

Robin: An Interactive Visualization System and Instructional Tool to Democratize United States Domestic Migration Data

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Migration in the News

BROOKINGS

Election '24 | U.S.

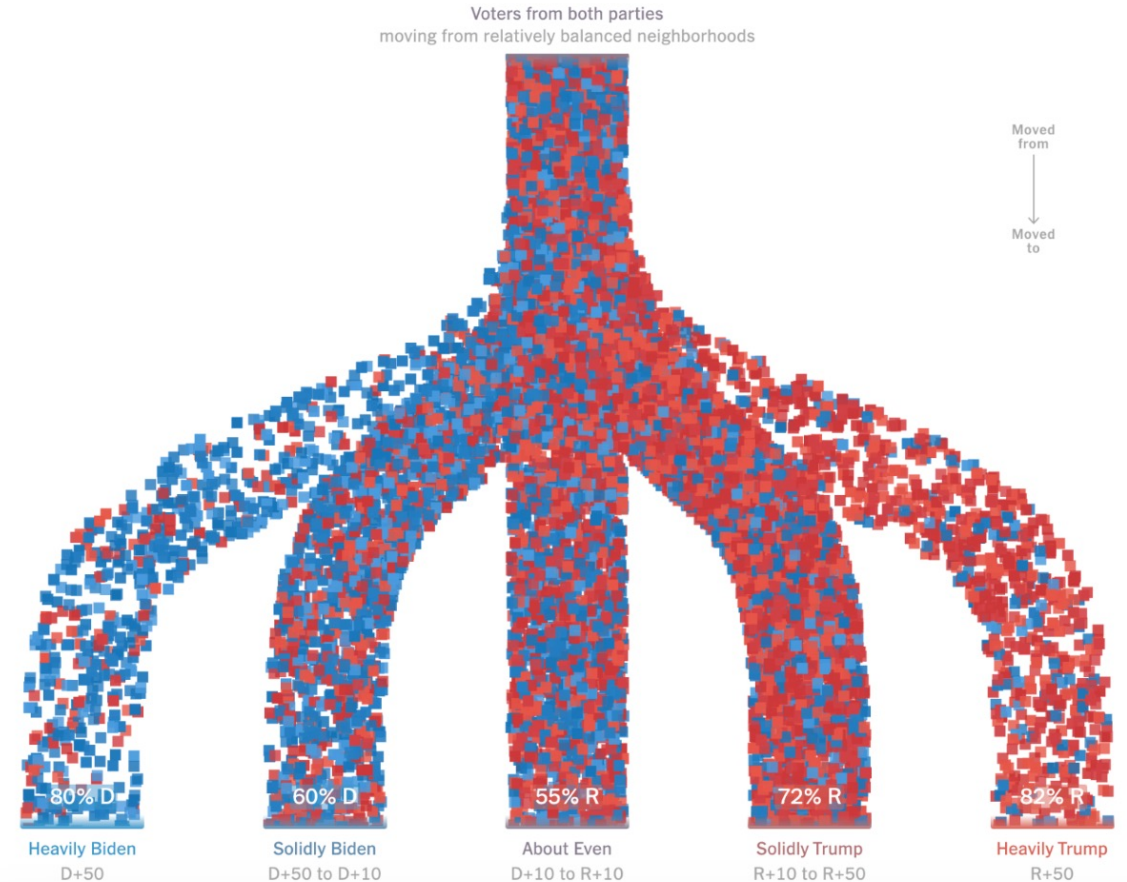
RESEARCH

How the pandemic changed—and didn't change—where Americans are moving

Alan Berube
September 6, 2024

Visualizing How Domestic Migration Impacts Political Polarization in America

by Martin Makaryan | November 8, 2024



Birds of a Feather...

