An Evaluation of COVID-19 Dashboards from Cartographic and Epidemiological Perspectives

KWANG-IL (JASON) YOO

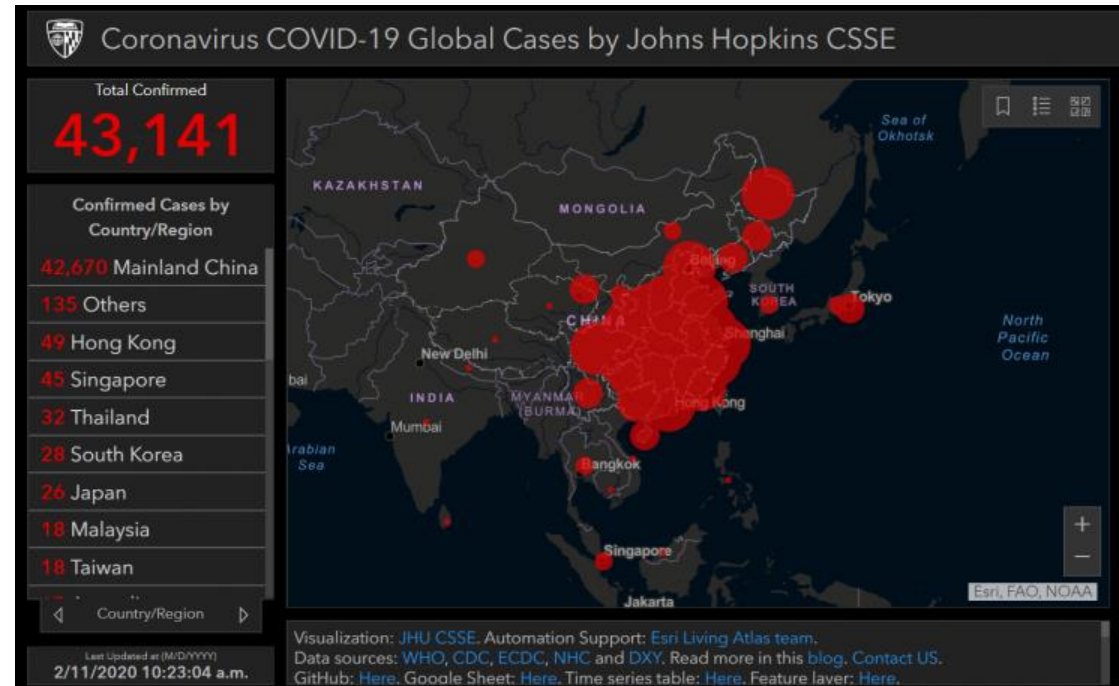BARRY J KRONENFELD

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Outline

1. Motivation

2. Analysis of Covid-19 dashboards
   - *Epidemiological Variables*
   - *Cartographic Symbolization*
   - *Animation and Interactivity*
   - *Speed and Underlying Technologies*

3. The Coviz project

Motivation

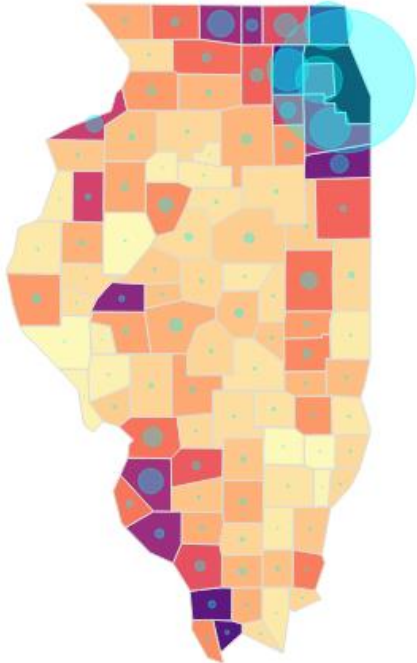Early dashboards dominated by symbol maps

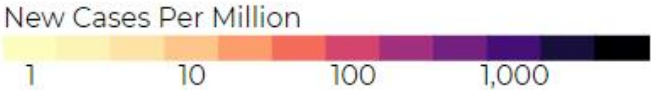Questionable cartographic choices

John Hopkins University (https://systems.jhu.edu/research/public-health/ncov/)
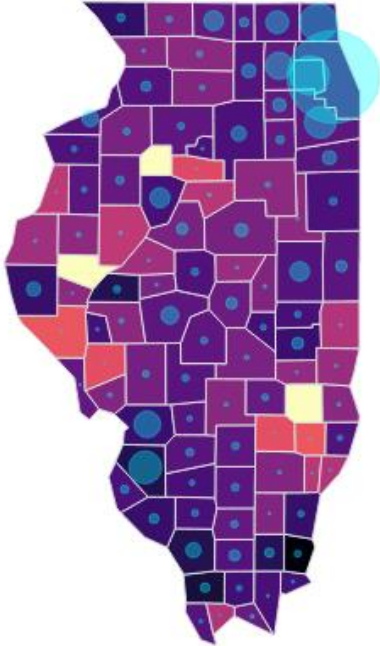
Cumulative vs. Recent Cases

Total Cases   Jul 25, 2020

Weekly Cases   Jul 25, 2020

Cases Per Million

1,000   10,000

New Cases Per Million

1   10   100   1,000

Case Counts vs. Rates

Weekly Cases   Sep 25, 2020

New Cases Per Million

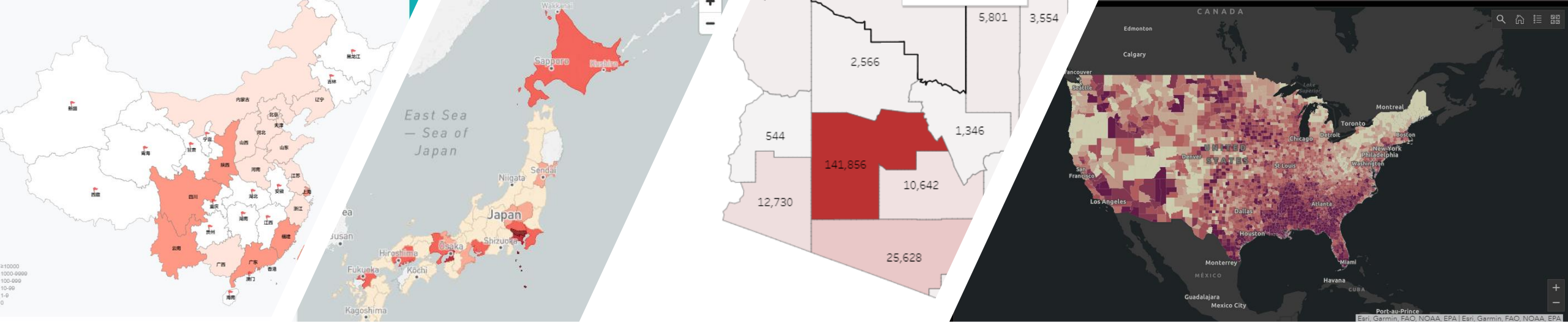100   1,000   10,000
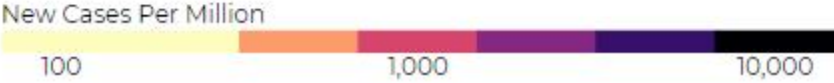
Why Dashboards?

