Analysis of Failure Time Data with Missing and Informative Auxiliary Covariates

Lipika Gosh

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Abstract

In this dissertation we use Cox's regression model to failure time data with continuous informative auxiliary variables in the presence of a validation subsample. The work is motivated by a common problem of missing or mismeasured covariates in survival analysis as a result of which the relative risk function is not available for all the subjects in the sample. Here we introduce a two-stage procedure for estimating the parameters in the model. We estimate the induced relative risk function with a kernel smoother based on the validation subsample, and then improve the estimation by utilizing the information from the non-validation subsample and the auxiliary observations from the primary sample. Asymptotic normality of the proposed estimator is obtained. The proposed method allows one to efficiently model the failure time data with informative multivariate auxiliary covariate. Comparison of the proposed approach with several existing methods is made via simulations. A real dataset is analyzed to illustrate the proposed method.

Department of Mathematics, UNC Charlotte, Charlotte, NC 28223