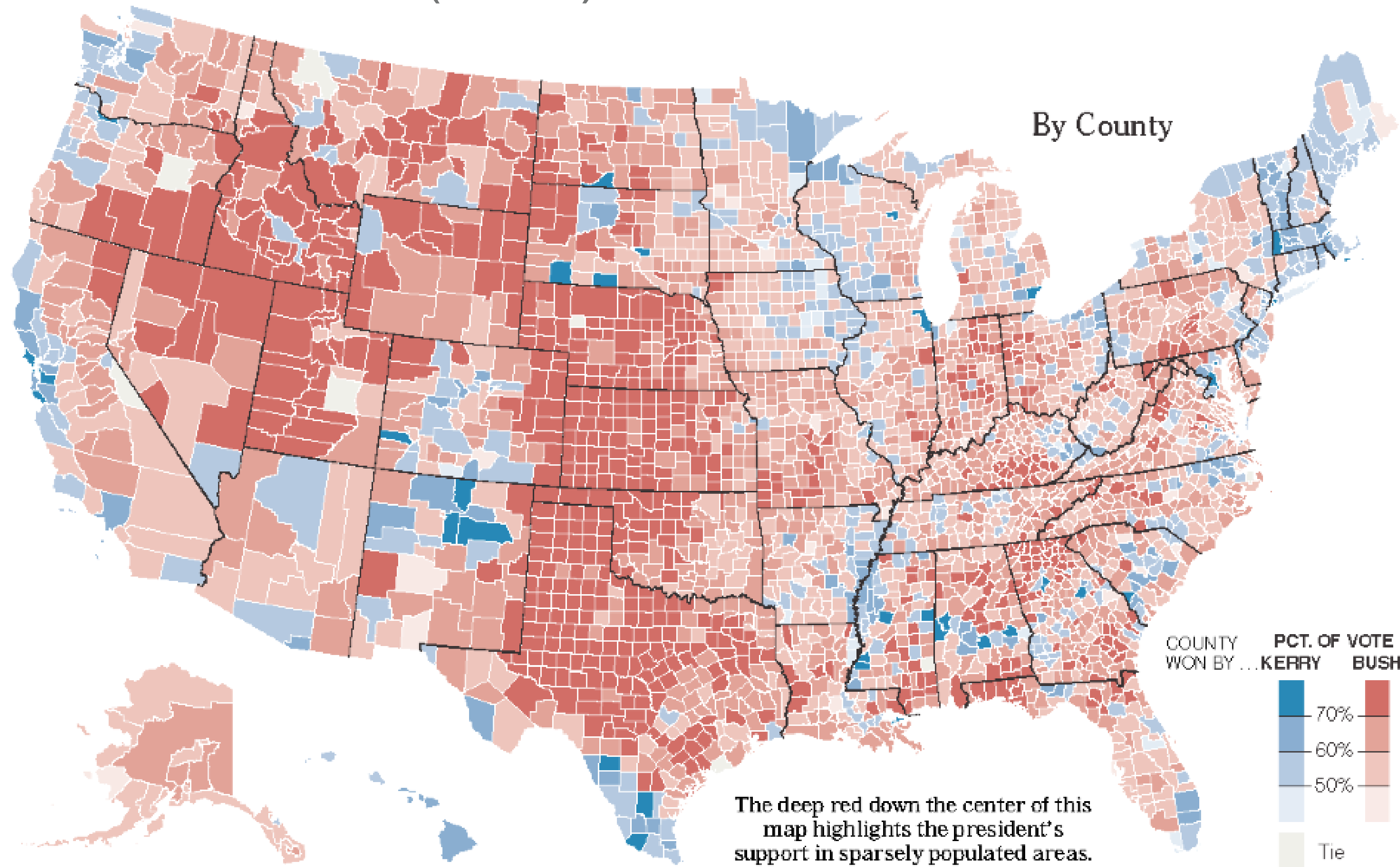
Amount of red and blue shown on map



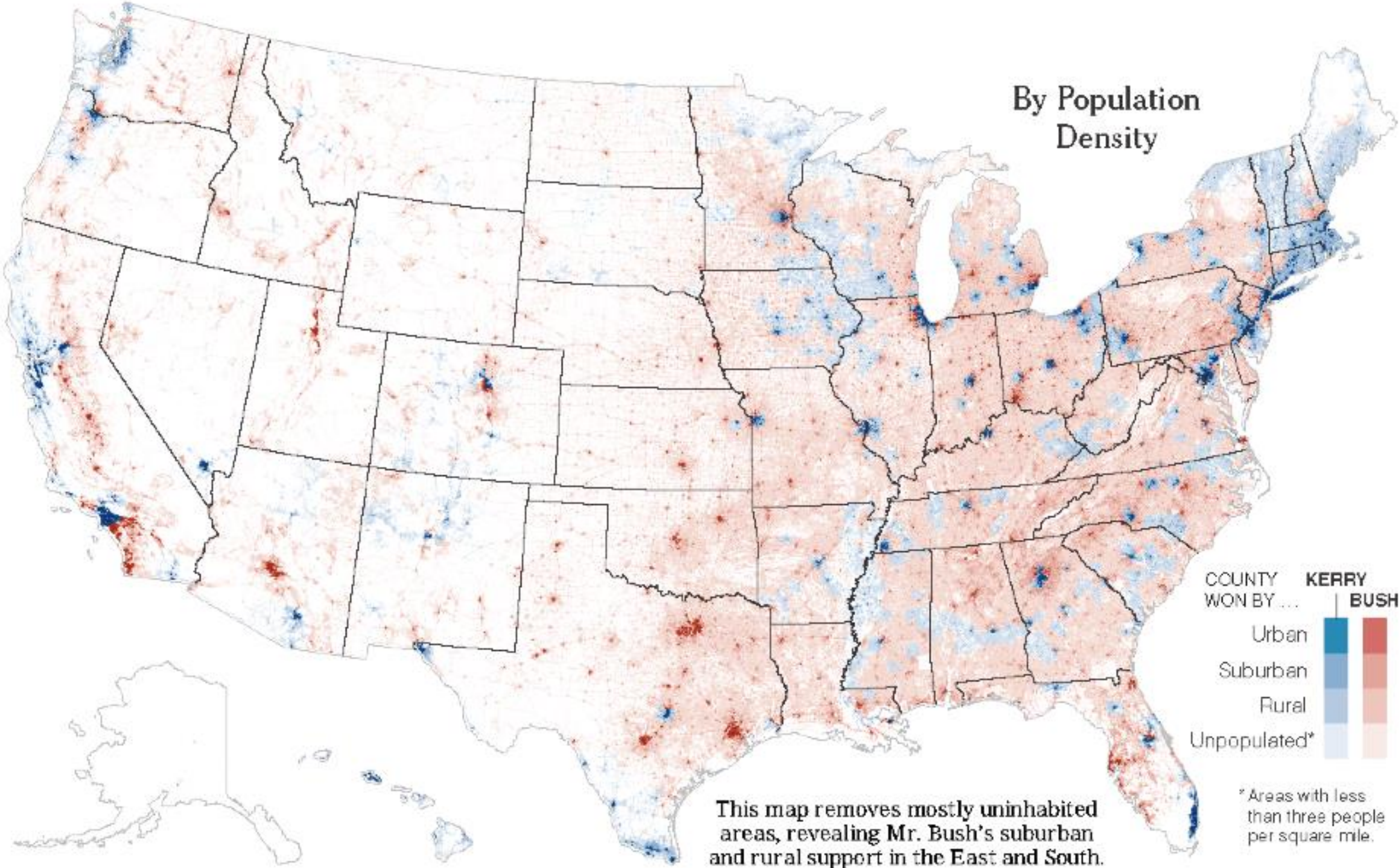
Hence the maps do not convey voter representation well

Ideally the amount of colors would stand for the amount of votes

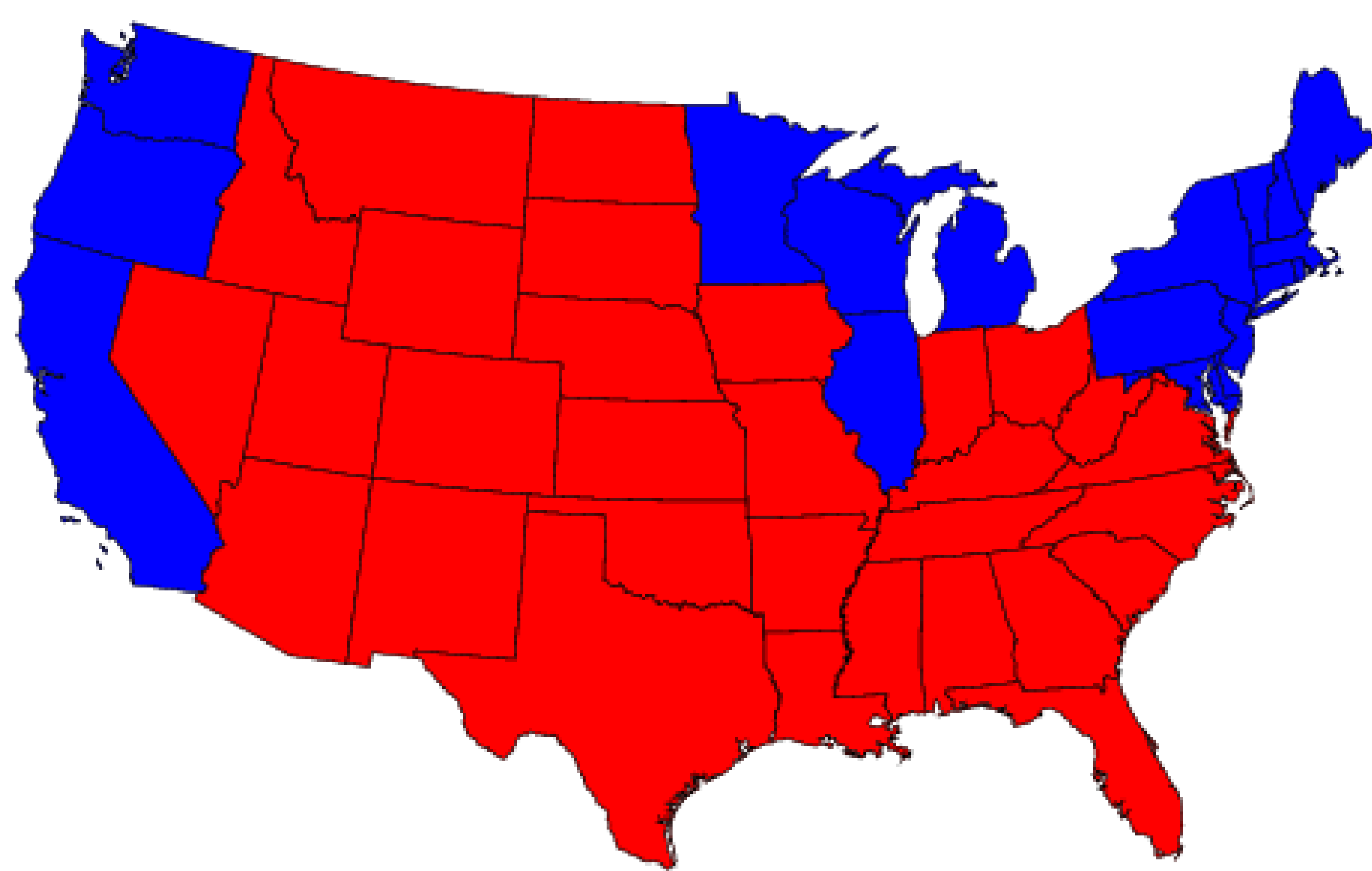
# KERRY VS. BUSH (2004) COUNTY LEVEL BY % MARGIN



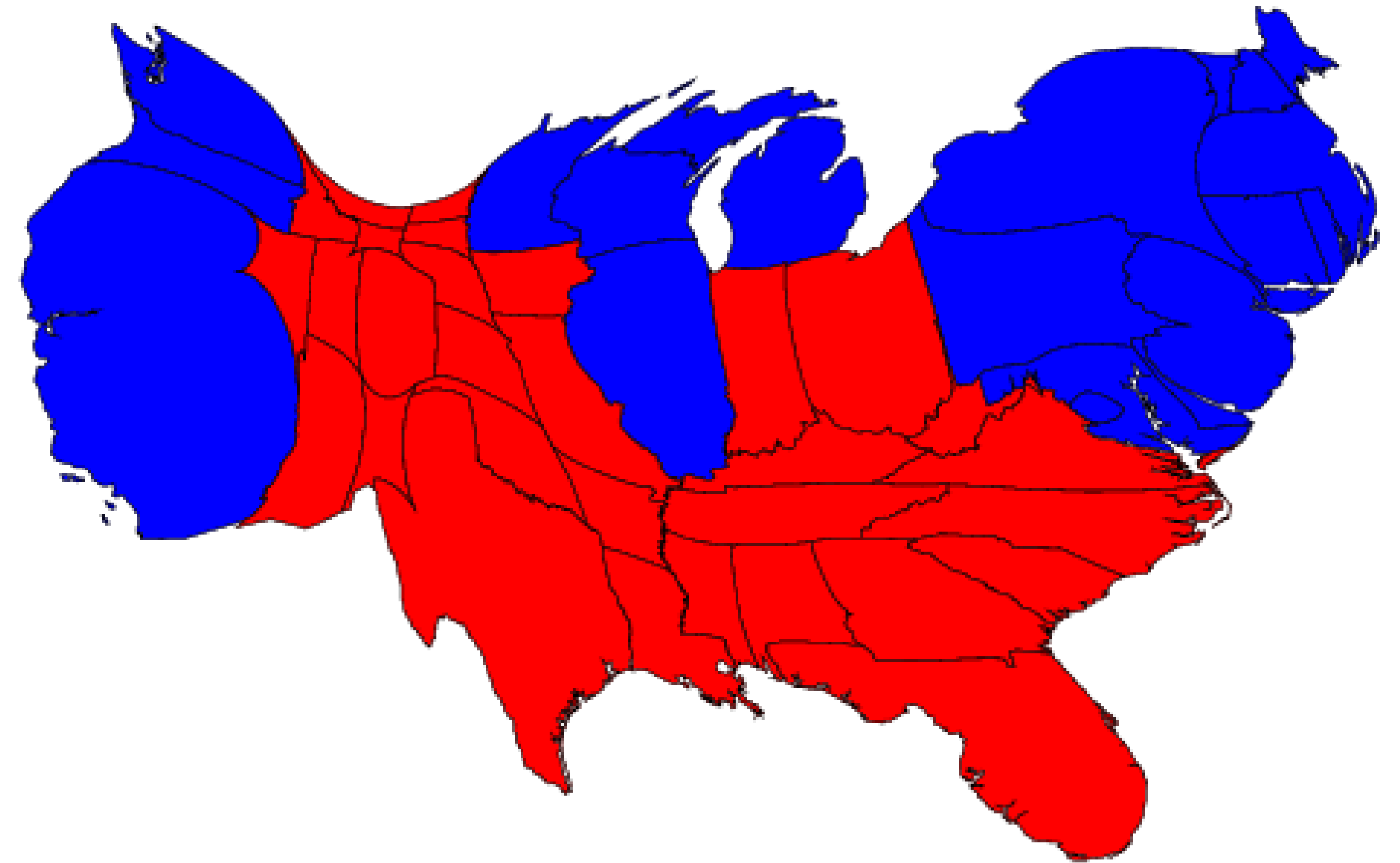
# KERRY VS. BUSH (2004) CORRECTED FOR POPULATION DENSITY



