

BLCFA: An R package for Bayesian model modification in confirmatory factor analysis

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Confirmatory factor analysis (CFA) has been widely used in psychological research to investigate the structure of latent variables. However, strict constraints are imposed on traditional CFA. As a result, fitting data to CFA with strong assumptions such as conditional independence between items given factor often leads to poor model fit. A commonly used method to improve model fit is to tweak residual correlation coefficients between items given factor based on modification indexes (MIs). However, the MI approach requires fixing the coefficients one at a time. When there are many MIs, the procedure is not efficient, and subjective choice of what to modify could lead to biased estimates. Pan, Ip, and Dubé (2017) proposed a Bayesian Lasso method for deriving a sparse positive definite residual covariance matrix. The method shrinks weak residual correlations toward zero and detects significant residual correlations. In this presentation, we further extend that work and outline a two-step approach for practical CFA fitting. We will describe the R package ‘blefa’ which aims to: (1) detect significant residual covariances different from zero by Bayesian covariance Lasso CFA; (2) free the identified residual correlation parameters; and (3) automatically feed the output from (2) into *Mplus* to obtain an appropriately modified CFA model. This method circumvents the problem of manually modifying parameters one-at-a-time. We conducted simulation studies to evaluate the validity of the proposed procedure. In the presentation, we will provide a brief overview of the structure of the package and illustrate its practical implementation through a real data example.

Key words: confirmatory factor analysis, Bayesian Lasso, model modification