

Nonparametric Regression for Longitudinal Binary Data Based on GEE-Smoothing Spline

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Abstract

This paper considers nonparametric regression to analyze longitudinal binary data. In this paper we propose GEE-Smoothing spline and study the properties of the estimator such as the bias, consistency and efficiency. We use natural cubic spline with combination of generalized estimating equation proposed by Liang & Zeger (1986). We evaluated these properties through simulations and obtained that GEE-Smoothing spline has good properties. The percentage of acceptance of the hypothesis that the function is equal to the true function, using naive and sandwich variance estimators is also obtained. The bias of pointwise estimator is decreasing with increasing sample size. The pointwise estimator is also consistent even using incorrect correlation structure, and the most efficient estimate is obtained if the true correlation structure is used. Example of real data is presented with comparison of GEE with GEE-Smoothing spline.

Keywords: Nonparametric regression, longitudinal binary data, generalized estimating equation, natural cubic spline, property of estimator.

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