What I want to do is to replicate empirical part of a job market paper by Karan Adusumilli. This paper gives him a job in UPenn.

The main contribution of this paper is providing a valid bootstrap procedure for propensity score matching.

When estimating average treatment effect, since the two potential outcomes Y(0), Y(1) are not observed simultaneously, people usually calculate the difference in the average outcome for the treatment group and control group when the propensity score is fixed. This is called the propensity score matching estimator.

This estimator has the desired asymptotic properties, it is consistent and asymptotically normal. But Abadie and Imbens show that the naïve bootstrap inference is not valid. This paper shows how to do a valid bootstrap inference.

The procedure involves calculating the potential errors and the potential matching function. Potential means that one of them are unobserved. And then the paper uses potential errors and potential matching function to construct a statistic and show that it is asymptotically normal.

The empirical part of this paper compares the inference method based on bootstrap and the inference method based on asymptotic result. The result of this paper shows that the inference method based on bootstrap behaves better than the inference method based on asymptotic result.

I need to replicate the simulation results and also replicate a case study. The key computational component is finding the MLE from maximizing the multivariate objective function. The replication also estimates the distribution of covariates nonparametrically.

From this project, I can learn more about this new bootstrap method and get more insights about how to perform finite sample inference better.