Analysis of Censored Data
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Maximum Likelihood Estimation for Proportional Odds Regression Model with Current Status Data

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Abstract The maximum likelihood estimator (MLE) for the semiparametric proportional odds regression model with current status data is studied. It is shown that the MLE for the regression parameter is asymptotically normal and asymptotically efficient, even though the MLE for the baseline log-odds function only converges at $n^{1/3}$ rate.

1. Introduction. The proportional odds regression model is an interesting alternative to the widely used Cox's (1972) proportional hazards regression model. This model has been used by several authors in analyzing survival data, see for example, Bennett (1983), Dinse and Lagakos (1983), Pettitt (1984) and Parzen (1993). It specifies that

$$\text{logit}F(t|z) = \text{logit}F_0(t) + \beta' z, \tag{1.1}$$

where $\beta \in R^d$ is the regression parameter, $F(t|z)$ is the probability that the failure time is less than or equal to t given that the value of the covariate Z is z, i.e, $F(t|z) = P(T \leq t|Z = z)$, and $F_0(t) \equiv F(t|0)$ is the baseline distribution function. The logit function is defined by $\text{logit}(x) = \log(x/(1-x))$ for $0 < x < 1$. For simplicity, denote $\alpha(t) = \text{logit}F_0(t)$. $\alpha(t)$ can be interpreted as the baseline log-odds function, and is a monotone increasing function since $F_0(t)$ is increasing. In comparison, the Cox model can be written as

$$\log(-\log(1 - F(t|z))) = \log(-\log(1 - F_0(t))) + \beta' z.$$

In model (1.1), the logit function is used as the link function, while in the Cox model, $\log(-\log)$ is the link. The proportional odds regression model

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