

No quiz today (yay!)
Lecture still starts at 1:10pm

Geographic vis

SI 649 W20: Information visualization

Matthew Kay, Assistant Professor, School of Information
& Computer Science and Engineering
University of Michigan

Geographic vis

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This week

Lecture

COVID update

Geographic visualization

Lab

Group mockup presentations

COVID update

Moving to Zoom instead of BlueJeans

Remember to take care of yourselves...



Carl T. Bergstrom @CT_Bergstrom · 46s

Good example from @cmyeaton: #COVID19 cases classified as severe in the recent Diamond Princess study would have been classified as mild in the Wuhan epi study.

Data are not just data. Context matters. Detailed understanding matters. Thoughtful analysis matters.

Caitlin Rivers, PhD @cmyeaton · 4m

A high fraction (27%) were severe, but the definition of severe was "clinical symptoms of pneumonia." Goes to show how context is so important to understanding epidemiology. medrxiv.org/content/10.110...

Show this thread

1 1 6 1



yoni sidi replied
bob Rudis @hrbmstr · 1h

The GOP is pretty much admitting they want to kill the least of us.
Shameful.

Yamiche Alcindor @Yamiche · 1h

.@VP: The CDC tomorrow is going to issue new guidance which will make it possible for people who have exposed to the coronavirus to return to work more quickly by wearing a mask for a certain period of time.

1 2 5 1



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1 1 2 1



Sanjay Srivastava replied
Ivy Onyeador @Ivuoma · 4h
Don't get quarantined with a man with 5 spices!

Eric Phillips @EricPhillips · 11h

Alphabetizing all your spices. Time: 15 seconds. Satisfaction: 4.
#EricsQuarantineTips



33 28 431 1



Sanjay Srivastava @hardsci · 18m
There are dishes that only use 5 spices?



57 104 1.8K 1



Sarita Schoenebeck and Elena Glassman liked

Ben Zhao @ravenben · 3h

I second this. We are in daily communication with our students and I recommend all my academic colleagues do same. Isolation, heightened anxiety and living alone are tough to bear for grad students typically already under high stress. For many, we are their main support system.

Prof. Andrew R. Timming @timminglab · 13h

Can I please remind you to check in regularly on your PhD students via phone or email. They are vulnerable. Many (perhaps most) live alone with no family nearby. We supervisors are the closest they have to a family.

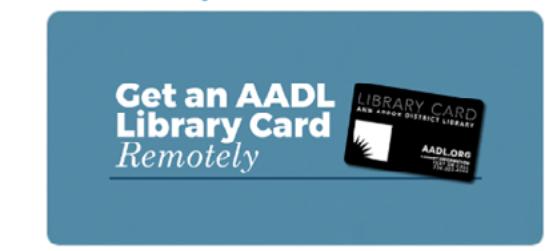
#AcademicTwitter
#AcademicChatter
#Coronavirus

1 1 23 1

Ann Arbor District Library @aadl

If you live in the Ann Arbor School District, get an AADL Library card remotely, TODAY!

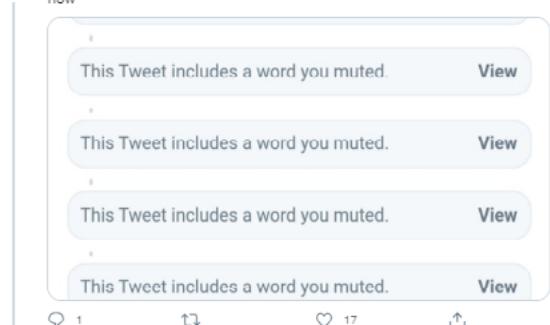
Thousands of reasons to get your Library card, even with our physical locations closed: aadl.org/node/56995



Danielle Navarro received a reply

Danielle Navarro @djnavarro · 15h

getting tagged into a lot of threads I probably don't want to look at right now



Jocelyn Petitto, MPH, MAI, etc. @flutterbyeffect · 1h

You can mute words?

I don't know how to Twitter correctly.

Alberto Cairo Retweeted

Qinyu Ding @Sherry_pcy · 1h

I miss those days.#um @univmiami

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1 1 4 1

Christopher Peters @DrGavinSimpson · 12h

thetraveller_artists @ThetravellerA · 12h

Some of Italian nurses & doctors after long hours of work in intensive care.

#COVID-19 #respect



1K 16.3K 41.1K 1

Alberto Cairo @AlbertoCairo · 34m

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2 1 0 1

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Enrico Bertini liked

Greg James @gregjames · 2h

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Andrew Heiss liked

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Bethany Albertson @AlbertsonB2 · 17m

What are my fellow runners doing if/when shelter in place kicks in?

18 12 1 1

Sanjay Srivastava @hardsci · 11m

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Quiche ~Lorraine~ liked

Anthony Oliveira @meakoopa · 2h

day one: this sucks but it might be a little fun!

day ten: "crying with my head in the dryer" i hope the inside laundry isn't jealous of the clothes that get to go outside

5 46 470 1

Sanjay Srivastava Retweeted

Neil Lewis, Jr. @NeilLewisJr · 4h

1/9. If you'll indulge me, I'd like to share a story about a rock (yes, as in a naturally occurring solid mass). But first, the reason I'm talking about it: this afternoon I went to campus to pack up some things in my office and bring them home.

13 14 133 1

Show this thread

Iris van Rooij liked

Jade @Vertigopostdoc · 18h

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1) Academics only just now discovering that systematic academic inequality is a thing.
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1 57 289 1

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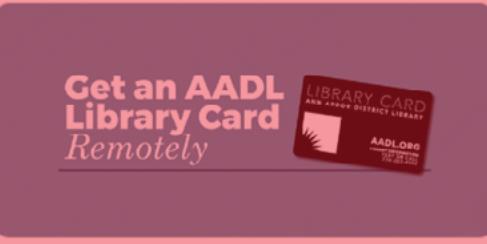
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COVID update

Your health (physical and mental)
is more important than this class

Please reach out to me if you are
having issues, need accomodations, etc.

COVID update

Last two quizzes: free 100% for everyone

If you have the time/capacity, fill out the anonymous feedback form for this class (optional):
<https://forms.gle/DGTW7iuioJiBfS979>

Lab this week

Lab: Group high-fidelity mockup presentations

5 min max per group

It should be clear:

- what your design rationale is
- how encodings/interaction support your tasks

Presentations on Zoom

When it's your turn, someone from your group will screen share and you can present

When it's not your turn, please mute

Geographic visualization

Geographic visualization

Added last year because lots of projects with maps

I'm seeing several maps this year again

Worth revisiting the map question

The map question

Position is the **most effective channel** we have

Real-world location is naturally mapped onto position

BUT **real-world location may not be important**

The map question

Unless location is 100% most important variable,
always ask:

Can we get rid of this map altogether?

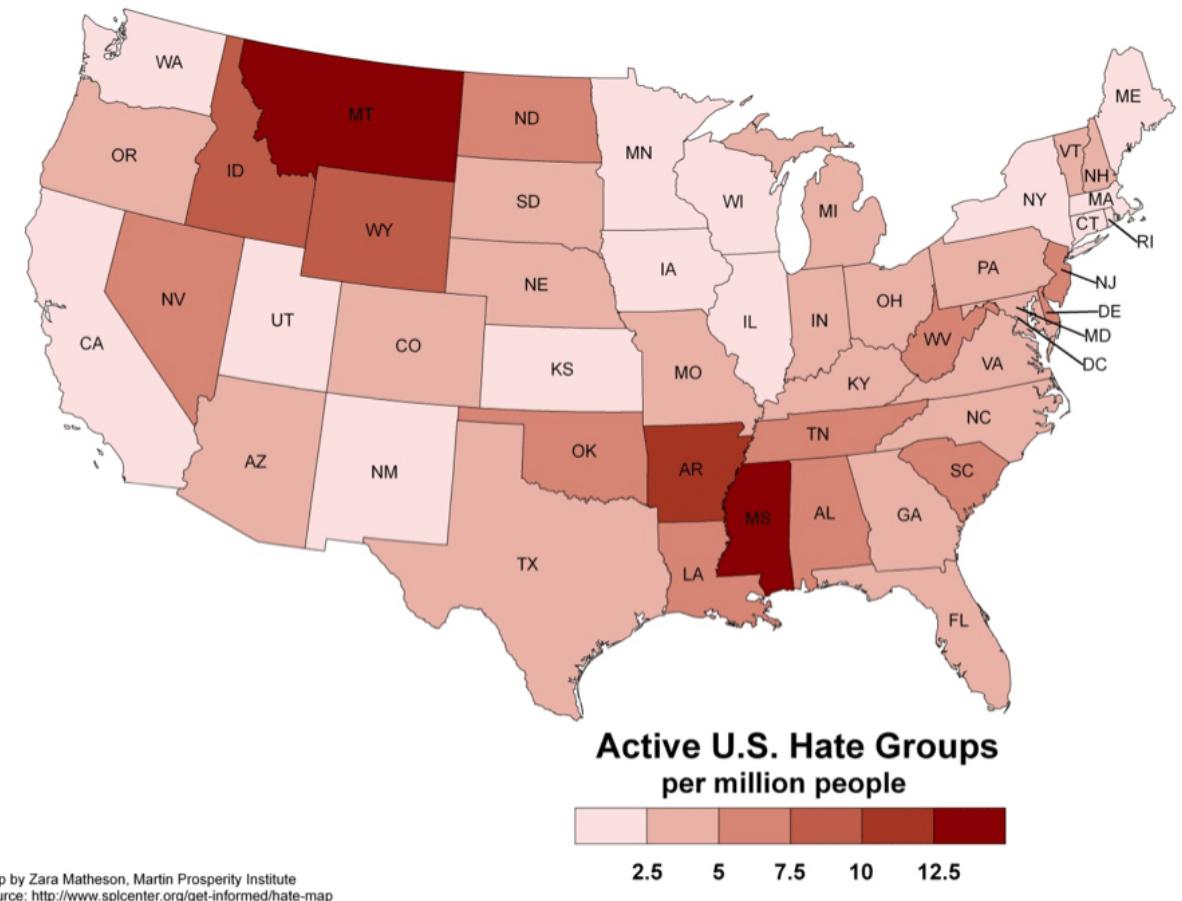
Not hypothetically — try doing it! (paper is cheap)

For example...

<https://www.theatlantic.com/national/archive/2011/05/the-geography-of-hate/238708/>

How to add
correlation with voting
patterns to this?

Find another channel?



