Classes and weights

$\mathbb{C} = \{c_{i=1}, \ldots, c_{i=I}\}; \Theta = \{0, 0.5, 1\}$

Primary data

$$L_P = \begin{bmatrix} q_{1,1} & q_{1,2} & \cdots & q_{1,\mathrm{m}} \\ q_{2,1} & q_{2,2} & \cdots & q_{2,\mathrm{m}} \\ \vdots & & & \vdots \\ q_{\mathrm{j},1} & q_{\mathrm{j},2} & \cdots & q_{\mathrm{j},\mathrm{m}} \end{bmatrix}; \begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_j \end{bmatrix}; k_P$$

Auxiliary data

$$L_A = \begin{bmatrix} b_{1,1} & b_{1,2} & \cdots & \cdots & b_{1,\mathrm{n}} \\ b_{2,1} & b_{2,2} & \cdots & \cdots & b_{2,\mathrm{n}} \\ \vdots & & & & \vdots \\ b_{\mathrm{j},1} & b_{\mathrm{j},2} & \cdots & \cdots & b_{\mathrm{j},\mathrm{n}} \end{bmatrix}; \begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_j \end{bmatrix}; k_A$$

Neighbour matrices

$$N_P = \begin{array}{c} \begin{matrix} c_{i=1} & \cdots & c_{i=I} \end{matrix} \\ \begin{bmatrix} n^P_{1,1} & \cdots & n^P_{1,\mathrm{I}} \\ n^P_{2,1} & \cdots & n^P_{2,\mathrm{I}} \\ \vdots & & \vdots \end{bmatrix} \end{array}; N_A = \begin{array}{c} \begin{matrix} c_{i=1} & \cdots & c_{i=I} \end{matrix} \\ \begin{bmatrix} n^A_{1,1} & \cdots & n^A_{1,\mathrm{I}} \\ n^A_{2,1} & \cdots & n^A_{2,\mathrm{I}} \\ \vdots & & \vdots \end{bmatrix} \end{array}$$

Classes and weights

$\mathbb{C} = \{c_{i=1}, \ldots, c_{i=I}\}; \Theta = \{0, 0.5, 1\}$

Primary data

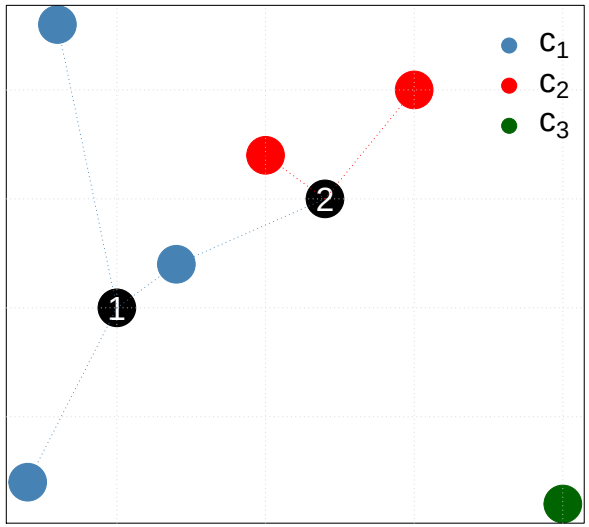
$$L_P = \begin{bmatrix} q_{1,1} & q_{1,2} & \cdots & q_{1,\mathrm{m}} \\ q_{2,1} & q_{2,2} & \cdots & q_{2,\mathrm{m}} \\ \vdots & & & \vdots \\ q_{\mathrm{j},1} & q_{\mathrm{j},2} & \cdots & q_{\mathrm{j},\mathrm{m}} \end{bmatrix}; \begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_j \end{bmatrix}; k_P$$

Auxiliary data

$$L_A = \begin{bmatrix} b_{1,1} & b_{1,2} & \cdots & \cdots & b_{1,\mathrm{n}} \\ b_{2,1} & b_{2,2} & \cdots & \cdots & b_{2,\mathrm{n}} \\ \vdots & & & & \vdots \\ b_{\mathrm{j},1} & b_{\mathrm{j},2} & \cdots & \cdots & b_{\mathrm{j},\mathrm{n}} \end{bmatrix}; \begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_j \end{bmatrix}; k_A$$

Neighbour matrices

$$N_P = \begin{matrix} & c_{i=1} & \cdots & c_{i=I} \\ \end{matrix} \begin{bmatrix} n^P_{1,1} & \cdots & n^P_{1,\mathrm{I}} \\ n^P_{2,1} & \cdots & n^P_{2,\mathrm{I}} \\ \vdots & & \vdots \end{bmatrix}; N_A = \begin{matrix} c_{i=1} & \cdots & c_{i=I} \\ \end{matrix} \begin{bmatrix} n^A_{1,1} & \cdots & n^A_{1,\mathrm{I}} \\ n^A_{2,1} & \cdots & n^A_{2,\mathrm{I}} \\ \vdots & & \vdots \end{bmatrix}$$



$$N_P = \begin{matrix} & c_1 & c_2 & c_3 \\ p_1 \\ p_2 \\ \end{matrix} \begin{bmatrix} \frac{3}{3} & 0 & 0 \\ \frac{1}{3} & \frac{2}{3} & 0 \\ \vdots & \vdots & \vdots \end{bmatrix}$$