# KERRY VS. BUSH (2004) BY STATE

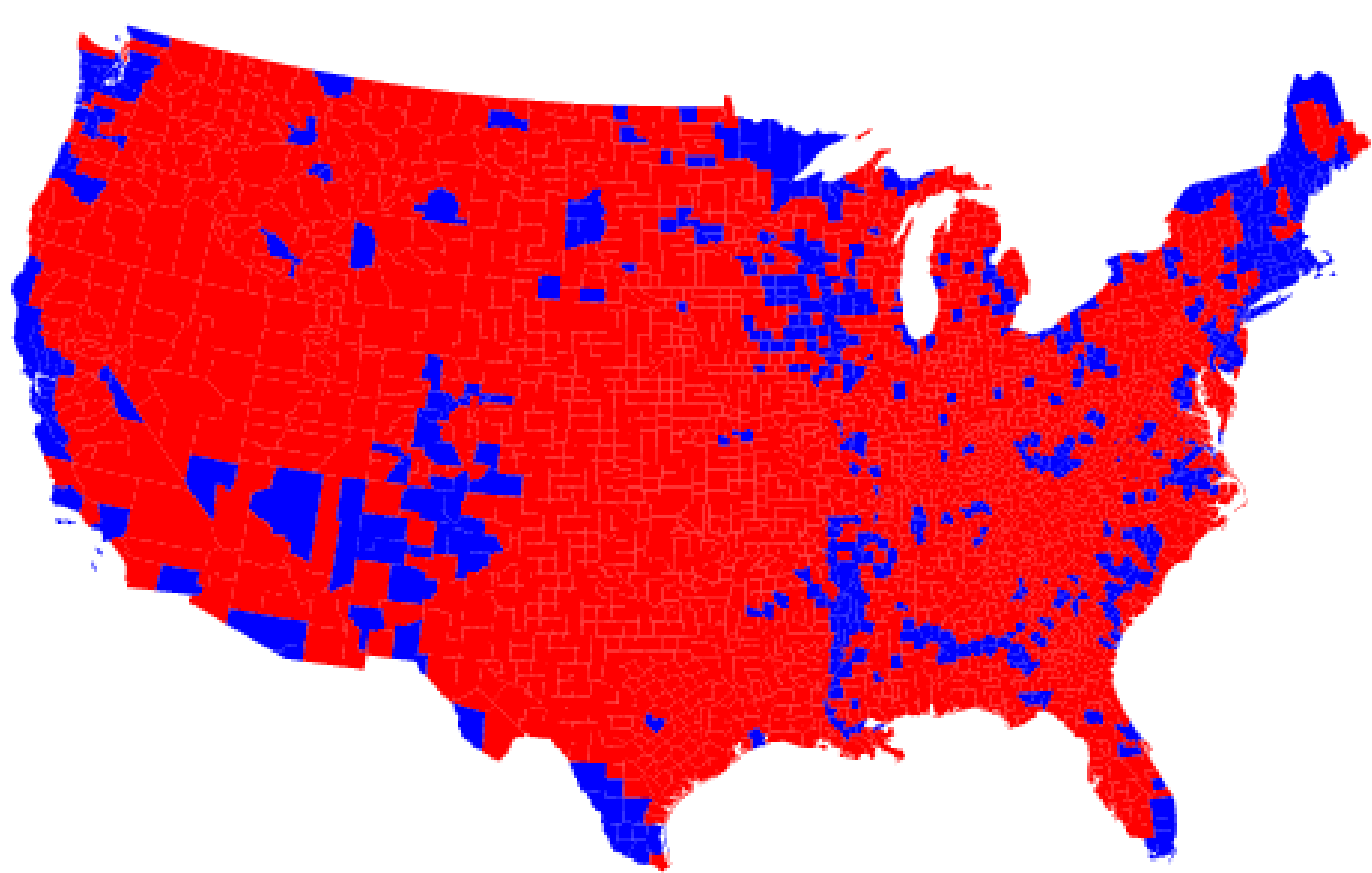


geographically accurate

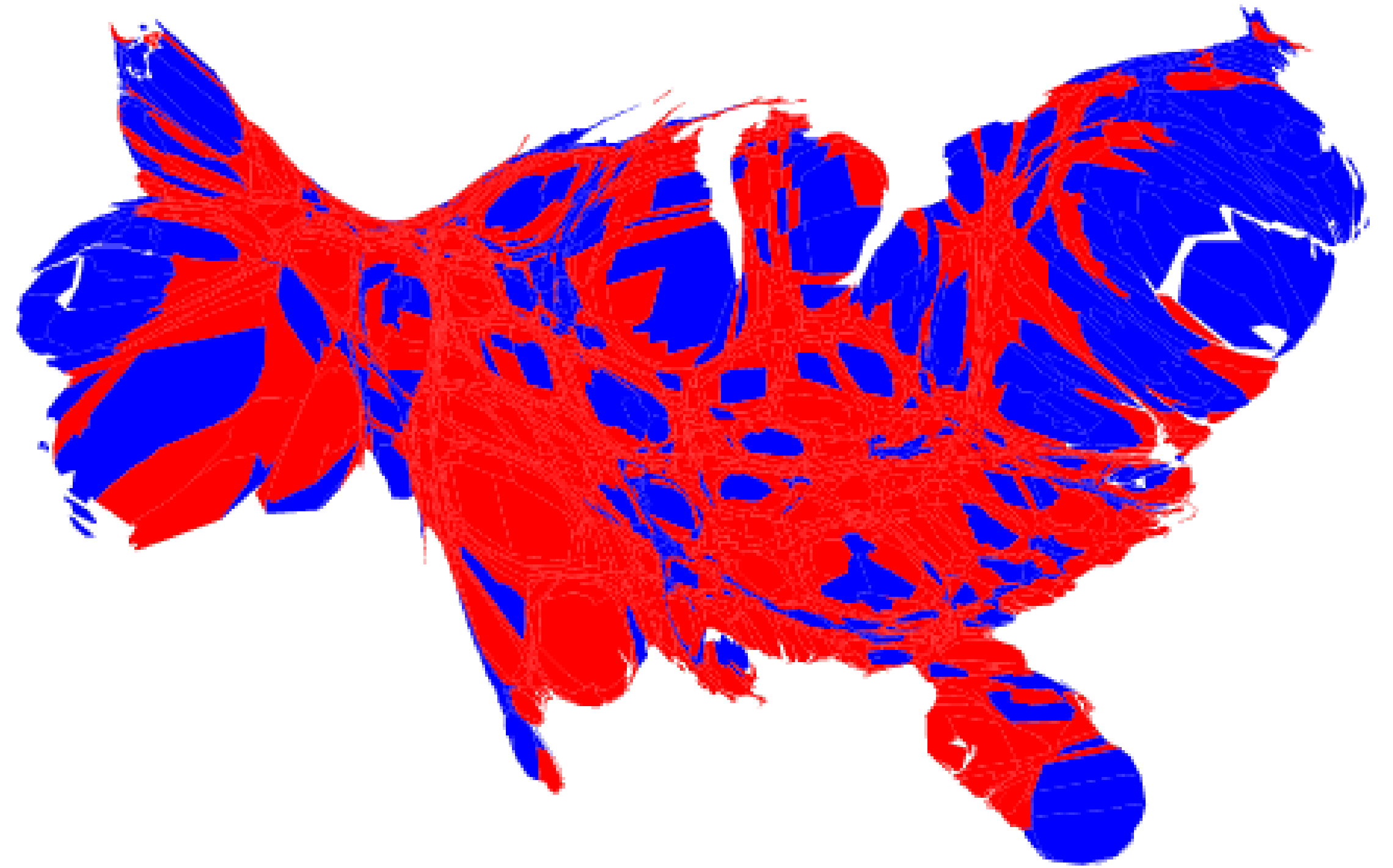


geography scaled by population gives a seemingly fairer visual representation of the "one man, one vote" principle

# KERRY VS. BUSH (2004) BY COUNTY

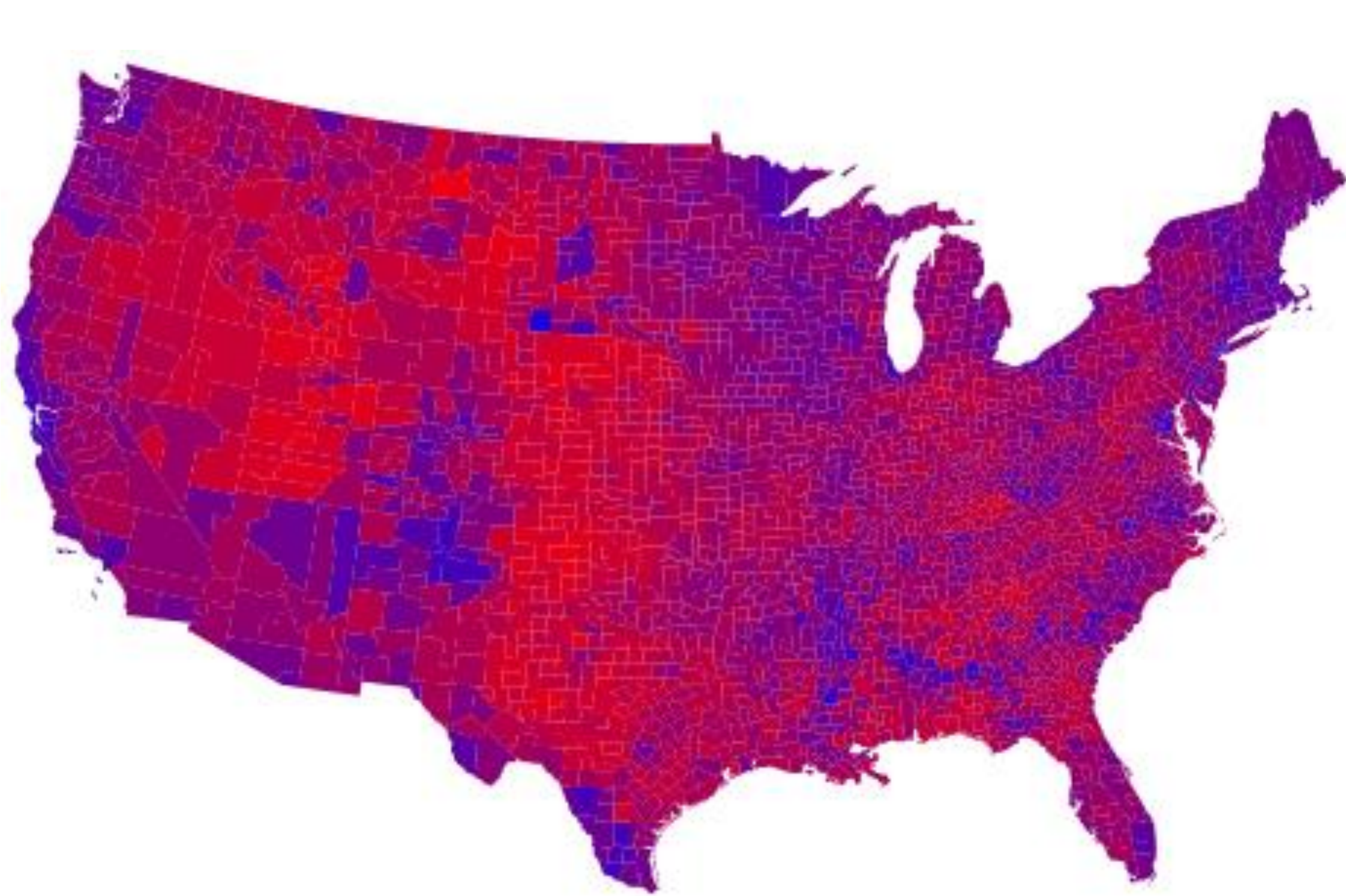


geographically accurate

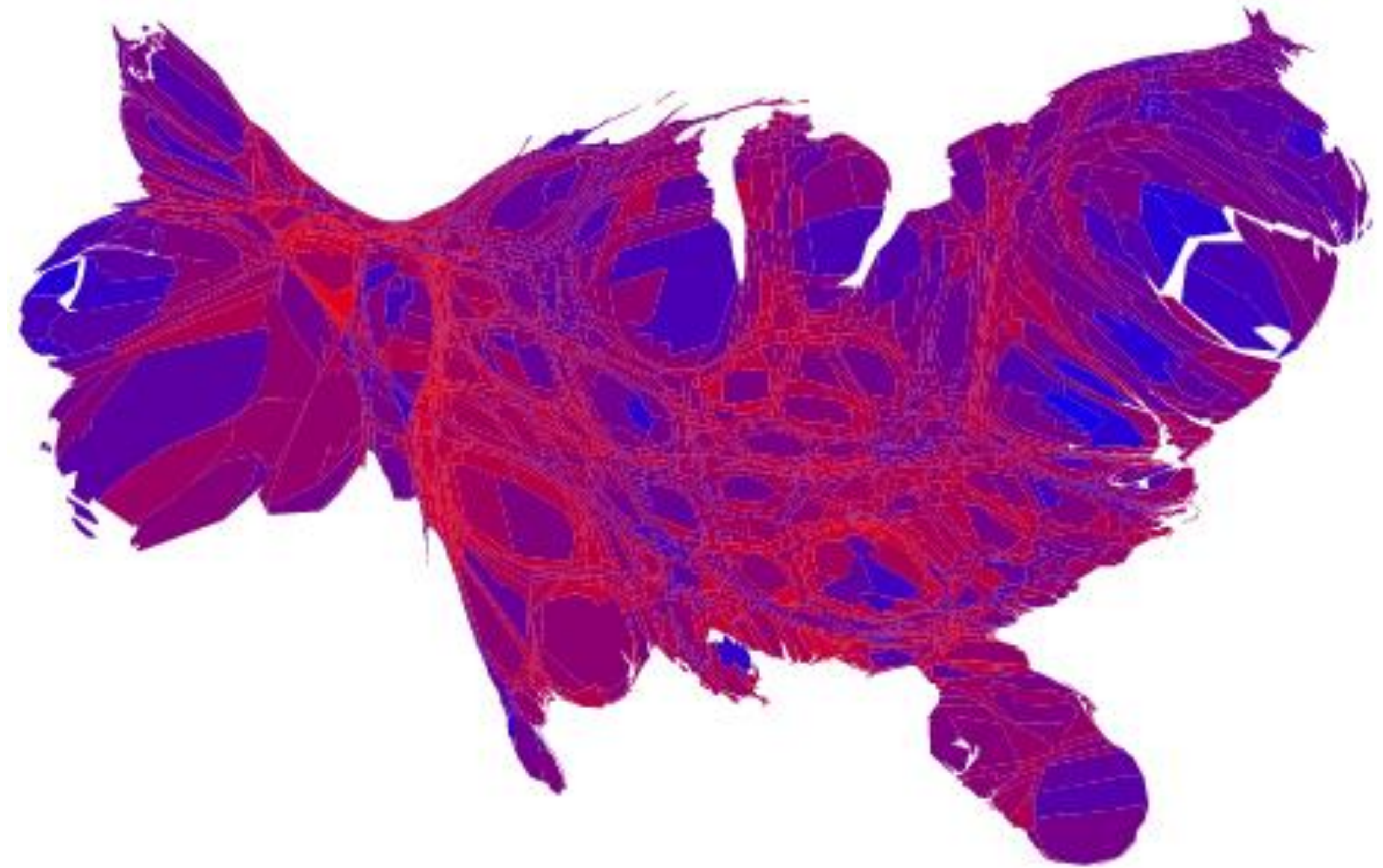


geography scaled by population gives a seemingly fairer visual representation of the "one man, one vote" principle

# KERRY VS. BUSH (2004) COUNTY LEVEL BY % MARGIN



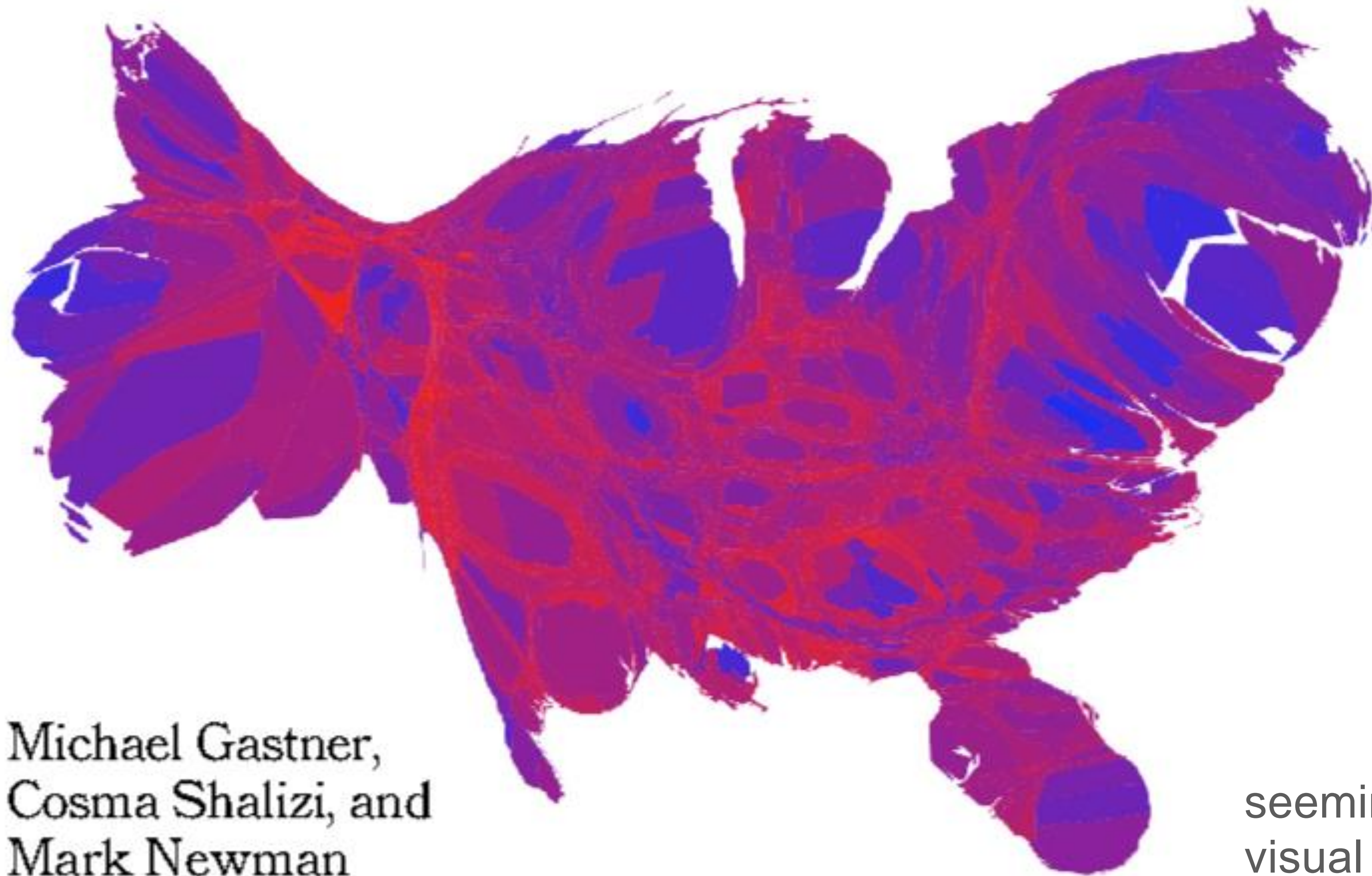
geographically accurate



geography scaled by population gives a seemingly fairer visual representation of the "one man, one vote" principle



# KERRY VS. BUSH (2004) COUNTY LEVEL BY % MARGIN



Michael Gastner,  
Cosma Shalizi, and  
Mark Newman  
*University of Michigan*

seemingly even fairer  
visual in terms of 'one  
man, one vote'

