A Data Science Approach to Gerrymandering

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Abstract

Gerrymandering is the rearrangement of election districts in such a way that gives one political party an advantage over the other. It is often used to suppress the weight of the political minority. Currently, redistricting is overseen by the majority political party within each state. It persists as an issue today because there are no concrete analytical methods used to judge whether a state has been gerrymandered since it is determined by human judgement.

Currently, the Supreme Court currently deems it "nonjusticiable," meaning the nature of determining gerrymandering is not concrete enough to carry out rulings over. With the ever increasing political tensions, our team tackles an attack on American democracy through looking at voter patterns.

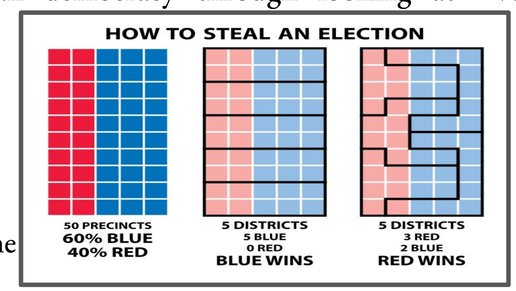

Figure 1: Brief depiction the manipulation of district borders to influence the outcome of an election.

Introduction

We sought to find a way that could find an objective answer to if gerrymandering is impacting swing states. Our project looks at the voter data of swing states to determine whether there are gerrymandered districts.

Our research showed us that there are a handful of ways to see if gerrymandering has taken place, but the efficiency gap is the most reliable metric as it accounts for wasted votes.

We chose to focus our website to depict 10 states: Wisconsin, Ohio, Florida, Pennsylvania, Arizona, Texas, Georgia, North Carolina, Virginia, and Nevada. These states were selected because we felt they would most effectively communicate the different extents of efficiency gaps in different states.

Charts and Maps

State	Efficency Gap	Party Winner
North Carolina	2.40%	Democrats
Ohio	2.49%	Republicans
Pennsylvania	5.67%	Republicans
Georgia	6.11%	Democrats
Virginia	7.50%	Republicans
Florida	8.19%	Republicans
Texas	10.10%	Republicans
Wisconsin	14.44%	Democrats
Arizona	29.92%	Republicans
Nevada	34.67%	Republicans

Figure 2: The table indicates which states have been gerrymandered most and which political party has benefited from the disparity.

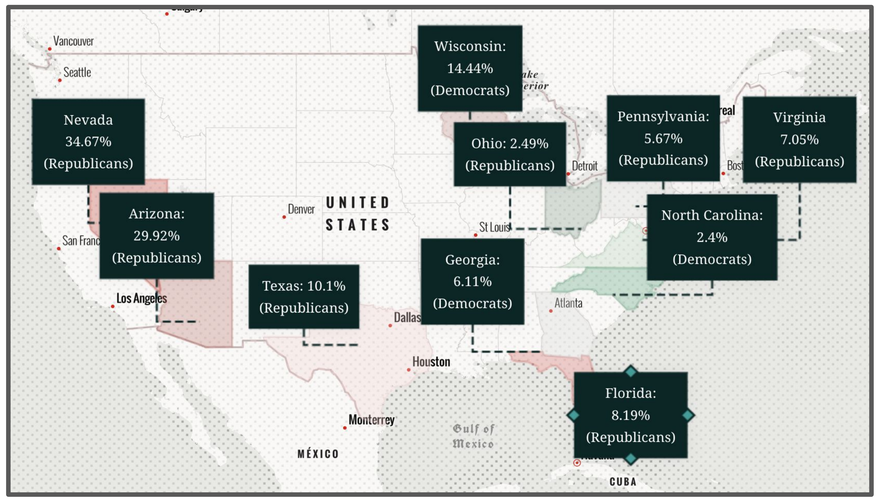

Figure 3: Image from our website's map containing the efficiency gaps of the states in Figure 2.

Efficiency Gap Formula:
Efficiency Gap = (Total Democratic Wasted Votes – Total Republican Wasted Votes) ÷ Total Votes

Website QR

References

Martínez i Coma F, Lago I. 2018. Gerrymandering in comparative perspective. Party Politics. 24(2):99–104. doi:10.1177/1354068816642806.
Petry, Eric. *How the Efficiency Gap Works* . Brennan Center for Justice.
Ingraham, Christopher. "Where Are the Most Gerrymandered Congressional Districts?" *The Washington Post*, WP Company, 26 Nov. 2021

Methods

- We had to find readily available data about each swing state first, which as found on the website Politico
- We used the csv file to create a pandas dataframe in Google Colab
- The data frame was used to find the sum of wasted votes for each party
- Efficiency gap formula was applied after identifying the sum of wasted votes
- We translated these results into a website that could visualize our results
- ArcGIS Storymaps was selected as our website's platform since it could provide us with premade maps that we could then edit

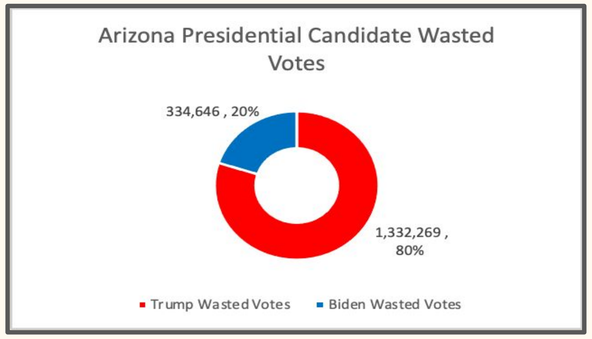

Figure 4: Pie chart of wasted votes for the state of Arizona. This is a visual representation of how the efficiency gap is calculated

Conclusions

We found that of the states we calculated the data for 4 states had a concerning percentage: Texas, Wisconsin, Arizona, and Nevada. What we labeled as a concerning percentage was anything above 8%. Three of the four states that were labeled as gerrymandered were republican won states.

Next Steps

An error with the efficiency gap that we did not have time to fix was for states that may be overwhelmingly one sided. For the future we would try to implement another algorithm to measure gerrymandering. We may have to factor in shape of district, or add a weighted factor if a state is overwhelmingly one sided.