ABSTRACT

INDAHWATI. A Robust Approach for Joint Models Based on $t$ Distribution. Supervised by AUNUDDIN, KHAIRIL ANWAR NOTODIPUTRO and I GUSTI PUTU PURNUABA.

Existing methods for joint modeling are usually based on normality assumption of random effects and intra-subject errors. We propose a joint model based on $t$ distribution of the intra-subject errors to improve robustness of the estimation. In addition, study is also performed to evaluate the effects of number of longitudinal data series on normality assumption. Our model consists of two submodels: a mixed linear mixed effects model for the longitudinal data, and a generalized linear model for continuous/binary primary response. The proposed method is evaluated by means of simulation studies as well as application to HIV data. Results of simulation study show that the effects of random effect distribution on bias and MSE of parameter estimates will be small if large number of longitudinal data series are used. Otherwise, the number of longitudinal data series give little effects when intra-subject error is not normal. But long tail intra-subject error distribution will give large bias and MSE if modeled as normal. For small number of longitudinal data series, robust approach based on $t$ distribution give smaller bias and MSE, mainly for parameters that joint longitudinal covariate with the primary response variable.

Keywords: longitudinal data, joint model, mixed model, generalized linear model, robust, $t$-distribution