
Analysis of survival data with cure fraction and variable selection: A pseudo-observations approach

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Abstract

In biomedical studies, survival data with a cure fraction (the proportion of subjects cured of disease) are commonly encountered. The mixture cure (MC) and bounded cumulative hazard (BCH) models are two main types of cure fraction models when analyzing survival data with long-term survivors. In this article, in the framework of the Cox proportional hazards mixture cure (PHMC) model and BCH model, we propose several estimators utilizing pseudo-observations to assess the effects of covariates on the cure rate and the risk of having the event of interest for survival data with a cure fraction. A variable selection procedure is also presented based on the pseudo-observations using penalized generalized estimating equations for PHMC and BCH models. Extensive simulation studies are conducted to examine the proposed methods. The proposed technique is demonstrated through applications to a melanoma study and a dental data set with high-dimensional covariates.

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