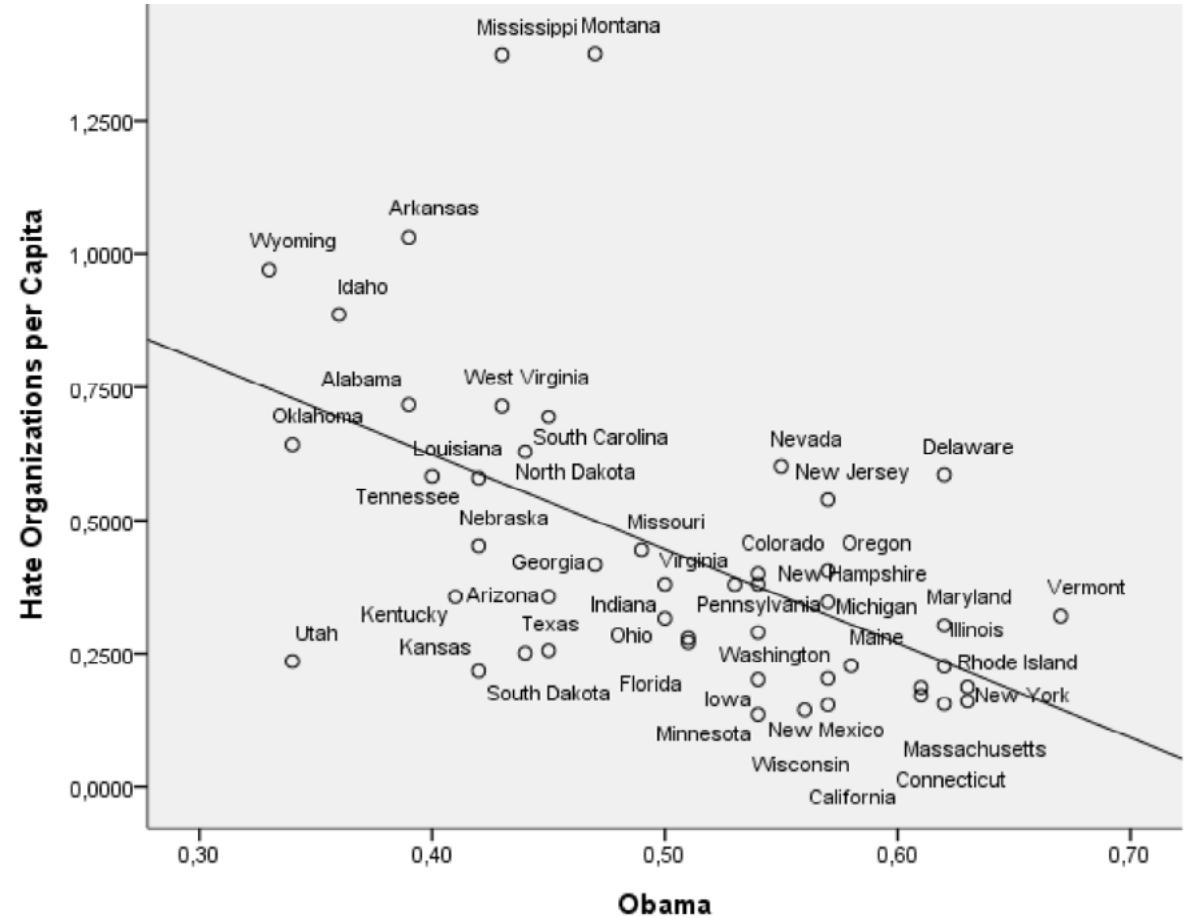
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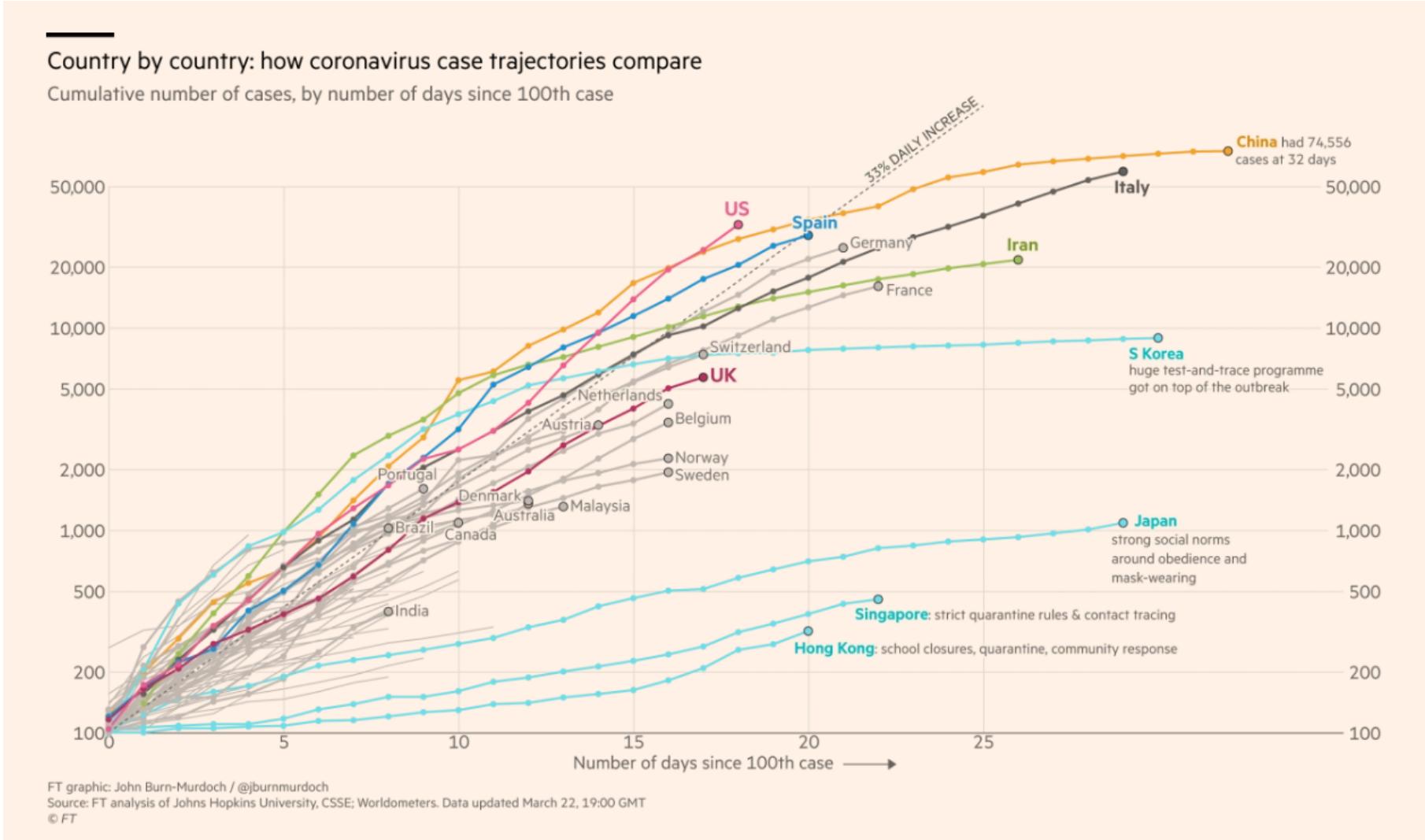
Lose geographic accuracy, gain accuracy in correlation estimation

Might be worth it, might not (go back to tasks!)



For example...

<https://www.ft.com/coronavirus-latest> | <https://twitter.com/jburnmurdoch/status/1241820210455285760>



But I really **need** geographic location!

Given my **data and abstract tasks**...

