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Mentor: Erin Lipman 2022/03/15

Covid case fatality rate modeling

Throughout the Statistics and Probability Association's Directed Reading Program, I was introduced to an increasingly popular philosophy of statistics called "Bayesian" statistics. In the first couple weeks, my mentor Erin and I discussed Bayesian inference and the basic tools for performing Bayesian calculations. Although Bayesian theorem is a basic notion, I gained a greater depth of understanding in Bayesian perspective and broad statistical background from weekly assigned readings. Compared to frequentist statistics, Bayesian statistics aren't justifying their inferences with imagined repeat sampling. It allows me to assign probability to certain events to reflect the uncertainty in my knowledge, and update the probability in light of seeing new data or evidence about those events.

In the last three weeks, we moved onto modeling the covid death fatality rate in Washington State from Bayesian perspective. First, we collected the number of death cases in each county, and we collected 2 weeks (14 days), an estimate of the average time from diagnosis to death, beforehand to correct the data to reflect the death lag behind cases. After that, we built the models from the frequency perspective and Bayesian perspective by hand. Compared to the Bayesian model, case fatality rate in the frequency model was quite noisy, especially for counties with limited amounts of data. From the Bayesian perspective, I could combine what we know about the average death rate in Washington state with the data for each county to get a better estimate of the death rate. At the end, we used a geospatial heatmap to visualize the difference between two models.

Overall, I had a great experience working with mentor Erin on this project. She is patient, and really good at explaining complex definitions in an intuitive way. Also, I got more knowledge about the application and importance of Bayesian Statistics.