RESEARCH ARTICLE

Migration and political polarization in the U.S.: An analysis of the county-level migration network

Xi Liu¹, Clio Andris¹, Bruce A. Desmarais^{2*} 

- Adjusting for geographic distance, population, and economic variables, **migration flows connect counties with similar political preferences**

Goals

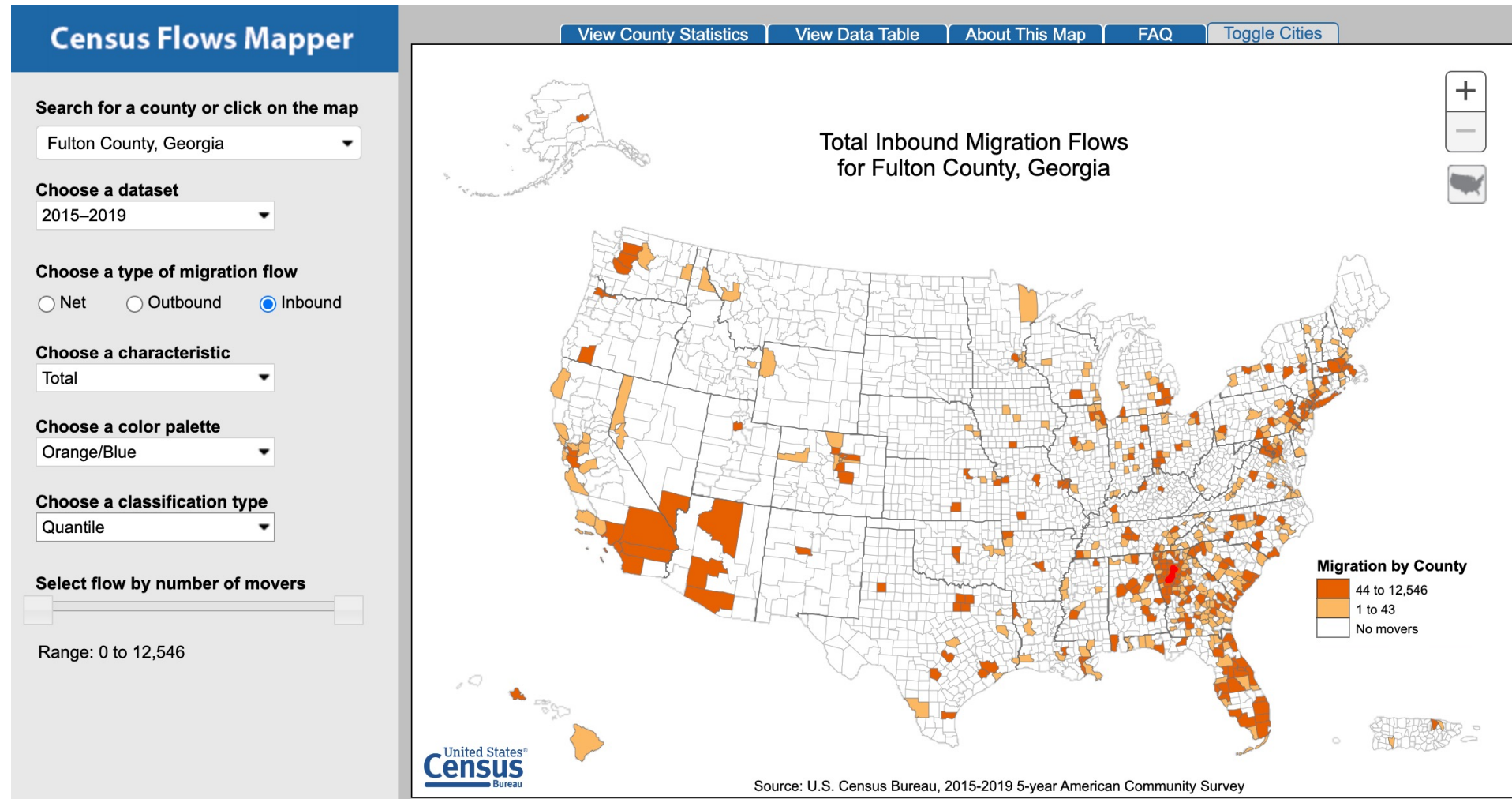
- Create an interactive tool to **help visualize migration patterns** within the U.S.
 - **Democratize data** from publicly available sources about a societally relevant topic
 - Facilitate discovery of **insights**
- Explore how migration flows connect counties based on **county-level attributes**
 - Political preferences
 - Median household income
 - Educational attainment
 - ...



