CWVS: Critical Window Variable Selection

Statistical Model

$$Y_i|\boldsymbol{\beta},\boldsymbol{\alpha} \overset{\text{ind}}{\sim} \text{Bernoulli}\left\{p_i\left(\boldsymbol{\beta},\boldsymbol{\alpha}\right)\right\},\ i=1,...,n;$$

$$\log\left\{\frac{p_i\left(\boldsymbol{\beta},\boldsymbol{\alpha}\right)}{1-p_i\left(\boldsymbol{\beta},\boldsymbol{\alpha}\right)}\right\}=\mathbf{x}_i^{\mathrm{T}}\boldsymbol{\beta}+\sum_{j=1}^{m_i}\mathrm{z}_{ij}\alpha\left(j\right);$$

$$\alpha\left(j\right)=\theta\left(j\right)\gamma\left(j\right),\ j=1,...,m;$$

$$\gamma\left(j\right)|\pi\left(j\right)\overset{\text{ind}}{\sim}\text{Bernoulli}\left\{\pi\left(j\right)\right\},\ \Phi^{-1}\left\{\pi\left(j\right)\right\}=\eta\left(j\right),\ j=1,...,m;$$

$$\left[\begin{array}{c}\theta\left(j\right)\\ \eta\left(j\right)\end{array}\right]=A\left[\begin{array}{c}\delta_1\left(j\right)\\ \delta_2\left(j\right)\end{array}\right],\ A=\left[\begin{array}{cc}A_{11}&0\\ A_{21}&A_{22}\end{array}\right];$$

$$\boldsymbol{\delta}_k=\left\{\delta_k\left(1\right),...,\delta_k\left(m\right)\right\}^{\mathrm{T}}|\phi_k\overset{\text{ind}}{\sim}\text{MVN}\left\{\mathbf{0}_m,\Sigma\left(\phi_k\right)\right\},\ k=1,2;$$

- $m=\max\left\{m_i:i=1,...,n\right\}$;
- $\mathbf{0}_m$: Length m vector with each entry equal to zero.

Prior Information

$\beta_j\overset{\text{iid}}{\sim}\text{N}\left(0,\sigma_\beta^2\right),\ j=1,...,p;$

- p: Length of $\mathbf{x}_{ij}$ vector (same for all i, j);
- Default setting: $\sigma_\beta^2=10,000$.

$\ln\left(A_{11}\right),\ln\left(A_{22}\right),A_{21}\overset{\text{iid}}{\sim}\text{N}\left(0,\sigma_A^2\right);$

- Default setting: $\sigma_A^2=1.00$.

$\phi_k\overset{\text{iid}}{\sim}\text{Gamma}\left(\alpha_{\phi_k},\beta_{\phi_k}\right),\ k=1,2;$

- Default setting: $\alpha_{\phi_k}=1.00$, $\beta_{\phi_k}=1.00,\ k=1,2$.

Default Initial Values

- $\beta_j=0$ for all j;
- $\gamma\left(j\right)=1$ for all j;
- $\delta_k\left(j\right)=0$ for all j, k;
- $\phi_k=-\ln\left(0.05\right)/\left(m-1\right)$ for all k;
- $A_{kk}=1$ for all k;
- $A_{21}=0$.