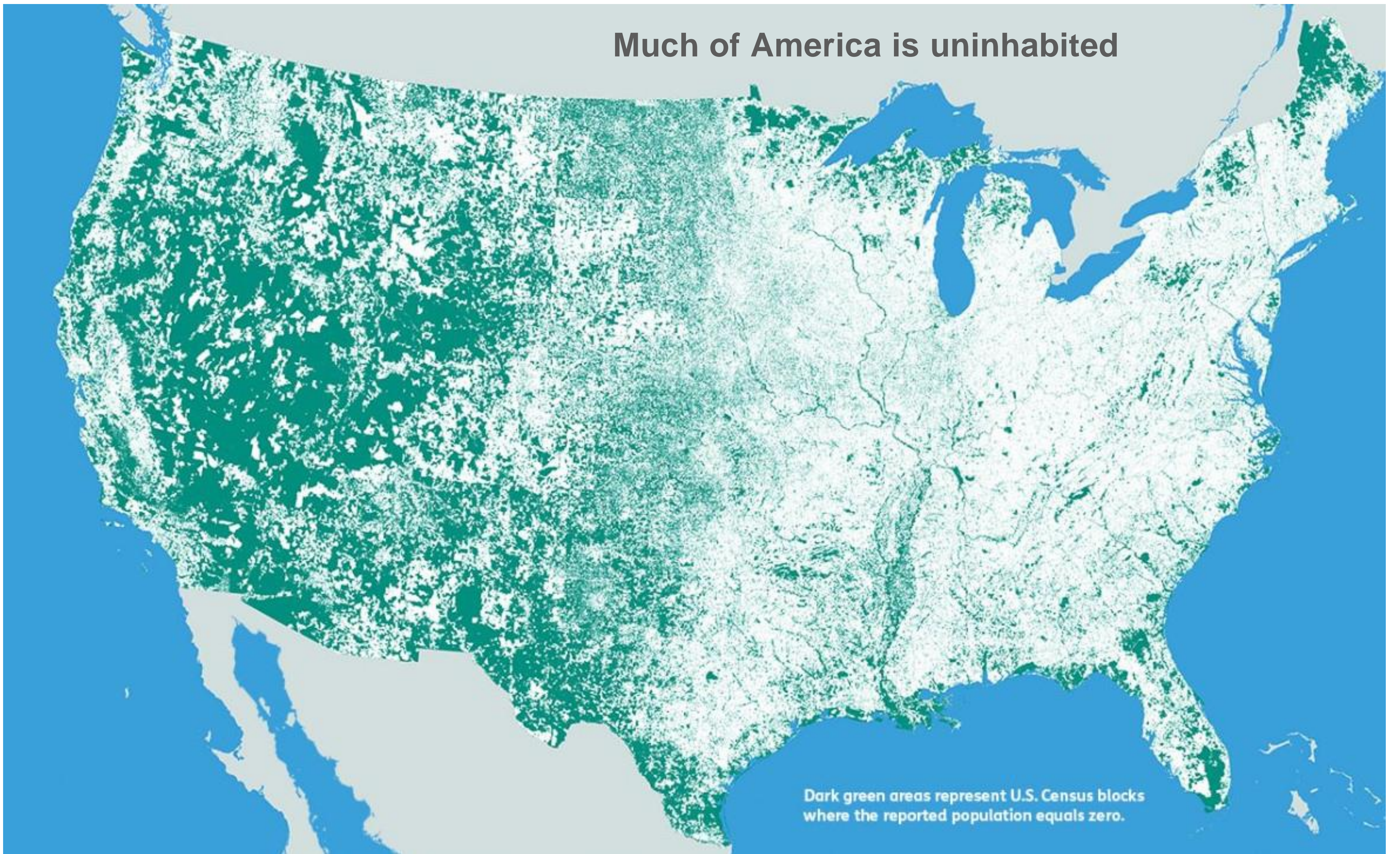
# COLOR IS POWERFUL

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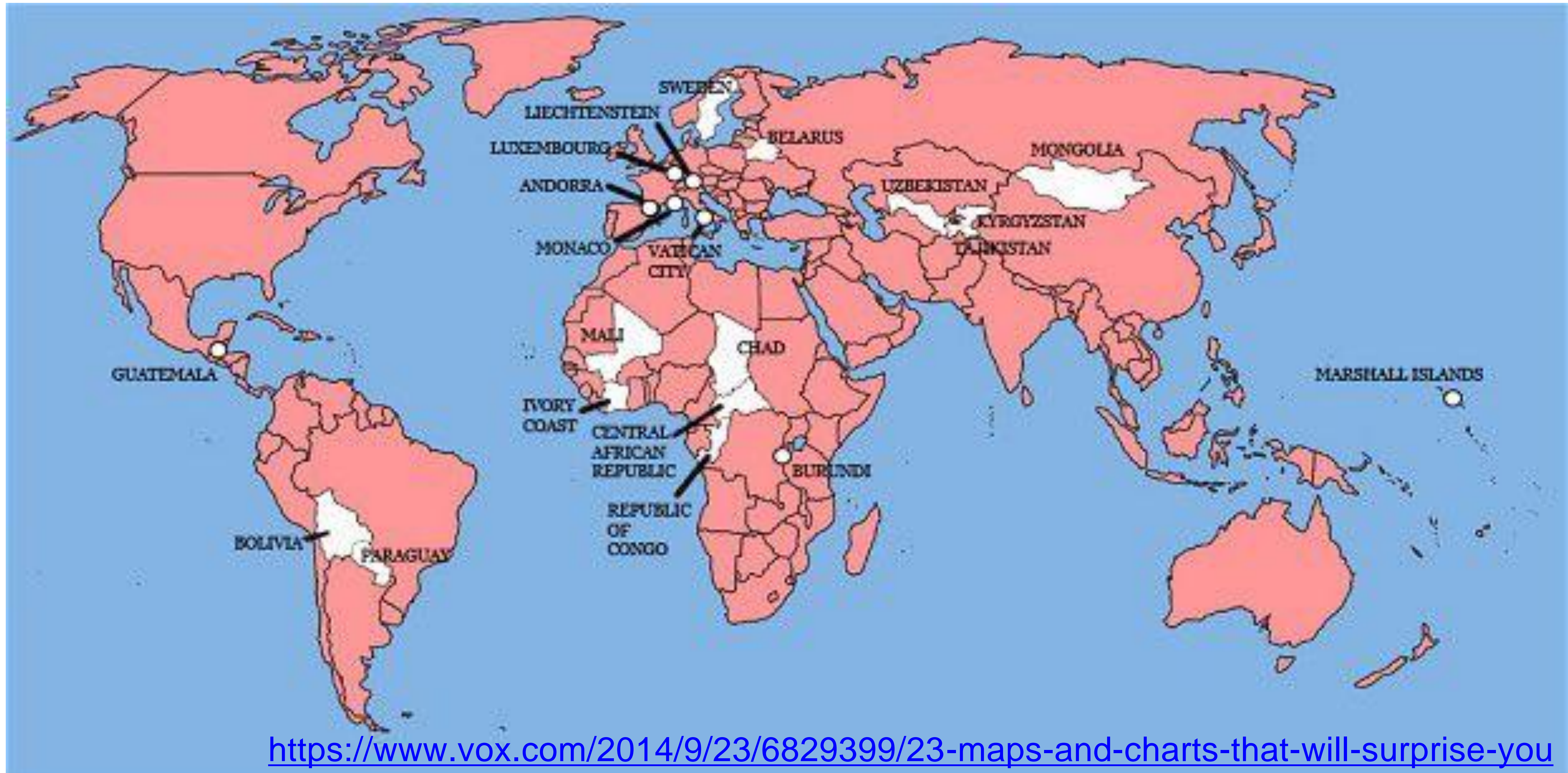
- <https://www.nytimes.com/interactive/2020/10/30/opinion/election-results-maps.html?action=click&module=Opinion&pgtype=Homepage>

## Much of America is uninhabited

Dark green areas represent U.S. Census blocks where the reported population equals zero.



# THE BRITISH HAVE INVADED ALMOST EVERY COUNTRY ON EARTH



# THE WORLDS LARGEST LAKES COMPARED



# RAILWAY SYSTEMS COMPARED

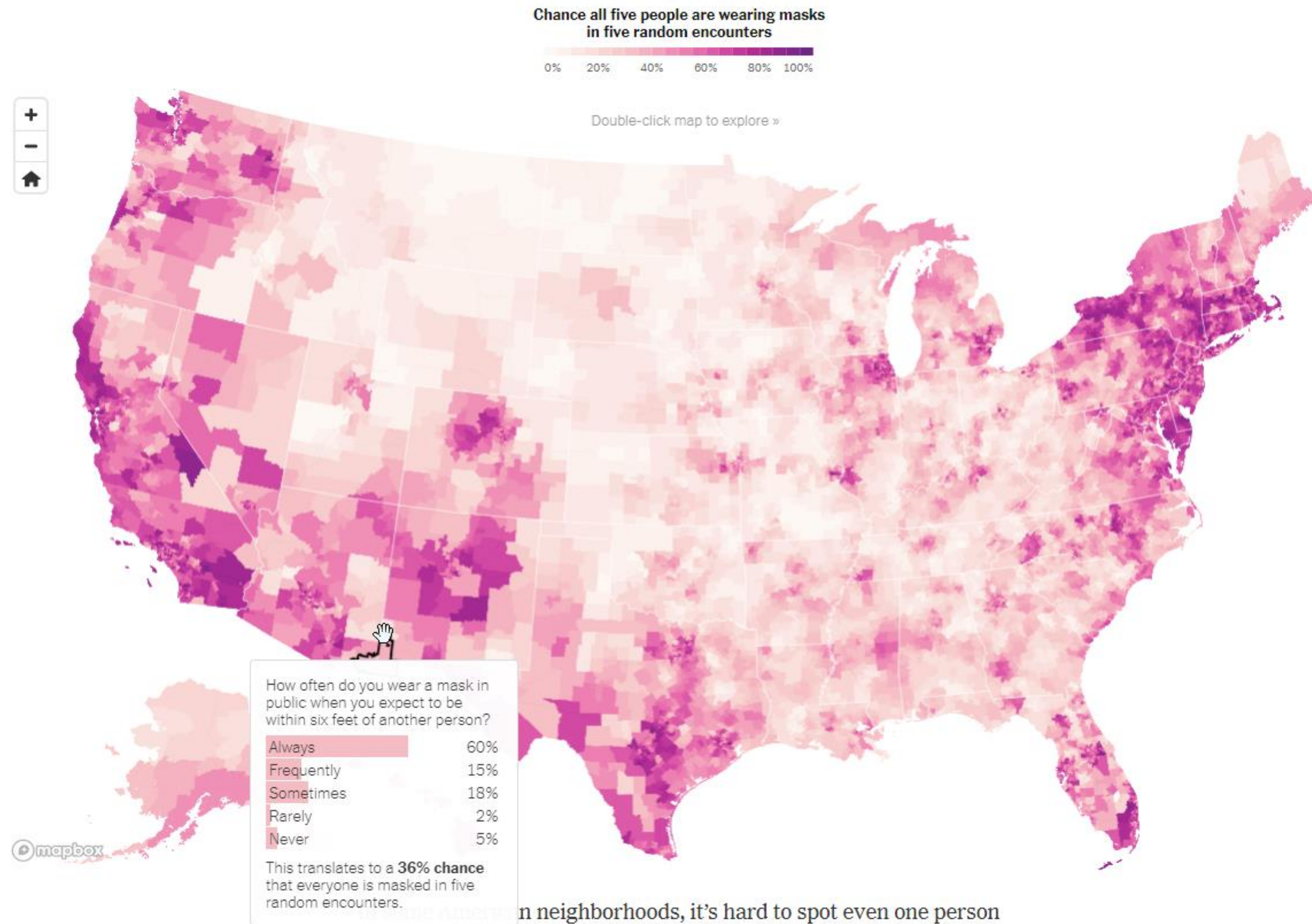
USA



Europe

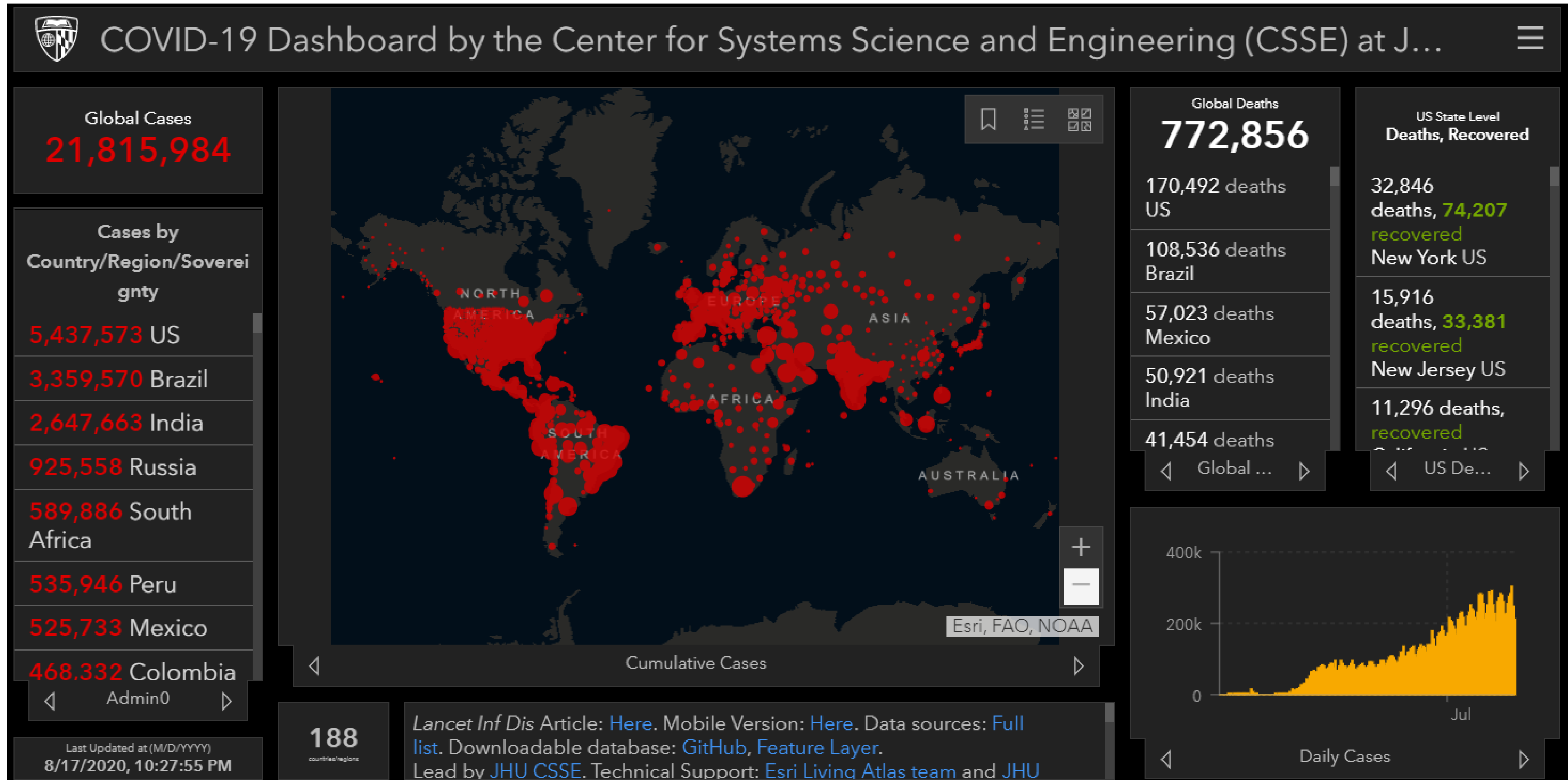


# MASK WEARING DISCIPLINE



Chance all five people are wearing masks in five random encounters (New York Times)

# JOHNS-HOPKINS COVID-19 DASHBOARD





cylindrical



conical



azimuthal



azimuthal



polyconical



# UNFOLDING THE EARTH: MYRIAHEDRAL PROJECTIONS

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<https://www.youtube.com/watch?v=TMKaxQvJQp4>

Jarke J. van Wijk. Unfolding the Earth: Myriahedral Projections. *The Cartographic Journal*, Vol. 45, No. 1, pp.32-42, February 2008.



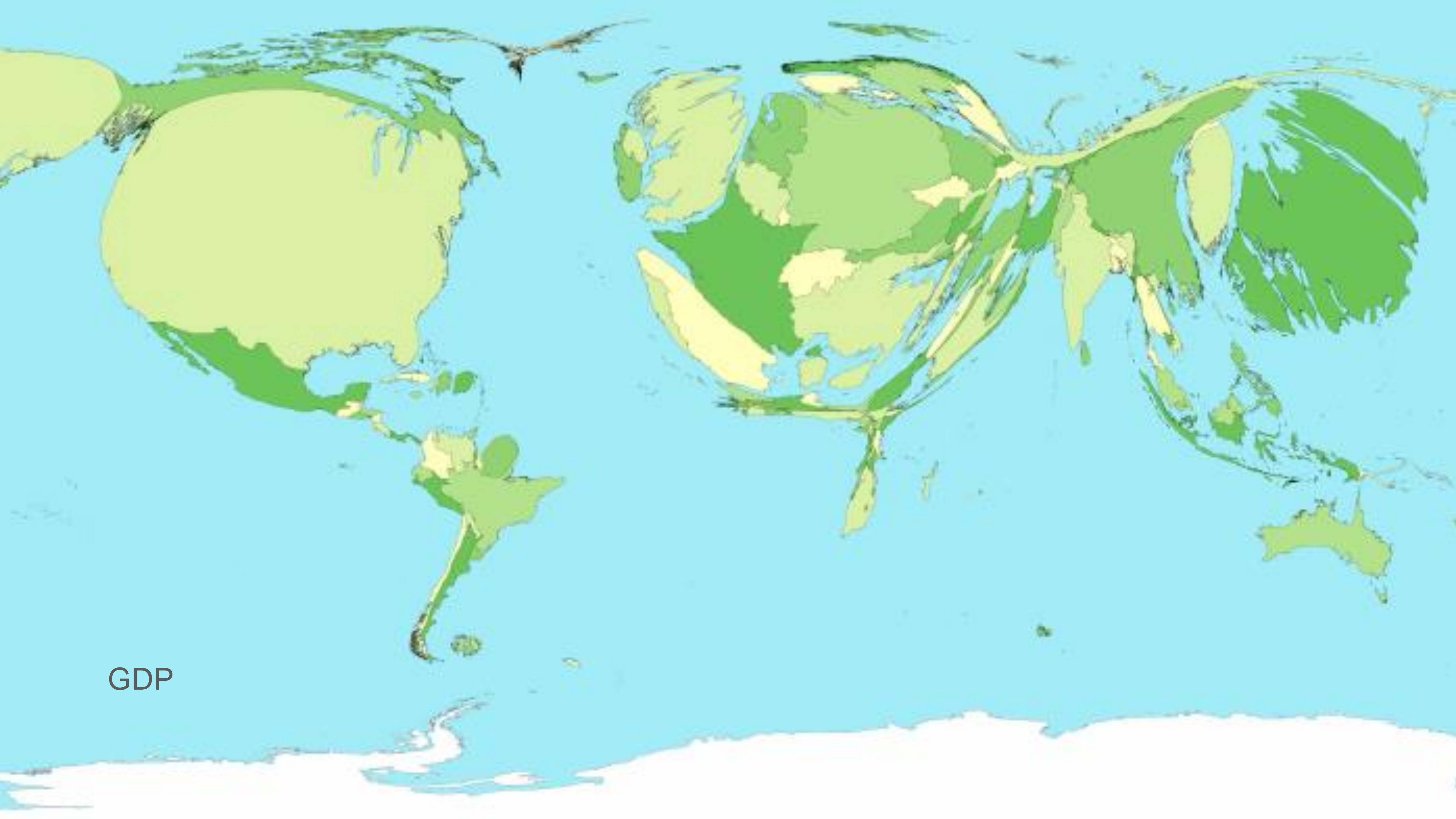
# *Unfolding the Earth: Myriahedral Projections*

