lqmm: Estimating Quantile Regression Models for Independent and Hierarchical Data with R

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Conditional quantile regression (QR) pertains to the estimation of unknown quantiles of an outcome as a function of a set of covariates and a vector of fixed regression coefficients. In the last few years, the need for extending the capabilities of QR for independent data to deal with clustered sampling designs (e.g., repeated measures) has led to several and quite distinct approaches. Here, I consider the likelihood–based approach that hinges on the strict relationship between the weighted L_1 norm problem associated with a conditional QR model and the asymmetric Laplace distribution (Geraci and Bottai, 2007).

In this presentation, I will illustrate the use of the *R* package **lqmm** to perform QR with mixed (fixed and random) effects for a two–level nested model. The estimation of the fixed regression coefficients and of the random effects' covariance matrix is based on a combination of Gaussian quadrature approximations and optimization algorithms. The former include Gauss-Hermite and Gauss-Laguerre quadratures for, respectively, normal and double–exponential (i.e., symmetric Laplace) random effects; the latter include a modified compass search algorithm and general purpose optimizers (`optim` and `optimize`). Modelling and inferential issues are detailed in Geraci and Bottai (2011) (a preliminary draft is available upon request). The package also provides commands for the case of independent data.

References

Geraci, M. and Bottai, M. (2007). Quantile regression for longitudinal data using the asymmetric Laplace distribution. *Biostatistics 8(1)*, 140–154.

Geraci, M. and Bottai, M. (2011). Linear quantile mixed models, in preparation.