

Large-sample properties of multiple imputation estimators for parameters of logistic regression with covariates missing at random separately or simultaneously

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Abstract

We examine the asymptotic properties of two multiple imputation (MI) estimators, given in the study of Lee et al. (<u>Computational Statistics</u>, **38**, 899–934, 2023) for the parameters of logistic regression with both sets of discrete or categorical covariates that are missing at random separately or simultaneously. The proposed estimated asymptotic variances of the two MI estimators address a limitation observed with Rubin's estimated variances, which lead to underestimate the variances of the two MI estimators (Rubin, 1987, <u>Statistical Analysis with Missing Data</u>, New York:Wiley). Simulation results demonstrate that our two proposed MI methods outperform the complete-case, semiparametric inverse probability weighting, random forest MI using chained equations, and stochastic approximation of expectation-maximization methods. To illustrate the methodology's practical application, we provide a real data example from a survey conducted at the Feng Chia night market in Taichung City, Taiwan.

Keywords Inverse probability weighting \cdot Logistic regression \cdot Missing at random \cdot Multiple imputation

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