

UCLA

BIOSTATISTICS SEMINAR

SPRING 2012

Bias and variance trade-offs when combining propensity score weighting and regression: with an application to HIV status and homeless men

Daniela Golinelli, PhD

Statistician, The RAND Corporation

Candidate for the Open Search in Biostatistics with Support from
Focus Group in Psychiatry

Monday, April 30, 2012

3:30pm - 4:30pm, CHS 33-105A

Refreshments served at 3:00 PM in room 51-254 CHS

ABSTRACT: The quality of propensity scores is traditionally measured by assessing how well they make the distributions of covariates in the treatment and control groups match, which we refer to as "good balance". Good balance guarantees less biased estimates of the treatment effect. However, the cost of reducing bias to achieve good balance is that the variance of the estimates increases due to a reduction in effective sample size, either through the introduction of propensity score weights or dropping cases when propensity score matching. In this paper, we investigate whether it is best to optimize the balance or to settle with a less than optimal balance and use double robust estimation to adjust for remaining differences. We compare treatment effect estimates from regression, propensity score weighting, and double robust estimation with varying levels of effort expended to achieve balance using data from a study about the differences in outcomes between HIV positive and negative heterosexually active homeless men residing in Los Angeles. Results from a simulation study suggest that there are instances in which we can obtain more precise treatment effect estimates without increasing bias too much by using a combination of regression and propensity score weights that achieve a less than optimal balance. There is a bias-variance tradeoff at work in propensity score estimation; every step toward better balance usually means an increase in variance and at some point a marginal decrease in bias may not be worth the associated increase in variance.