TECHNISCHE UNIVERSITÄT WIEN

for ordinals $\boxed{\sigma_j \text{ is } 1}$
for normals

$$y_{ij} = \beta_{j0} + \beta^T x_i + \sigma_j \varepsilon_{ij}, \quad \varepsilon_j \sim F(0, R)$$

Should we do β_j?

$y_1 \dots y_n \to y_1 \dots y_{g_0} \to$ ordinal (g_0 - ordinal vars)

$y_{g_0+1} \dots y_{g_0+g_n} \to$ normal (g_n - normal vars)

Pairwise likelihood:

3 cases: 2 ordinals (A)

2 normals (B)

1 ordinal + 1 normal (C)

(A) (as in mvord)

$\Pr(y_{i1} = r_1, y_{i2} = r_2) = \Pr(L_1 \le \tilde{y}_{i1} \le u_1, L_2 \le \tilde{y}_{i2} \le u_2)$

→ rectangular probability

(B) $l(y_1, y_2) = \phi_2(y_1, y_2, r)$ (ϕ_2 is the 2-variate normal pdf)

(C) $l(\overset{\text{ord.}}{y_1}, \overset{\text{normal}}{y_2}) = \Pr(y_1 = r_1 \mid y_2) \cdot \phi(y_2) \to \text{dnorm}(y_2, \mu_2, \sigma_2^2)$

$\Pr(y_1 = r_1 \mid y_2) = \Pr(L_1 \le \tilde{y}_1 \le u_1 \mid y_2)$

$$(\tilde{y}_1, y_2) \sim \text{Bivariate normal}\left(\begin{pmatrix} \underbrace{\beta_{10} + x\beta}_{\mu_1} \\ \underbrace{\beta_{20} + x\beta}_{\mu_2} \end{pmatrix}, \begin{pmatrix} 1 & r\sigma_2 \\ r \cdot \sigma_2 & \sigma_2^2 \end{pmatrix}\right)$$

$$\tilde{y}_1 \mid y_2 \sim N\left(\mu_1 + r \cdot \frac{1}{\sigma_2} \cdot (y_2 - \mu_2), (1 - \rho^2) \cdot \sigma_2^2\right)$$