Estimating equation methods for longitudinal studies when drop-outs depend on outcome and uncensored observation process

Xia Cui

Guangzhou University
E-mail: cuixia@gzhu.edu.cn

Abstract: In some longitudinal studies, the response variable may be observed at different times for each individual. The associated observation times are often related to the repeated measures and dependent censoring may occur due to death or exclusion from the study related to the disease process. This paper studies inference for semiparametric regression model of longitudinal measurements when observation times are informative and censoring times are dependent. Given covariates or partial covariates, three marginal models are proposed. First, the response variable is described by a partially linear function of covaraites. Second, a proportional rate model is used to fit the intensity of uncensored observation times process. Third, the dependent censoring times are fitted by a transformation regression model. We herein assume the statistical relationship of the error term in the first model, the increment of the uncensored observation times process and the error term in the third model is fully nonparametric. To maintain the homogeneity of the hypothetical error variables under dependent censoring, we appeal to the device of artificial censoring. Based on this, a centralized observation process is proposed. We then estimate the interested parameter by solving an estimating equation constructed based on this centralizing observation process. The proposed estimator is shown to be consistent and asymptotically normal. Simulation studies demonstrate that the proposed inference procedure performs well in many settings. Application to a bladder cancer treatment study is presented.