*Jarke J. van Wijk  
TU Eindhoven*

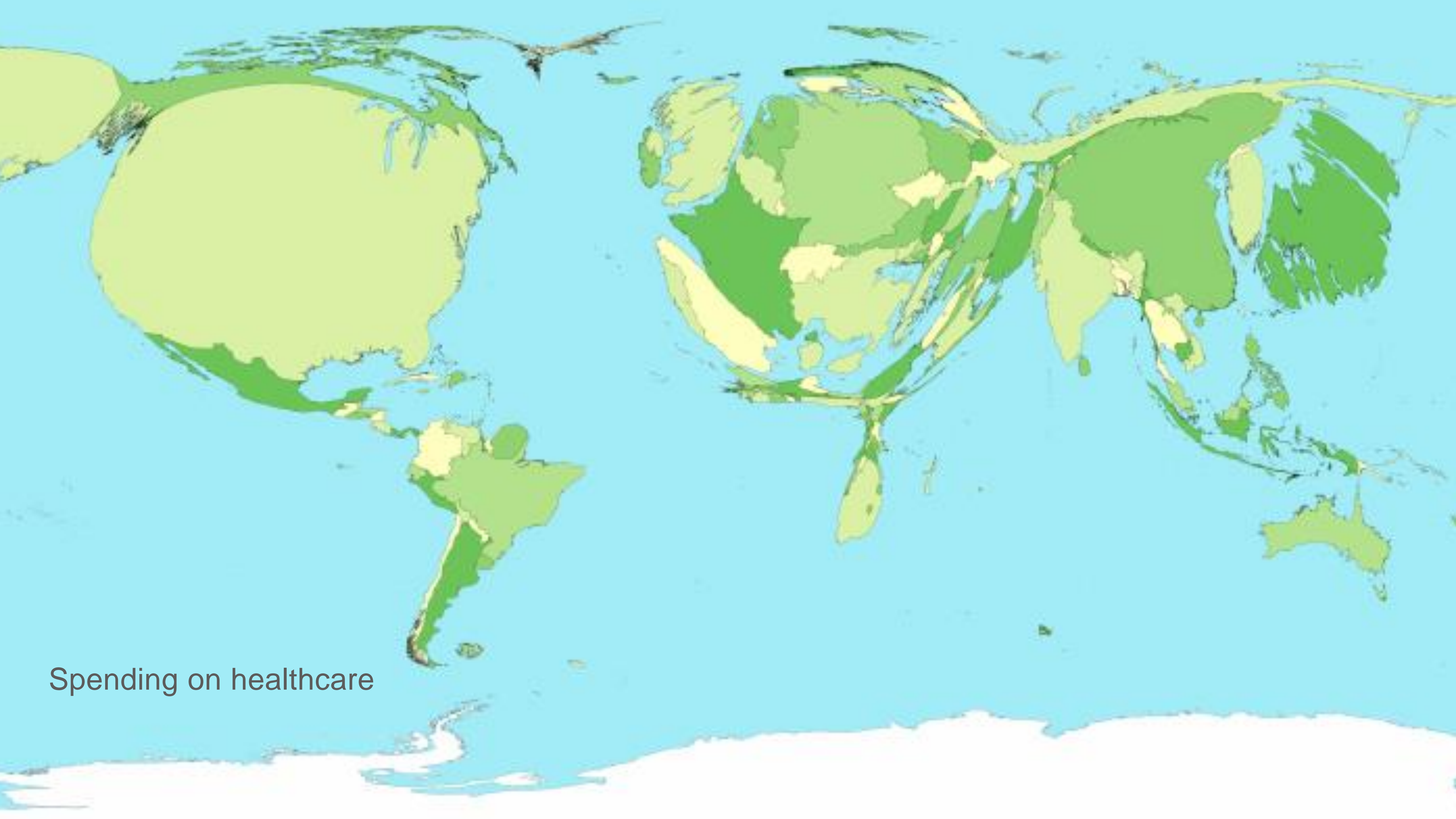


Population based

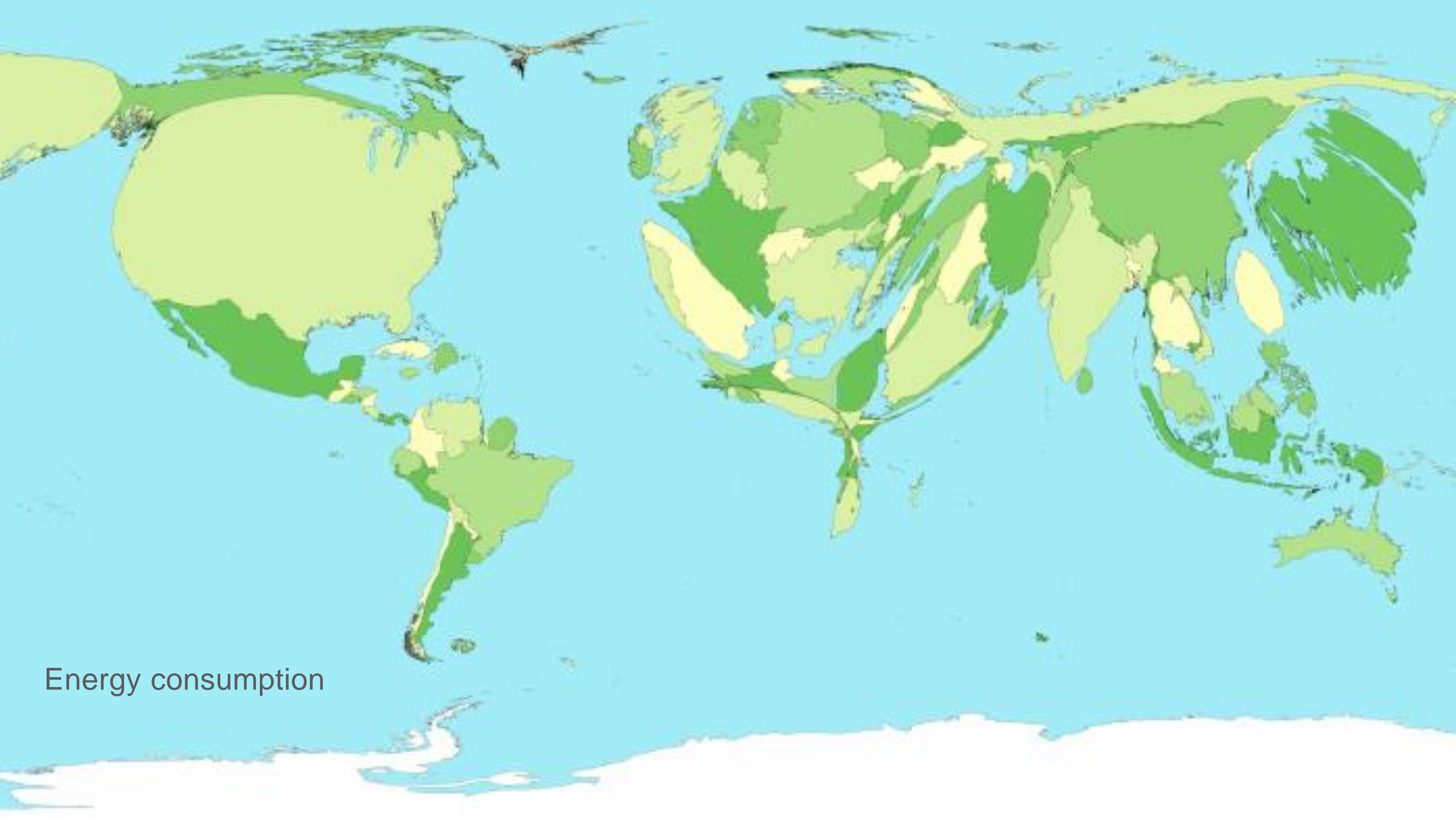
The next slides use population-based distortion for various national parameters →



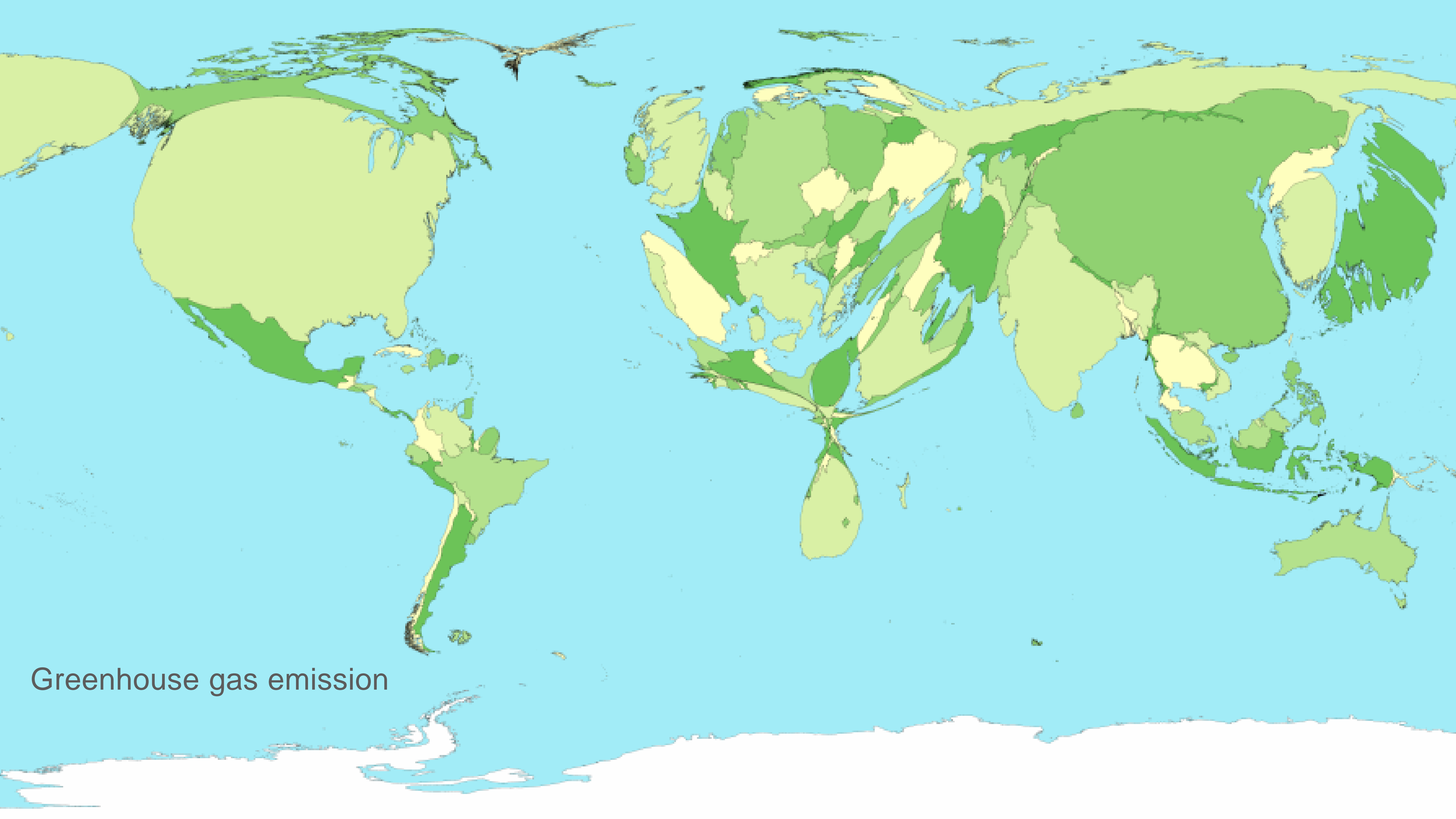
GDP



Spending on healthcare

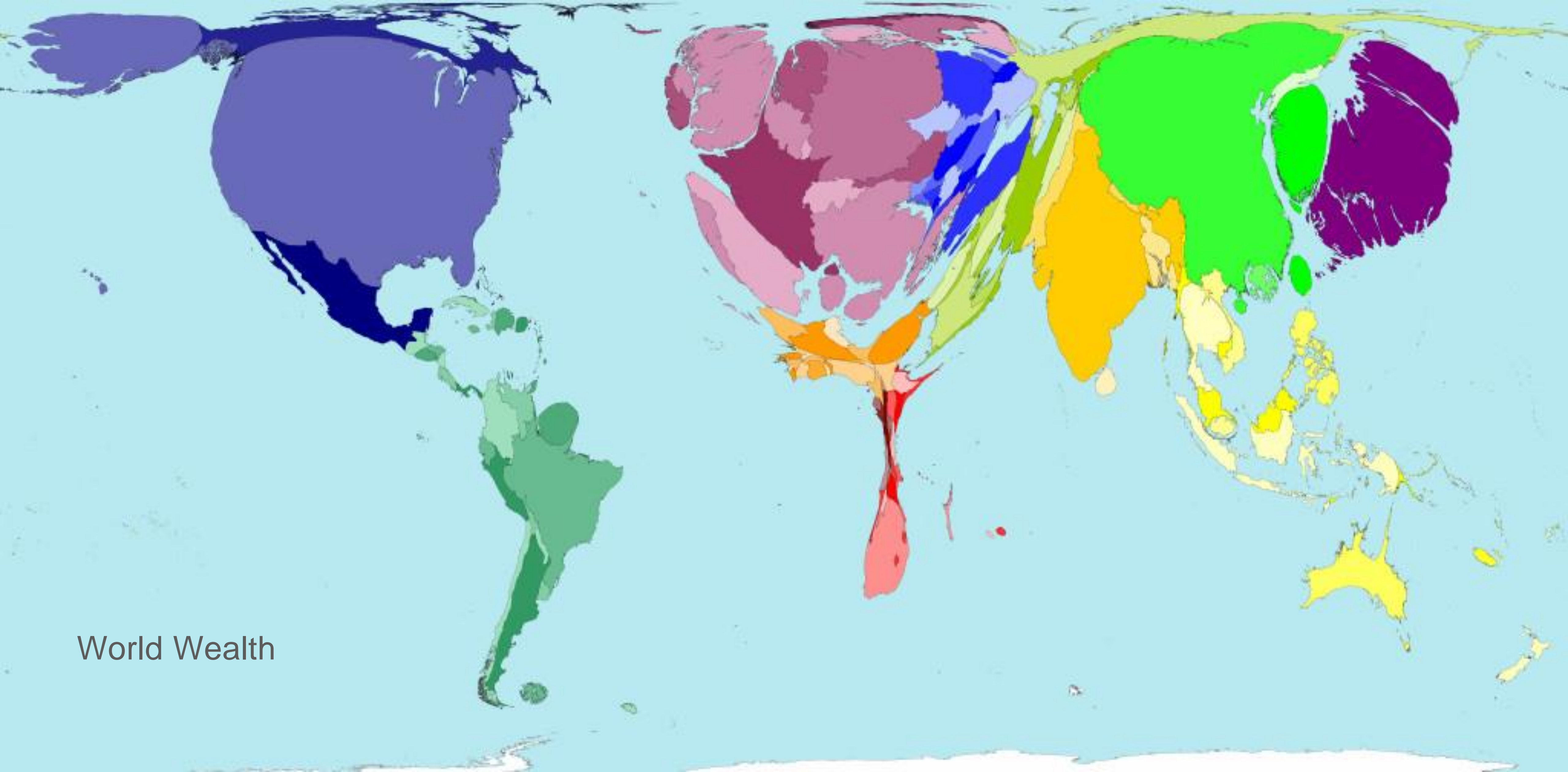


Energy consumption



Greenhouse gas emission





World Wealth

# Figure 1.8 Airlines' view of the United States.

Maps can be scaled to units other than distance. In this case, airline fares are used instead of miles or other linear units.

