Nonparametric Regression Analysis of Multivariate Longitudinal Data

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Abstract

Multivariate longitudinal data are common in medical, industrial and social science research. However, statistical analysis of such data in the current literature is restricted to linear or parametric modeling, which is inappropriate for applications in which the assumed parametric models are invalid. On the other hand, all existing nonparametric methods for analyzing longitudinal data are for univariate cases only. When longitudinal data are multivariate, nonparametric modeling becomes challenging, because we need to properly handle the association among the observed data across different time points and across different components of the multivariate response as well. Motivated by a real data from the National Hearth Lung and Blood Institute, this paper proposes a nonparametric modeling approach for analyzing multivariate longitudinal data. Our method is based on multivariate local polynomial smoothing. Both theoretical and numerical results show that it is useful in various cases.