

# Report: Post-Election Geospatial Analysis of 2016 and 2020 Election Results

Written by Gwen. <https://github.com/gowin20>

405196467

Geography 181A

# Introduction

---

As a (wannabe) geospatial analytics consultant, I have been employed to analyze the spatial patterns present in the 2016 and 2020 American presidential elections. This report uses maps, scatter plots, and spatial analysis to try and better understand the spatial dynamics of voting patterns across both the 2016 and 2020 elections.

Here is some preliminary information about this report. From the provided dataset, I used the following variables for my analysis:

- **pct\_dem\_16** : percentage of vote for the Democratic Party in the 2016 election
- **pct\_dem\_20** : percentage of vote for the Democratic Party in the 2020 election
- **pctchg\_dem** : the change in percentage of vote from 2016 to 2020 (calculated as pct\_dem\_20 - pct\_dem\_16)

Additionally, when creating spatial weights, I used a first-order Queen Contiguity algorithm in order to define neighbors.

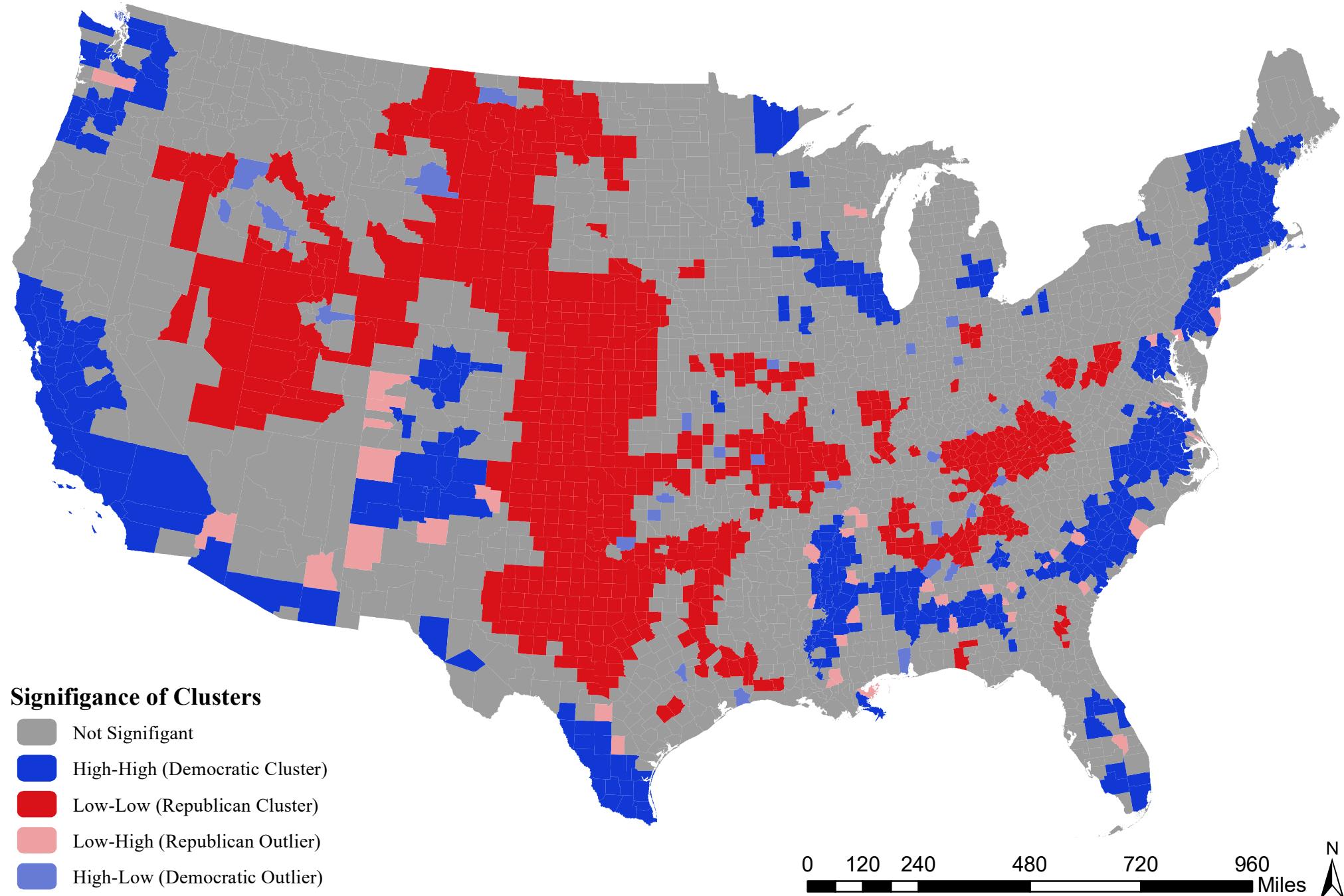
## Overall Assessment

---

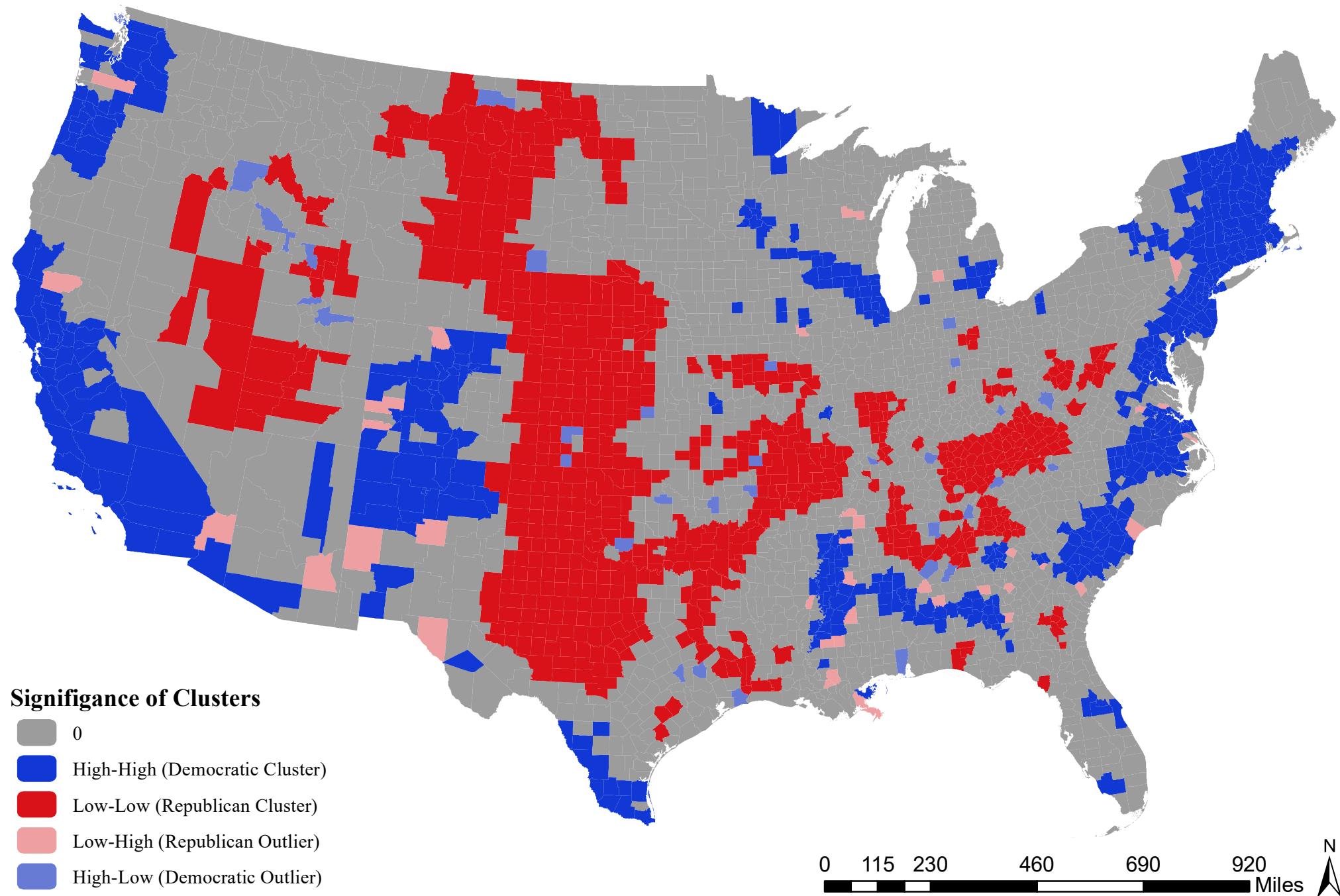
The overall spatial distribution of voting behavior is obviously very clustered. Political vote depends highly on geographic location, clearly exhibiting Tobler's first law of geography. When calculating Moran's I values for 2016 and 2020 election percentages, there was an abundance of evidence supporting the rejection of the null hypothesis. Both 2016 and 2020 election percentages share the same Univariate Moran's I value of 0.606 - indicative of spatial clustering - and are well outside the threshold of randomness. The change of vote percent variable also exhibits strong spatial clustering, with a Univariate Moran's I value of 0.479.

