R Package for EM Algorithms for Estimation of Correlated Probit Models

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Correlated probit models are widely used for modeling of ordinal data or joint analyses of ordinal and continuous data which are common outcomes in medical studies. When we have clustered or longitudinal data correlated probit models with random effects are used to take into account the dependence between clustered measurements. When the dimension of the random effects is large, finding of the maximum likelihood estimates of the model parameters via standard numerical approximations is computationally cumbersome or in some cases impossible. EM algorithms for one ordinal longitudinal variable [2] and for multiple ordinal outcome [1] are recently developed.

The methods developed will set the foundations of an R package (http://www.r-project.org/) which is going to offer the basic functionality for the model with two longitudinal ordinal variables. The working title of the package is EMcorrProbit. The design of the package allows it to be extended for additional models. An example will be presented using the longitudinal data from the Health and Retirement study (http://hrsonline.isr.umich.edu/), where a correlated model with random effects is fitted for the following ordinal outcomes: self-rated health and categorized body mass index.

References

[1] D. Grigorova and R. Gueorguieva, *Implementation of the EM algorithm for maximum likelihood estimation of a random effects model for one longitudinal ordinal outcome*, Pliska Stud. Math. Bulgar., **22**, 2013, 41–56.

[2] D. Grigorova, E. Encheva and R. Gueorguieva, *Implementation of the EM algorithm for maximum likelihood estimation of a random effects model for multiple ordinal outcome*, Serdica Journal of Computing , **7 (3)**, 2013, 227–244.