

dynr.mi: An R Program for Multiple Imputation in Dynamic Modeling

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Abstract : Assessing several individuals intensively over time yields intensive longitudinal data (ILD). Even though ILD provide rich information, they also bring other data analytic challenges. One of these is the increased occurrence of missingness with increased study length, possibly under non-ignorable missingness scenarios. Multiple imputation (MI) handles missing data by creating several imputed data sets, and pooling the estimation results across imputed data sets to yield final estimates for inferential purposes. In this article, we introduce `dynr.mi()`, a function in the R package, Dynamic Modeling in R (`dynr`). The package `dynr` provides a suite of fast and accessible functions for estimating and visualizing the results from fitting linear and nonlinear dynamic systems models in discrete as well as continuous time. By integrating the estimation functions in `dynr` and the MI procedures available from the R package, Multivariate Imputation by Chained Equations (MICE), the `dynr.mi()` routine is designed to handle possibly non-ignorable missingness in the dependent variables and/or covariates in a user-specified dynamic systems model via MI, with convergence diagnostic check. We utilized `dynr.mi()` to examine, in the context of a vector autoregressive model, the relationships among individuals' ambulatory physiological measures, and self-report affect valence and arousal. The results from MI were compared to those from listwise deletion of entries with missingness in the covariates. When we determined the number of iterations based on the convergence diagnostics available from `dynr.mi()`, differences in the statistical significance of the covariate parameters were observed between the listwise deletion and MI approaches. These results underscore the importance of considering diagnostic information in the implementation of MI procedures.

Keywords : dynamic modeling, missing data, mobility, multiple imputation

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