Propensity score weighted multiple group structural equation modeling

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Abstract

In behavioral sciences, interests of researchers often lie in differences of constructs between groups. Multiple group structural equation modeling (multiple group SEM) is very useful model for this purpose. However, random allocation to groups is usually not implemented, thus distributions of covariates differ between groups. Differences of distributions of covariates inevitably make estimates of parameters (then differences of groups) biased when one uses multiple group SEM model.

To estimate average differences of group in non-randomized study, Rosenbaum & Rubin proposed “propensity score” analysis method (1983). Although their proposed methods have been refined and applied to many areas such as medicine, economics and psychology by several researchers, this methodology was only useful in simpler models such as comparisons of means.

In this research, our aim is to propose a method to integrate propensity score analysis and multiple group SEM model. To do so, we define a modified likelihood using propensity score weight for each individual in the spirit of Horvitz-Thompson estimator (1952).

We also propose an estimation method that maximizes the weighted likelihood.

We prove consistency of the proposed estimator and show the asymptotic variance of the estimator. Some simulation studies also justify the validity of the proposed model and the estimation method. A simple illustration will also be given.

References

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