Ivan Jacob Agaloos Pesigan

August 13, 2023

References

Cheung et al.: semlbci: An R package for forming likelihood-based confidence intervals for parameter estimates, correlations, indirect effects, and other derived parameters

Cheung-Pesigan-2023b

Shu Fai Cheung and Ivan Jacob Agaloos Pesigan. "semlbci: An R package for forming likelihood-based confidence intervals for parameter estimates, correlations, indirect effects, and other derived parameters". In: *Structural Equation Modeling: A Multidisciplinary Journal* (May 2023), pp. 1–15. DOI: [10.1080/10705511.2023.2183860](10.1080/10705511.2023.2183860).

Abstract: There are three common types of confidence interval (CI) in structural equation modeling (SEM): Wald-type CI, bootstrapping CI, and likelihood-based CI (LBCI). LBCI has the following advantages: (1) it has better coverage probabilities and Type I error rate compared to Wald-type CI when the sample size is finite; (2) it correctly tests the null hypothesis of a parameter based on likelihood ratio chi-square difference test; (3) it is less computationally intensive than bootstrapping CI; and (4) it is invariant to transformations. However, LBCI is not available in many popular SEM software packages. We developed an R package, semlbci, for forming LBCI for parameters in models fitted by lavaan, a popular open-source SEM package, such that researchers have more options in forming CIs for parameters in SEM. The package supports both unstandardized and standardized estimates, derived parameters such as indirect effect, multisample models, and the robust LBCI proposed by Falk.

Eddelbuettel et al.: Rcpp: Seamless R and C++ Integration

Eddelbuettel-Francois-Allaire-etal-2023

Dirk Eddelbuettel et al. *Rcpp: Seamless R and C++ Integration*. 2023. URL: https://CRAN.R-project.org/package=Rcpp.

Neale et al.: OpenMx 2.0: Extended Structural Equation and Statistical Modeling

Neale-Hunter-Pritikin-etal-2015

Michael C. Neale et al. "OpenMx 2.0: Extended Structural Equation and Statistical Modeling". In: *Psychometrika* 81.2 (Jan. 2015), pp. 535–549. DOI: 10.1007/s11336-014-9435-8.

Abstract: The new software package OpenMx 2.0 for structural equation and other statistical modeling is introduced and its features are described. OpenMx is evolving in a modular direction and now allows a mix-and-match computational approach that separates model expectations from fit functions and optimizers. Major backend architectural improvements include a move to swappable open-source optimizers such as the newly written CSOLNP. Entire new methodologies such as item factor analysis and state space modeling have been implemented. New model expectation functions including support for the expression of models in LISREL syntax and a simplified multigroup expectation function are available. Ease-of-use improvements include helper functions to standardize model parameters and compute their Jacobian-based standard errors, access to model components through standard R $ mechanisms, and improved tab completion from within the R Graphical User Interface.

Ou et al.: What's for dynr: A package for linear and nonlinear dynamic modeling in R

Ou-Hunter-Chow-2019

Lu Ou, Michael D. Hunter, and Sy-Miin Chow. "What's for dynr: A package for linear and nonlinear dynamic modeling in R". In: *The R Journal* 11.1 (2019), p. 91. DOI: 10.32614/rj-2019-012.

Abstract: Intensive longitudinal data in the behavioral sciences are often noisy, multivariate in nature, and may involve multiple units undergoing regime switches by showing discontinuities interspersed with continuous dynamics. Despite increasing interest in using linear and nonlinear differential/difference equation models with regime switches, there has been a scarcity of software packages that are fast and freely accessible. We have created an R package called dynr that can handle a broad class of linear and nonlinear discreteand continuous-time models, with regime-switching properties and linear Gaussian measurement functions, in C, while maintaining simple and easy-to learn model specification functions in R. We present the mathematical and computational bases used by the dynr R package, and present two illustrative examples to demonstrate the unique features of dynr.

Pesigan et al.: Monte Carlo confidence intervals for the indirect effect with missing data
<div align="right">Pesigan-Cheung-2023</div>

Abstract: Missing data is a common occurrence in mediation analysis. As a result, the methods used to construct confidence intervals around the indirect effect should consider missing data. Previous research has demonstrated that, for the indirect effect in data with complete cases, the Monte Carlo method performs as well as nonparametric bootstrap confidence intervals (see MacKinnon et al., Multivariate Behavioral Research, 39(1), 99–128, 2004; Preacher & Selig, Communication Methods and Measures, 6(2), 77–98, 2012; Tofighi & MacKinnon, Structural Equation Modeling: A Multidisciplinary Journal, 23(2), 194–205, 2015). In this manuscript, we propose a simple, fast, and accurate two-step approach for generating confidence intervals for the indirect effect, in the presence of missing data, based on the Monte Carlo method. In the first step, an appropriate method, for example, full-information maximum likelihood or multiple imputation, is used to estimate the parameters and their corresponding sampling variance-covariance matrix in a mediation model.

In the second step, the sampling distribution of the indirect effect is simulated using estimates from the first step. A confidence interval is constructed from the resulting sampling distribution. A simulation study with various conditions is presented. Implications of the results for applied research are discussed.

Pesigan et al.: betaDelta and betaSandwich: Confidence intervals for standardized regression coefficients in R   Pesigan-Sun-Cheung-2023

Abstract: The multivariate delta method was used by Yuan and Chan to estimate standard errors and confidence intervals for standardized regression coefficients. Jones and Waller extended the earlier work to situations where data are nonnormal by utilizing Browne's asymptotic distribution-free (ADF) theory. Furthermore, Dudgeon developed standard errors and confidence intervals, employing heteroskedasticity-consistent (HC) estimators, that are robust to nonnormality with better performance in smaller sample sizes compared to Jones and Waller's ADF technique. Despite these advancements, empirical research has been slow to adopt these methodologies. This can be a result of the dearth of user-friendly software programs to put these techniques to use. We present the betaDelta and the betaSandwich packages in the R statistical software environment in this manuscript. Both the normal-theory approach and the ADF approach put forth by Yuan and Chan and Jones and Waller are implemented by the betaDelta package. The HC approach proposed by Dudgeon is implemented by the betaSandwich package. The use of the packages is demonstrated with an empirical example. We think the packages will enable applied researchers to accurately assess the sampling variability of standardized regression coefficients.

Rosseel: lavaan: An R package for structural equation modeling Rosseel-2012

Yves Rosseel. "lavaan: An R package for structural equation modeling". In: *Journal of Statistical Software* 48.2 (2012). DOI: 10.18637/jss.v048.i02.

Abstract: Structural equation modeling (SEM) is a vast field and widely used by many applied researchers in the social and behavioral sciences. Over the years, many software packages for structural equation modeling have been developed, both free and commercial. However, perhaps the best state-of-the-art software packages in this field are still closed-source and/or commercial. The R package lavaan has been developed to provide applied researchers, teachers, and statisticians, a free, fully open-source, but commercial-quality package for latent variable modeling. This paper explains the aims behind the development of the package, gives an overview of its most important features, and provides some examples to illustrate how lavaan works in practice.

Waller: fungible: Psychometric functions from the Waller Lab Waller-2022

Niels G. Waller. *fungible: Psychometric functions from the Waller Lab*. The R Foundation, 2022. URL: https://CRAN.R-project.org/package=fungible.