To determine:
- *Current risk of activity*
- *Rate of increase/spread*
- *Effects of policy*

For historical documentation
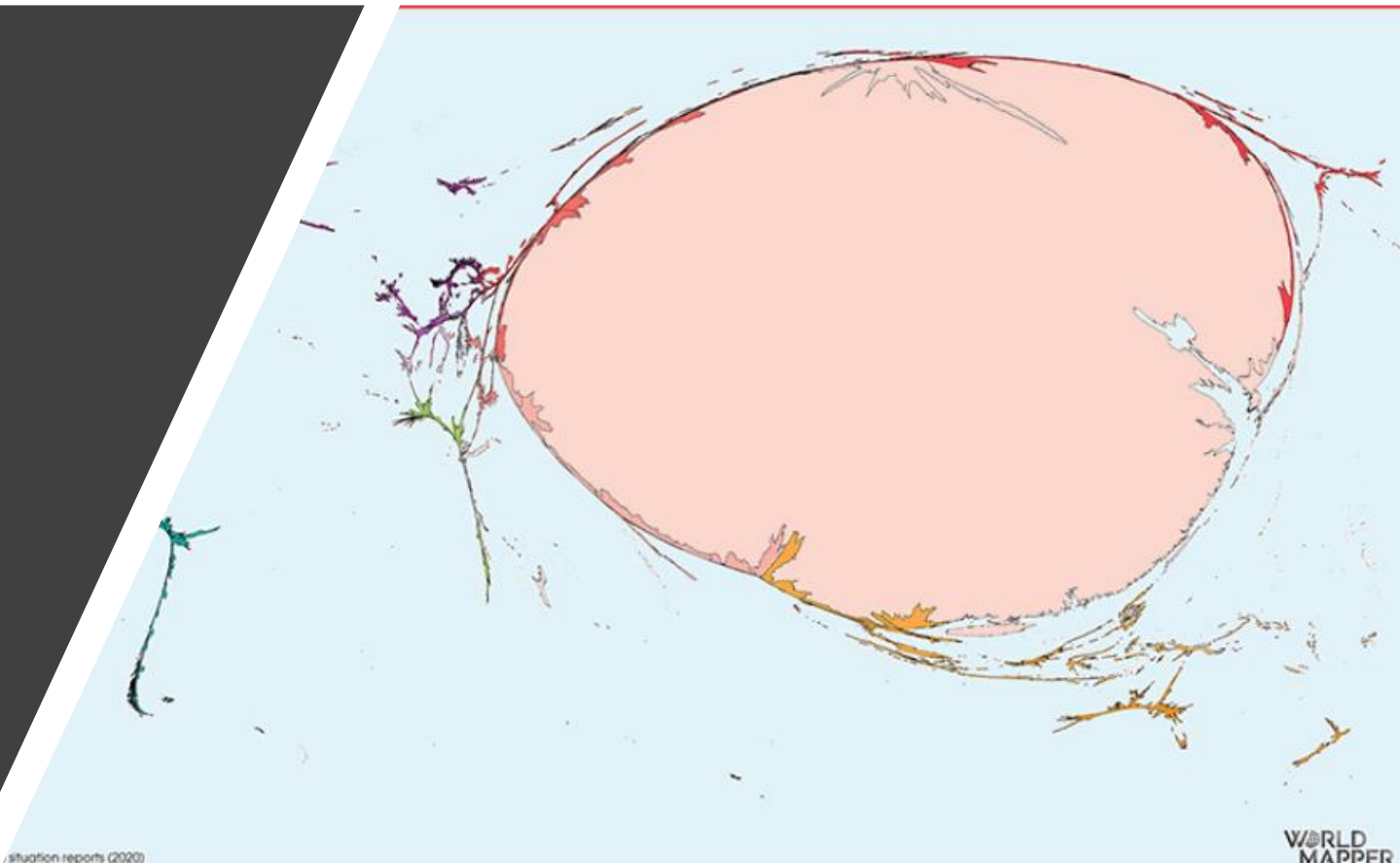
Analysis of Existing Dashboards

An Evaluation of COVID-19 Dashboards from Cartographic and Epidemiological Perspectives

39 Dashboards

- Asia
  - (China, Hong Kong, Japan, S.Korea)
- U.S.
  - (GOV, NGO, Volunteers, Educational Entities)

Area of Focus

1. Are data variables properly selected, well defined?

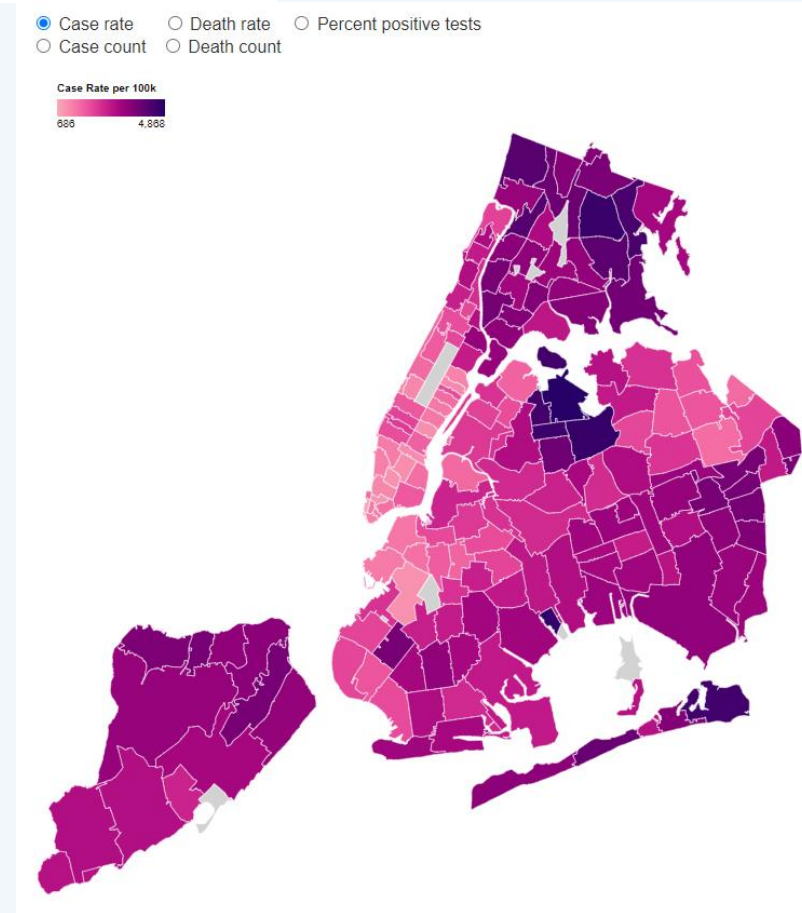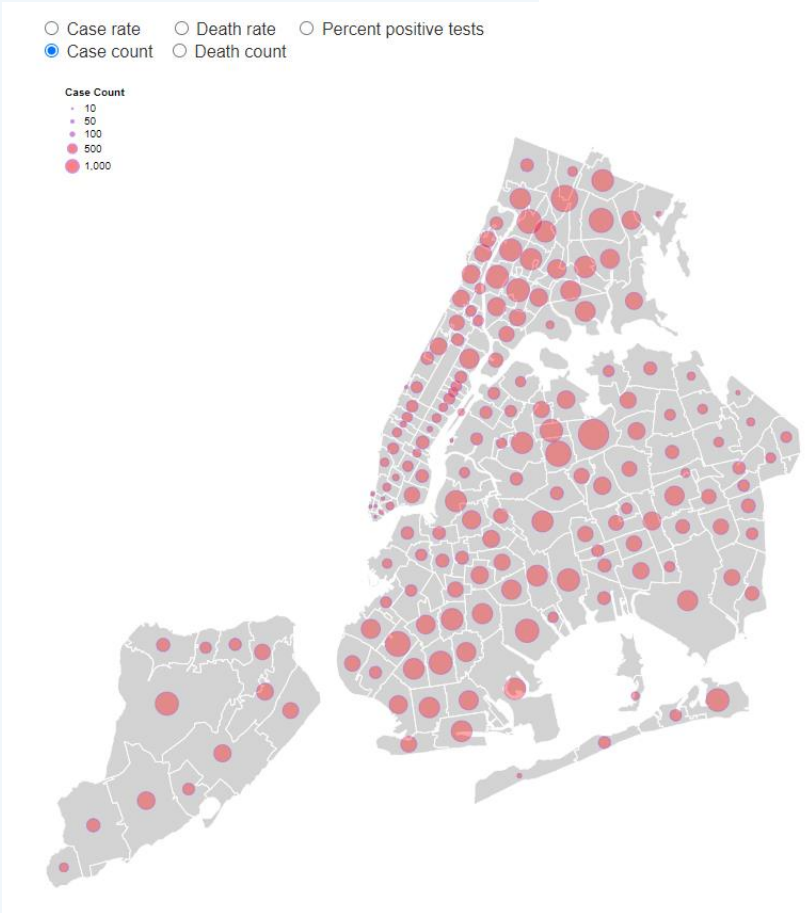2. Are visual variables appropriately symbolized?