Gaps to Address

- Little focus on promoting **access & engagement** for publicly-available migration/demographic data
- Powerful tools are designed for **experts only**
 - Lack affordances for teaching or engaging non-experts
- No **user-ready tools** for the general public
 - Need to **manually integrate data** from different sources

Tool from Census Bureau (DEFUNCT)



UW Net Migration Mapper

<https://netmigration.wisc.edu/>

Net Migration Patterns for US Counties

Data Details

Data Use

Press and Publications

About

Map

Charts

Data Download

Net Migration by County

☐ show advanced options - 2010s only

Decade

2010s

Migration Type

Total Net Migration

Update Map

2010s Total Net Migration Rate

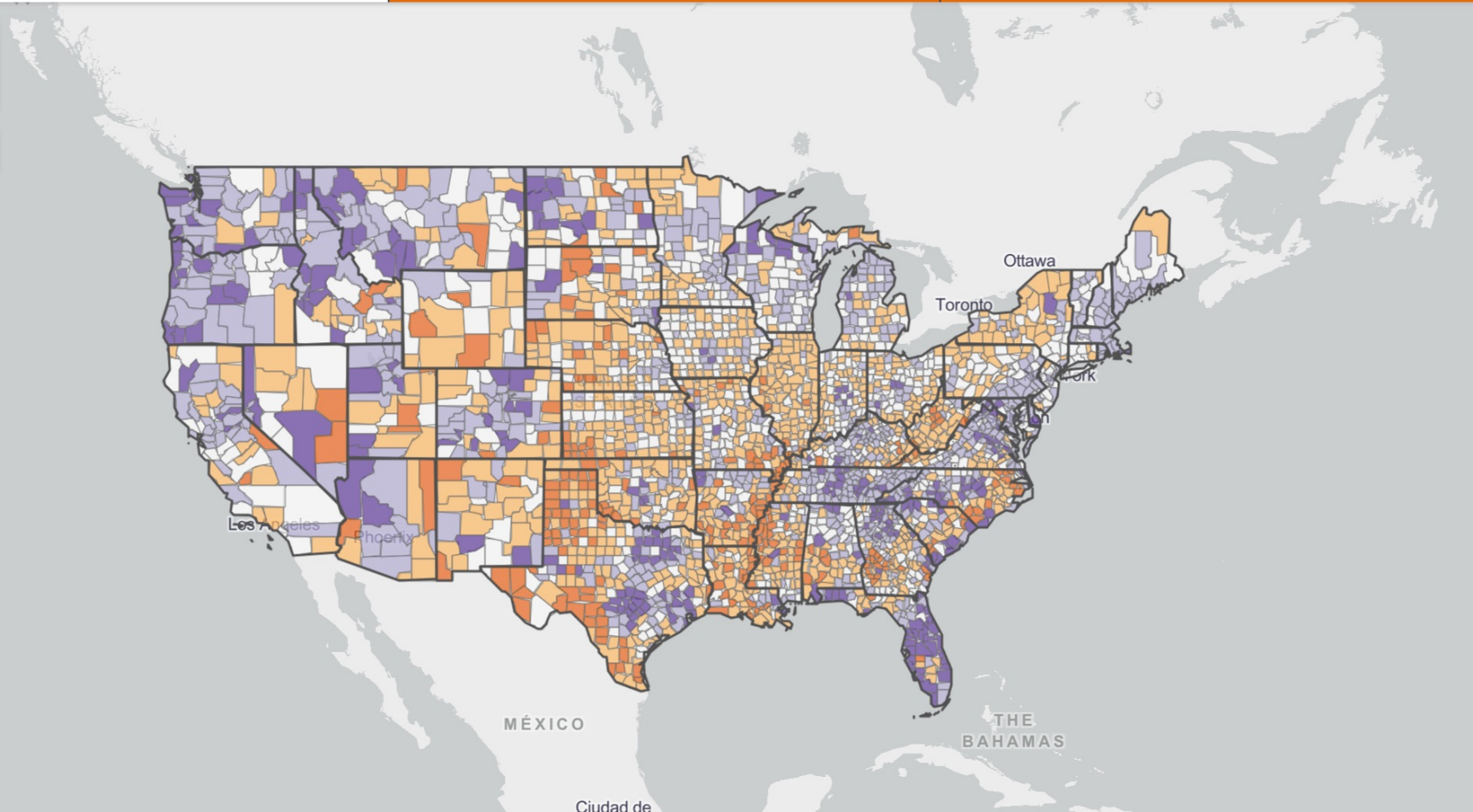
Net Migrants per 100 Individuals



Map Downloads

Download Map Data

Save Image

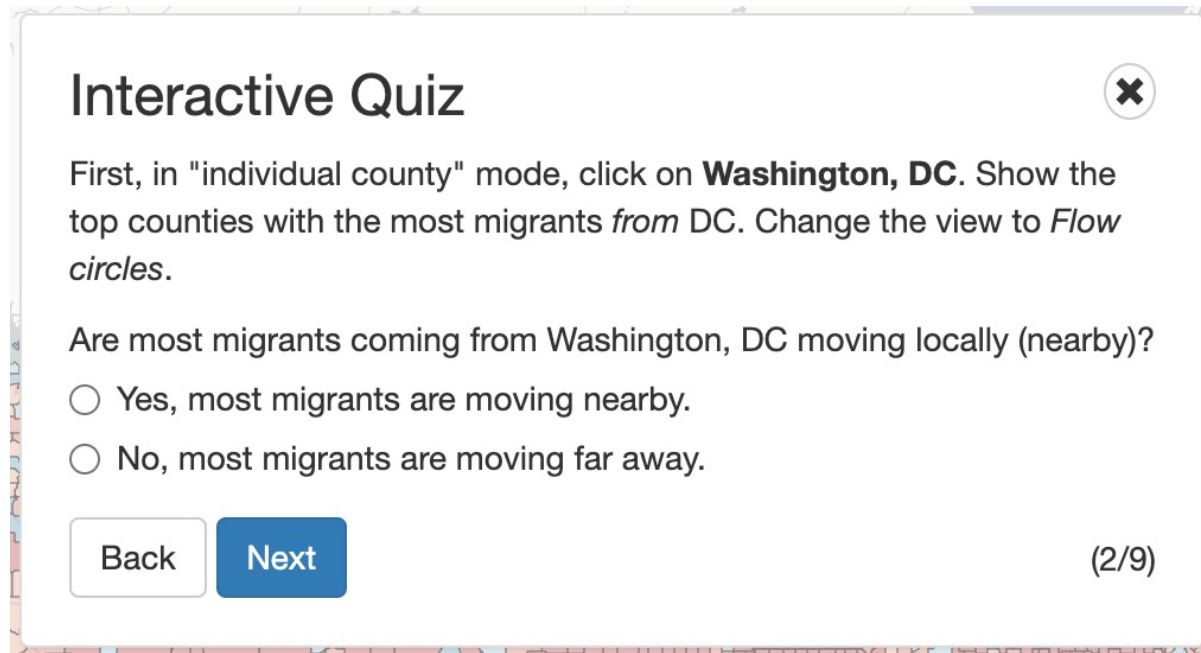


Data for Our System

- **Migration data** from the Internal Revenue Service (IRS)
 - Numbers of “migrants” based on address changes reported to the IRS
 - County-to-county data from 2010-2019
- **County statistics** from Census Bureau estimates (American Community Survey)
 - Median income, educational attainment, ...
- Presidential **Election data** at the county level from MIT Election Data & Science Lab

Non-Expert Features

- **Interactive Quiz** teaches users how to use the Robin system with a game-ified walkthrough

A screenshot of a web-based interactive quiz interface. The title "Interactive Quiz" is at the top left, and a close button (an 'x' in a circle) is at the top right. The main text reads: "First, in 'individual county' mode, click on **Washington, DC**. Show the top counties with the most migrants *from* DC. Change the view to *Flow circles*." Below this is a question: "Are most migrants coming from Washington, DC moving locally (nearby)?" with two radio button options: "Yes, most migrants are moving nearby." and "No, most migrants are moving far away." At the bottom left are two buttons: "Back" and "Next". At the bottom right is the text "(2/9)".

Interactive Quiz

First, in "individual county" mode, click on **Washington, DC**. Show the top counties with the most migrants *from* DC. Change the view to *Flow circles*.

Are most migrants coming from Washington, DC moving locally (nearby)?

☐ Yes, most migrants are moving nearby.

☐ No, most migrants are moving far away.

Back Next (2/9)

- **Public Snapshots** provide a library of saved insights

Demo time!