The following maps explore this spatial distribution in greater detail by examining the local spatial autocorrelation through univariate LISA mapping techniques.

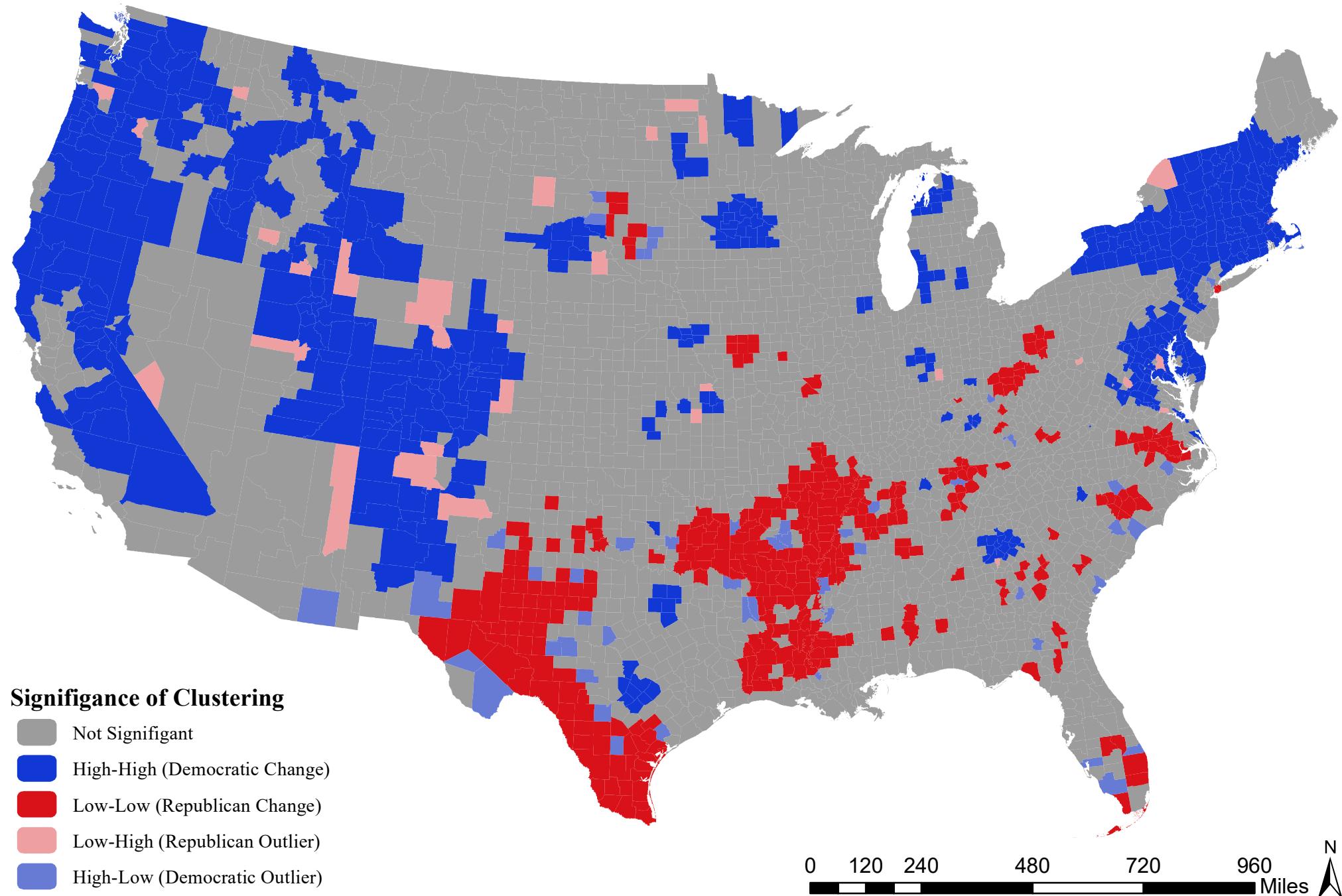
# Statistically Significant Clusters in the 2016 Election