*(Map copyright by the author.)*



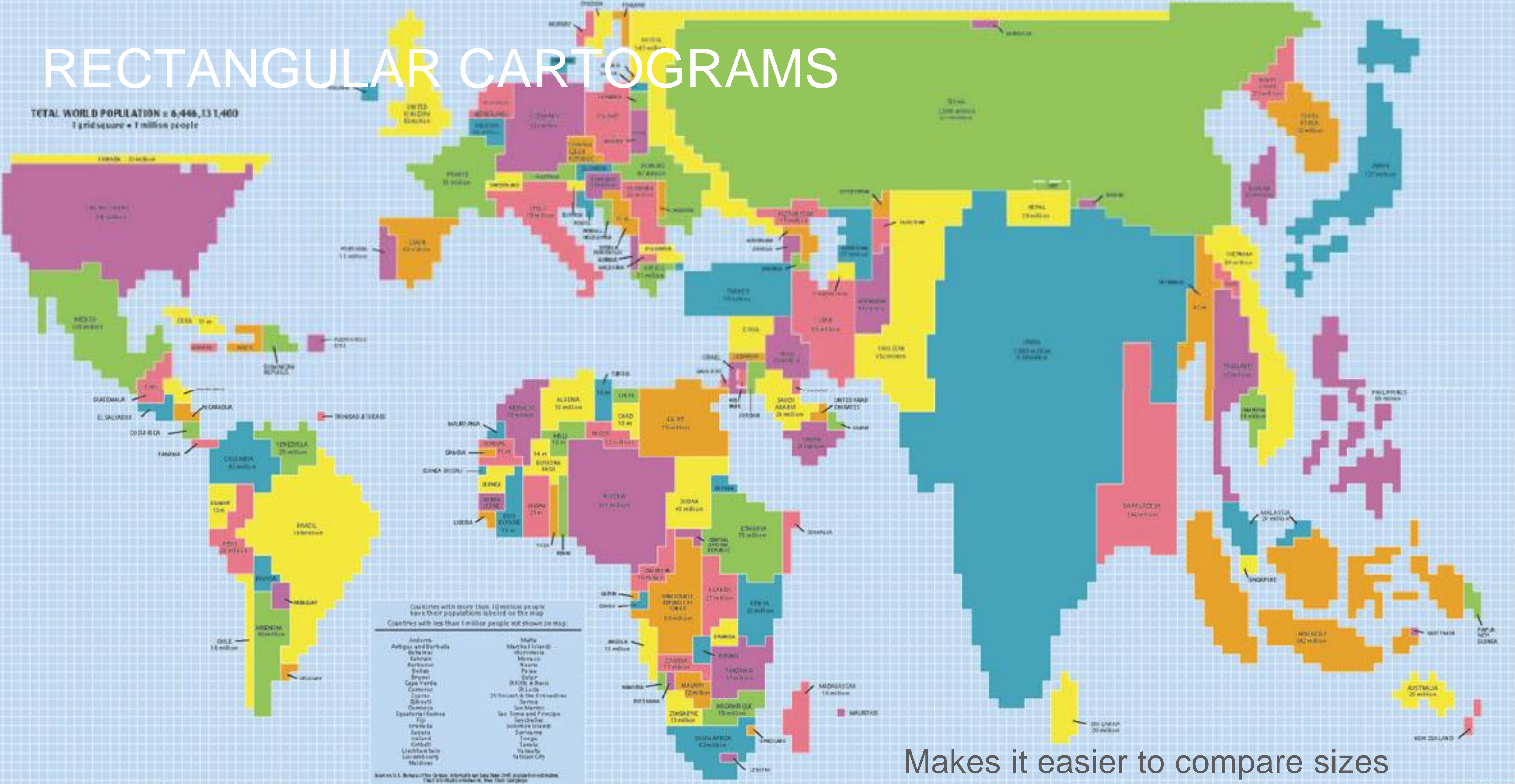
# USA

## Major Cities by Population



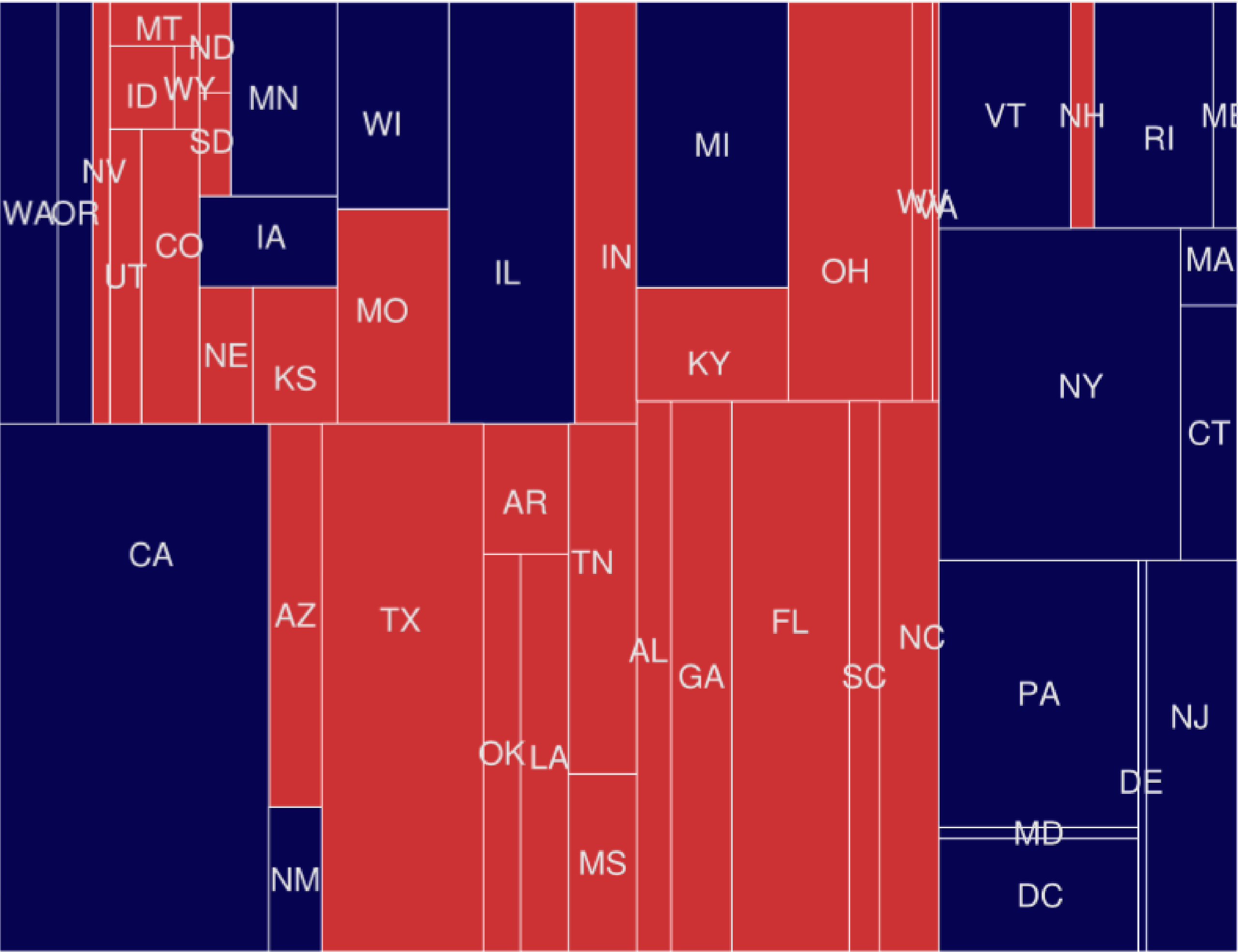
# RECTANGULAR CARTOGRAMS

TOTAL WORLD POPULATION = 6,446,131,400  
 1 grid square = 1 million people

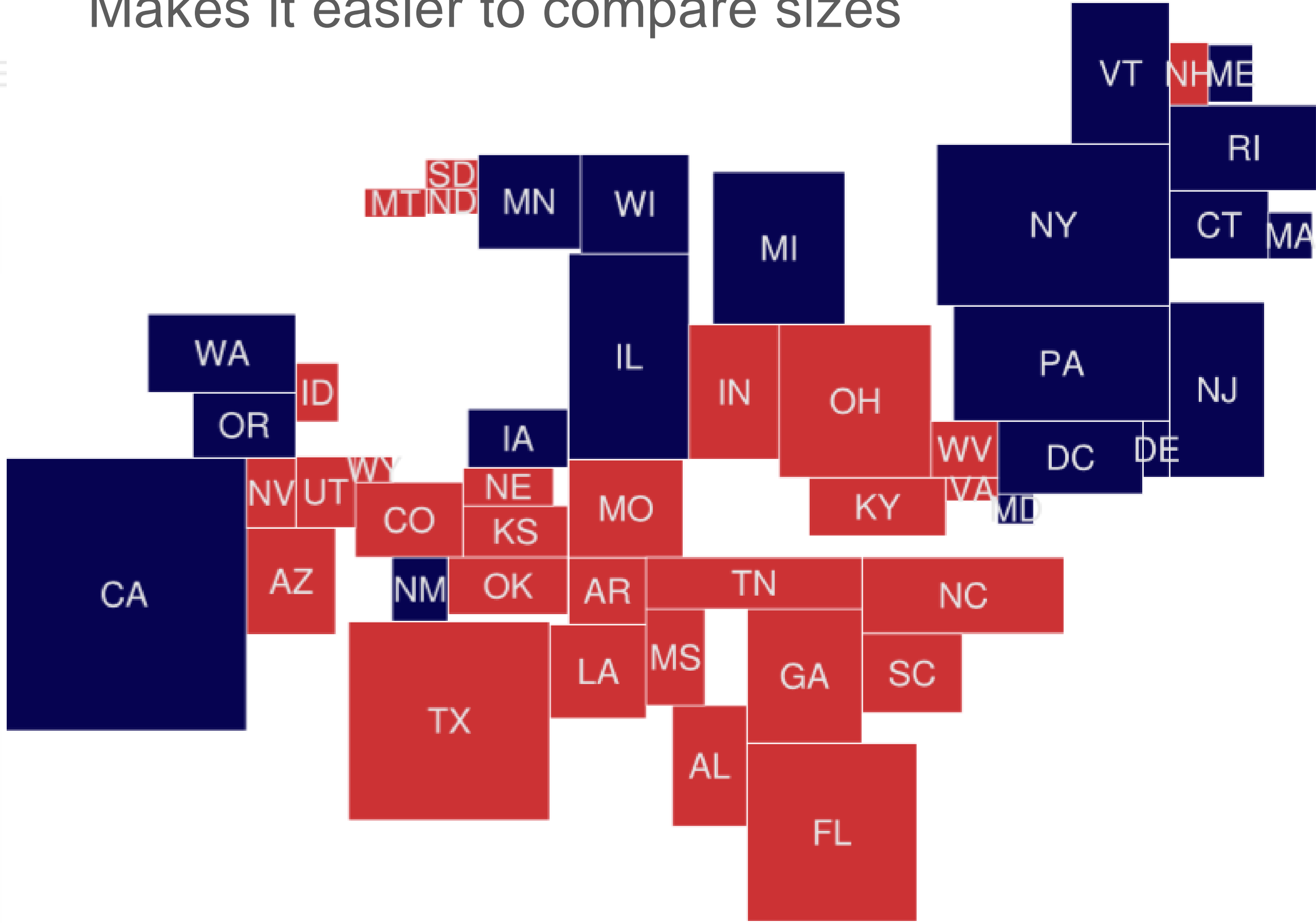


Makes it easier to compare sizes

# RECMAP (2004)

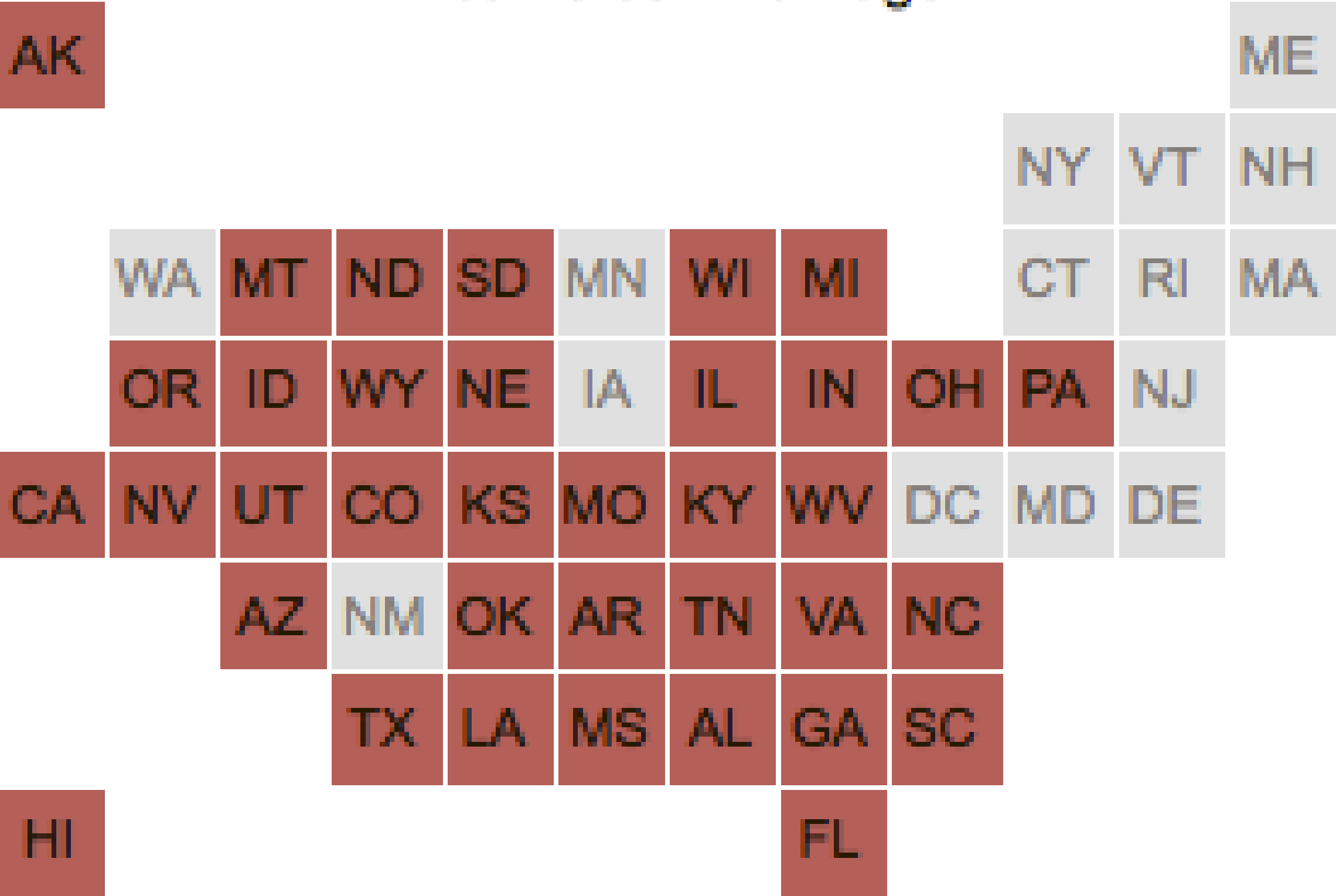


Makes it easier to compare sizes

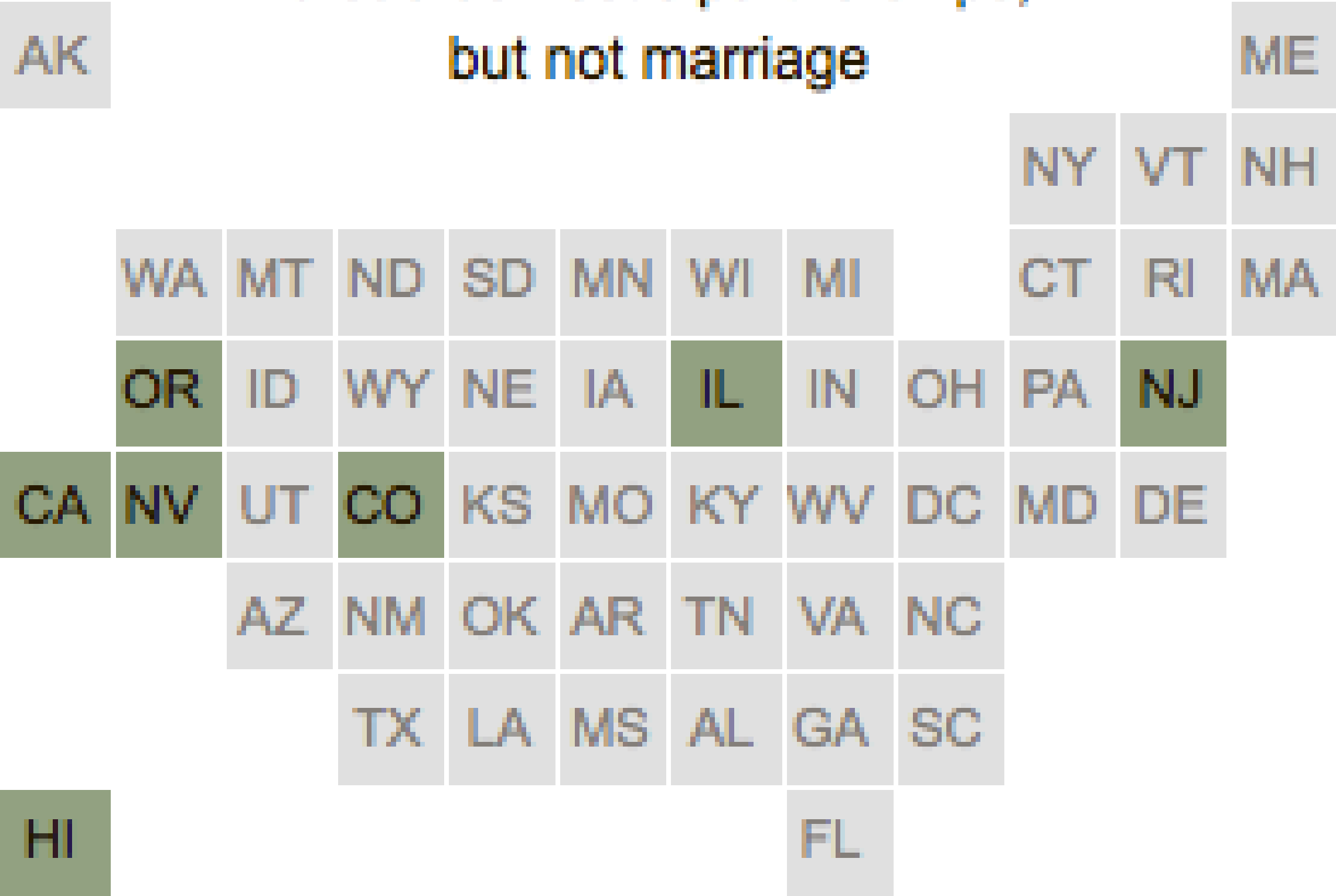


# GRID MAP

States with bans on same-sex marriage\*

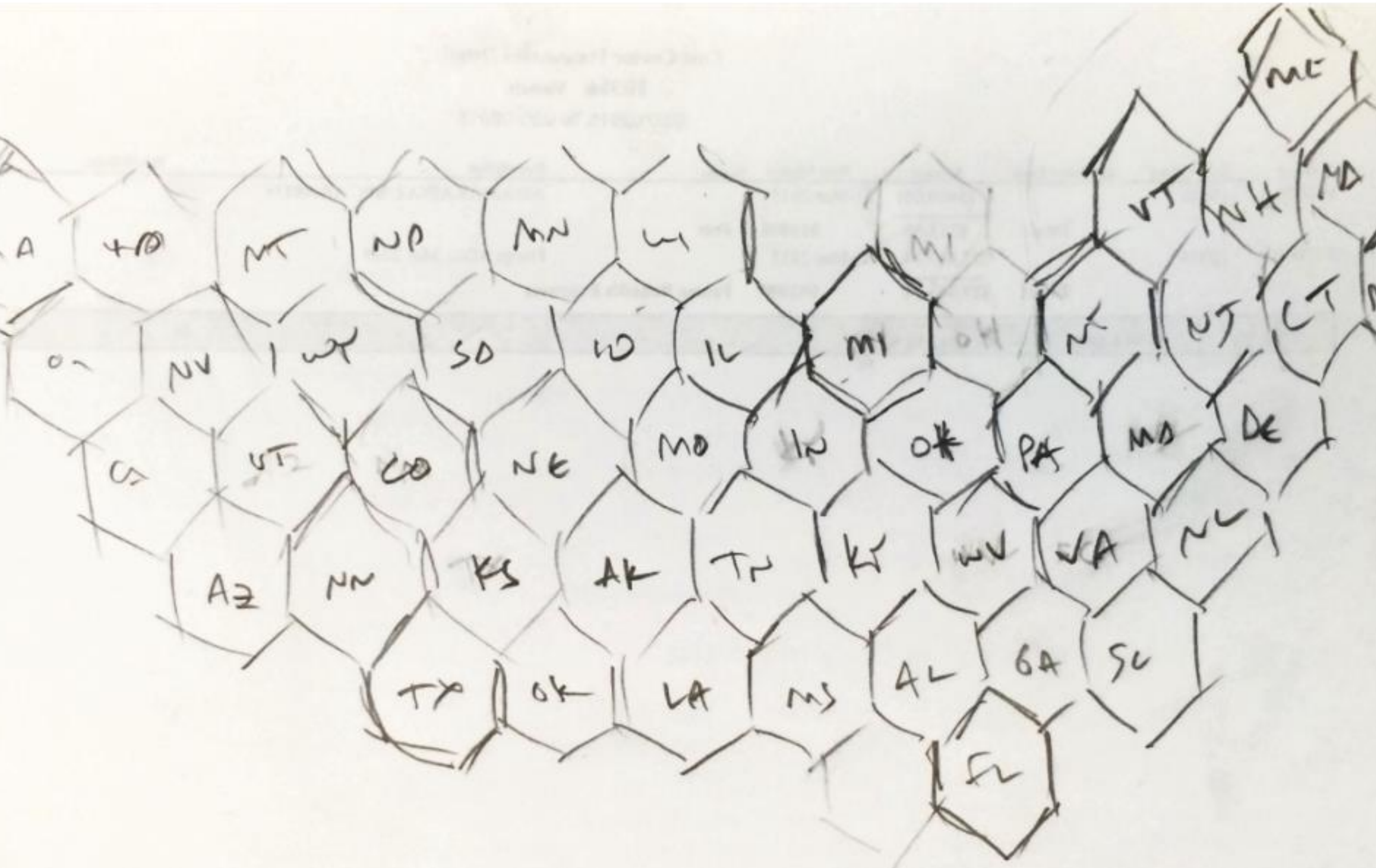


States that allow civil unions or broad domestic partnerships, but not marriage



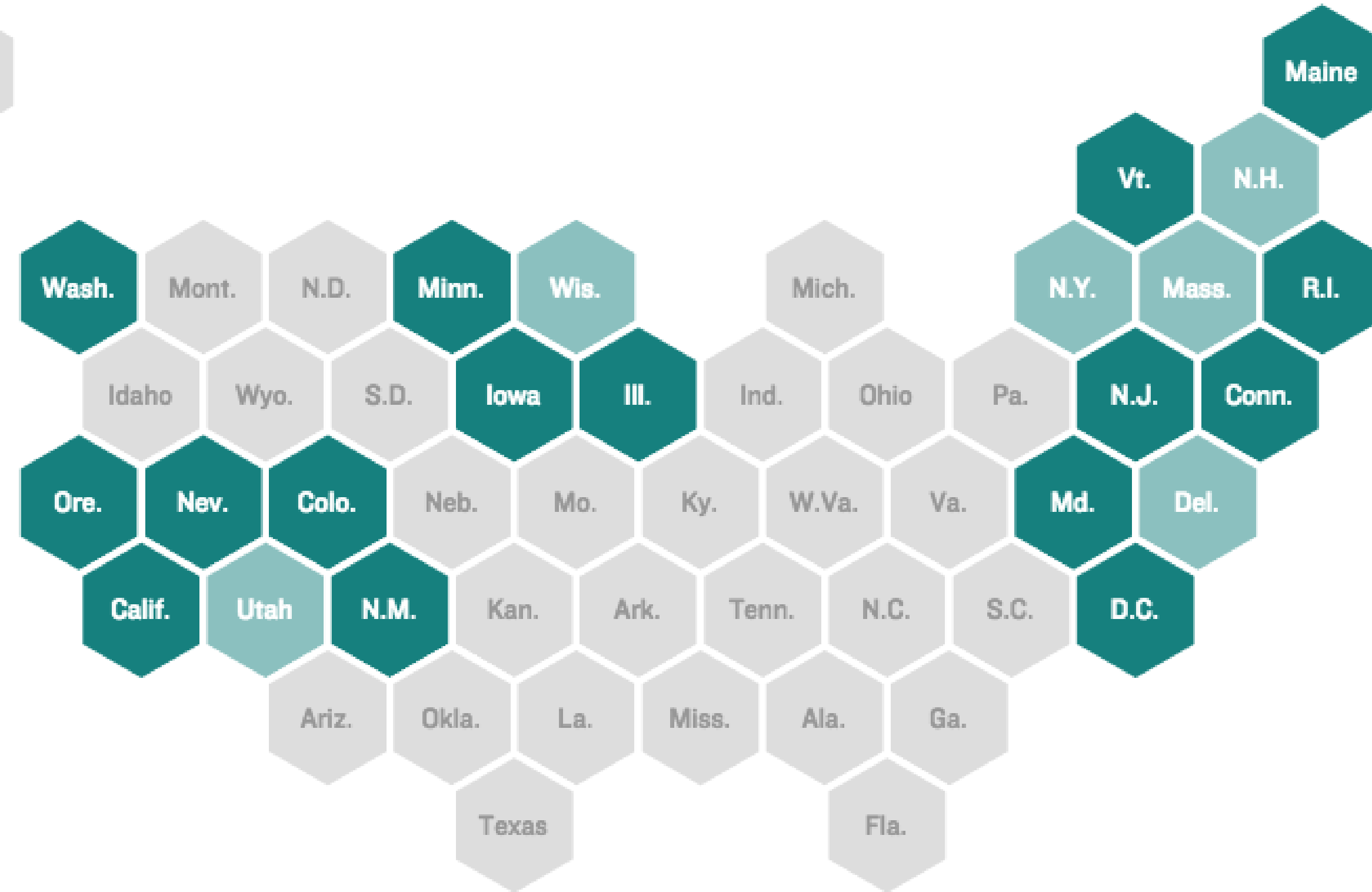
Makes it easier to compare spatial entities (here states) in terms of a binary variable