3. Is map animation and/or interactivity used effectively?

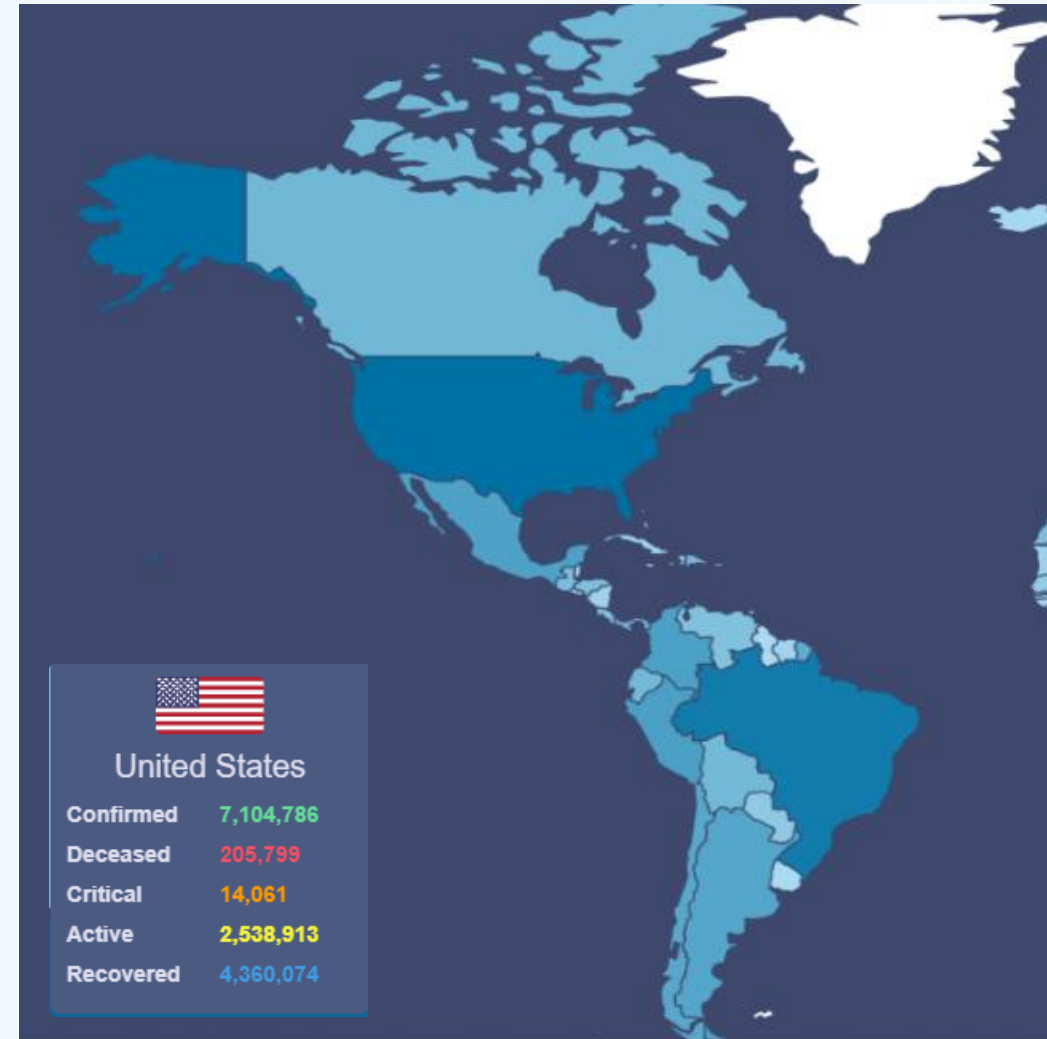4. Is the dashboard fast and responsive?

Dashboard Follows General Cartographic Principles

New York City (https://www1.nyc.gov/site/doh/covid/covid-19-data.page)

Dashboards without Proper Data Variables

- **11 out of 39 (28%) were not well defined or difficult to interpret**

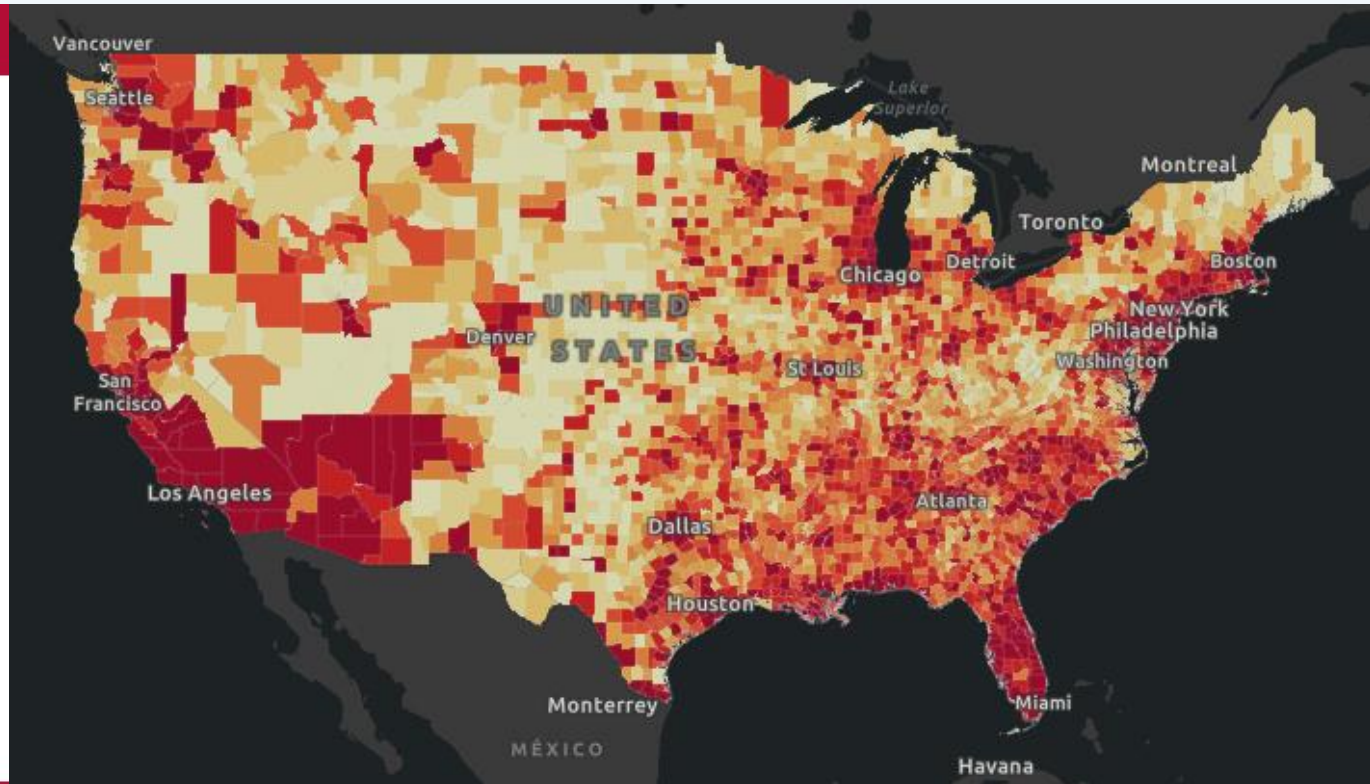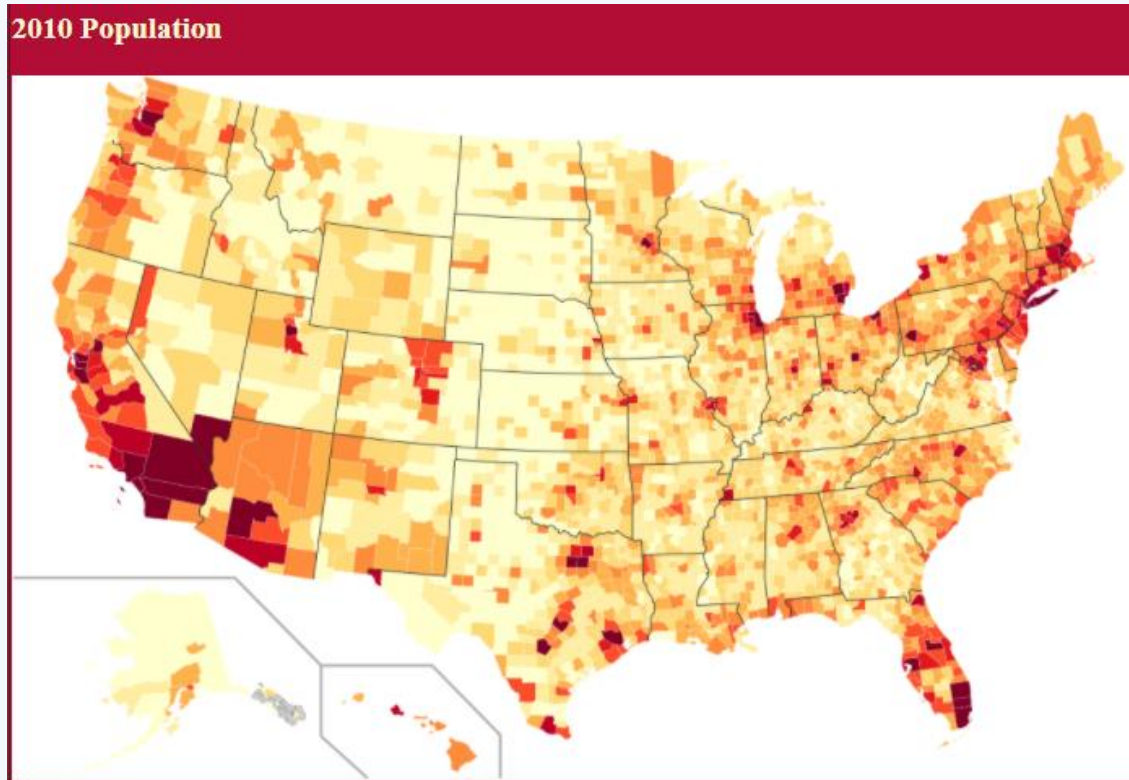- **3 out of 39 (7.7%) did not have a legend or label**