...are my encodings **expressive?**
effective? **perceptually justified?**

domain tasks

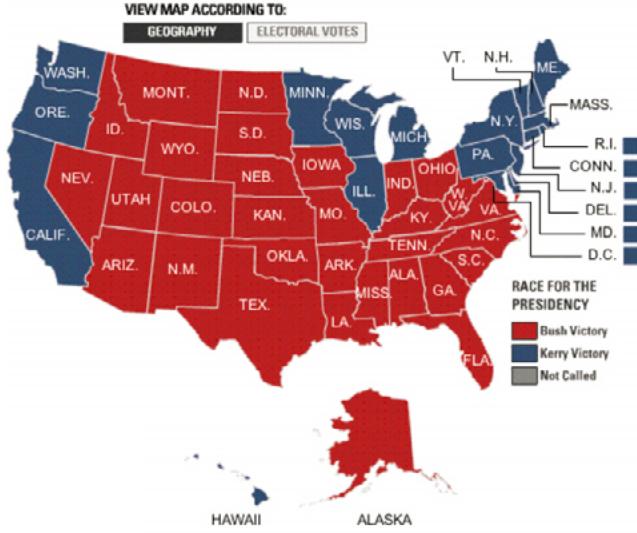
abstract tasks

encodings/
interaction

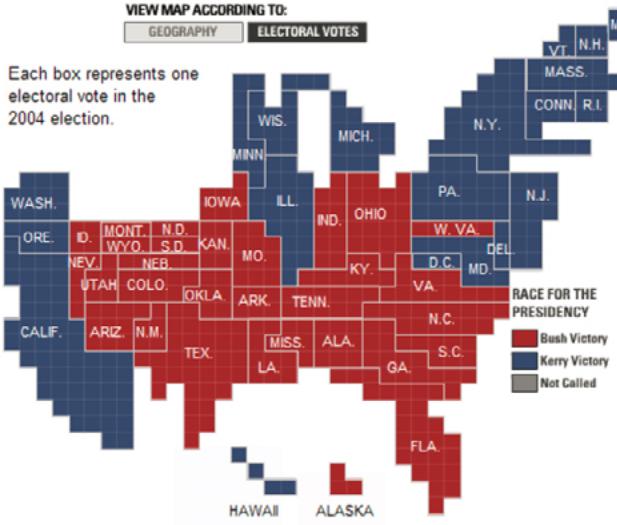
algorithm/
implementation



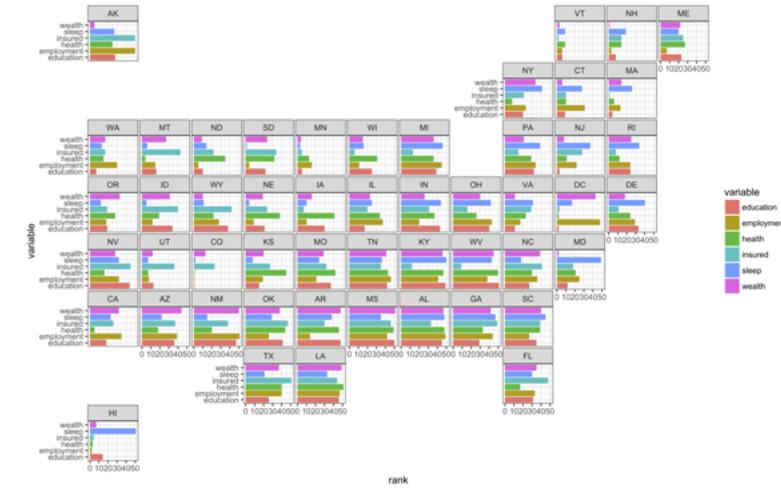
Maps with subregions: some classes



1. Choropleths



2. Cartograms



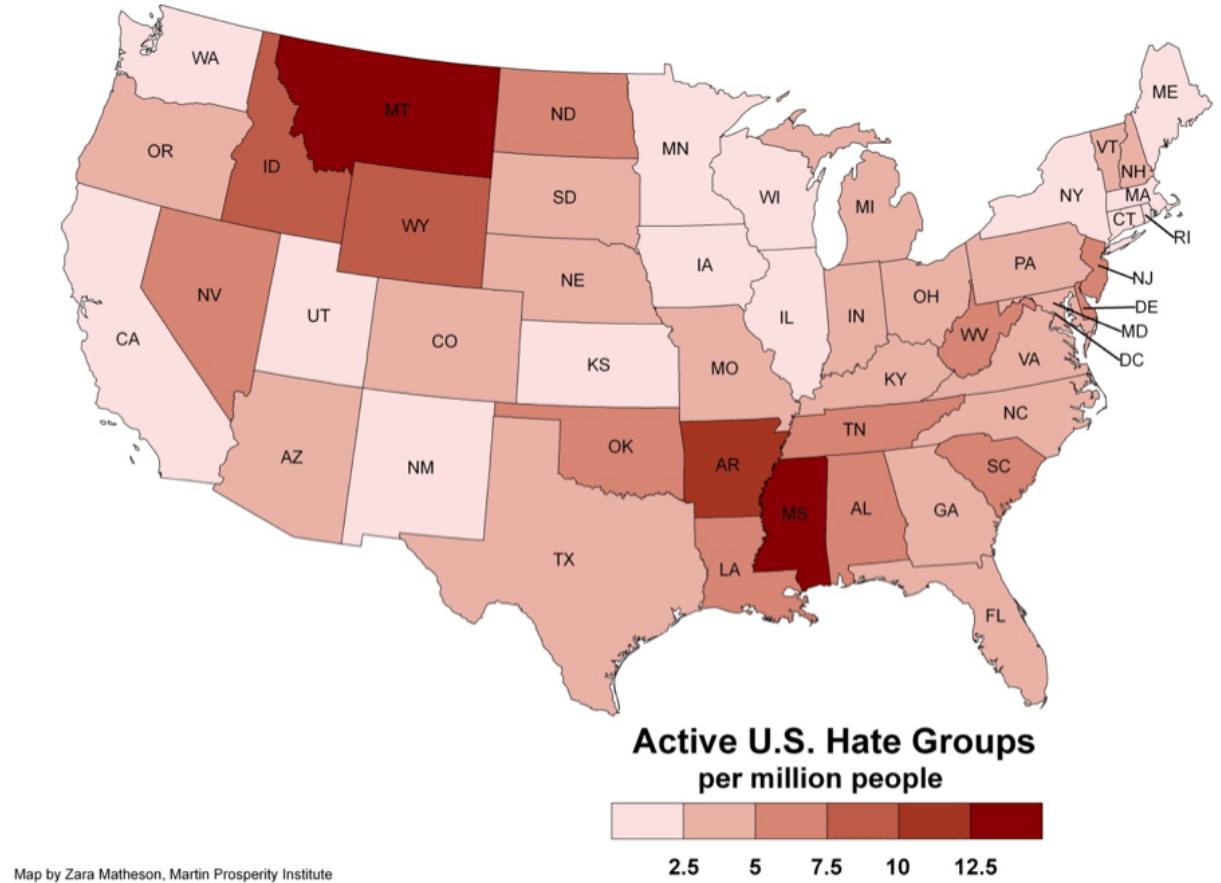
3. Geo-facets

Maps: Choropleths

region size -> area

other variable -> color

large regions dominate



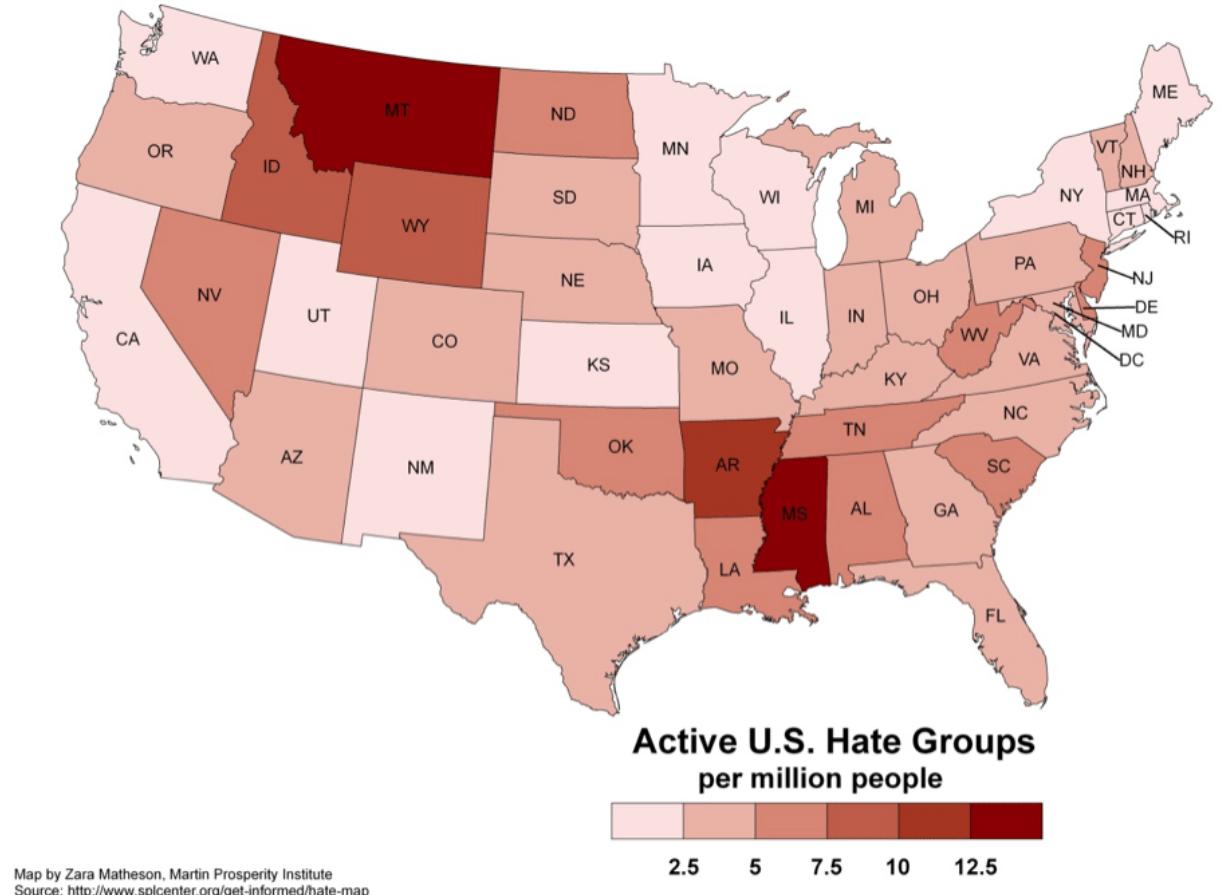
Maps: Choropleths

area: fixed to region size

contiguous

shape: accurate

topology preserved: yes



Cartograms: mapping another variable to area

Contiguous cartograms

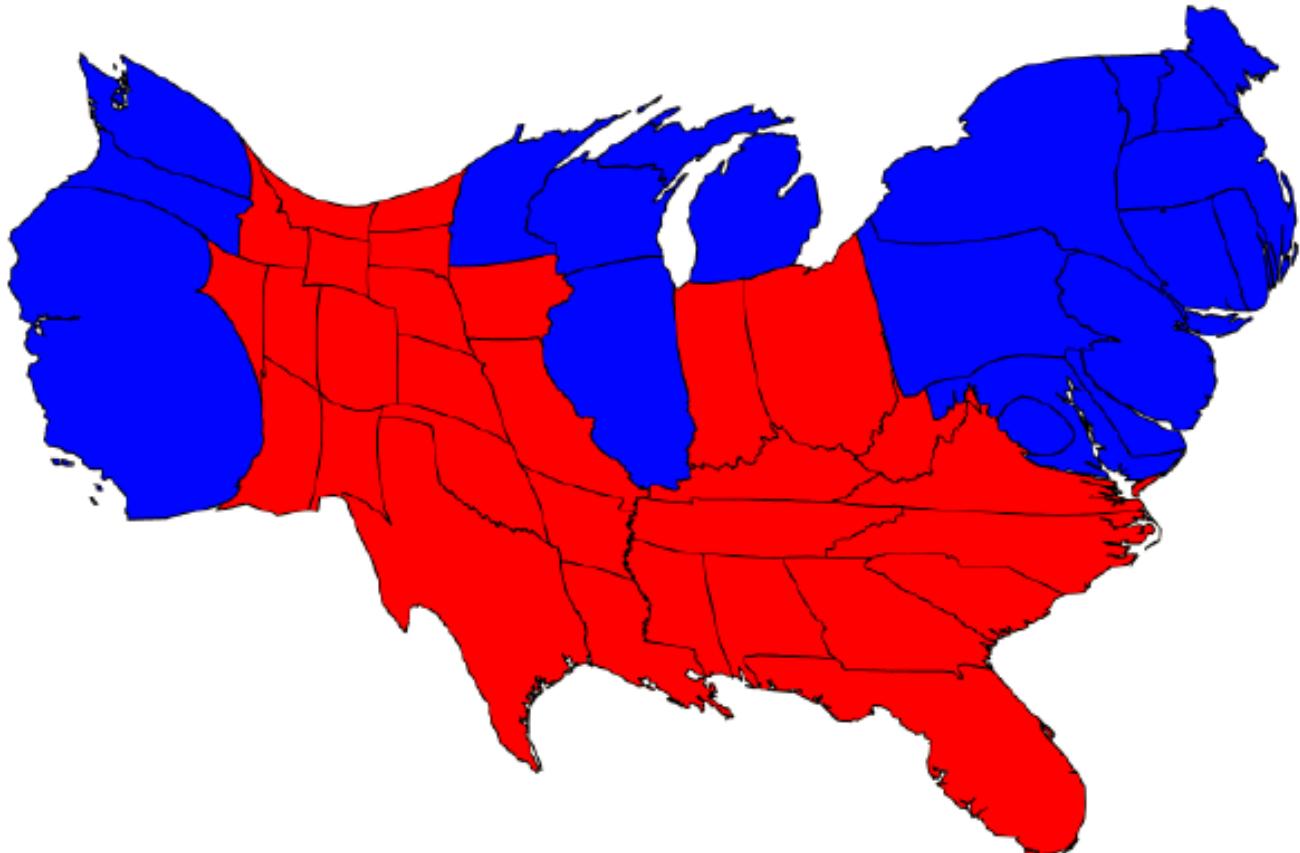
(numerous algorithms, see [Nusrat and Kobourov 2016](#))

area: ~accurate

contiguous

shape: distorted

topology preserved: yes



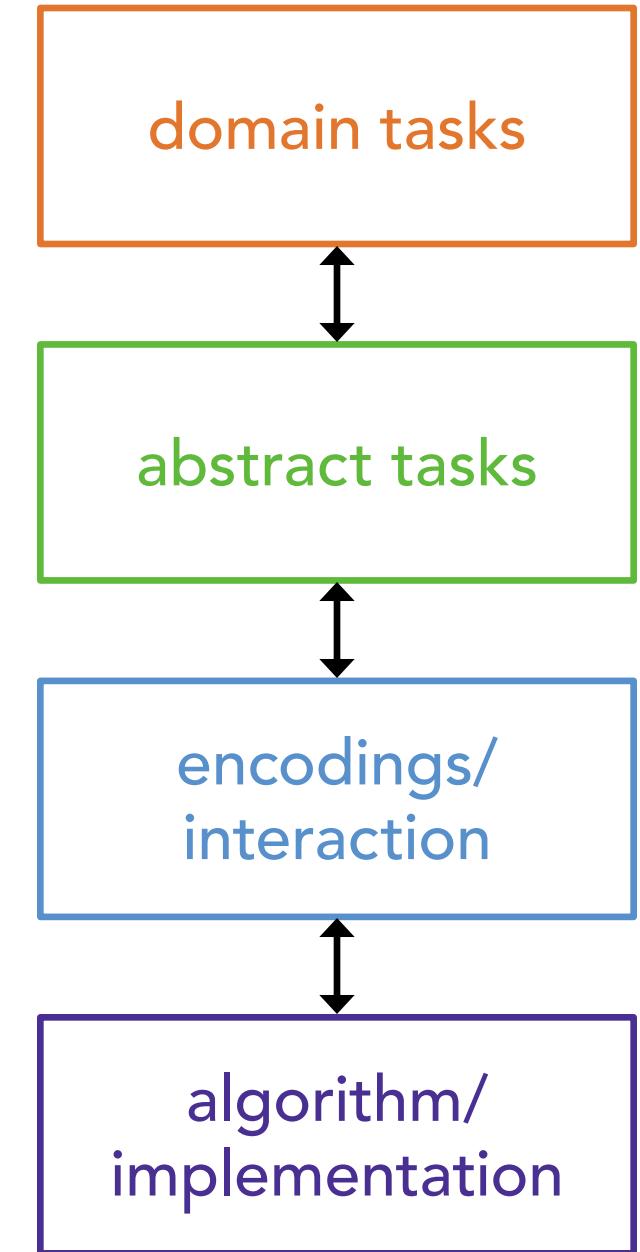
It comes back to tasks

area perception

contiguosity

geographic shape

topology



Contiguous cartogram

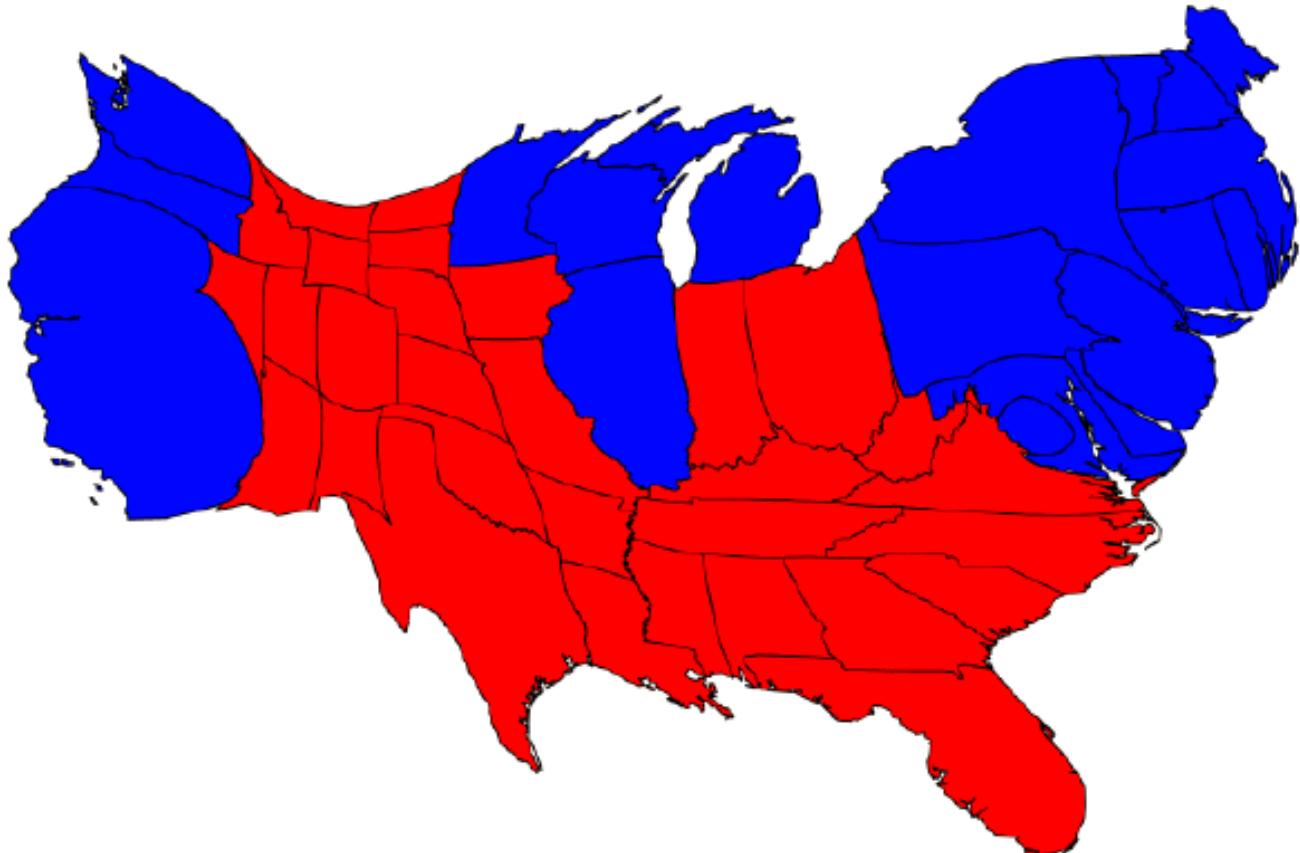
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area: ~accurate