# Statistically Significant Clusters in the 2020 Election



# Significant Clusters in the Percent Change in Democratic Vote from the 2016 Election to the 2020 Election



# Univariate LISA Map Analysis

---

## 2016 Election and 2020 Election Maps

All three of these maps showcase interesting relationships that are clearly geographic in nature. While the 2016 and 2020 election maps initially look similar, comparison of the two brings to light some notable differences. High-High clusters - those counties which have both positive percent values and positive lagged percent values of their neighbors - are generally larger and more frequent in 2020. On the 2016 and 2020 election maps, these clusters represent counties which voted in blocks for the Democratic party. On the other end of the spectrum, Low-Low clusters represent those which voted in blocks for the Republican party. While these clusters in 2020 are somewhat smaller in the Western United States, many of them are actually even larger than they were in 2016. For both the 2016 and 2020 map, Republican clusters are almost exclusively present in the inland United States, namely the Great Plains and South-Central America (Tennessee, Kentucky, Northern Alabama, etc). On the other hand, Democratic clusters are present both in coastal regions and major cities. The clusters which increased the most in size from 2016 to 2020 encapsulate most of California, Colorado, Minneapolis, and New England / the Northeastern United States.

Interestingly, a significant Democratic cluster is also present along the banks of the Mississippi river and in southern Alabama. These clusters are unexpected given the track records of Mississippi, Alabama, and Louisiana in past elections. These southern clusters correlate almost exactly with the geological region of America known as the [Black Belt in the American South](#), historically home to the majority of plantations before the Civil War. I'm not sure what this correlation means, but the widespread Democratic support in these regions may be indicative of different demographic groups there, and perhaps be a positive indicator that some of these states may soon flip blue.

### Percent Change from 2016 to 2020 Map

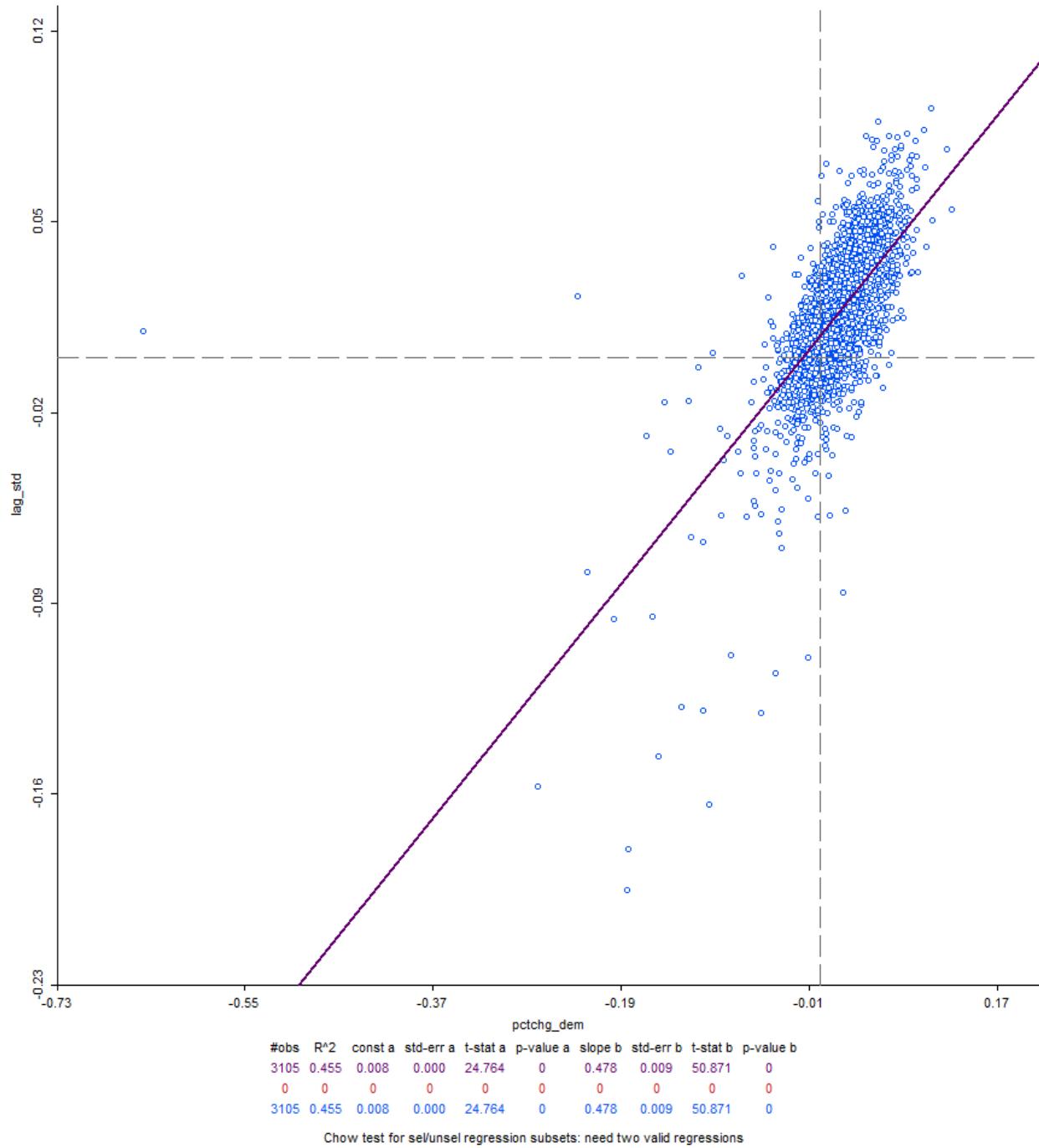
The map showcasing clustering in the percent change in democratic vote from 2016 to 2020 is perhaps the most interesting. While the previous maps showcase raw results, this one is more indicative of trends in voter behavior across the last four years. Large High-High clustering is present, indicative of positive change in support for the Democratic party. These clusters are mostly in the Western US, as well as the Northeast from DC up through Maine. Additional large clusters are present around Minneapolis, Atlanta, Dallas, and Houston, as well as select other counties around the country.