Choose Mode

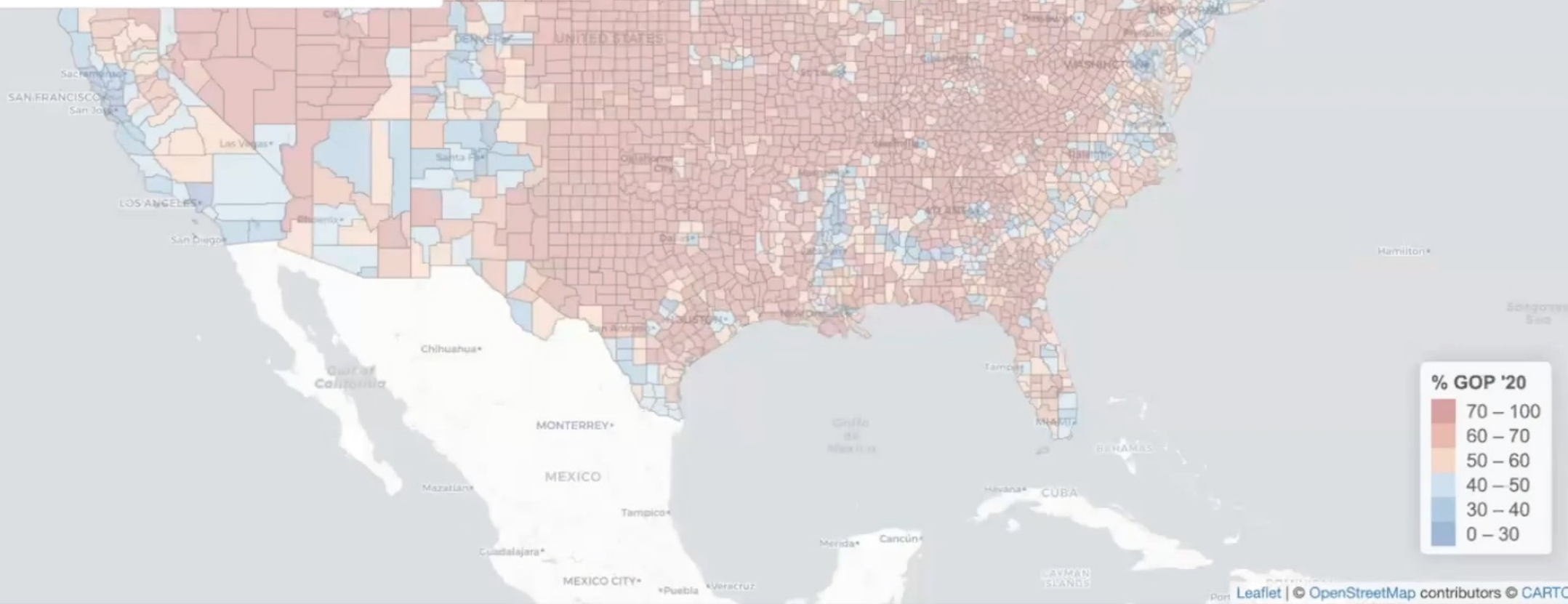
☒ individual county ☐ attribute

Click a County

Click a county on the map to view its migration flows.