# GRID MAP



Alaska

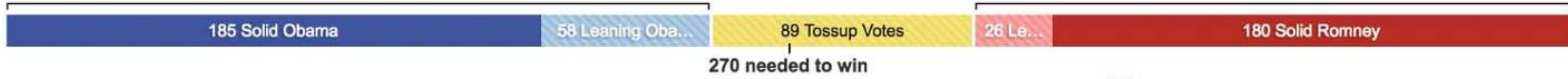
Hawaii



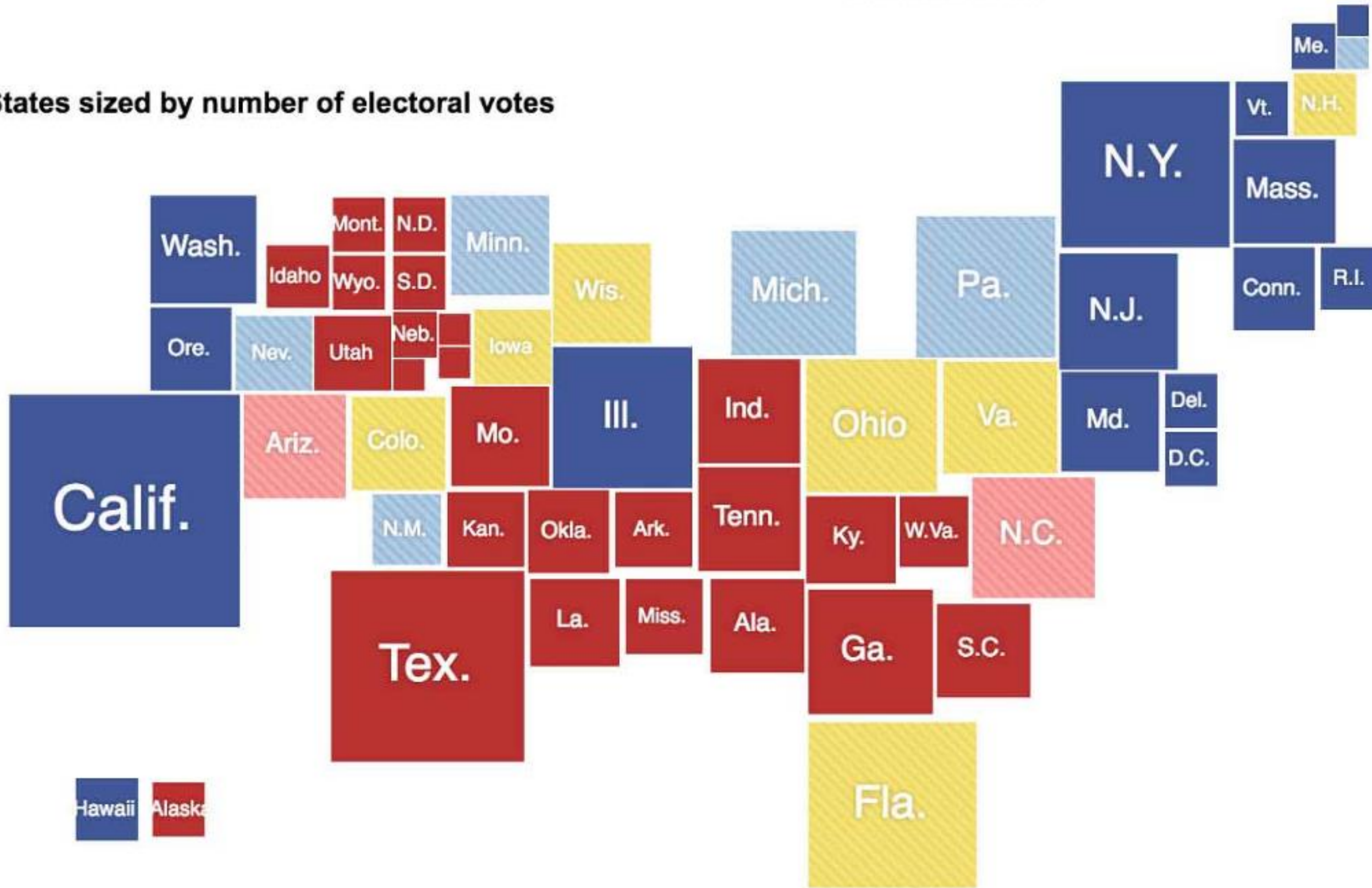
Hexagonal shape allows for better (state) neighborhood encoding (has more sides)

Obama **243** Needs 27 to win  
ELECTORAL VOTES

Needs 64 to win **206** Romney  
ELECTORAL VOTES



**States sized by number of electoral votes**



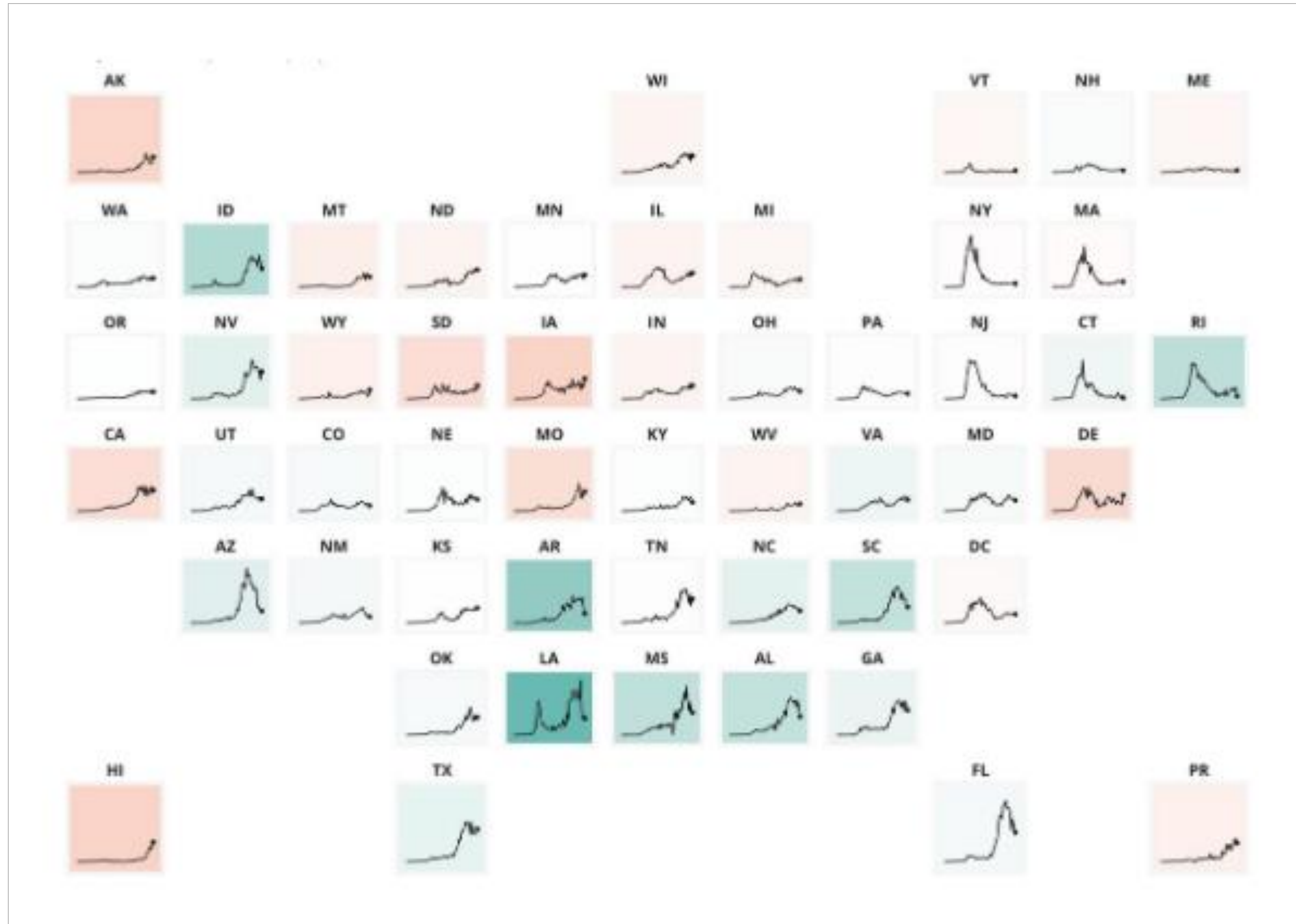
Maine and Nebraska give two electoral votes to the statewide winner and allocate the rest by congressional district.

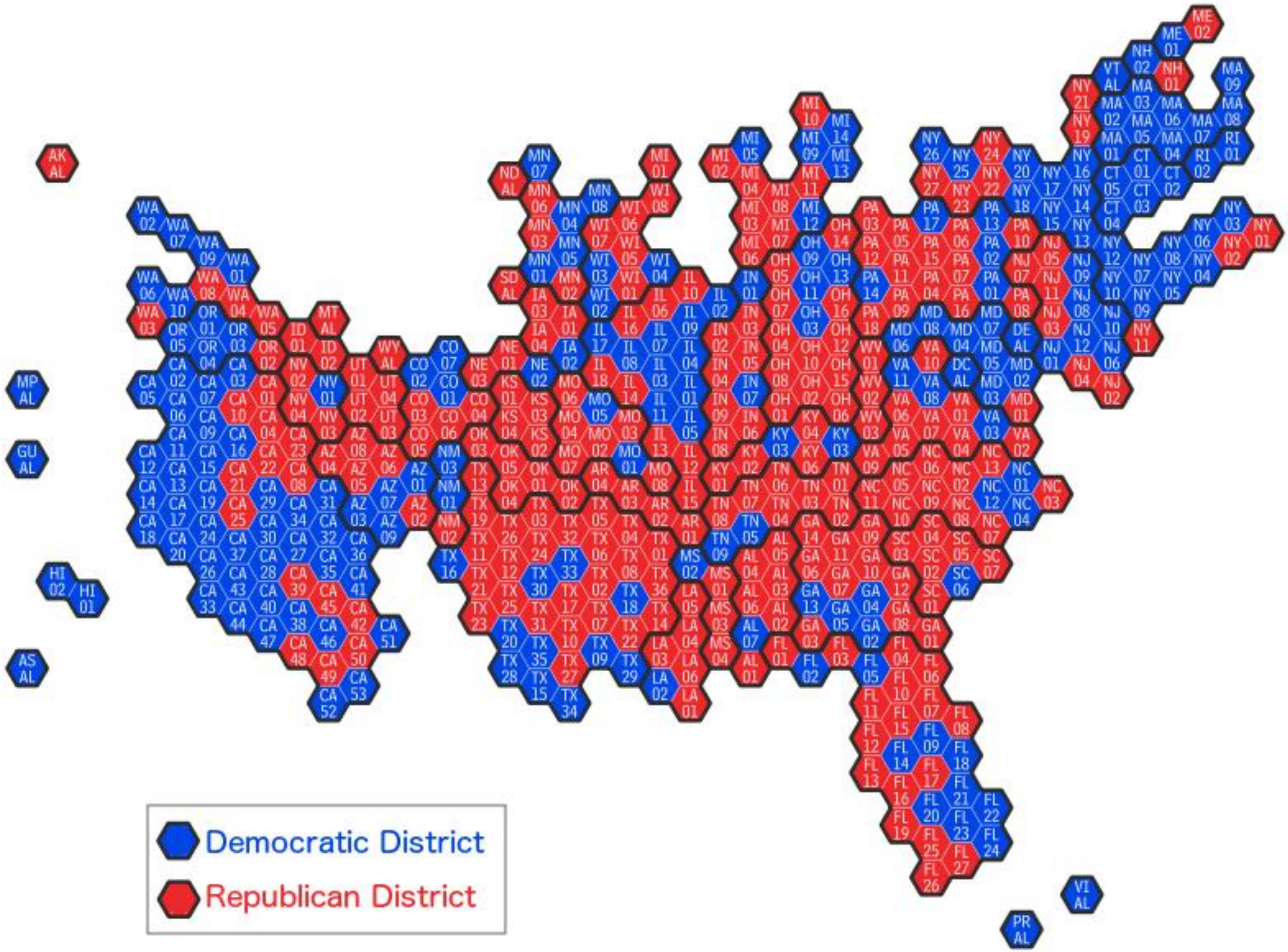
**Geographic View**

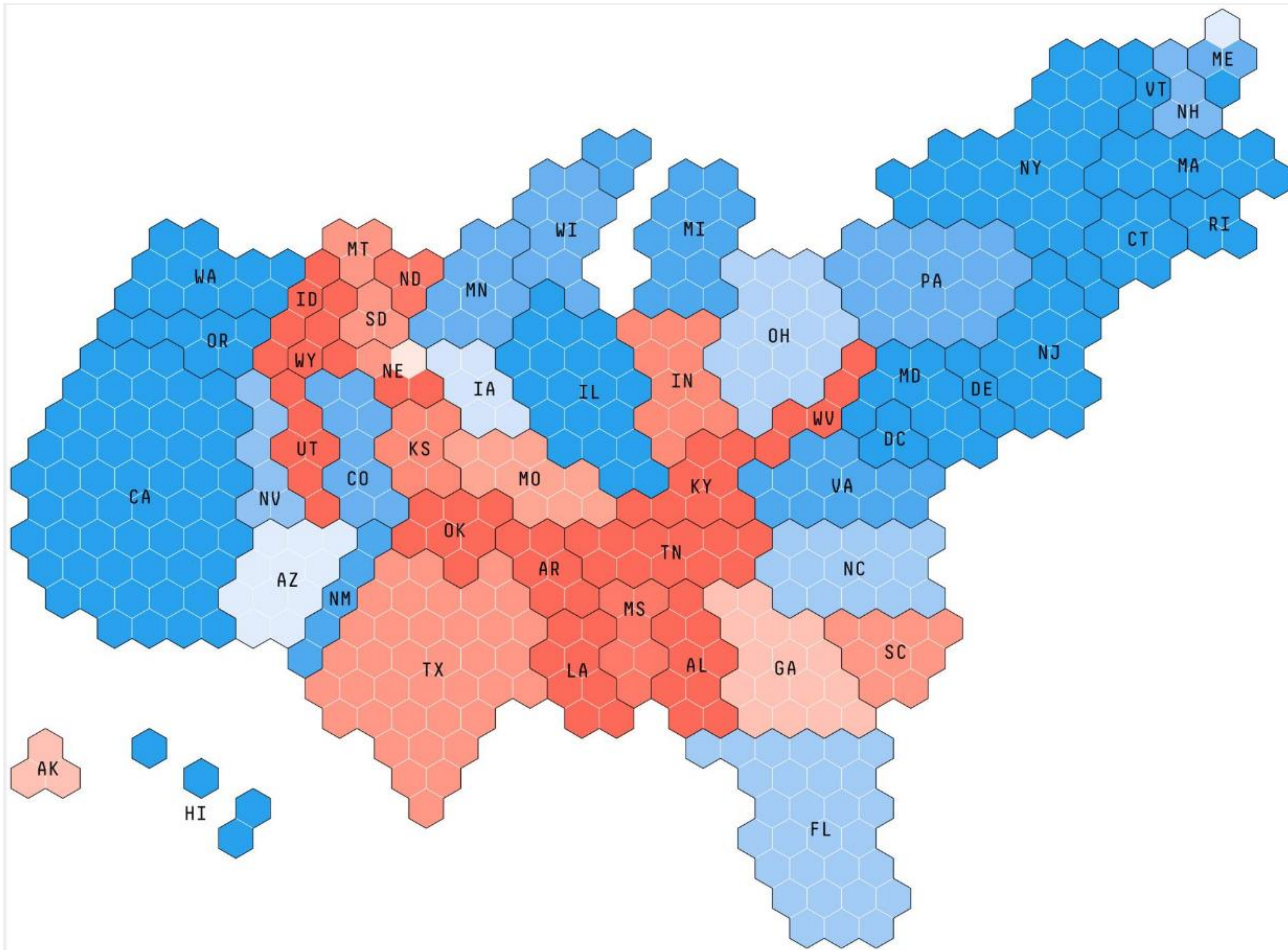




# COVID-19 DEATH RATE TRENDS







# What's in a Surname?

Facebook

Twitter

More »



