

This paper made theoretical analyses of the role of propensity score matching in studying the causal effects of treatment. The propensity score is defined as the condition probability of being assigned the treatment given the observed covariates. Matching propensity scores encourage the treatment group to have similar covariate distributions compared to the control group, which mimics the randomization process in experimental studies and reduces the selection bias.

This paper is one of the most important works in the development of causal inference. The authors make analyses and draw conclusions from assumptions carefully and rigorously. Though the framework of propensity score matching was proposed 40 years ago, it still serves as the foundation block in causal inference studies. The basic idea of propensity score is to use a function to map covariate to a scalar that reflects the probability of receiving treatment. Therefore, various algorithms, from linear regression to large language models, can be used as such functions to make the prediction. To me, it is the most charming part of this paper: no matter what novel algorithm has emerged, it can always be fit into such a classic and solid framework though the framework was proposed 40 years ago.