Options

Color: Presidential Vote '20



Choose Mode

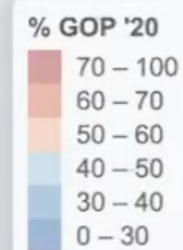
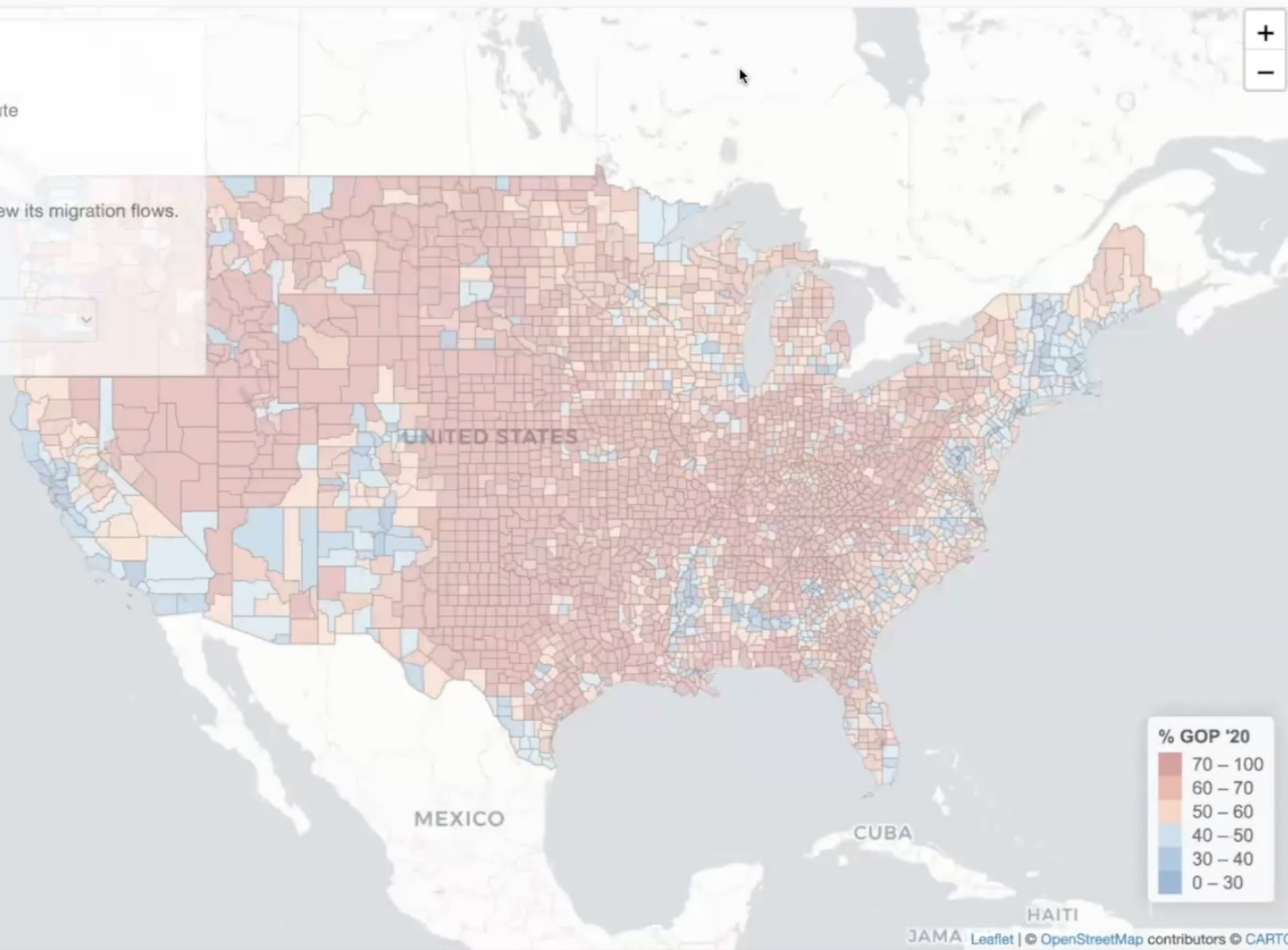
☒ individual county ☐ attribute

Click a County

Click a county on the map to view its migration flows.