Ncov2019.live (https://ncov2019.live/map) & Illinois Department of Public Health (https://www.Dph.illinois.gov/covid19)

Comparing Cumulative and Recent Cases

	Case Rate per Population	Raw Case Count
Recent	8 (21%)	8 (21%)
Cumulative	14 (36%)	30 (77%)

Total Cases

Daily Cases

1point3arces (https://coronavirus.1point3acres.com/)
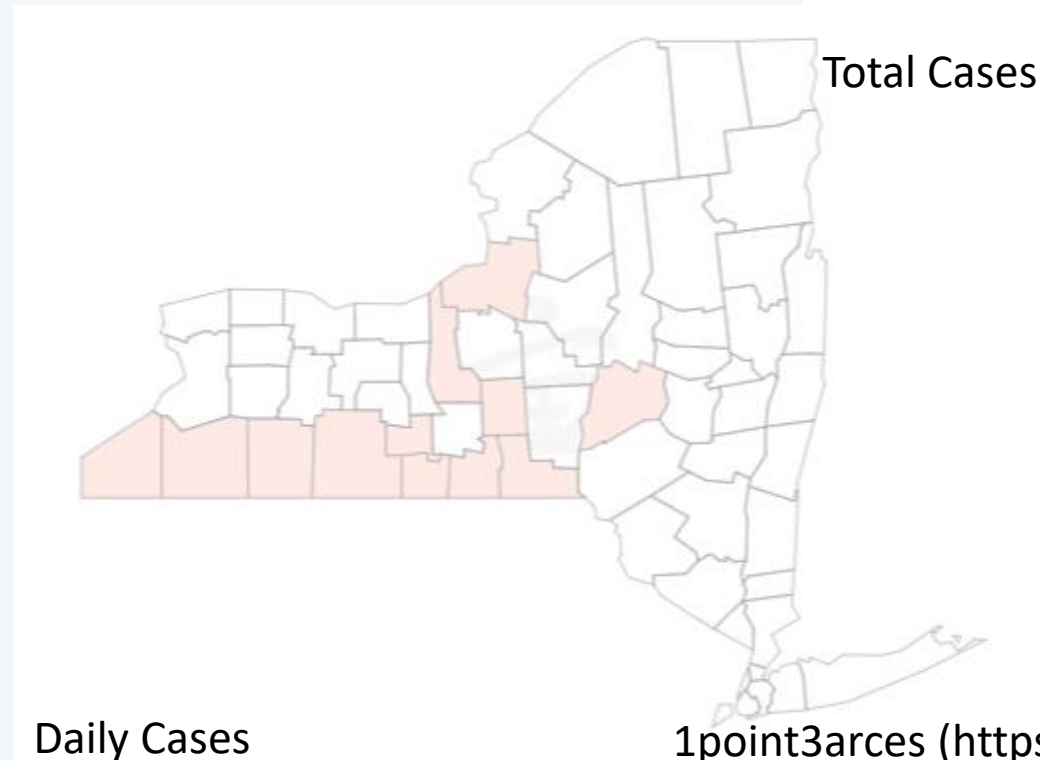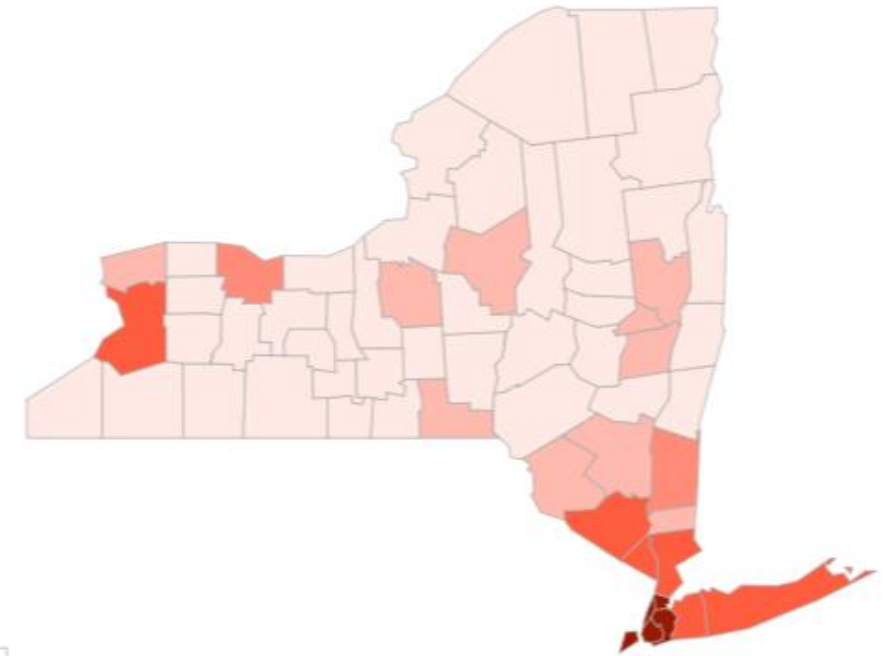
Comparing Population Map and Raw Cases
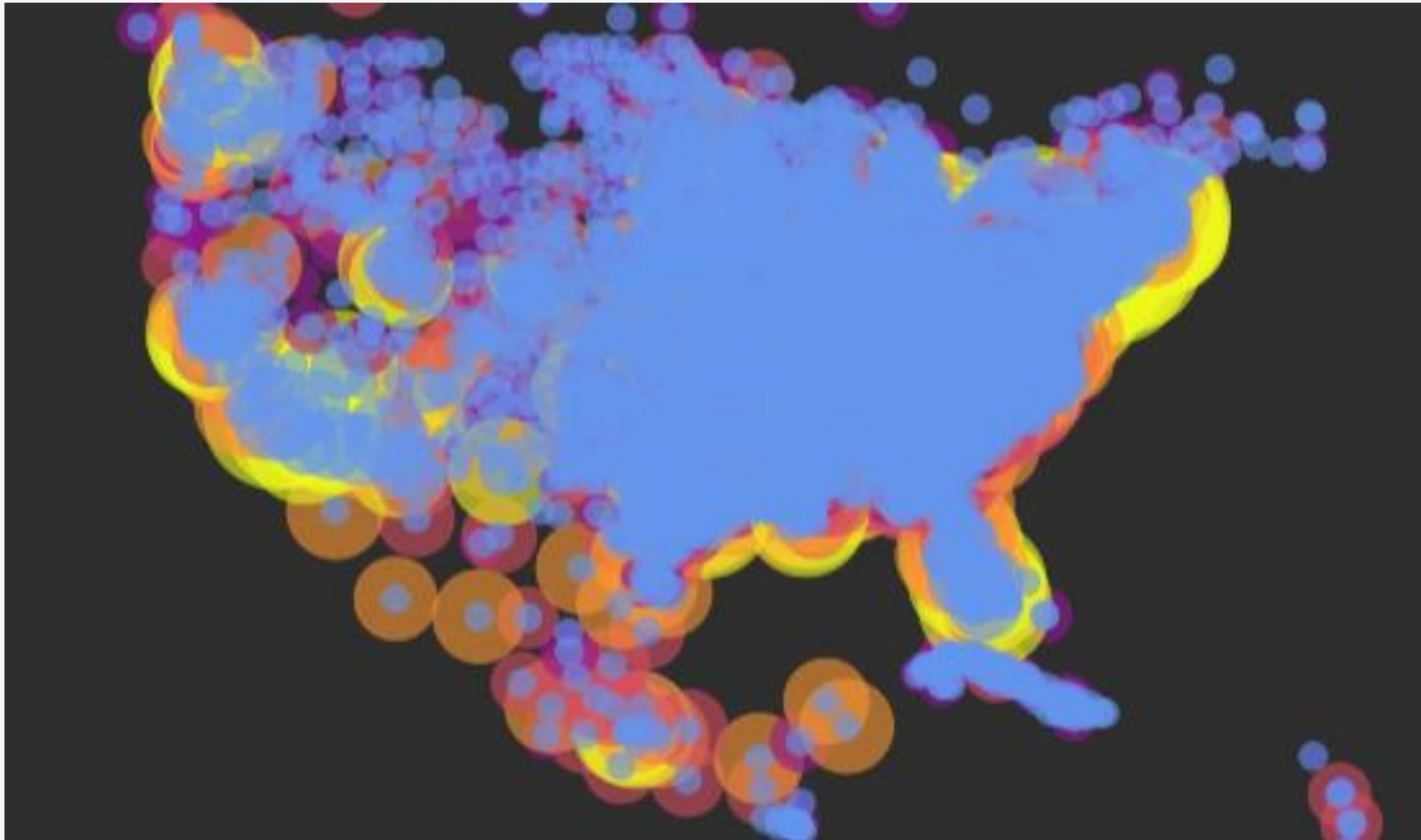

