Correction PGEE article: regression coefficients inserted into the PGEE definition

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The modified equations are indicated in blue.

1 Methodology

1.1 Penalized GEE

1.1.1 PGEE estimators

Consider a random sample of n subjects. Y_{it} is the measured response for subject i at time t with $t = 1, \ldots, T_i$. $\boldsymbol{X}_{it} = (X_{1,it}, \ldots, X_{p,it})$ is a vector of p time-dependent covariates measured at the same time as the response. Observations within a subject are correlated, observations of different subjects are assumed independent.

Without loss of generality and to facilitate the use of penalization, we assume the response to be scaled and the covariates to be standardized.

The cross-sectional influence of the covariates $\boldsymbol{X}_{it}$ on the response Y_{it} is our main interest. We assume Y is generated from a distribution in the exponential family with $\mathrm{E}(Y_{it}|\boldsymbol{X}_{it}) = g^{-1}(\boldsymbol{X}_{it}^T\boldsymbol{\beta})$, where g is a known link-function.

The regression coefficients $\boldsymbol{\beta}$ can be estimated by solving the PGEE:

$$\boldsymbol{S^P}(\boldsymbol{\beta}) = \sum_{i=1}^{n} \boldsymbol{D}_i^T V_i^{-1}(\boldsymbol{Y}_i - \boldsymbol{\mu}_i) - N\dot{\boldsymbol{P}}(\boldsymbol{\beta}) = \boldsymbol{0}. \tag{1}$$

With $\boldsymbol{\mu}_i = g^{-1}(\boldsymbol{X}_{it}^T\boldsymbol{\beta})$; $\boldsymbol{D}_i = \boldsymbol{D}_i(\boldsymbol{\beta}) = \partial\boldsymbol{\mu}_i(\boldsymbol{\beta})/\partial\boldsymbol{\beta}$; $V_i = U_i^{1/2}W(\boldsymbol{\alpha})U_i^{1/2}$ the working covariance matrix; $W(\boldsymbol{\alpha})$ is the working correlation matrix, parameterized with parameter vector $\boldsymbol{\alpha}$, U_i is a diagonal matrix with diagonal elements $\mathrm{Var}(Y_{it}|\boldsymbol{X}_{it})$; $\dot{\boldsymbol{P}}(\boldsymbol{\beta}) = \partial P(\boldsymbol{\beta})/\partial\boldsymbol{\beta}$ is the vector derivative of the penalty function.