

GerryChain Practice Day 5: Extremal GerryChain

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1 Introduction

Congratulations on learning on all of the components of GerryChain! Hopefully over the last four days you have been able to try out many of the possible analyses that our software permits and get a sense for the inherent complexities of ensemble analysis. In many ways, these exercises just scratch the surface of the data collection/preparation problems presented by each new state and the modeling decisions that are necessary for performing even simple experiments. Our goal was to provide you with enough exposure so that you

It seems likely that most of you will be working on polishing a few last things up for the your state presentations this afternoon. Also, we have already covered all of the main pieces of GerryChain as described in the [guide](#)¹. Thus, instead of introducing new techniques, the list of tasks to attempt below describes some optimization tasks that will require you to combine the ideas from earlier in the week in novel ways. In particular, those of you who have gotten tired of looking at the outline of your state might try these out on one of the other states where we have precinct data with votes. No need to go through the list sequentially, instead read through them and see if any seem particularly interesting to you.

2 ☺

1. What is the Congressional plan with the highest/smallest proportion of cut edges you can create?
2. What is the smallest population imbalance you can generate for each type of districting plan?
3. What is the largest number of nodes that you can fit into a single contiguous district with no more than 5% population deviation.
4. What is the largest number of districts that you can get to within 1% population deviation?
5. What is the largest number of donut district you can create in a single plan?
6. In a single plan, what is the maximum/minimum number of Congressional districts that touch the exterior boundary of the state?
7. Across an entire ensemble, what is the maximum difference you can create between the largest and smallest population deviation or cut edges?
8. Can you create a Congressional plan and a Senate plan for your state so that the Senate plan has fewer cut edges than the Congressional plan?
9. Using the FKT code from the GerryChain Templates Alaska directory, what is the largest number of matchings you can generate on the dual graph of a House plan for your state?
10. Run the SIR code on your state (you'll need to copy your json/shapefile to the day5 directory²). Can you find a combination of parameters where the infection dies out before infecting all the nodes?

¹which is also a useful resource for later on when the memories of this week have started to fade.

²or move SIR.py to wherever you have the data saved.