2010 Population

Examples of improper symbolization

- **14 out of 39 (36%) followed basic cartographic principles**

- **16 out of 39 (41%) did not follow basic cartographic principles**

- **9 out of 39 (23%) had two or more map themes and followed basic cartographic principles in one map theme but did not follow in other themes.**
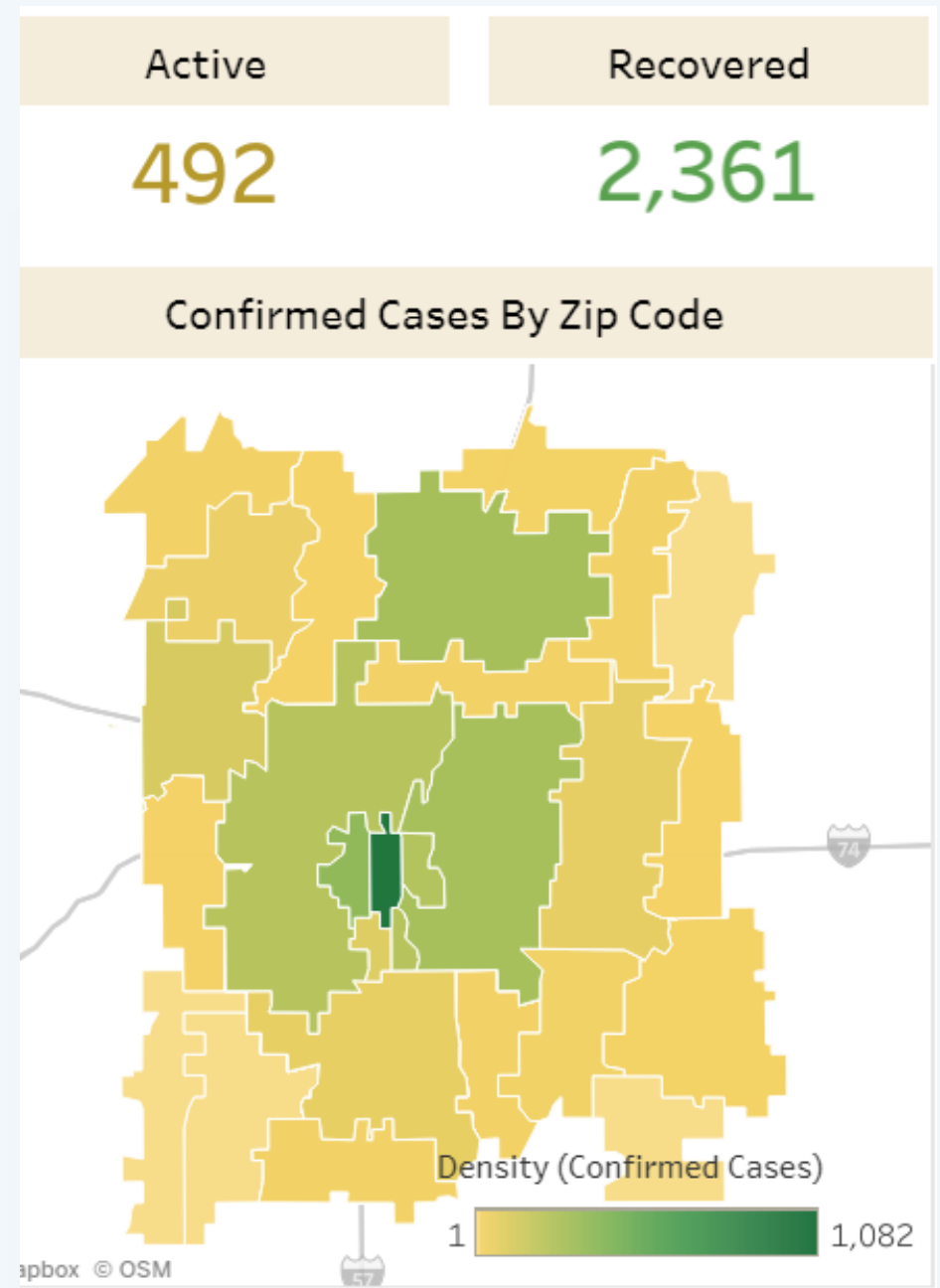

