Marschall Furman

Andrew Giffin

Matt Miller

**Final 733-Project Proposal**

**Overarching goal:** create a spatio-temporal model of voting/demographic data in North Carolina, that’s able to predict NC election outcomes, and can inform the drawing of new districts in non-gerrymandered ways.

Main goals of our study:

* Collect and clean North Carolina voter data over space and time at the precint level, as well as county level demographic data.
* Use a hierarchical Bayesian spatio-temporal model (details to be informed by the data) to model voting.
* Use this model to examine the various maps (some gerrymandered; some not) generated by Jonathan Mattingly’s team at Duke:

<https://sites.duke.edu/quantifyinggerrymandering/author/jonmduke-edu/>

* Potentially draw other conclusions about NC voting trends.
* Examine different voting maps now and in the future, and potentially under different scenarios.

Our approach:

* Our approach is divided into two halves:
  + First half: estimate a rigorous spatio-temporal model for precinct-level voting, that will additionally show the relationship between voting and demographics. Our intuition is to use a binomial GLM to predict vote counts for Democratic and Republican candidates in each precinct.
  + Second half:
    - Use forecasted demographic projections to estimate future voting.
    - Examine different voting maps now and in the future, and potentially under different scenarios.
    - Choose an “optimal” map over a 10 year period, based off projected demographic changes. District maps remain constant for 10 years.
    - Speak to the “fairness” of voting maps more generally.

Team member roles:

* We plan to divide thing relatively equally, but we do plan to somewhat specialize:
  + Marschall is largely focusing on collected data
  + Andrew is largely focusing on the precinct level spatio-temporal model
  + Matt is largely focusing on the complexities related to the different possible voting maps.