contiguous

shape: distorted

topology preserved: yes



Non-contiguous cartogram

area: accurate



non-contiguous

shape: accurate

topology preserved: no

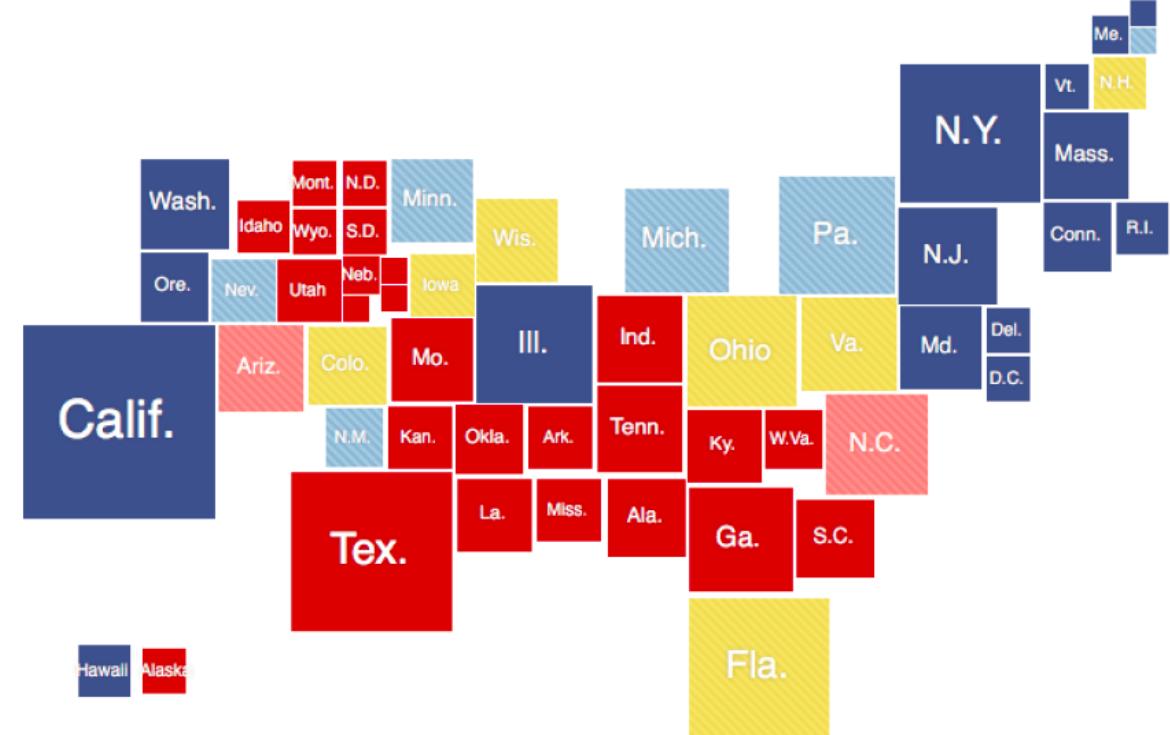
Square cartogram (“Demers” cartogram)

area: accurate

non-contiguous

shape: inaccurate

topology preserved: no



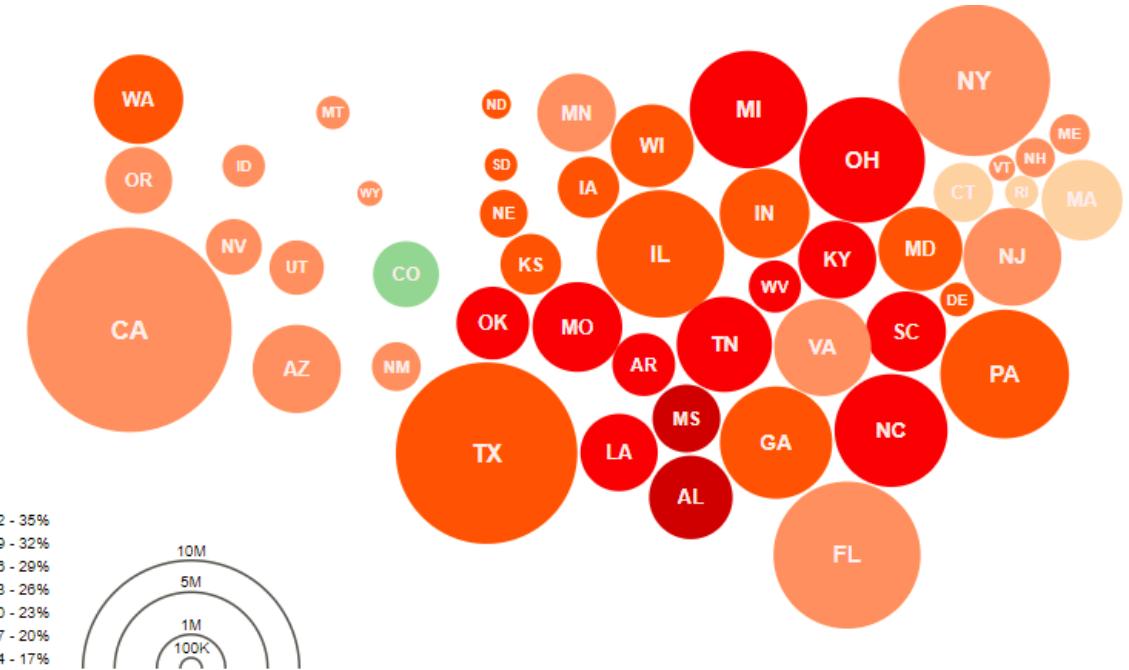
Circular cartogram (“Dorling” cartogram)