# Mapping America: Every City, Every Block

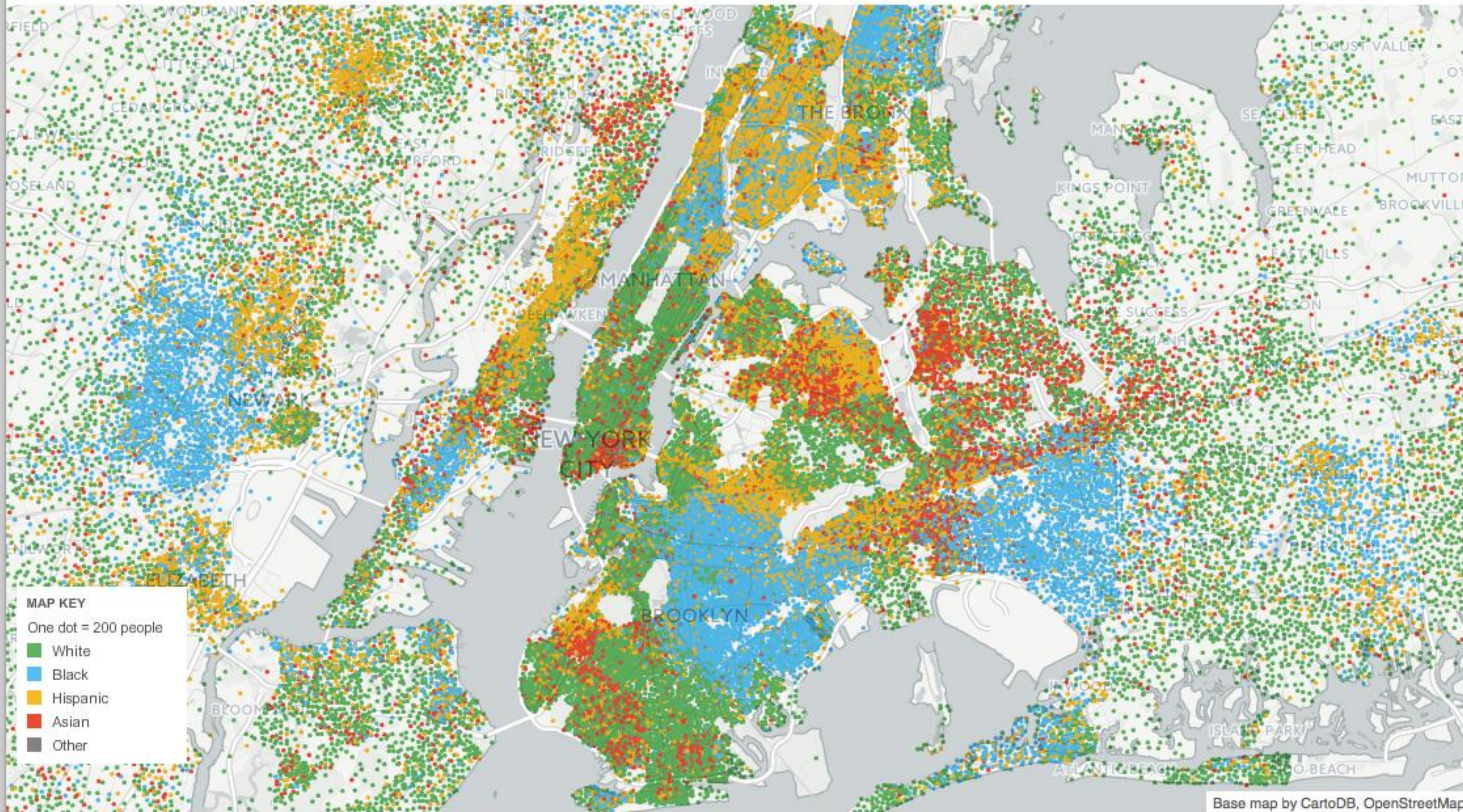
Find something interesting? Share this view on [Twitter](#) or [Facebook](#)

Browse local data from the Census Bureau's American Community Survey, based on samples from 2005 to 2009. Because these figures are based on samples, they are subject to a margin of error, particularly in places with a low population, and are best regarded as estimates.

[View Readers Maps \(49\)](#)

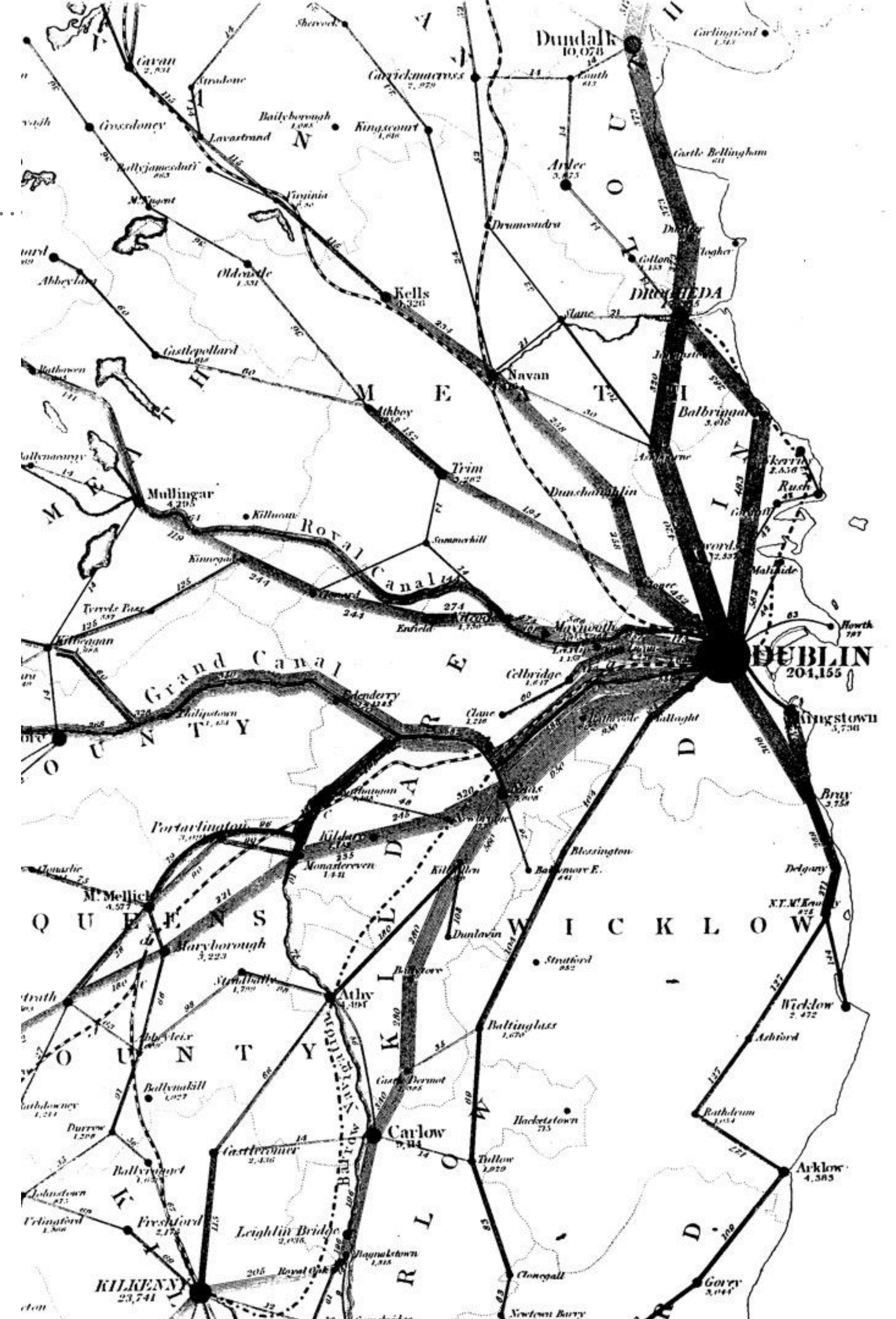
## Distribution of racial and ethnic groups

[View More Maps](#)   



# FLOW MAPS

- First in 1837
- Transportation of Passengers in Ireland



# Carte Figurative des pertes successives en hommes de l'Armée Française dans la campagne de Russie 1812-1813.

Dressée par M. Minard, Inspecteur Général des Ponts et Chaussées en retraite. Paris, le 20 Novembre 1869.

Les nombres d'hommes présents sont représentés par les largeurs des zones colorées à raison d'un millimètre pour dix mille hommes; ils sont de plus écrits en travers des zones. Le rouge désigne les hommes qui entrent en Russie, le noir ceux qui en sortent. — Les renseignements qui ont servi à dresser la carte ont été puisés dans les ouvrages de M.M. Chiers, de Ségur, de Fezensac, de Chambray et le journal inédit de Jacob, pharmacien de l'Armée depuis le 28 Octobre. Pour mieux faire juger à l'œil la diminution de l'armée, j'ai supposé que les corps du Prince Jérôme et du Maréchal Davout qui avaient été détachés sur Minsk et Mohilow et ont rejoint vers Orscha et Witebsk, avaient toujours marché avec l'armée.

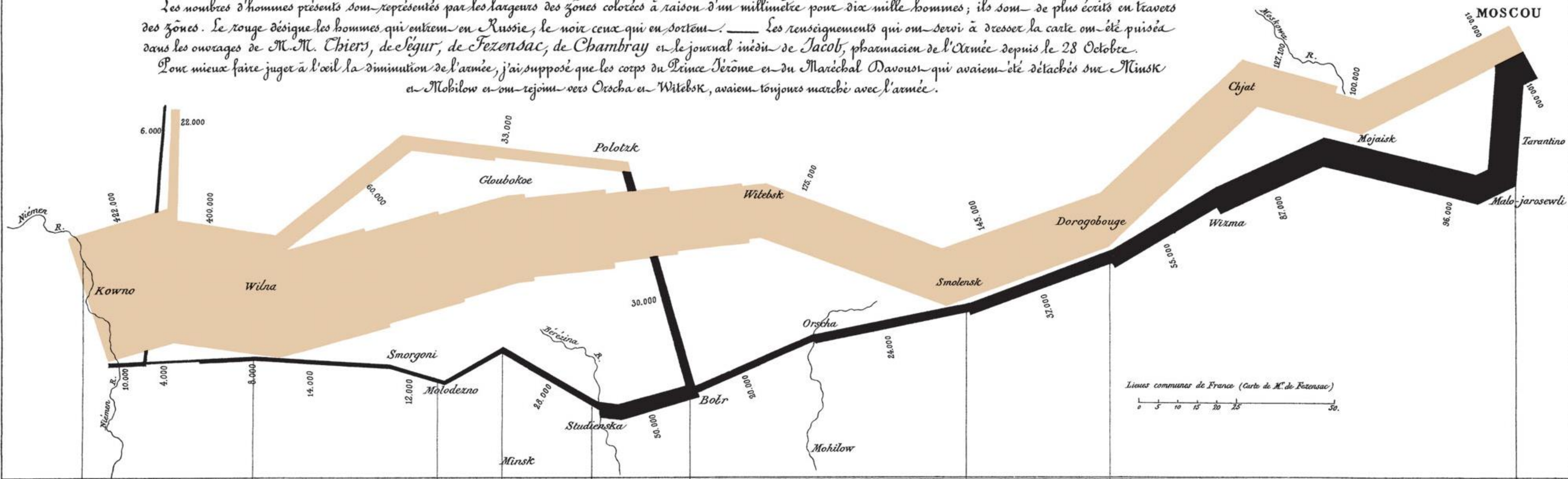
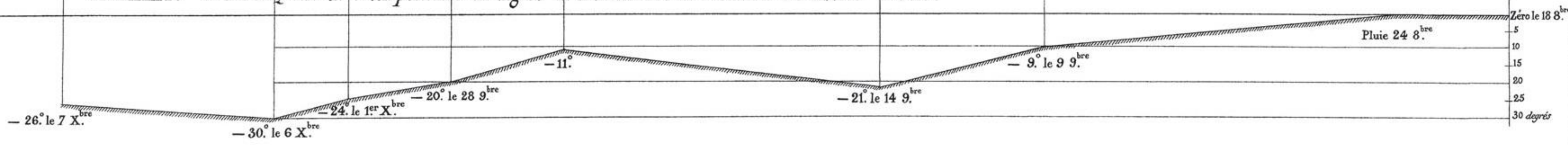
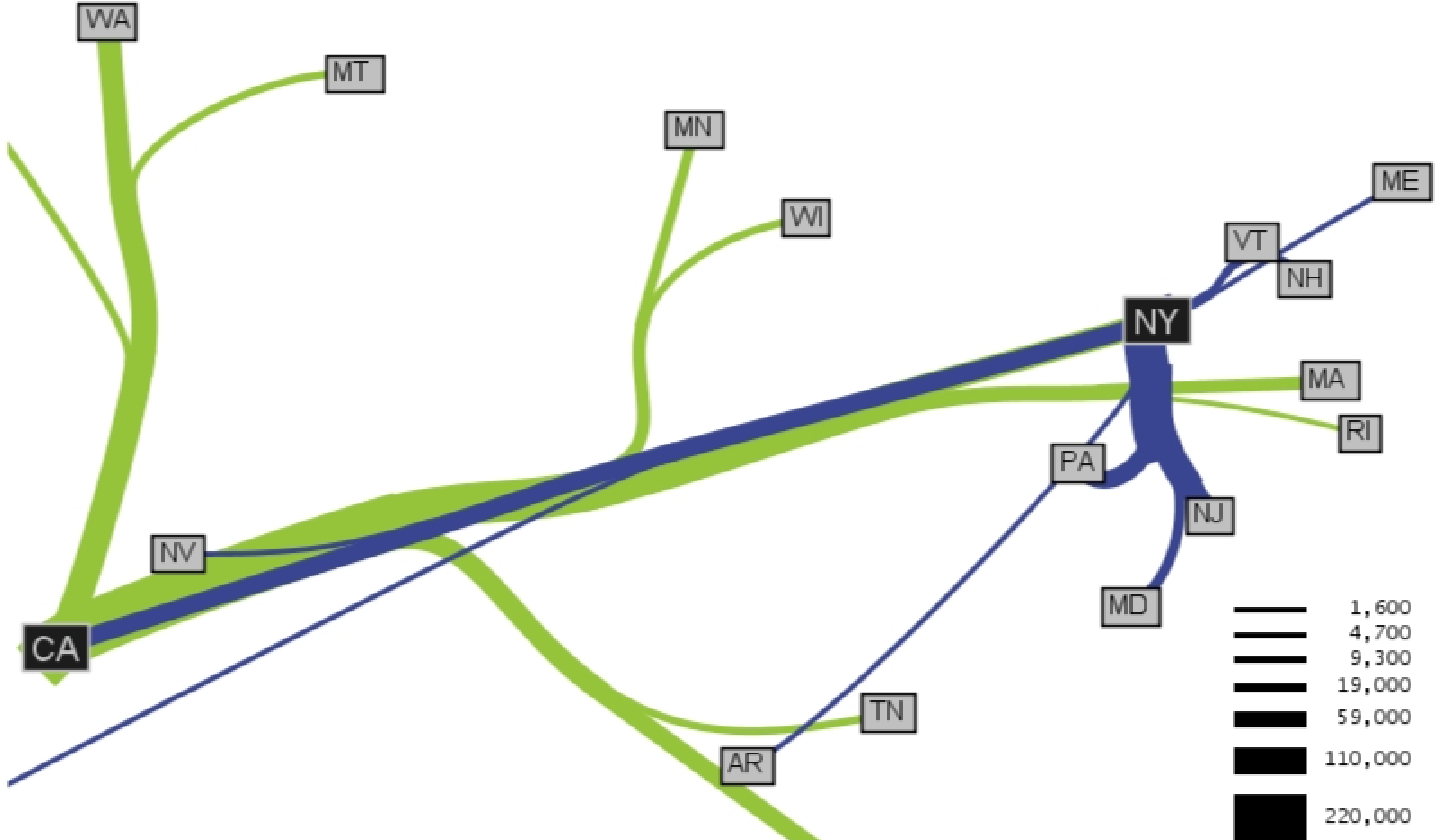


TABLEAU GRAPHIQUE de la température en degrés du thermomètre de Réaumur au dessous de zéro.

Les Cosaques passent au galop le Niémen gelé.



