

---

**Algorithm 1** Thresholded Ordered Sparse CCA (TOSCCA)

---

**Input.**  $\mathbf{X}_{1,s}$ ,  $\mathbf{X}_{2,s}$ ,  $\boldsymbol{\alpha}_0$ ,  $p_\alpha$ , and  $q_\beta$

**Output.**  $\boldsymbol{\alpha}_k^*$  and  $\boldsymbol{\beta}_k^*$

$t \leftarrow 1$ ,  $\theta \ll 1$ ,  $\varepsilon = 10^6$ ,  $\rho^{(0)} \leftarrow 0$

- 1: **while**  $\varepsilon > \theta$  **do** ▷ Changes larger than tolerance measure
  - 2:    $\boldsymbol{\gamma}_0 \leftarrow \mathbf{X}_{1,s} \boldsymbol{\alpha}_0^{(t-1)}$
  - 3:    $\tilde{\boldsymbol{\beta}}^{(t)} \leftarrow \mathbf{X}_{2,s}^T \boldsymbol{\gamma}_0$
  - 4:    $\boldsymbol{\beta}_k^{(t)} \leftarrow \mathbb{1}_{|\tilde{\boldsymbol{\beta}}^{(t)}| > q_\beta} \tilde{\boldsymbol{\beta}}^{(t)} - q_\beta$
  - 5:    $\boldsymbol{\zeta}_k \leftarrow \mathbf{X}_{2,s} \boldsymbol{\beta}_k^{(t)}$  ▷ Standardise canonical variable for  $\mathbf{X}_2$
  - 6:    $\tilde{\boldsymbol{\alpha}}^{(t)} \leftarrow \mathbf{X}_1^T \boldsymbol{\zeta}_k$
  - 7:    $\boldsymbol{\alpha}_k^{(t)} \leftarrow \mathbb{1}_{|\tilde{\boldsymbol{\alpha}}^{(t)}| > p_{\alpha_i}} \tilde{\boldsymbol{\alpha}}^{(t)} - p_\alpha$
  - 8:    $\boldsymbol{\gamma}_k \leftarrow \mathbf{X}_{1,s} \boldsymbol{\alpha}_k^{(t)}$  ▷ Standardise canonical variable for  $\mathbf{X}_1$
  - 9:    $\rho^{(t)} \leftarrow \text{cor}(\boldsymbol{\gamma}_k, \boldsymbol{\zeta}_k)$
  - 10:    $\varepsilon \leftarrow \rho^{(t)} - \rho^{(t-1)}$
  - 11:    $t = t + 1$
  - 12: **return**  $(\boldsymbol{\alpha}_k^*, \boldsymbol{\beta}_k^*)$  ▷ The canonical vectors
-