area: accurate

non-contiguous

shape: inaccurate

topology preserved: no



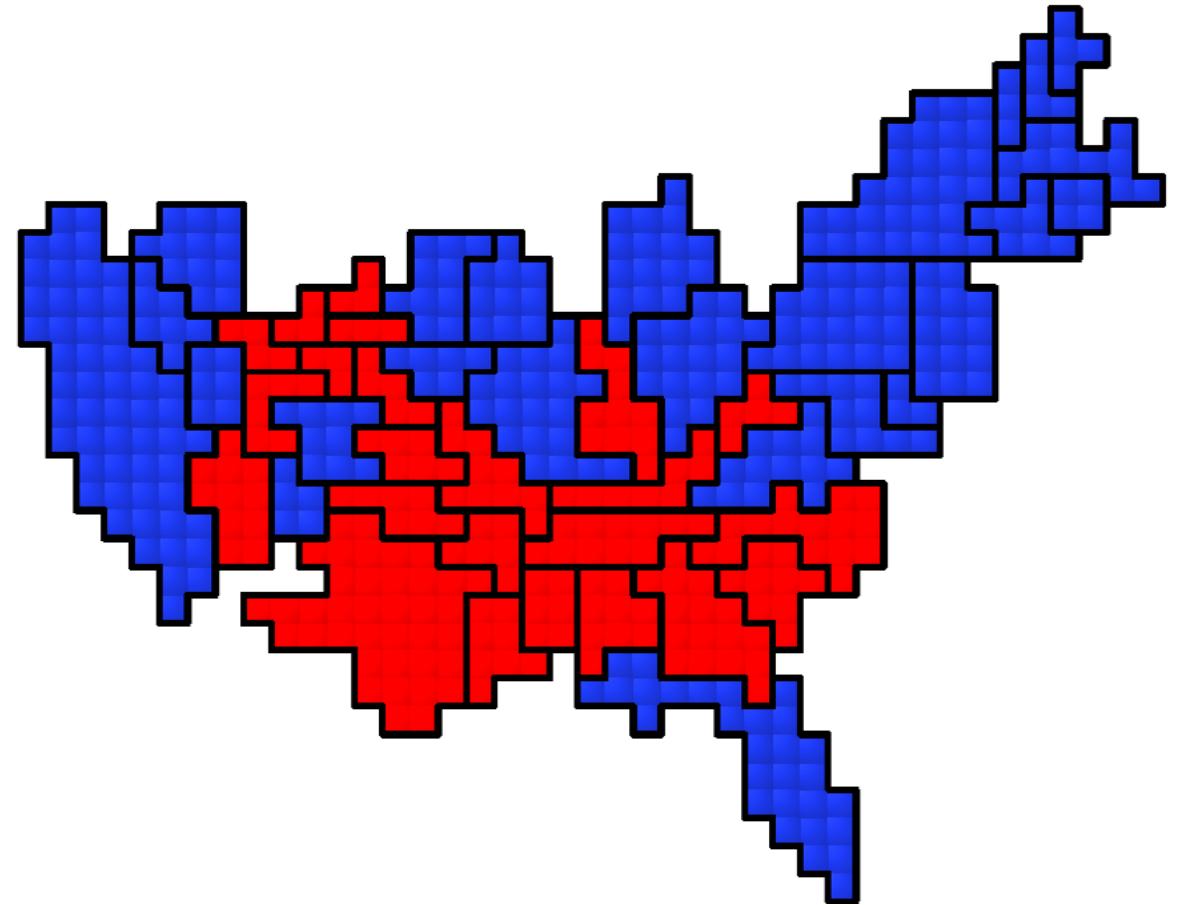
Mosaic cartogram: a compromise

area: ~accurate

contiguous

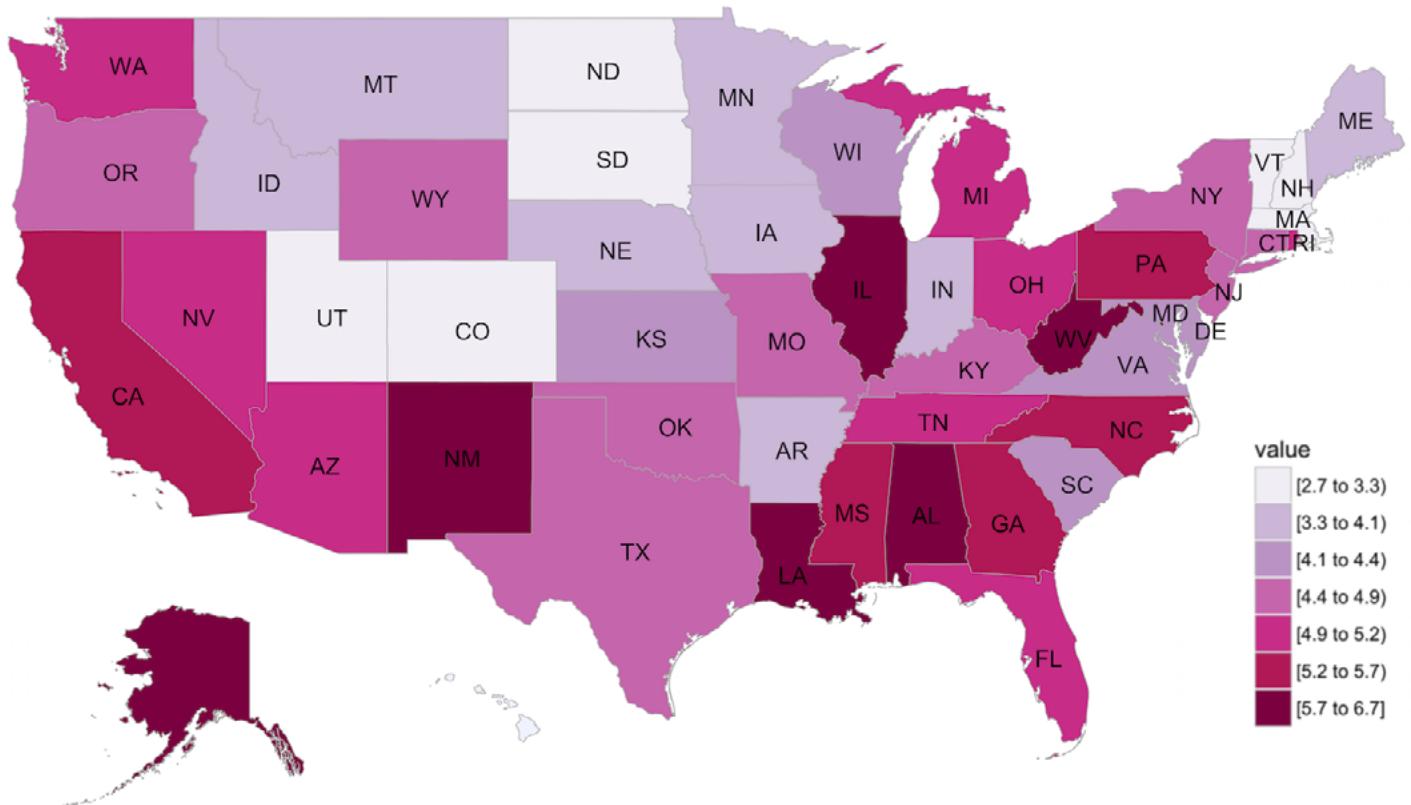
shape: ~accurate

topology preserved: ~yes



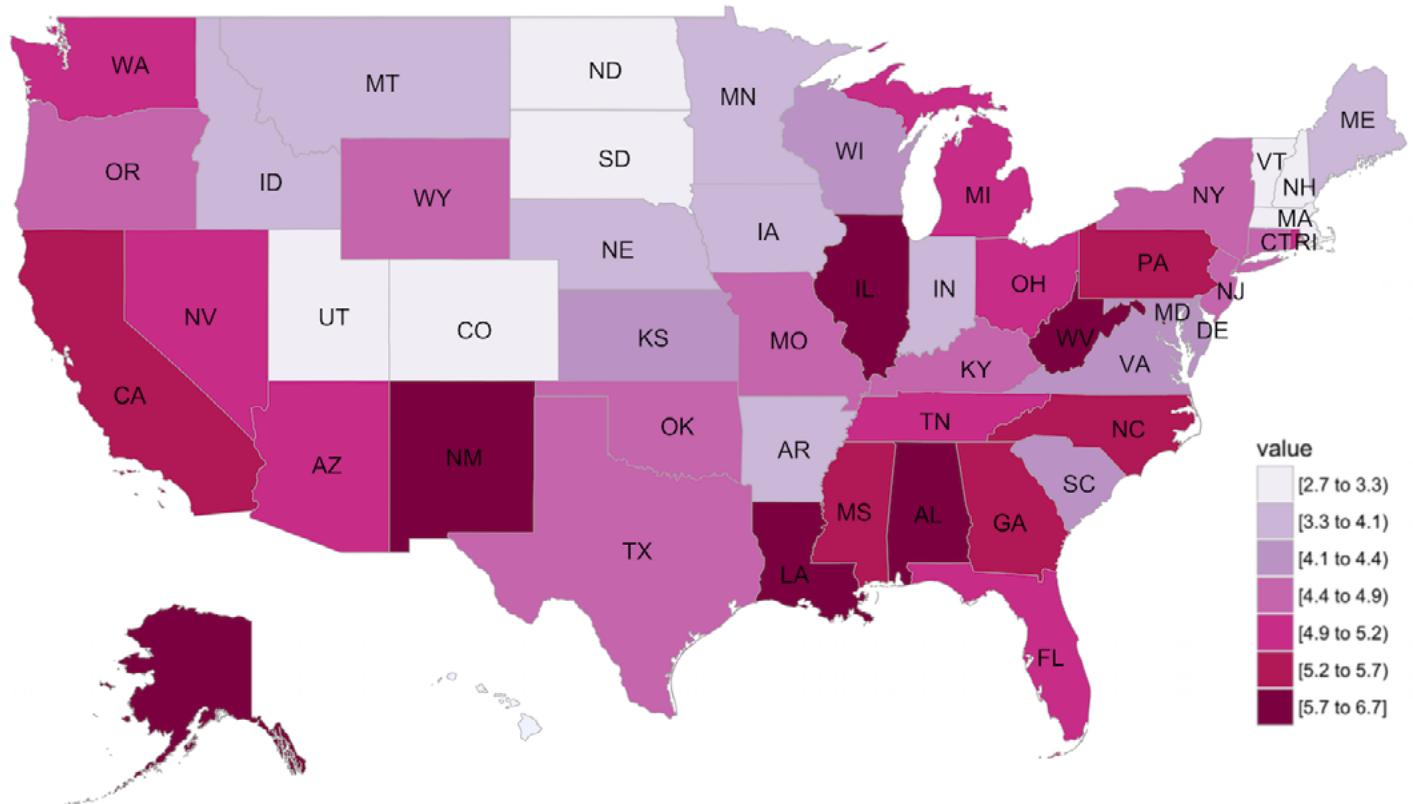
Geo-facets: small multiples within maps

2016 US Unemployment



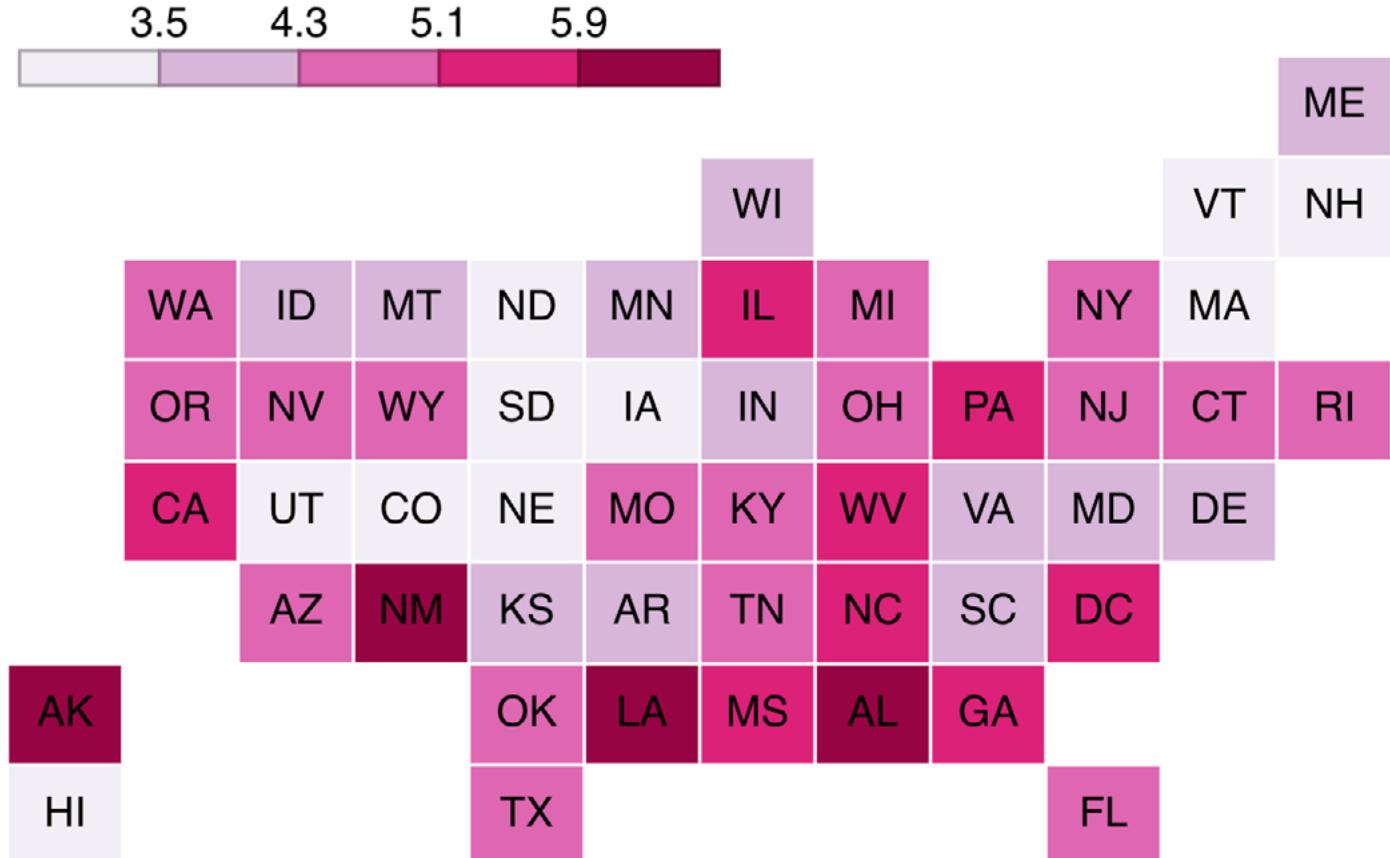
2016 US Unemployment

Large areas
dominate, let's
drop area...



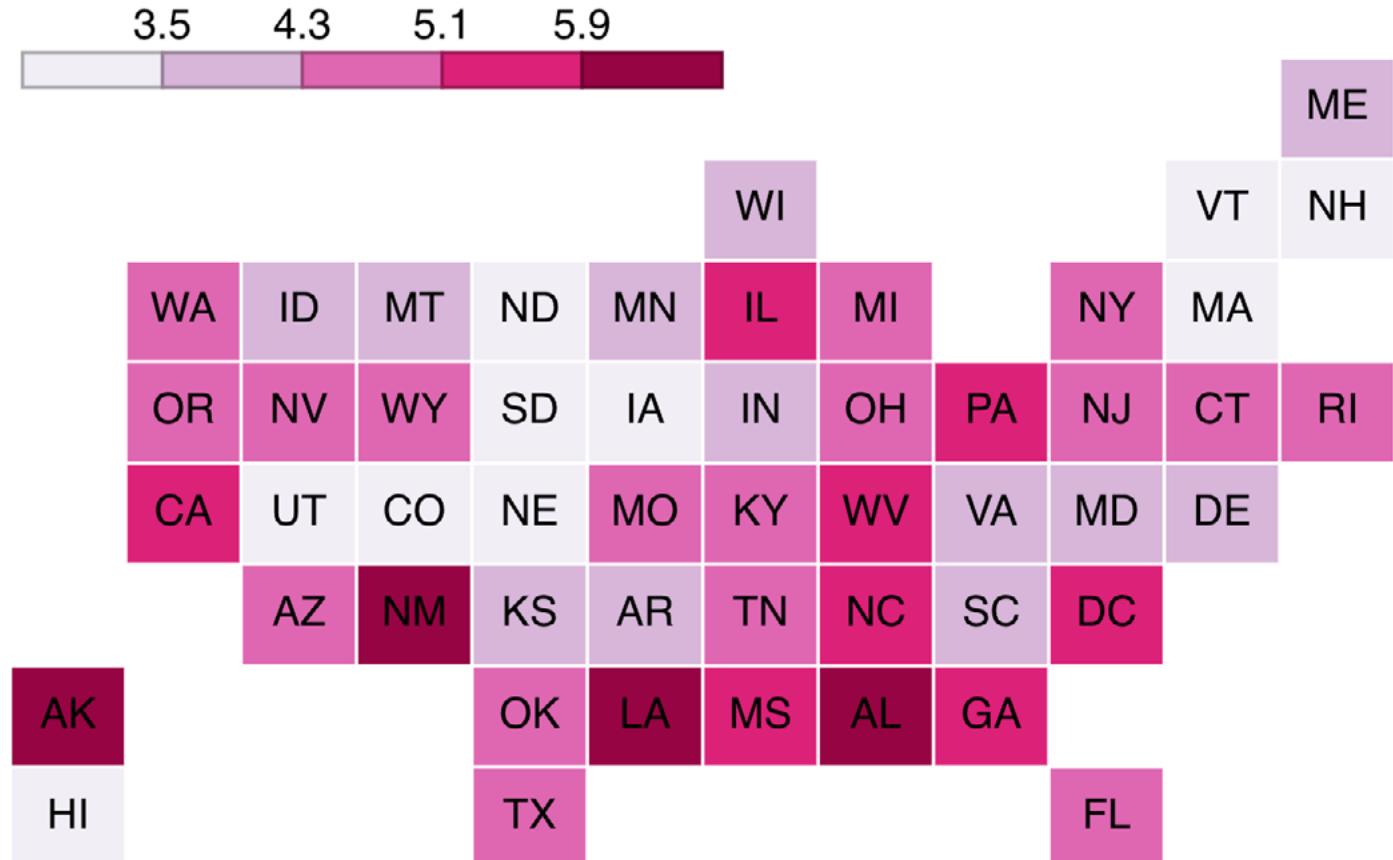
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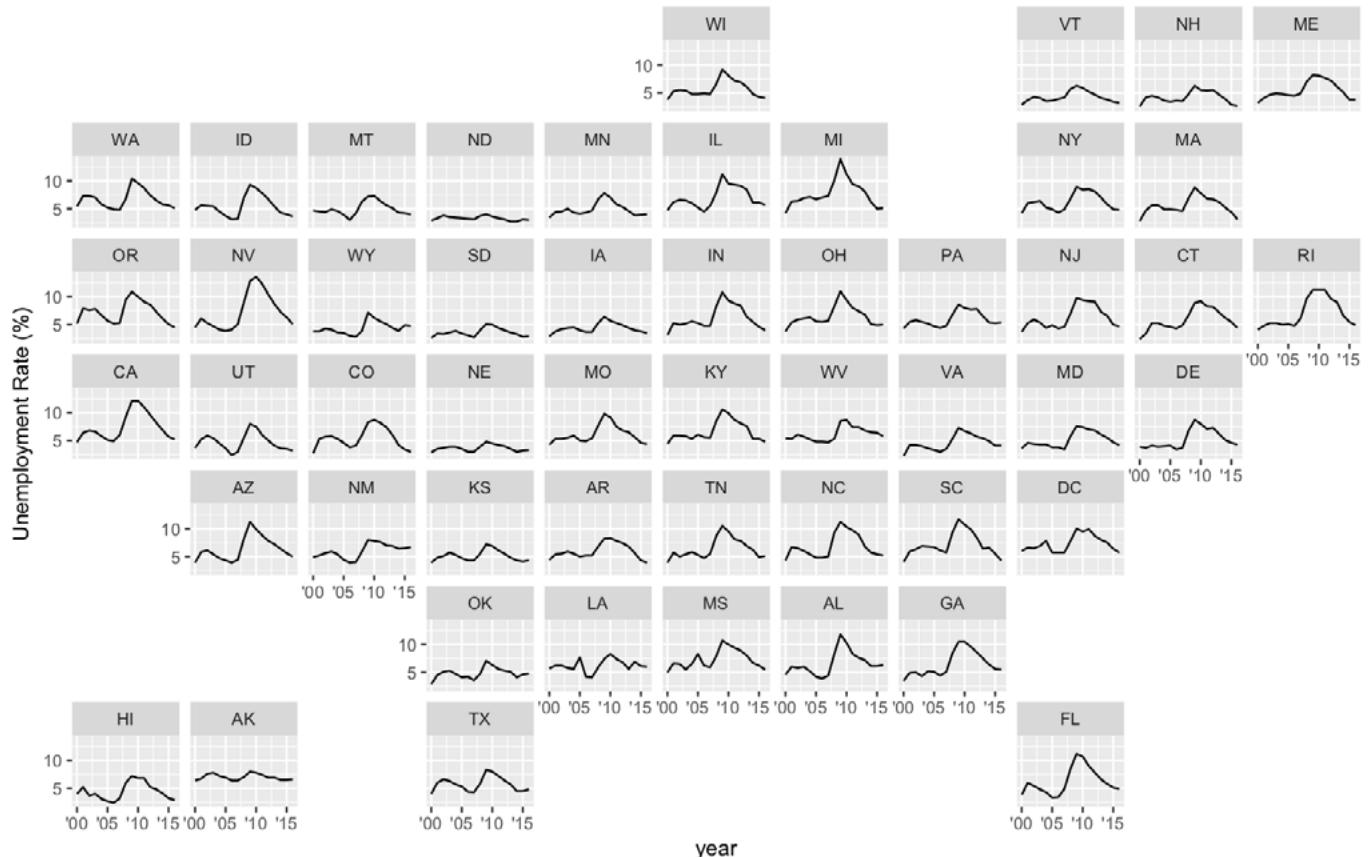
2016 US Unemployment

Now we can use
small multiples...