1point3acres.com & npr (www.npr.org/)
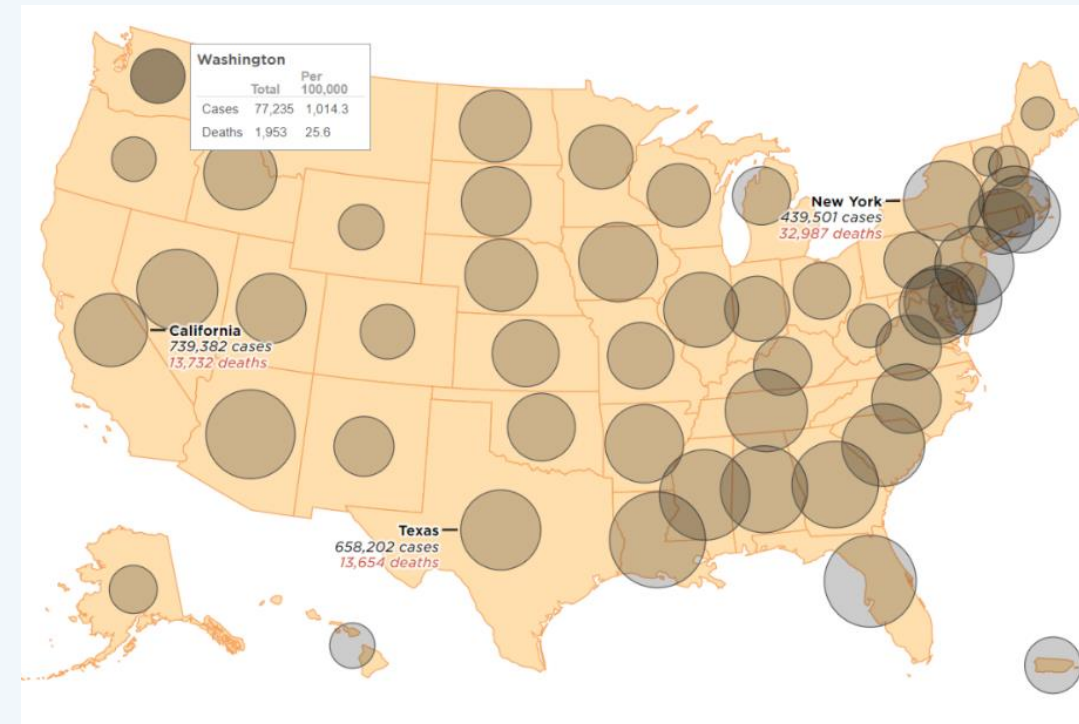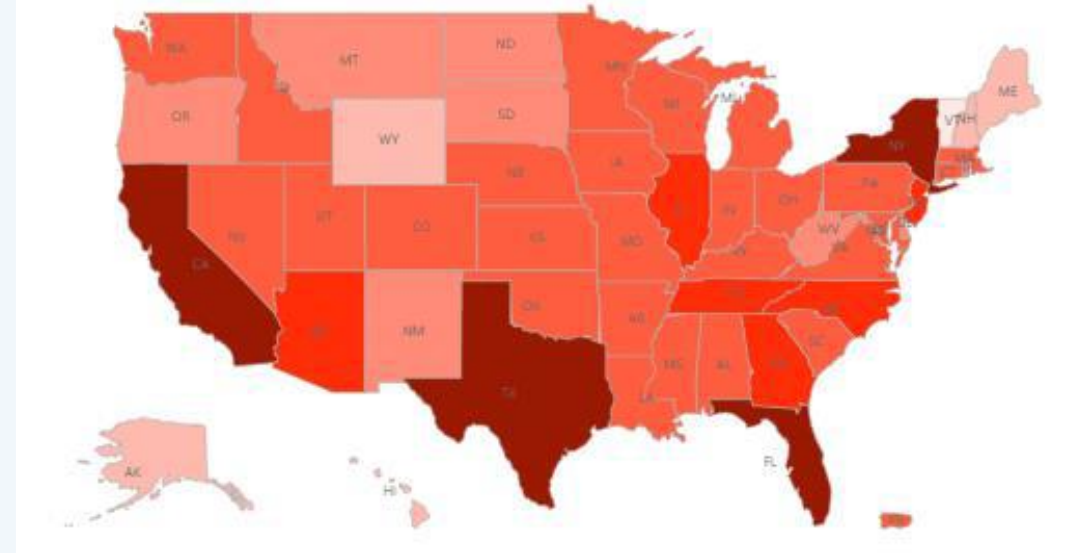
Examples of Unsuitable Symbols

- **3 out of 39 (8%) were making confusion with unsuitable symbols**

Healthmap (https://www.healthmap.org/covid-19/)

Inconsistent Use of Color

Champaign Urban Public Health District (https://www.c-uphd.org/champaign-urbana-illinois-coronavirus-information.html)
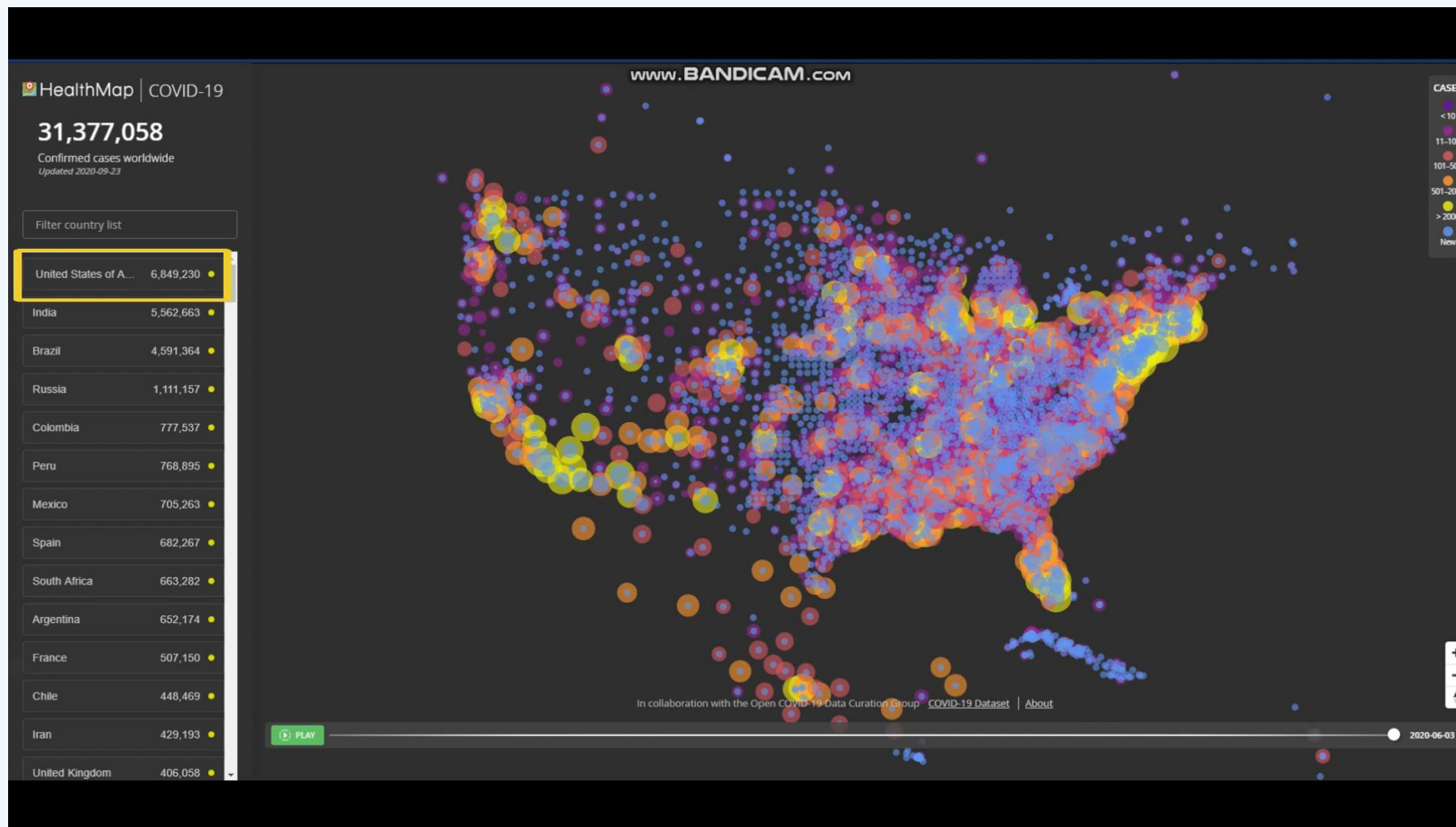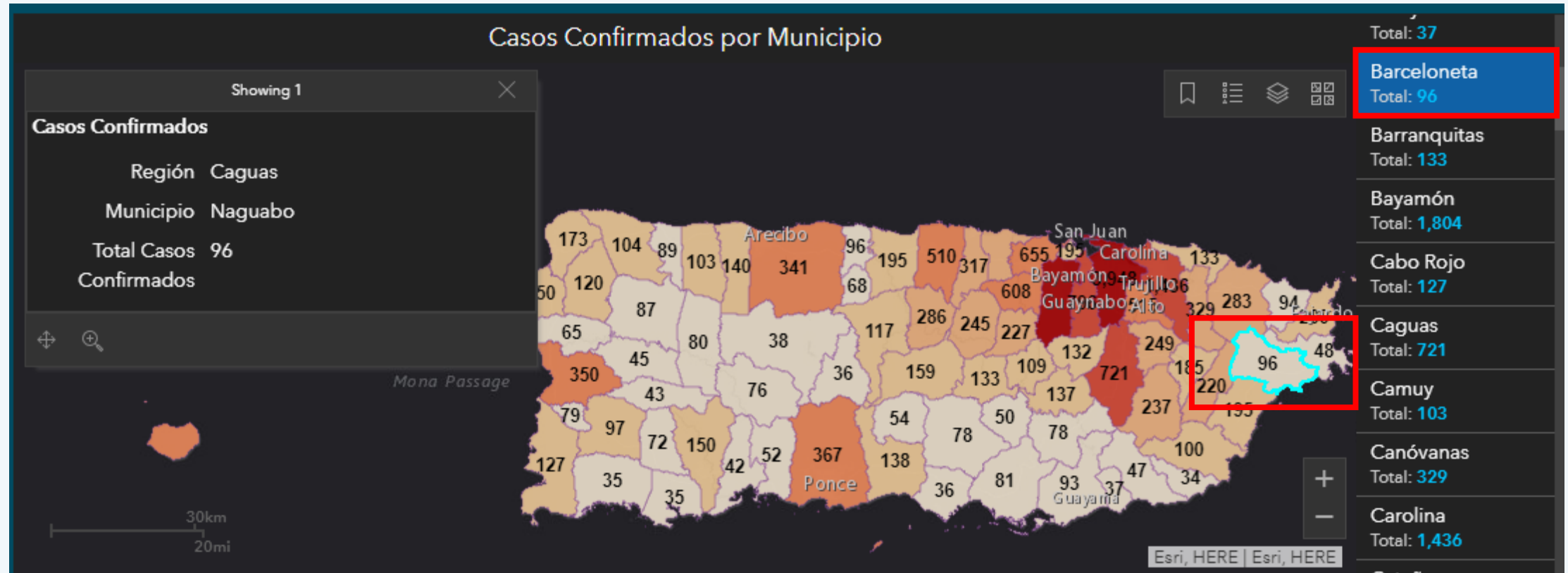
Importance of Animation

