Examples in which Misspecification of a Random Effects Distribution Reduces Efficiency

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Abstract

This note shows three cases in which a considerable loss of efficiency can result from assuming a parametric distribution for a random effect that is substantially different from the true distribution. For two simple models for binary response data, we studied the effects of assuming normality or of using a nonparametric fitting procedure for random effects, when the true distribution is potentially far from normal. Although usually the choice of random effects distribution has little effect on efficiency of predicting outcome probabilities, the normal approach suffered when the true distribution was a two-point mixture with a large variance component. Likewise, for a simple survival model, assuming a gamma distribution for the frailty distribution when the true one was a two-point mixture resulted in considerable loss of efficiency in predicting the frailties. This also occurred, but to a lesser extent, in using nonparametric fitting when the true frailty distribution was a gamma distribution.

Keywords: Binomial; Frailty model; Gamma distribution; Logit model; Nonparametric; Odds ratio.