cold: a package for Count Longitudinal Data

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The software tools that we propose were built for the analysis of longitudinal count data from the point of view of likelihood inference, which requires complete specification of a stochastic model for the individual profile. We provide a direct evolution of the model proposed by Azzalini (1994) for Poisson response variables where the serial dependence is assumed to be of Markovian type. Besides serial dependence, another important source of dependence among data from one given subject is the presence of individual random effects (Gonçalves et al., 2007). The Poisson regression model which links the covariates and the probability distribution of the response, is \[ \ln\{E(Y_{it})\} = \ln(\theta_{it}) = x_{it}^\top \beta \] allowing also some form of dependence among observations of the same individual. The introduction of random effects can be formulated by adding the component \[ b_i \sim N(0, \sigma^2_b) \] in the previous model, leading to the random intercept model \[ \theta_{it}^b = \exp(x_{it}^\top \beta + b_i). \]

This software allows the presence of individual random effects by adding the component to the linear predictor. One dimensional integrals were computed using adaptive Gaussian quadrature. The package, called cold, is a S4-methods package and provides R functions for parametric analysis of longitudinal count data. The functions of cold were written in R language, except for some FORTRAN routines which are interfaced through R. The main function, called cold performs the fit of parametric models via likelihood methods. Serial dependence and random effects are allowed according to the stochastic model chosen: ind (independence), AR1 (1st order autoregressive), indR (independence with random effects), AR1R (1st order autoregressive with random effects). Missing values and unbalanced data are automatically accounted for computing the appropriate likelihood function.

References