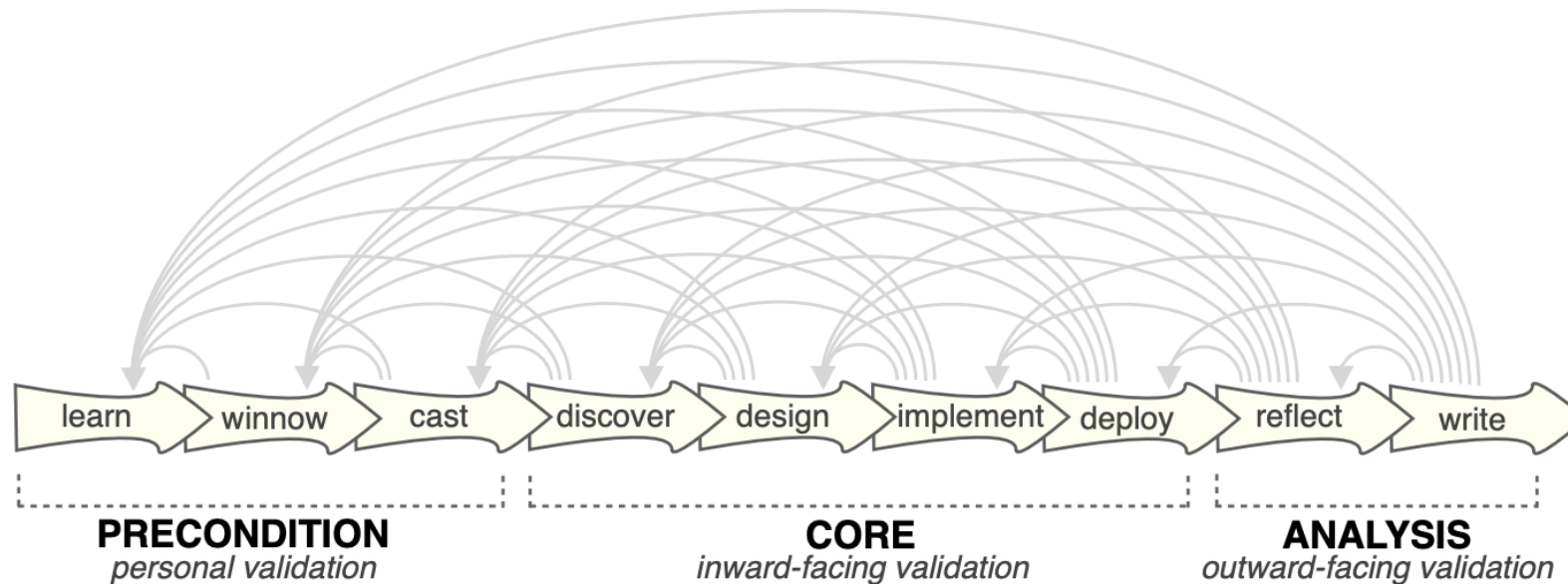
Options

Color: Presidential Vote '20



Development Methodology

- Iterative design process following the Vis Design Study Methodology¹



- Involved both domain experts and non-experts

[1] Sedlmair, Michael, *et al.* "Design study methodology: Reflections from the trenches and the stacks." *IEEE TVCG* 18.12 (2012): 2431-2440.

Code & Deployment



- Robin is programmed in the **R** language
 - Key libraries: Shiny, Leaflet
- Deployed using shinyapps.io
- All code and data released on GitHub

Evaluation Approach

- Two sets of user studies
 - Migration domain experts (8 profs, 1 Census Bureau employee)
 - Non-experts (17 students in undergrad vis course)
- Protocol
 - System demo
 - Free exploration
 - Debriefing interview

Feedback from Non-Experts

- “*really like*” the interactive quiz; “*very well done*”
- Mostly easy to use, but sometimes still “*overwhelming*”
- Snapshots are a “*shortcut to insights*”
- Migration data is personal
 - “*I moved as a whole with my family down to the South [...] it’s interesting to see that other people, I guess, have moved as well.*”

Feedback from Domain Experts

- Useful as a “*hypothesis generator*” for research
- Novelty
 - “*I don’t know that I’ve seen anything like this before [. . .] to kind of characterize the Republican versus Democrat split of counties and then to cross that by migration.*”
- Great potential as a teaching tool
 - “*Really useful to students to explore concepts*”
 - Interactive quiz can “*get them [students] sort of seeing [...] what the possibilities are*”

Additional Expert Feedback

- ***“I talk to media people a lot, and for them to be able to look at something like this while I was talking to them would be another thing that would be a use of it for me.”***

<i>Question</i>	<i>Avg. Score (out of 5)</i>
Q1: I enjoyed using the tool.	4.8
Q2: The tool would be useful for me in an educational setting.	4.75
Q3: The tool would be useful for me in my work or research.	4.4
Q4: The tool clearly shows relationships between migration & other data.	4.8
Q5: I was often confused or disoriented in individual county mode.	2.0
Q6: I was often confused or disoriented in attribute mode.	2.8

Future Directions

- Additional geographic units
 - States, metro areas, ...
- Support for temporal querying
- Longer-term, real-world evaluation
 - Experts expressed interest in classroom use
 - Social good: Can we promote more informed discourse?



Thank you!