- **5 out of 39 (13%) have animation and only one dashboard provide interactivity**
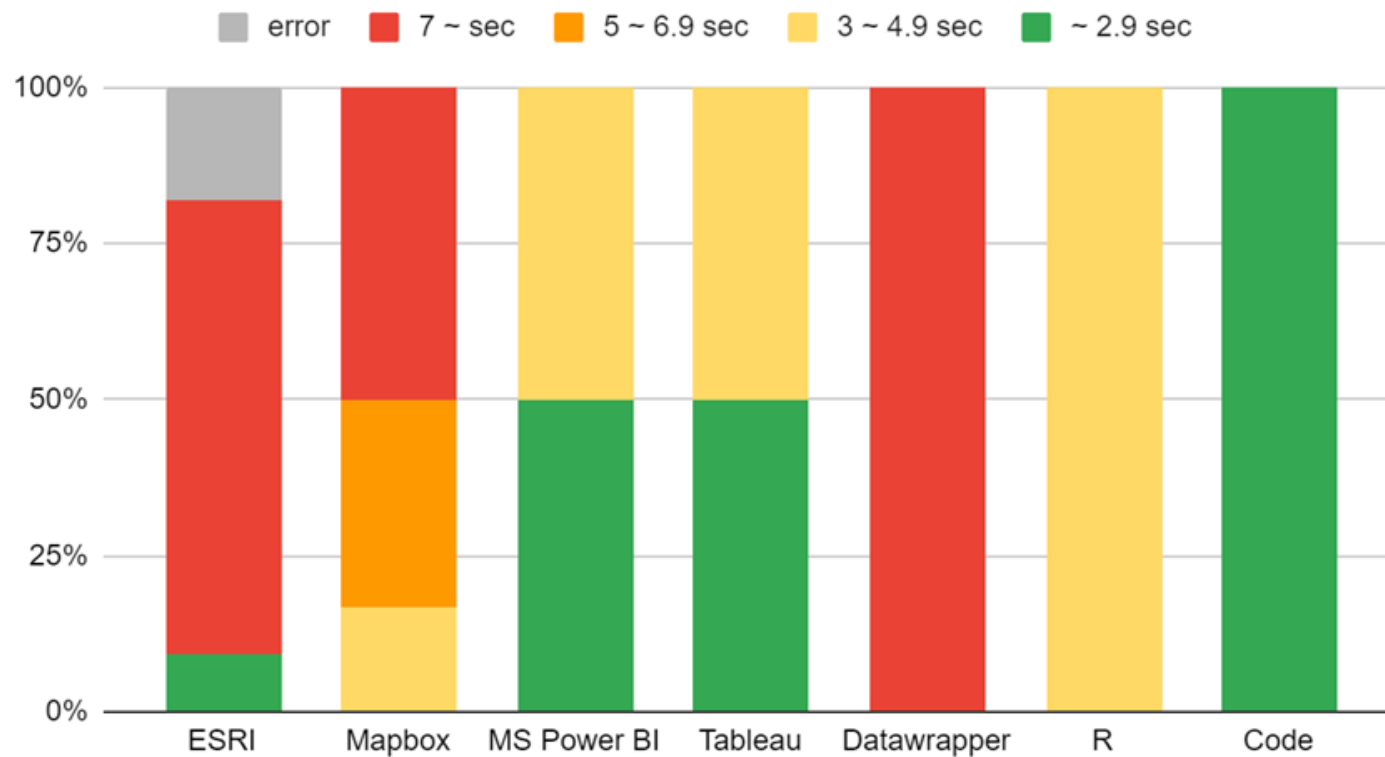
Importance of Linking and brushing

- **18 out of 39 (46%) have linking and brushing**
- **2 (5%) dashboards worked one way**

Speed and Underlying Technologies

- **21 out of 39 (54%) took more than 5 seconds**

- **17 out of 39 (44%) recorded as "slow" by user experience**

- **14 dashboards took more than 5 seconds with speed measure and also recorded as slow by UX**

- **8 out of 11 (73%) ESRI products took more than 7 seconds**

- **5 out of 6 (83%) Mapbox products took more than 5 seconds**

Key Takeaways

- Label and Explain

- Visualize the recent data to show current risk

- Choropleth map work best to visualize rates (cases per population)