2016 US Unemployment

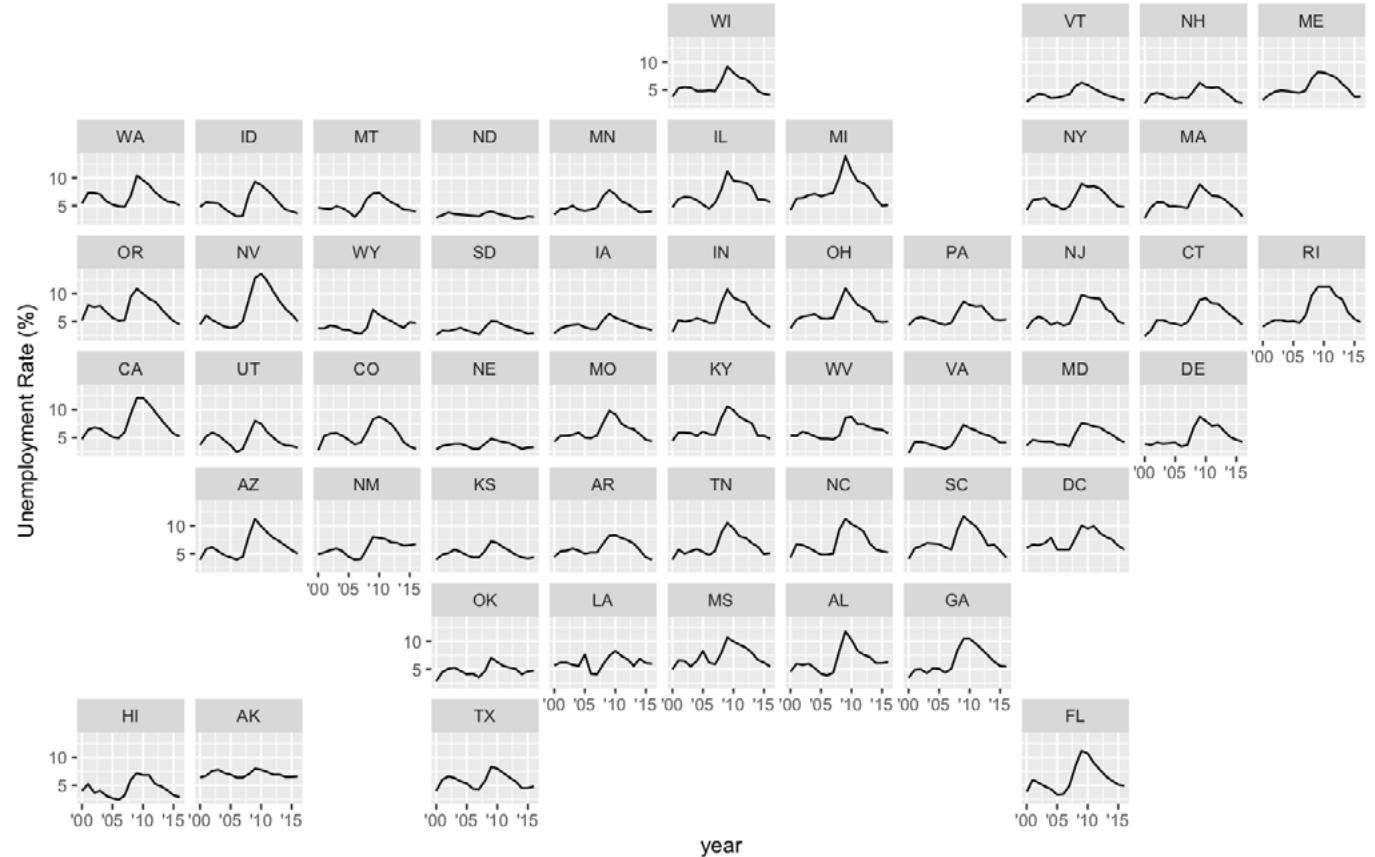
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2016 US Unemployment

Now we can use
small multiples...
This is **geo-faceting**

<http://ryanhafen.com/blog/geofacet>



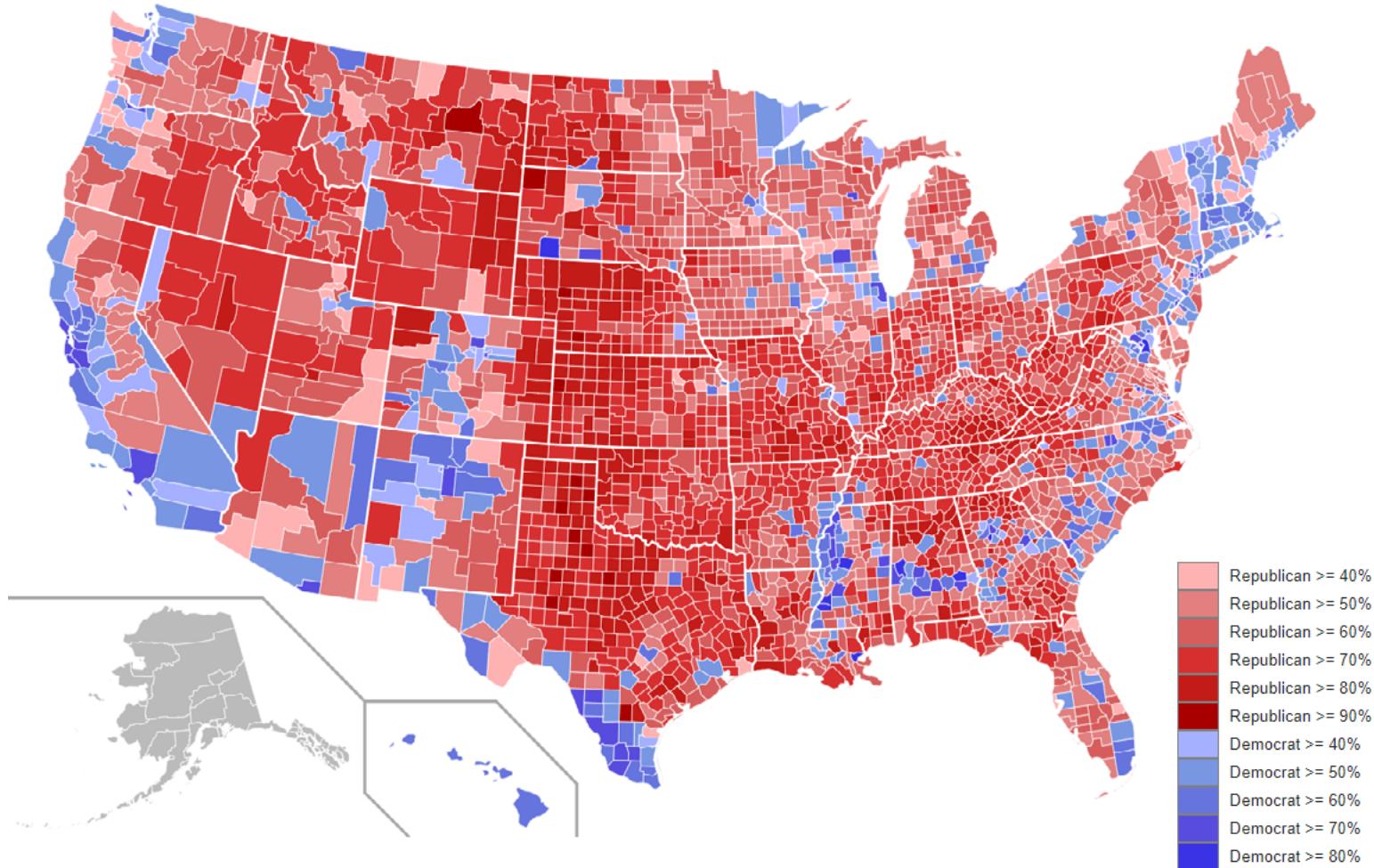
Or draw the map but ignore region boundaries...

US presidential election 2016

Popular vote by
county

Area and color
become
integrated

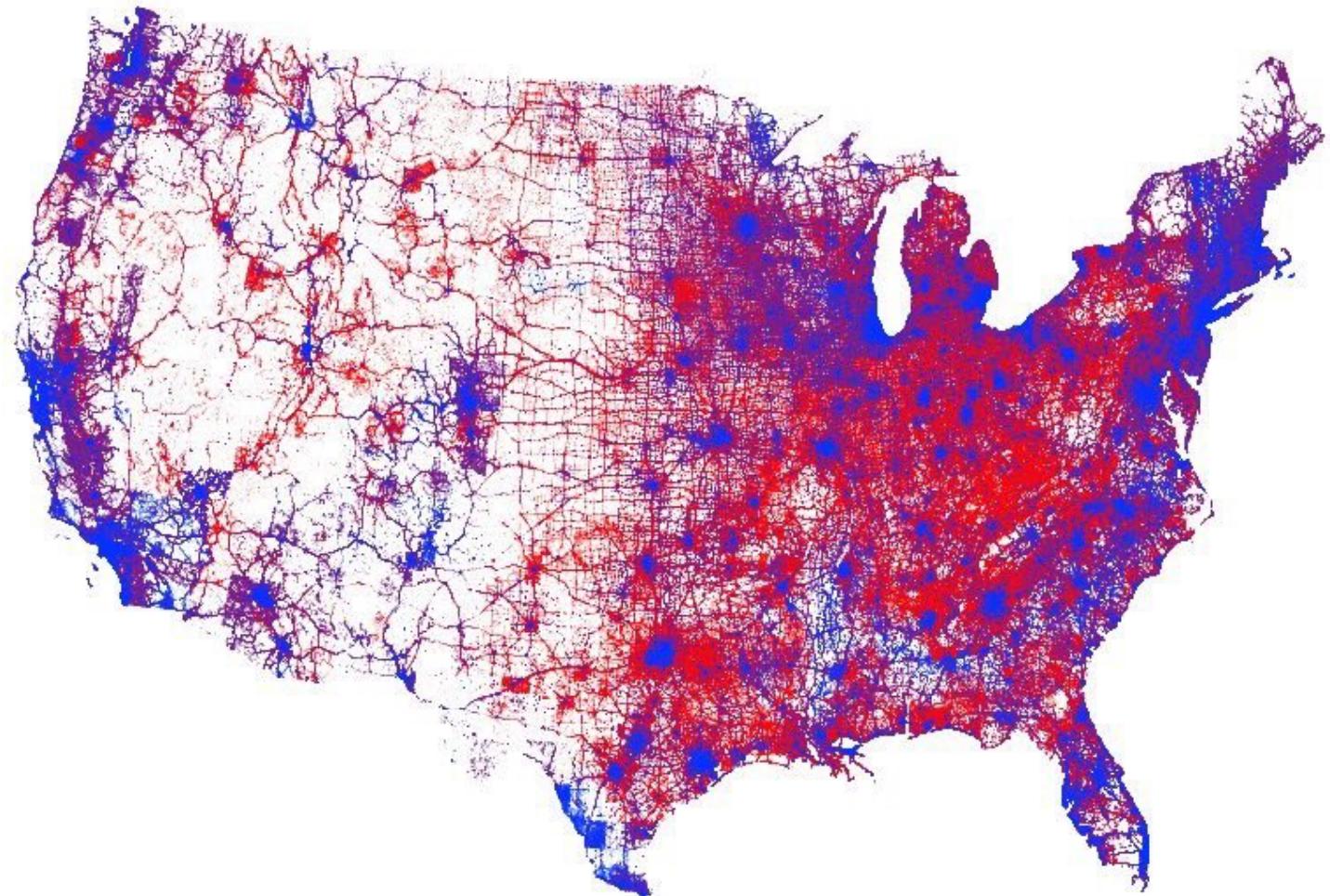
https://en.wikipedia.org/wiki/File:2016_Nationwide_US_presidential_county_map_shaded_by_vote_share.svg



