Performance of Covariate-Based Partitioning Goodness of Fit Test for Semiparametric Logistic GEE Regression

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ABSTRACT

This paper evaluates the covariate-based partitioning goodness of fit (GOF) test for semi-parameric logistic regression for correlated binary data. Estimation of the model uses GEE-Smoothing Spline, where the basis of estimation is GEE and the estimation of nonparametric component is based on smoothing spline. In this paper we extend the covariate-based partitioning GOF test for parametric logistic GEE model into GOF test for semiparametric logistic GEE model. The performance of this extension method is evaluated by simulation. We obtained that it has good capability to detect correct model but low power to detect incorrect model.

Keywords: Correlated binary data, Semiparametric estimation, Generalized estimating equation, Natural cubic spline, Logistic GEE, Goodness of fits.

2000 Mathematics Subject Classification: 62G08, 62G20, 62F12, 62J12, 65D10.

1 Introduction

Binary outcomes are frequently observed in many areas of study, such as clinical trial, medical, marketing, social science, biology and another area. It is also common that in this study the data are correlated due to repeated measurement for each subject (longitudinal study) or grouping of subject based on area. Generalized estimating equation (GEE) is one methods that can be used to analyze correlated data under marginal model for exponential family distribution. GEE initially proposed by Liang and Zeger (1986) and has been extended to overcome its drawback (Prentice, 1988; Zhao and Prentice, 1990; Prentice and Zhao, 1991; Hall and Severini, 1998).

Suliadi *et al.* (2010) and Suliadi *et al.* (2013)extended the parametric GEE of Liang and Zeger (1986) for correlated binary data to semiparametric GEE, that can be used to estimates a semiparametric model of correlated binary data. This semiparametric model allows the systematic component consists of two form, parametric and nonparametric. This method employs

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