

Sobol's Sequence Based Method for Fitting Nonlinear Mixed Effects Model: A Comparative View

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Nonlinear mixed effects models are mixed effects models in which some of the fixed and random effects parameters enter nonlinearly to the model function. Nonlinear models are parsimonious so that we can capture the nonlinear variation with a minimum number of parameters. Due to their great importance, fitting of these models are also of crucial matters. A number of methods for fitting nonlinear mixed effects model are available in literature, most of the methods require approximating wither the model function or the likelihood function. A new method is proposed which numerically evaluate the integrations involved in the likelihood function with Monte Carlo integration using Sobol's sequence. The methods are compared using simulation studies and the method based on Laplace approximation is found to fit the nonlinear mixed effects model the best. The proposed Sobol's sequence based method performs better than some of the existing methods, especially in some cases; it produces good result in estimating random effects parameter. Thus, the Sobol's sequence based proposed method is very much compatible with the existing ones as well as the approximation based methods are quite handy.

Key Words: Laplace approximation, Lindstrom and Bates approximation, intractable integrations, quasi Monte Carlo integration.