Step mancanti

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Gibbs sampler of the model under the prior:

$$[B, \sigma_\epsilon^2] = \pi[B] \times \frac{1}{\sigma_\epsilon^2} \tag{1}$$

where $\pi[B]$ is such that all the coefficients are independent across species:

$$\forall j = 1, \ldots, S \qquad \beta_j \overset{iid}{\sim} N(0, \sigma^2 I) \tag{2}$$

where β_j is the j-th row of B (if B is $S \times k$). σ is an hyperparameter that gives the degree of uninformativeness of the prior. You can take $\sigma = 10$.

- $[V_i^\star | B^\star, X, A, Y]$: for each site $i = 1, \ldots, n$ and each species $j = 1, \ldots, S$ we sample $V_{i,j}^\star$ from a univariate truncated normal:

$$V_{i,j}^\star | B^\star, X, A, y_{i,j} \sim trunc.N(B_j^\star x_i + Aw_i, \sigma_\epsilon^2) \tag{3}$$

  Where the normal is truncated to the positive axis if $y_{i,j} = 1$ and to the negative axis if $y_{i,j} = 0$.

- $[B^\star | V^\star, X, A, ...]$: for each species $j = 1, \ldots, S$ we sample $\beta_j^\star$ from a multivariate normal

$$\beta_j^\star \sim N\left(\left(\frac{1}{\sigma^2} I + \frac{1}{\sigma_\epsilon^2} X'X\right)^{-1} \frac{1}{\sigma_\epsilon^2} X'(V_j^\star - WA_j), \left(\frac{1}{\sigma^2} I + \frac{1}{\sigma_\epsilon^2} X'X\right)^{-1}\right) \tag{4}$$

  Where W is the nxr matrix whose lines are w_i.
  Notice that this is a mix between equation (3.A.3) by Golding and step 3 in section 3.2 by Taylor-Rodriguez.

- $[\sigma_\epsilon^2 | rest]$ as in Taylor and Rodriguez appendix

- Finally, obtain the variables on the correlation scale using the following transformations.
  Let D be the diagonal matrix $D = diag(\Sigma^\star)$, with $\Sigma^\star = AA' + \sigma_\epsilon^2$.
  Then, $V = D^{-1/2} V*$, $B = D^{-1/2} B*$ and $R = D^{-1/2}(AA' + \sigma_\epsilon^2) D^{-1/2}$.
  This step is needed to the identifiablily issue of the probit link, where the variance covariance matrix has to be a correlation matrix. Leggete 3.2 di Taylor-Rodriguez per capirla meglio, opure, meglio, ci chiamiamo via skype e provo a spiegarvela.