

Bivariate censoring models with covariates

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In this talk we consider a pair (T_1, T_2) of survival times, subject to right random censoring and in the presence of a covariate random variable X . We assume that (T_1, T_2) and the censoring time(s) are conditionally independent, given X . The goal is nonparametric estimation of the joint conditional survival function $S_x(t_1, t_2) = P(T_1 > t_1, T_2 > t_2 | X = x)$.

Our starting point is the inverse probability weighting idea. This is of course a challenging problem due to the presence of the unknown joint conditional censoring distribution. We therefore restrict to two important specific censoring schemes: univariate censoring (only one censoring variable for (T_1, T_2)) and one-component censoring (T_1 fully observed and T_2 subject to censoring). Our estimators involve Nadaraya-Watson weights that smooth over the values of the covariate X . We prove asymptotic normality of the joint conditional survival function estimators in the above cases.

Key words: bivariate survival, censoring, covariates, nonparametric estimation