Draw across boundaries: dot-density maps

1 dot = 1 person

Avoids problems
with unequal
denominators in
regions

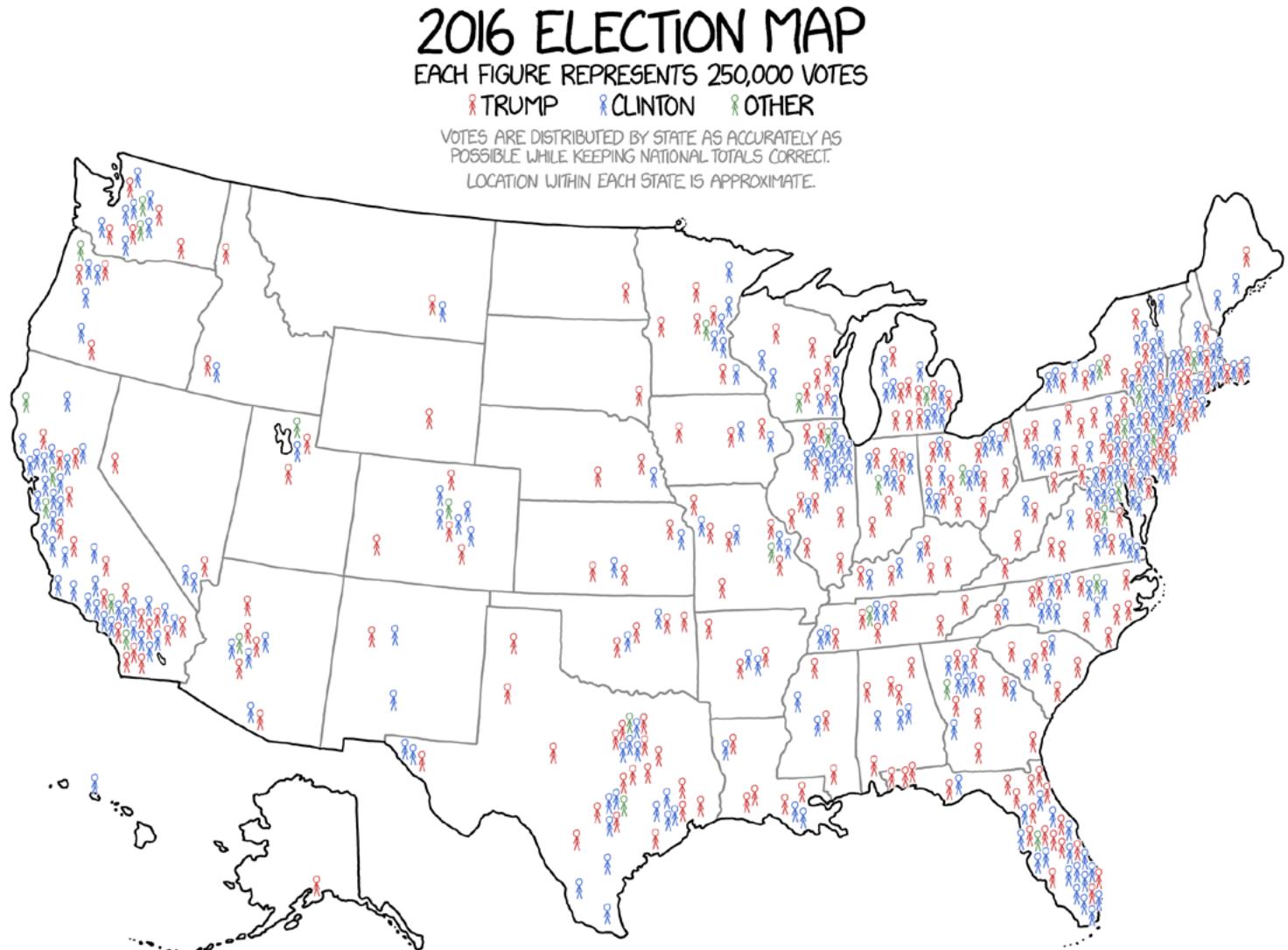


[http://cartonerd.blogspot.com/
2018/03/dotty-election-map.html](http://cartonerd.blogspot.com/2018/03/dotty-election-map.html)

Draw across boundaries: dot-density maps

1 dot = 250k people

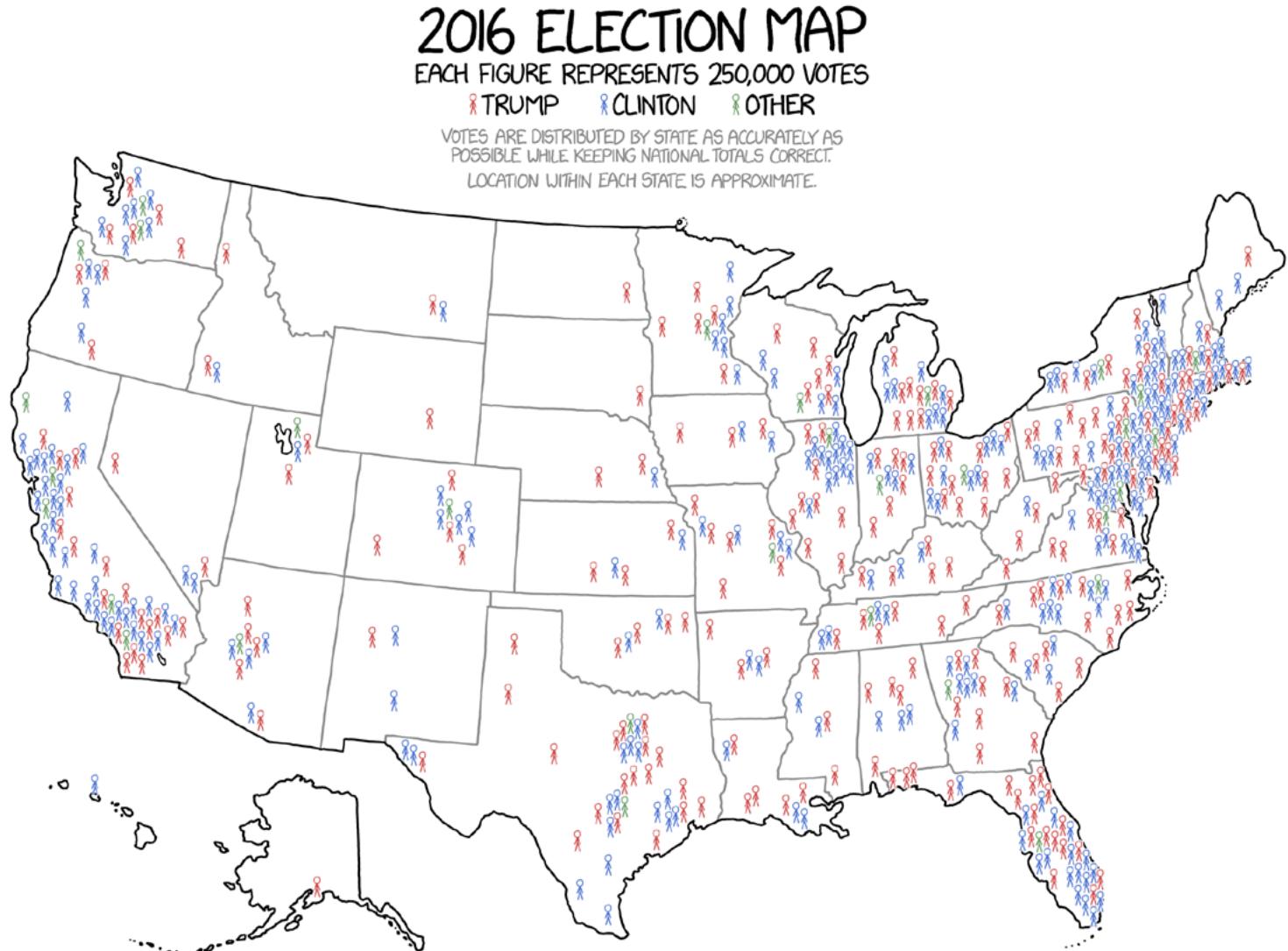
Drawn to
avoid overlaps



<https://xkcd.com/1939/>

Draw across boundaries: dot-density maps

Decouples
color channel
from area
channel



Geographic visualization

Always ask the **map question**:

Can we get rid of this map altogether?

If no, what matters? Geographic shape? Topology?
Area accuracy? **Go back to your tasks**

Consider **mosiacs**, **geo-facets** and **dot-density** maps

Geographic visualization

Additional reading:

Nusrat and Kobourov 2015, Visualizing Cartograms: Goals and Task Taxonomy

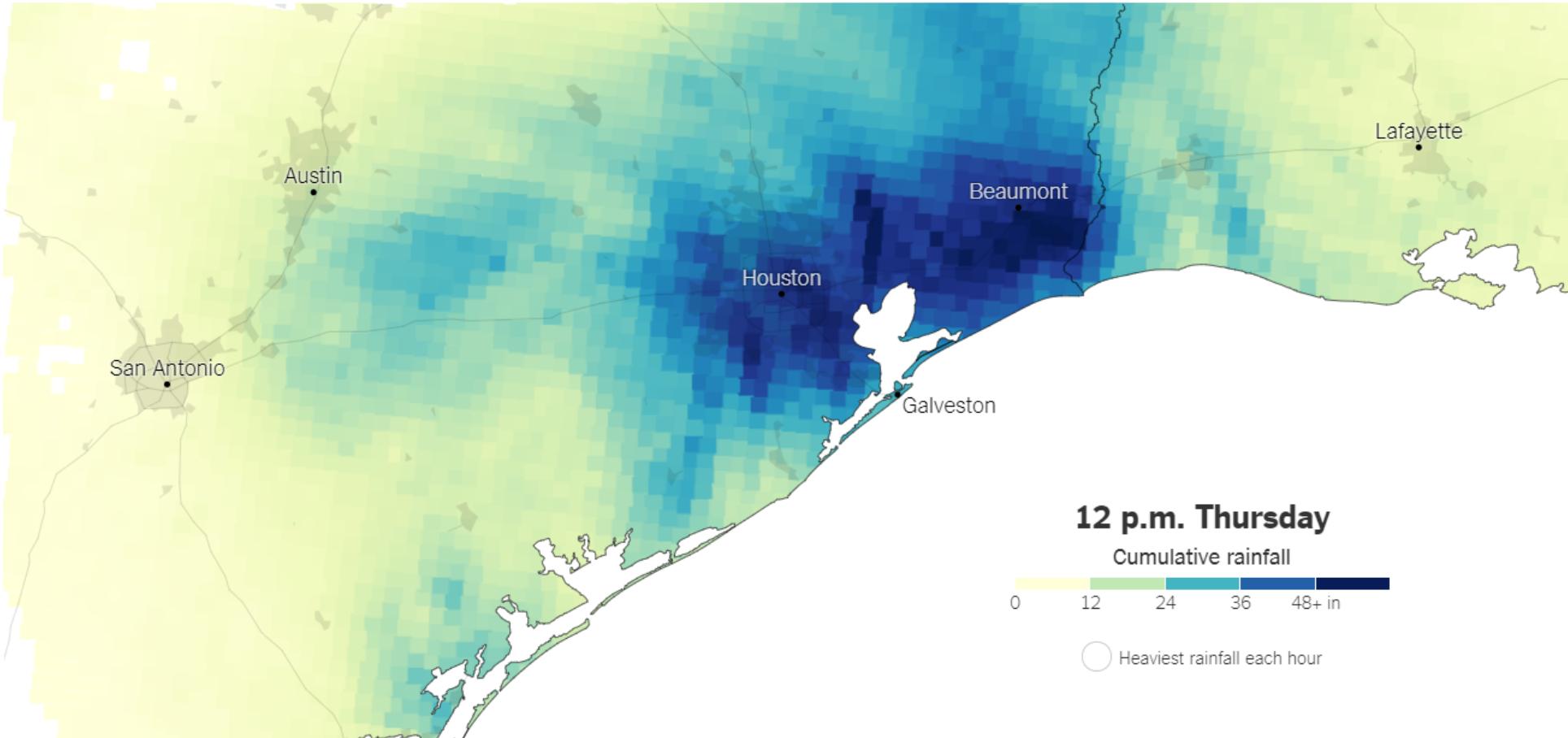
Nusrat and Kobourov 2016, The State of the Art in Cartograms

Geographic visualization

Check out Kenneth Field's page of examples:

