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# Adaptive penalized M-estimation with current status data

Received: 18 August 2004 / Revised: 7 February 2005 / Published online: 11 July 2006  
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**Abstract** Current status data arises when a continuous response is reduced to an indicator of whether the response is greater or less than a random threshold value. In this article we consider adaptive penalized M-estimators (including the penalized least squares estimators and the penalized maximum likelihood estimators) for nonparametric and semiparametric models with current status data, under the assumption that the unknown nonparametric parameters belong to unknown Sobolev spaces. The Cox model is used as a representative of the semiparametric models. It is shown that the modified penalized M-estimators of the nonparametric parameters can achieve adaptive convergence rates, even when the degrees of smoothing are not known in advance.  $\sqrt{n}$  consistency, asymptotic normality and inference based on the weighted bootstrap for the estimators of the regression parameter in the Cox model are also established. A simulation study is conducted for the Cox model to evaluate the finite sample efficacy of the proposed approach and to compare it with the ordinary maximum likelihood estimator. It is demonstrated that the proposed method is computationally superior. We apply the proposed approach to the California Partner Study analysis.

**Keywords** Adaptive semiparametric estimation · Current status data · Penalized M-estimator