

Parametric frailty approach in a mixture cure model

Pierre Joly^{1,2}, Fabien Corbière^{3,4}

¹ INSERM, U897, Bordeaux , F-33076, France

² Université Victor Segalen Bordeaux 2, Bordeaux , F-33076, France

³ Université de Toulouse, Ecole Nationale Vétérinaire, Toulouse, F-31076, France

⁴ INRA, UMR1225, Toulouse, F-31076 France

We consider the problem of estimating the covariates effect in a mixture cure model with shared frailties. Cure models have been developed in survival analysis to take into account the possibility of cure. Mixture cure models assume that the studied population is a mixture of susceptible (uncured) subjects, that may undergo the event of interest while non-susceptible (cured) subjects will never undergo it. This model allows estimating simultaneously the covariate effect on the cure fraction and on the survival of uncured individuals. To deal with the presence of grouped data, we generalize this approach to shared frailties model. A weibull model or a more flexible piecewise exponential model are proposed for the estimation of the survival function of uncured subjects. The influence of covariates is modeled by a proportional hazard regression model with random effects. A logistic regression model with random effects is used to estimate the covariates influence on the cure fraction. Independent or correlated random effects are considered. The proposed method is applied to a multi-flock longitudinal study to estimate factors influencing the contamination and the survival of animals infected by classical scrapie.