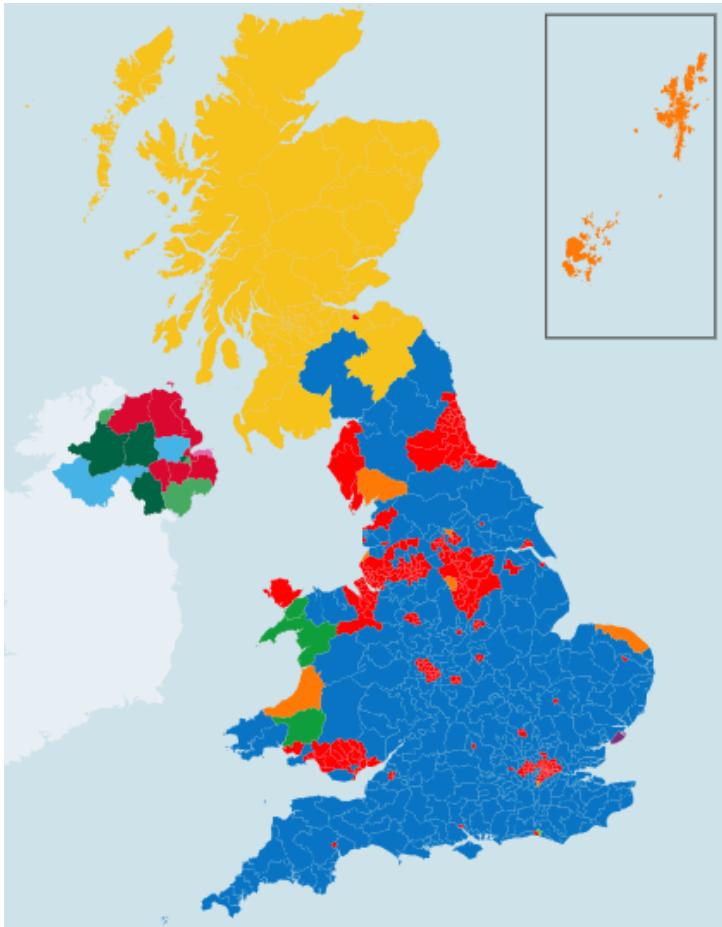
<http://cartonerd.com/>

Hurricane Harvey maps



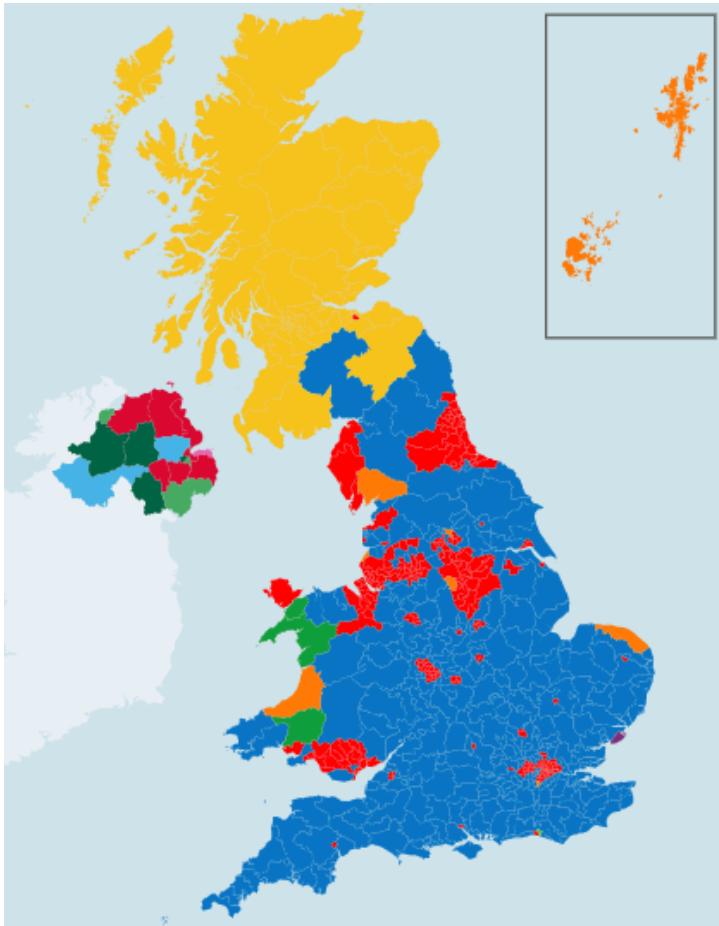
<https://nyti.ms/2vu92ZU>

Election maps...

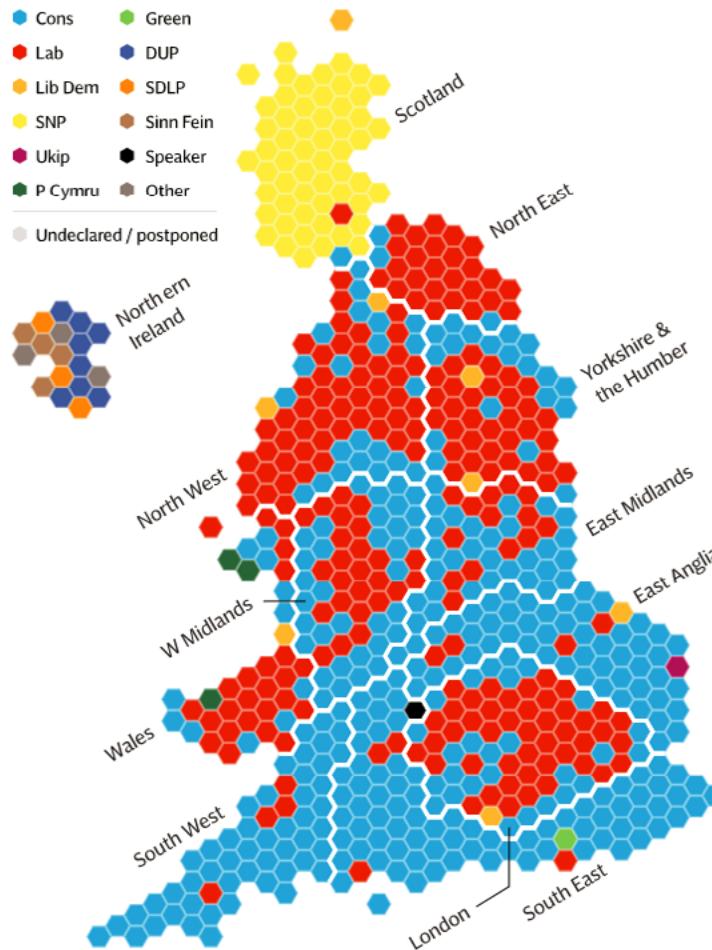


<https://tinyurl.com/bbce-2015>

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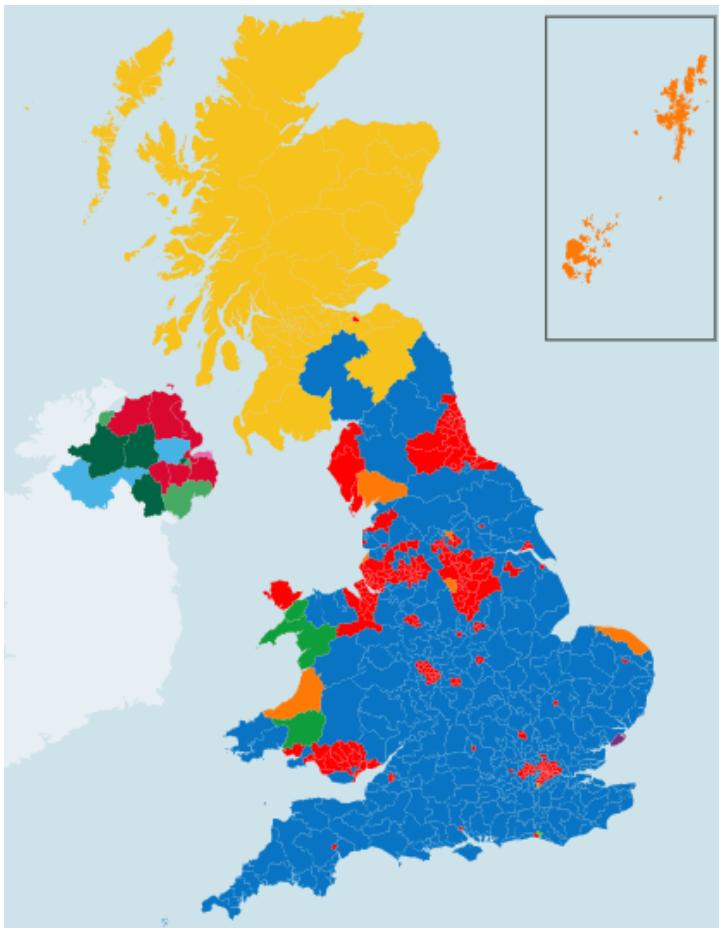


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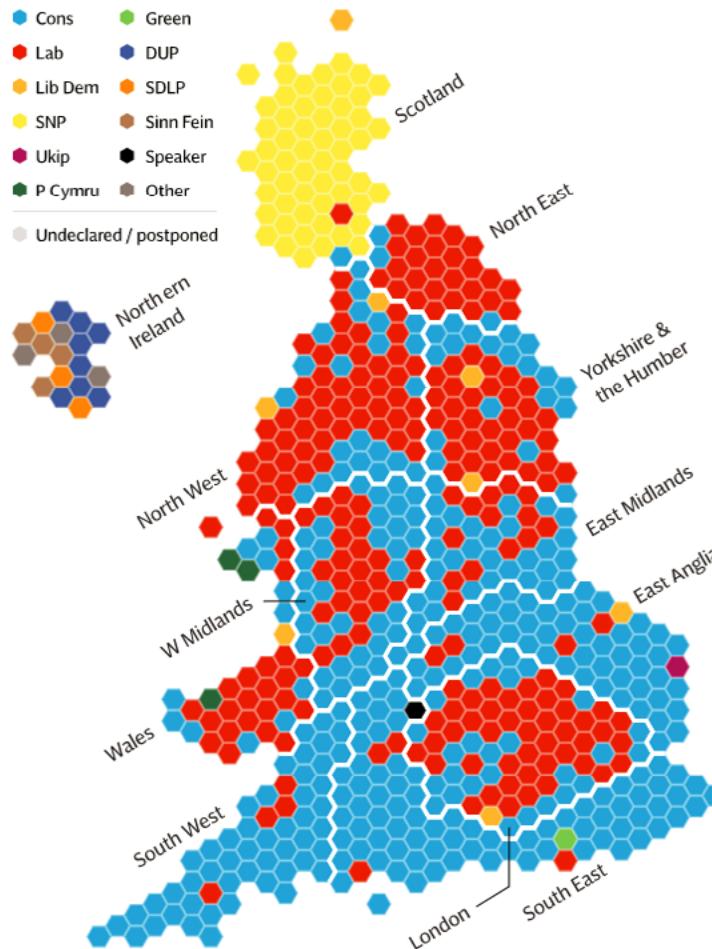


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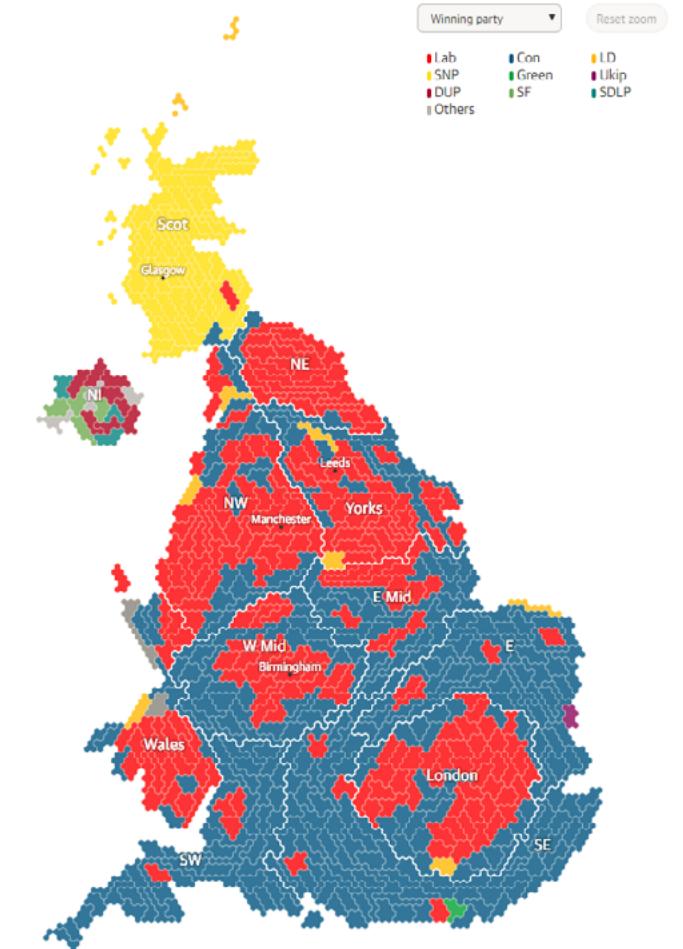
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