Margot Stewart
12/16/2018
15-300
Project Milestone Report

There haven't been any major changes to my plan for my project; I still intend to construct an algorithmic model for our proposed congressional redistricting methodology that we formalized over the summer. This tool should be usable to produce concrete districting proposals for at least the handful of states whose voter data we have access to.

At this point in the game, I still do not have a model implemented yet. This is due in part to a number of other competing projects I had at the end of this semester and to a bit of uncertainty as to where to start. Namely, while I am sufficiently familiar with the constrained optimization tools I'll have to work with to implement the model, I'm not sure what the best way to represent the problem is. This is because our theoretical approach was based on a continuous two-dimensional plane. Not just that, but the continuous nature of our representation was essential for our theorem; our attempts to make similar guarantees under a discrete graph model thus far have failed. However, in order to implement the algorithm I will need to somehow discretize the map to be divided up, and I still need to decide on how to do this in a fashion that will avoid issues. My intuitive and currently strongest inclination is to represent all census nodes or precincts as nodes in a graph connected based on border adjacency, which might be able to work if the district borders could be drawn up on the continuous plane after the allocation of the nodes to districts. However, I'm not sure how to automate this.

At this point, however, I don't necessarily feel stuck; this is theory and modeling work, and carefully choosing a representation is important. My intention is to dig through the literature with a fine-tooth comb over the break and see how others have implemented constrained redistricting algorithms. I've already begun looking through some articles on genetic algorithm implementations, which, while not likely the exact strategy I will use, provide unique representational challenges that I suspect might offer some insight. I'll be able to access the CMU library via VPN, as well as the CSU library at home, so I am fairly confident I have all the resources I'll need for this research.

Since the model hasn't been implemented yet, my milestones for next semester will need to be adjusted somewhat. At this point, I think I can hope to have a working general districting algorithm in place by the end of January. After that point, I can tune it and constrain it to fit our theoretical approach throughout the month or so after that and then construct the districtings from our state data.