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On sufficient dimension reduction with missing responses through estimating equations

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Abstract

A linearity condition is required for all the existing sufficient dimension reduction methods that deal with missing data. To remove the linearity condition, two new estimating equation procedures are proposed to handle missing response in sufficient dimension reduction: the complete-case estimating equation approach and the inverse probability weighted estimating equation approach. The superb finite sample performances of the new estimators are demonstrated through extensive numerical studies as well as analysis of a HIV clinical trial data.

Keywords: Complete-case analysis, Inverse probability weighting, Kernel inverse regression, Linear conditional mean, Missing at random.

1. Introduction

Since its introduction about two decades ago, sufficient dimension reduction (SDR; Cook, 1998) has received great attention due to its flexibility in facilitating regression analysis. Denote $Y \in \mathbb{R}$ as the univariate response and $\mathbf{x} = (X_1, X_2, \ldots, X_p)^{\mathrm{T}} \in \mathbb{R}^p$ as the p-dimensional predictor. The main goal of SDR is to find $\mathbf{B} = (\boldsymbol{\beta}_1, \ldots, \boldsymbol{\beta}_d) \in \mathbb{R}^{p \times d}$ $(d < p)$ with the smallest possible

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