Locally Homogeneous Accelerated Failure Time Model with Time-Dependent Covariates

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Abstract: In this paper, we discuss a generalization of the accelerated failure time model for survival data subject to right censoring, which is independent of the actual lifetime conditional on possibly time-varying covariates. We relax the existing assumption of globally homogeneous conditional quantile on the lifetime distribution to only a specific range of quantile levels. By introducing a class of weighted rank-based estimation procedure, our framework allows a quantile localized inference on the covariate effect with less stringent assumption. Meanwhile, the form of the proposed estimating equations can be viewed as a generalization of its counterpart under the accelerated failure time model with time-varying covariates. Numerical studies demonstrate that the proposed estimator overperforms current alternatives under various settings in terms of smaller empirical bias and standard deviation. A perturbation-based resampling method is also provided to reconcile the asymptotic distribution of the parameter estimates. Finally, consistency and weak convergence of the proposed estimator is established via empirical process theory. This is a joint work with George Chi Wing Chu from Columbia University.