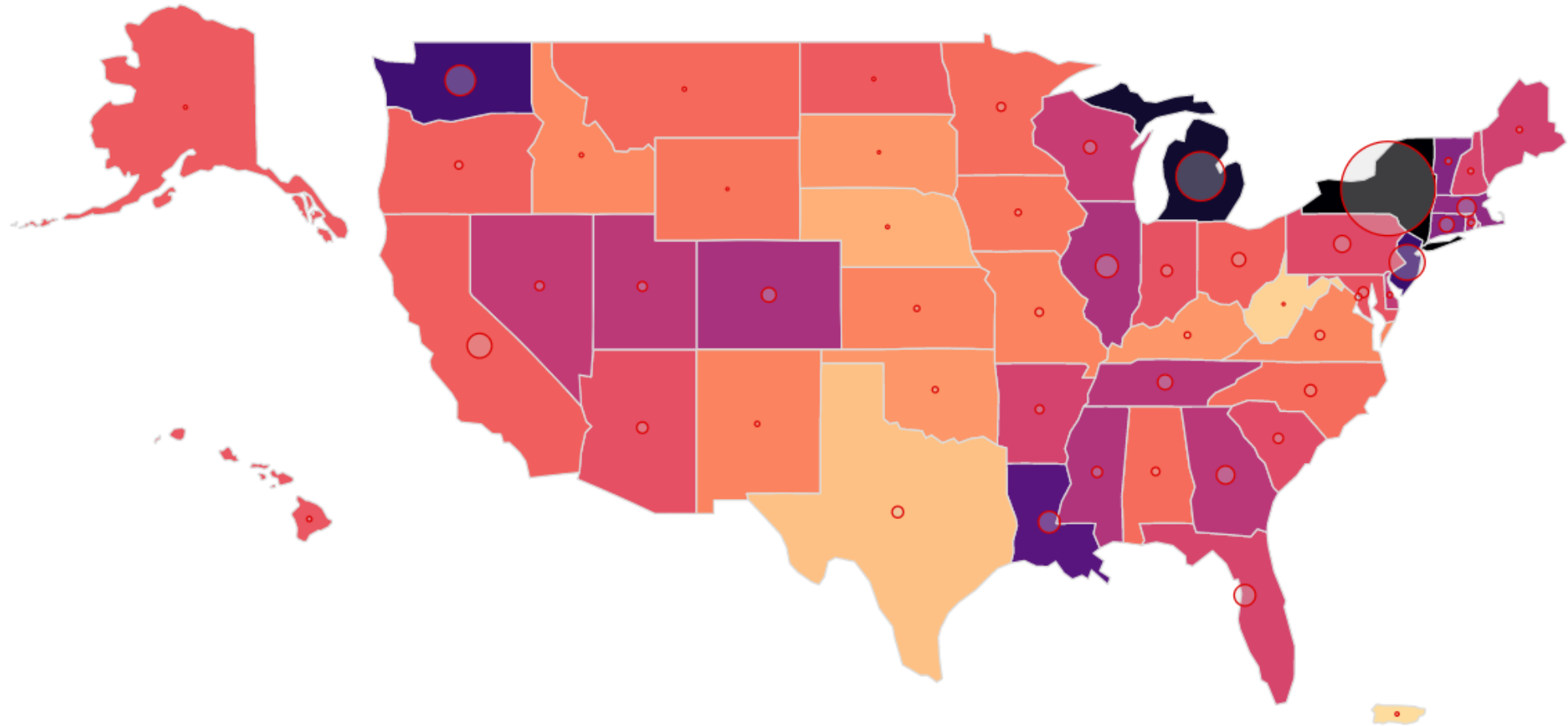- Choose suitable symbols and make it clear and simple

- Provide useful function such as animation or interactivity

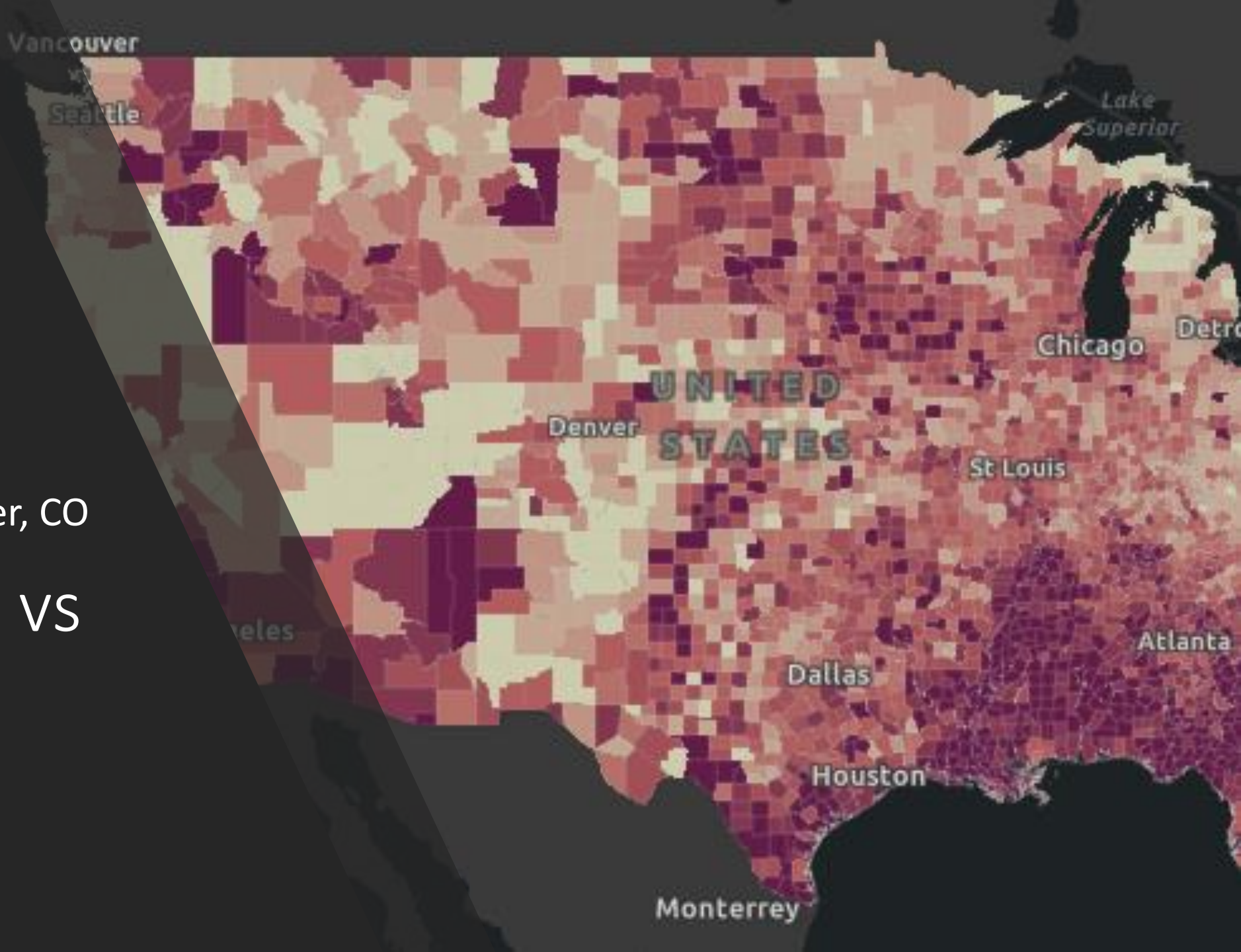- Make the dashboard faster and provide good user experiences

COViz: The Covid-19 Open Visualization Project

Weekly Cases (week ending Tue Mar 24 2020)

New Cases Per Million

10   100   1,000

Logan, CO vs Denver, CO

Raw count vs Rate

Coviz Highlights:
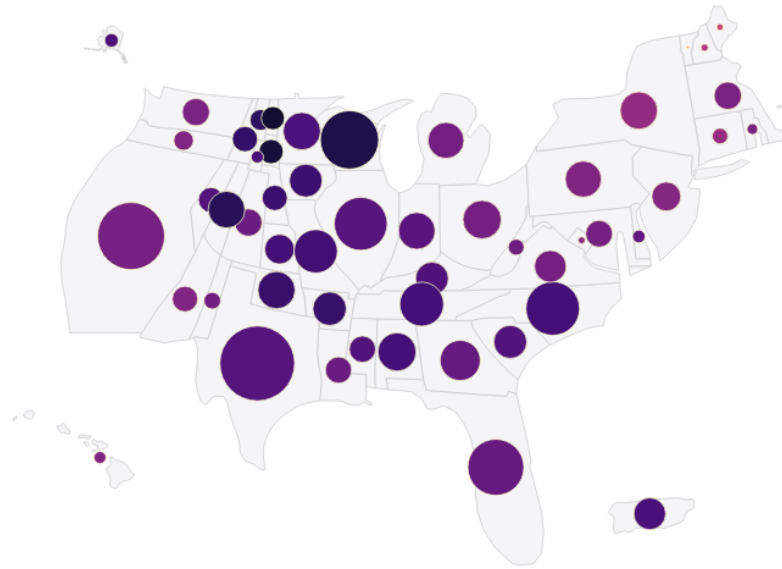
Begun in March 2020

Completely open source, built on D3

Recent cases shown by default

Focus is always on rates per population

Cartograms provide population context for symbols

Smooth animation with controls
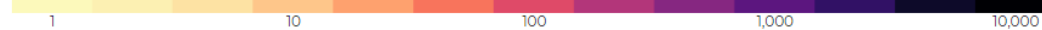
The Covid-19 Open Visualization Project (Coviz)

EIU.EDU/GISCI/COVIZ