# FLOW MAP LAYOUT (2005)





# TIME-VARYING MAPS

▶ Play

Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday



**Penn Station**  
One of the busiest train stations in the world, and the busiest cab stand in the city.



**Columbus Circle**  
Central Park, Whole Foods and Lincoln Center nearby.



**Lower East Side**  
Comes alive after work, and throbs until well after midnight.



**Bloomingdale's**  
Midday center for shopping.

Grand Central Terminal

Meatpacking District

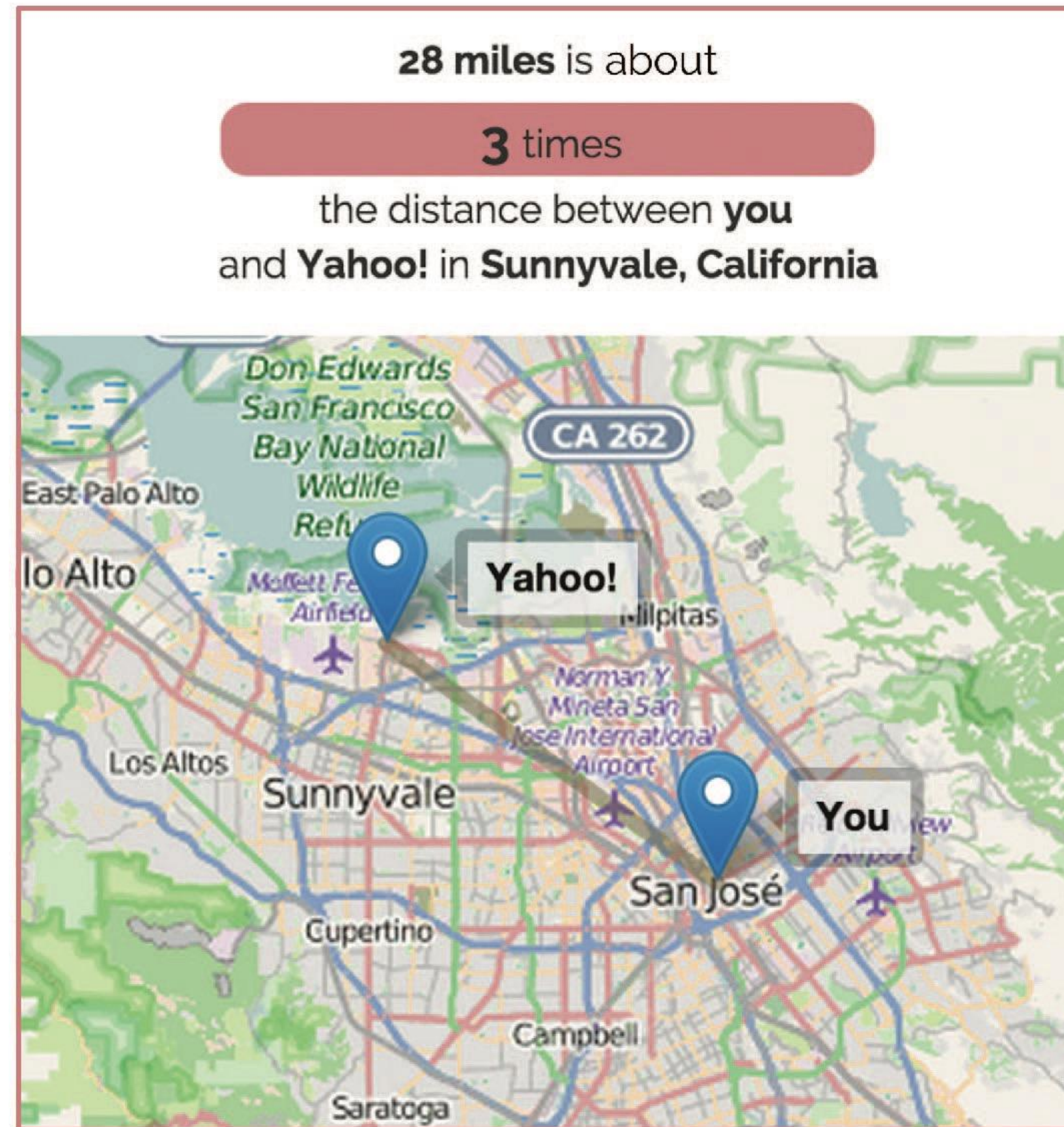
# PERSONALIZED SPATIAL ANALOGIES (2016)

## Some Say New Wal-Mart Intrudes on Historic Mexican Pyramids

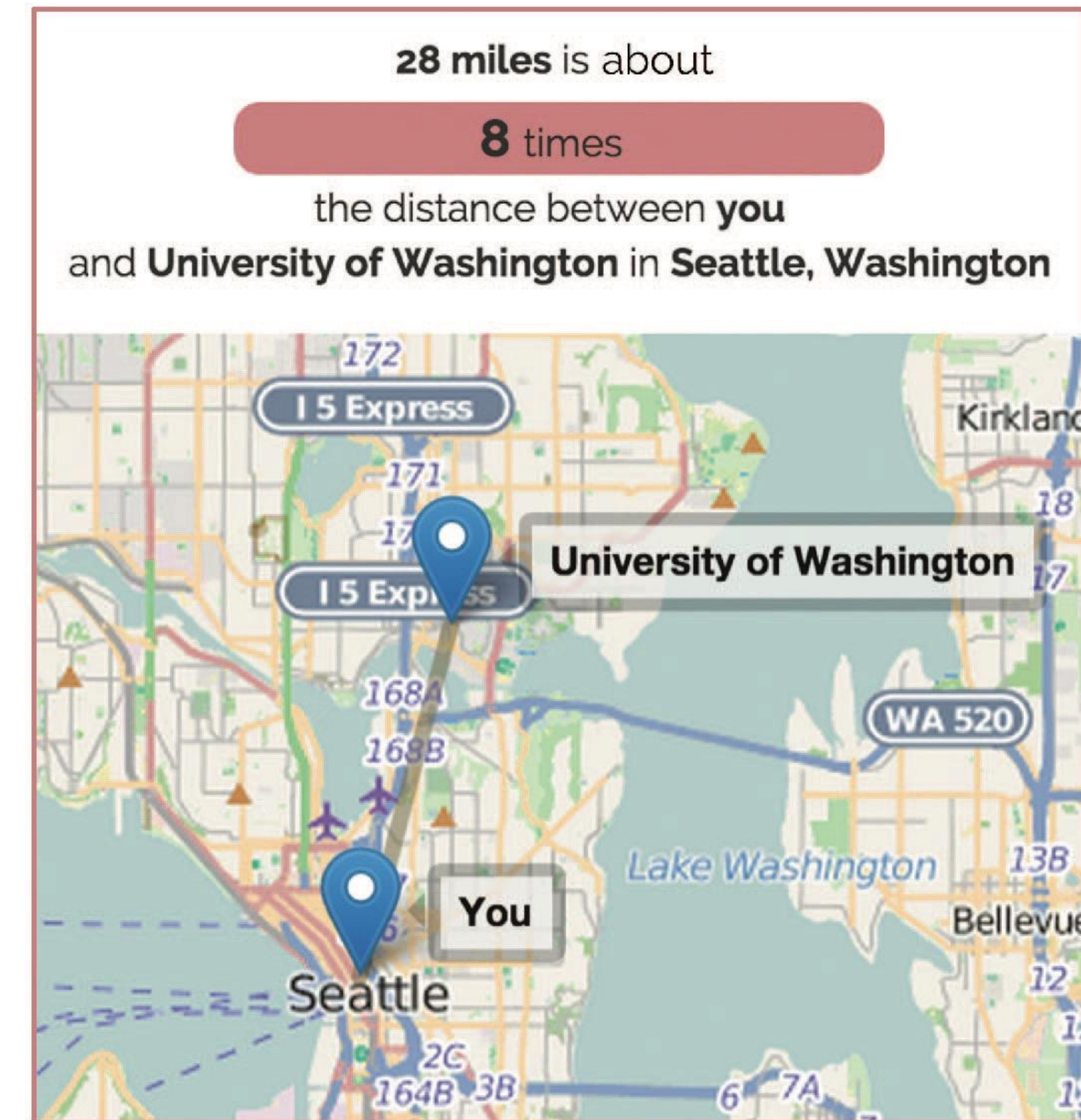
Oct 5, 2004, Mexico

The multinational retailer is building a discount supermarket **28 miles** from one of Mexico's most treasured ruins. The pre-Columbian city's mighty pyramids, dedicated to the sun and moon, tower within view of the Bodega Aurrera, a Wal-Mart subsidiary.

**User location:**

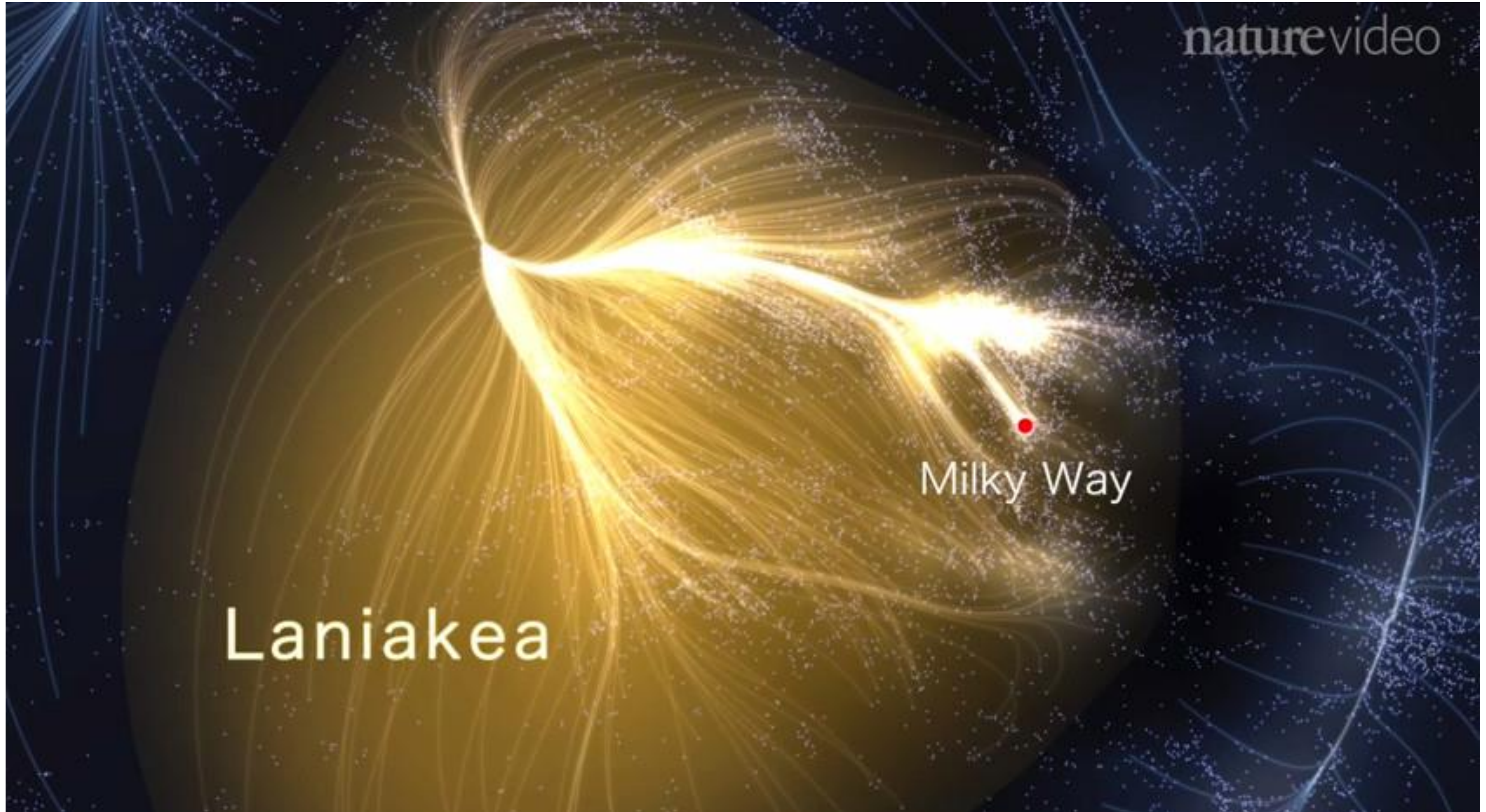


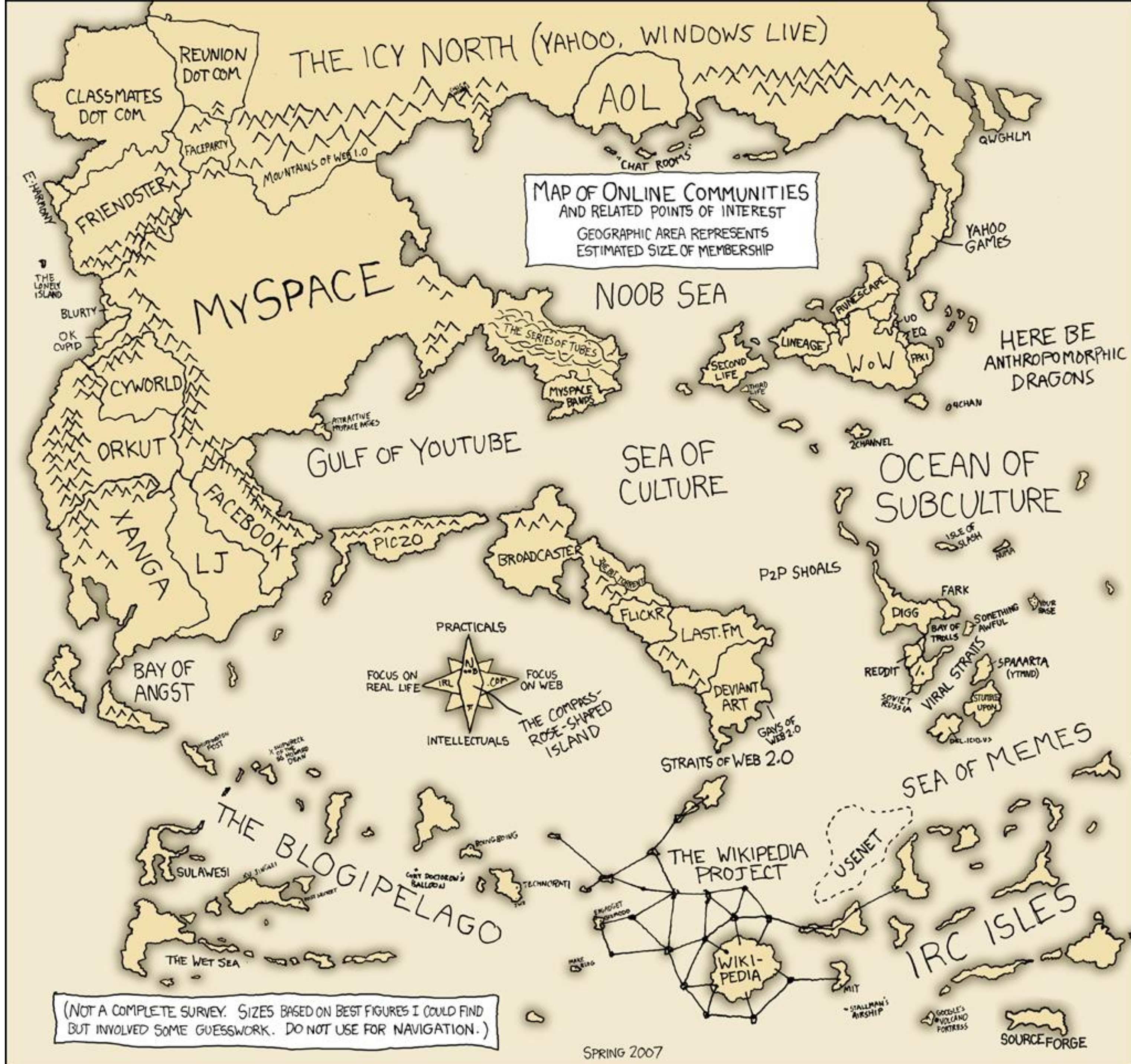
**San Jose** (37.338208, -121.886328)



**Seattle** (47.603961, -122.329887)

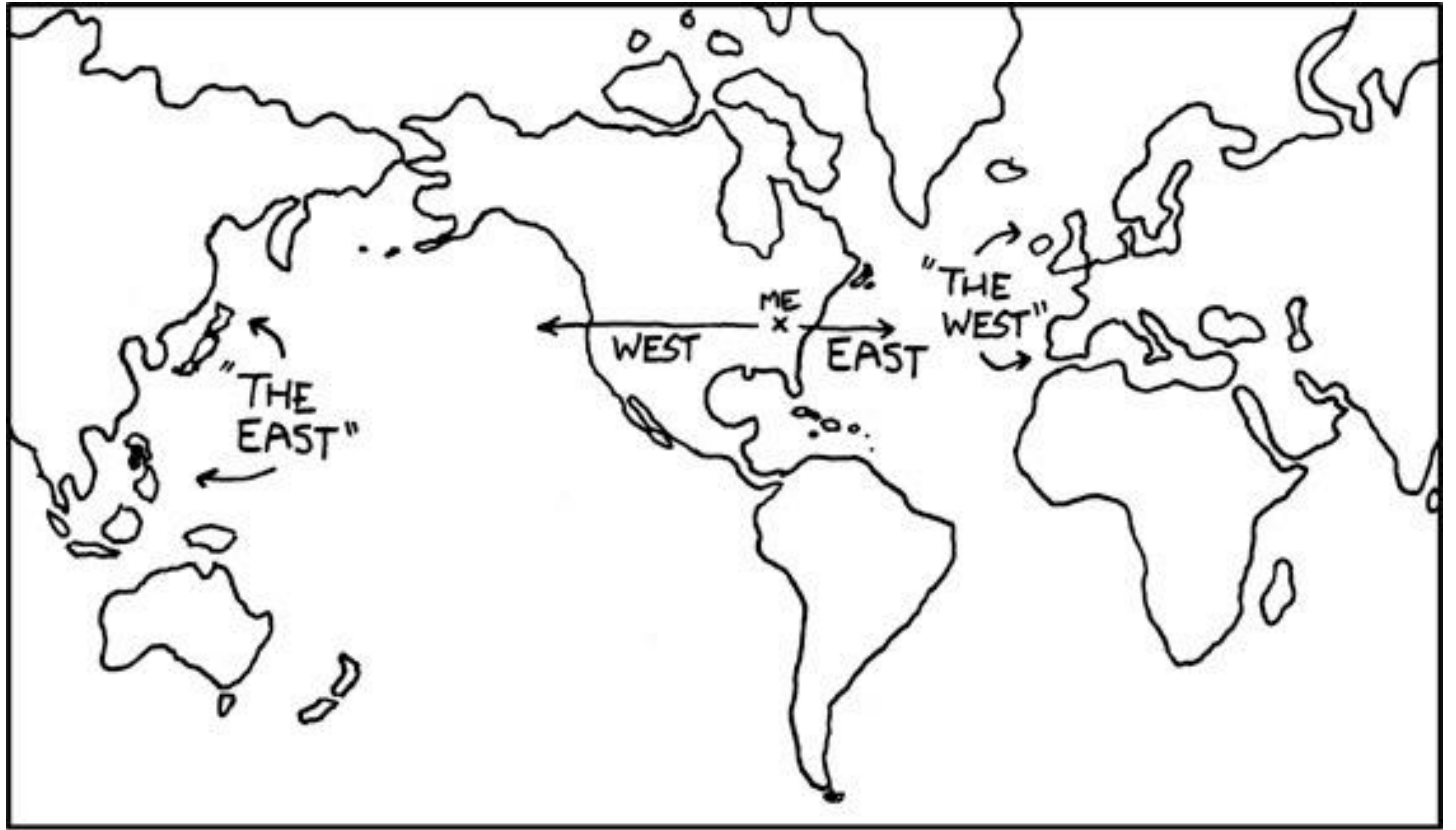
100,000 GALAXIES, STRETCHING MORE THAN 500 MILLION LIGHT YEARS ACROSS





(NOT A COMPLETE SURVEY. SIZES BASED ON BEST FIGURES I COULD FIND BUT INVOLVED SOME GUESSWORK. DO NOT USE FOR NAVIGATION.)

SPRING 2007



THIS ALWAYS BUGGED ME.

# SOME MAP APIS

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- leaflet API <https://leafletjs.com/>
- Folium API <https://python-visualization.github.io/folium/>