On the other hand, there are also large clusters of Low-Low results, indicative of a lessening of support for the Democratic party. Due to our two-party system, this may be interpreted as a positive change in support for the Republican party. While not as numerous as the Democratic clusters, Republican clusters are still present, mostly in the Southern United States. In particular, the border that Texas shares with Mexico all shifted significantly towards the Republican party, as well as the entire state of Arkansas and much of Louisiana. Additional places in North Carolina, Southern Florida, Kansas City, and select other counties also showed an increase in support of the Republican party.

Almost all counties which increased their support for the Republican party are located in the Southern United States. In my view, this shows the extreme geographic and cultural significance of "The American South" as a region. Historically, this region has always held different political ideals than the rest of the nation. This has directly resulted in many conflicts, the largest of which of course being the Civil War. While many Americans consider this cultural divide to be part of the past, this analysis certainly shows the growing association of the South with the Republican Party. Since the Civil War, the issue at the center of this divide has always been Racism. While slavery and segregation are no longer present, their cultural shadow still looms large in the South, and it is disheartening to see that the Republican party is becoming more and more closely associated with this imagery. Up until college, I've spent my entire life living in the South - in Nashville, Tennessee - and this topic is especially interesting to me because of it.

# Directional Local Autocorrelation Analysis

## Origin Standardized Scatter Plot



**x-axis:** percent change in Democratic vote from 2016 to 2020

**y-axis:** lagged percent change in Democratic vote of surrounding counties from 2016 to 2020

## Scatter Plot Analysis

This origin-standardized scatter plot provides a very effective tool for parsing how support for the Democratic party has changed from 2016 to 2020. Values to the right of the origin indicate increased support for the democratic party - about 2,298 of the total 3105 counties analyzed here. Values above the origin indicate that counties surrounding the given county have increased in support as well. This means that points in the first quadrant of this scatterplot are indicative of new democratic clusters of counties, where multiple counties in a geographic region have increased their support of the Democratic party since 2016. It's somewhat exciting to see how many counties fall into this category; around 1,982 or 63%. This doesn't mean that all of those counties were won by democrats - many were not. It just means that these counties have increased their support of the democratic party in clusters. The regions exhibiting the greatest positive change are central Colorado, New England, and Georgia. These regions are all highlighted as significant clusters on the prior localized LISA map of percent change in Democratic vote.

On the flipside, areas in the third quadrant of the map (negative in both values) indicate clusters of counties which have shifted more towards the Republican party. These values exhibit even more notable spatial clustering than the values in quadrant one. Nearly every single value here is located in the Southeast. There are no values west of Texas, and very few north of Tennessee. In particular, every single outlier which has greatly shifted towards the Republican party lies in Southern Texas, right along the border of Mexico. Clearly something has happened in this region to shift support vastly towards the Republican party, as the amount by which they have shifted is larger than any other points on the plot. The area which has undergone the next most extreme shift is Arkansas. While these trends were present on the previous map plotting the clustering of percent change in Democratic vote, this scatter plot has allowed us to identify those regions which underwent the most extreme changes.