

# Reading Assignment 3

Due Jun 18 Noon EST

## Introduction

For the final reading assignment of the course, you have two options:

- You can take the proposed reading assignment. (See below)
- You can suggest your own topic on a research area related to Probability.

## Instructions for Option 2

If you choose Option 2, you must write a proposal and have me approve it. The proposal should include:

- Assignment title/topic;
- Tentative list of references;
- Short discussion on why you want to study the problem and how it is related to probability.

The proposals are **due June 14 noon**. Email me the proposal.

Below I have listed some good example topics. The topics vary from very technical to more applied, and some of them require in-depth knowledge beyond the scope of this course - only choose such topic if you are already knowledgeable about it! The most important criterion is that your choice should reflect your own interests. Example topics:

- A review article on some applied paper that has substantial statistical/probabilistic content;
- Election predictions;
- The SIR model and corona virus.
- User's guide to multi-level modeling;
- Hands-on Tutorial on Markov Chain Monte Carlo;
- The Erdos-Renyi graph model;

You may also pick a topic to work on as a group, there is no limit how many people can pick the same topic. In this case everyone has to turn in their individual work, and the nature of collaboration must be specified. Your work may be based on your own research, but in that case be careful and explicit about stating your references. Plagiarism, including self-plagiarism, is not tolerated.

I am expecting an essay of some sort, but if your work is technical, you may diverge from this form. If you write an essay, it should not exceed 3 pages, single spaced.

### **Do not over-scope your assignment**

The assignment is very open-ended, so there is a danger of over-scoping it. Whatever you do, the workload of this assignment should be **at most** that of the first reading assignment. Crafting the topic itself is a lot of work, it is better to focus on a small problem and explain that well than have a large and ambitious but half-finished project. The exposition should be on the level that any of your peers could understand it. I am not an expert on the applications, so it is important to explain those areas in an easy-to-digest format.

## **The proposed assignment: Gerry Mandering**

Explore the Duke Gerrymandering site [2] and write a short essay on the Gerrymandering problem. You will find good resources under the Papers/Talks section of the website.

In your essay explain and discuss in your own words the *Simpsons Paradox* and Post-stratification[1] and how they relate to the Gerrymandering problem. You may also pick a specific paper and discuss that in detail.

Your essay should not exceed 3 pages, single spaced.

## **References**

- [1] Prof. A.Herring *Statistical Case studies: post-stratification* [https://amy-herring.github.io/case-studies/decks/cs04\\_2\\_deck.html#/](https://amy-herring.github.io/case-studies/decks/cs04_2_deck.html#/)
- [2] Prof. J.Mattingly et al. *Quantifying Gerrymandering* <https://sites.duke.edu/quantifyinggerrymandering/>