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A Propensity Score Adjustment Method for Regression Models with Nonignorable Missing Covariates

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Abstract

In a linear regression model with nonignorable missing covariates, non-normal errors or outliers can lead to badly biased and misleading results with standard parameter estimation methods built on either least squares- or likelihood-based methods. A propensity score method with a robust and efficient regression procedure called composite quantile regression for parameter estimation of the linear regression model with nonignorable missing covariates is proposed. Semi-parametric estimation of the propensity score is based on the exponentially tilted likelihood approach. Asymptotic properties of the proposed estimators are systematically investigated. The proposed method is resistant to heavy-tailed errors or outliers in the response. Simulation studies and real data applications are used to illustrate its potential impacts and benefits compared with conventional methods.

Keywords: Exponentially tilted likelihood; Composite quantile regression; Not missing at random; Propensity score.

1. Introduction

Missing values are commonly encountered in statistical applications. Ignoring the missing data will undermine study efficiency, and may lead to misleading conclusions. For a complete review on missing data inference, see Little and

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