Looking at 2016 Presidential Election from Geography Perspective

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Introduction
This research examines the 2016 presidential election using a newly developed spatial statistical technique, Multi-scale Geographically Weighted Regression (MGWR), to examine spatial variations in the determinants of voting behavior (Fotheringham et al., 2017). The associations between 12 county-level socio-economic variables from the ACS (American Community Survey) and the percentage of the vote going to the Democratic party in each county were uncovered through regression with the research questions being "Do these associations vary across the country?" and "To what extent does geographical context affect the way people vote?".

Data and Model Specification
The dependent variable is county-level proportion of Democrat votes in straight fight between Democrats and Republicans after removing third parties. Eleven county-level socio-economic covariates were selected from American Community Survey 2015 5-year estimate datasets including sex ratio, % of population age 18 to 29, % of population age 65 and over, % of Black, % of Hispanic, household median income, % of college degrees, Gini coefficient, % of employment in manufacturing, log scale of population density and log scale of third party vote share. Both dependent and independent variables were normalized with mean = 0 and standard deviation = 1.

Methods
Standard models assume the processes generating the data we observe are the same across space. Geographically Weighted Regression (GWR) removes this assumption and allows processes to vary over space – this is referred to as Spatial Heterogeneity. In this study, we used the recently derived Multi-scale GWR (MGWR) model, which allows the rate at which data are borrowed from nearby locations (bandwidth) to vary across the covariates. The formulation of MGWR is as follows (Fotheringham et al., 2017)

\[ y_i = \beta_0(x_i, v_i) + \sum_{j=1}^{m} \beta_{ij}(x_i, v_i)x_{ij} + e_i \]

Since all the covariates are normalized, we establish two scenarios:
• If all counties had an average socio-economic composition, then the covariates \(x_{ij}\) will be all be zero and \(y_i = \beta_0(x_i, v_i) + e_i\) so that the predicted local intercept describes the geographical contextual effect in voting Democrat.
• Conversely, if geography did NOT influence voting behavior and we remove the intercept term, then \(y_i = \sum_{j=1}^{m} \beta_{ij}(x_i, v_i)x_{ij} + e_i\). This predicted value is then the democratic share of the vote which results solely from the socio-demographic composition of each county’s population and has nothing to do with geography.

Conclusion
• Geographic context influences voting behavior significantly. Voters in southern US counties inherently favor the Republican party while voters in northern and west coast counties inherently favor the Democratic party.
• The socio-economic composition of southern US counties should favor the Democratic party, while Central and Northern US counties should favor the Republican party but these influences are outweighed by geography.
• The MGWR model replicates 94% of the variance in voting behavior compared to only 64% by the traditional OLS model.

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Reference