

Pseudo Partial Likelihood Estimators for Cox Regression With Missing Covariates

Wei-Yann Tsai and Xiaodong Luo

Department of Biostatistics, Columbia University, U.S.A.

Missing covariates problem in Cox regression model (Cox, 1972) has been studied extensively in the literature. Qi et al. (2005) propose the simple weighted estimators (SWEs) based on the inverse-weighted partial score function with weights known or estimated by the Nadaraya-Watson estimate. This article presents the pseudo partial likelihood estimators (PPLEs). These estimators, based on the conditional partial score function derived by embedding the missing data into a left-truncated, right-censored failure time data, have different weighting scheme to SWEs. We show that: (1) PPLEs are consistent and asymptotically normal; (2) PPLE with estimated weights is more efficient than that with true weights, which is similar to the SWEs; (3) PPLEs and SWEs share similar asymptotic variance-covariance structure either with true or estimated weights. We also discuss the fully augmented versions of PPLEs and give the baseline hazard estimates. Simulation demonstrates that PPLEs improve the efficiency of estimation of the missing covariate effects and outperform SWEs when the weight function is close to zero.

[Wei-Yann Tsai , Department of Biostatistics, Columbia University, 21 Bruno Lane, Dix Hills, NY 11746, U.S.A.; wyt@biostat.columbia.edu]