Classes and weights

$\mathbb{C} = \{c_{i=1}, \ldots, c_{i=I}\}; \Theta = \{0, 0.5, 1\}$

Primary data

$$L_P = \begin{bmatrix} q_{1,1} & q_{1,2} & \cdots & q_{1,\mathrm{m}} \\ q_{2,1} & q_{2,2} & \cdots & q_{2,\mathrm{m}} \\ \vdots & & & \vdots \\ q_{\mathrm{j},1} & q_{\mathrm{j},2} & \cdots & q_{\mathrm{j},\mathrm{m}} \end{bmatrix}; \begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_j \end{bmatrix}; k_P$$

Auxiliary data

$$L_A = \begin{bmatrix} b_{1,1} & b_{1,2} & \cdots & \cdots & b_{1,\mathrm{n}} \\ b_{2,1} & b_{2,2} & \cdots & \cdots & b_{2,\mathrm{n}} \\ \vdots & & & & \vdots \\ b_{\mathrm{j},1} & b_{\mathrm{j},2} & \cdots & \cdots & b_{\mathrm{j},\mathrm{n}} \end{bmatrix}; \begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_j \end{bmatrix}; k_A$$

Neighbour matrices

$$N_P = \begin{array}{c} \begin{matrix} c_{i=1} & \cdots & c_{i=I} \end{matrix} \\ \begin{bmatrix} n^P_{1,1} & \cdots & n^P_{1,\mathrm{I}} \\ n^P_{2,1} & \cdots & n^P_{2,\mathrm{I}} \\ \vdots & & \vdots \end{bmatrix} \end{array}; N_A = \begin{array}{c} \begin{matrix} c_{i=1} & \cdots & c_{i=I} \end{matrix} \\ \begin{bmatrix} n^A_{1,1} & \cdots & n^A_{1,\mathrm{I}} \\ n^A_{2,1} & \cdots & n^A_{2,\mathrm{I}} \\ \vdots & & \vdots \end{bmatrix} \end{array}$$

Weights matrix (labelled)

$$\begin{array}{c} \\ \theta_1 \\ \theta_2 \\ \theta_i \\ \vdots \\ \theta_{\Theta I} \end{array} \begin{array}{c} \begin{matrix} c_1 & c_2 & c_3 \end{matrix} \\ \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 1 \\ \vdots & & \vdots \\ 1 & 1 & 0 \\ 1 & 1 & 1 \end{bmatrix} \end{array} \begin{bmatrix} F_{1_1} \\ F_{1_2} \\ \\ F_{1\,i} \\ \vdots \\ F_{1_{\Theta I}} \end{bmatrix}$$

$$\theta^* = \{1, 0, 1\}$$

(♥ `BiocParallel`)

Classes and weights

$\mathbb{C} = \{c_{i=1}, \ldots, c_{i=I}\}; \Theta = \{0, 0.5, 1\}$

Primary data

$$L_P = \begin{bmatrix} q_{1,1} & q_{1,2} & \cdots & q_{1,m} \\ q_{2,1} & q_{2,2} & \cdots & q_{2,m} \\ \vdots & & & \vdots \\ q_{j,1} & q_{j,2} & \cdots & q_{j,m} \end{bmatrix}; \begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_j \end{bmatrix}; k_P$$

Auxiliary data

$$L_A = \begin{bmatrix} b_{1,1} & b_{1,2} & \cdots & \cdots & b_{1,n} \\ b_{2,1} & b_{2,2} & \cdots & \cdots & b_{2,n} \\ \vdots & & & & \vdots \\ b_{j,1} & b_{j,2} & \cdots & \cdots & b_{j,n} \end{bmatrix}; \begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_j \end{bmatrix}; k_A$$

Neighbour matrices

$$N_P = \begin{array}{c} \begin{matrix} c_{i=1} & \cdots & c_{i=I} \end{matrix} \\ \begin{bmatrix} n^P_{1,1} & \cdots & n^P_{1,I} \\ n^P_{2,1} & \cdots & n^P_{2,I} \\ \vdots & & \vdots \end{bmatrix} \end{array}; N_A = \begin{array}{c} \begin{matrix} c_{i=1} & \cdots & c_{i=I} \end{matrix} \\ \begin{bmatrix} n^A_{1,1} & \cdots & n^A_{1,I} \\ n^A_{2,1} & \cdots & n^A_{2,I} \\ \vdots & & \vdots \end{bmatrix} \end{array}$$

Class-weighted classifier (unlabelled)

$$V(c_i)_j = \theta^* n^P_{ij} + (1 - \theta^*) n^A_{ij}$$

$$\begin{array}{c} \begin{matrix} c_{i=1} & \cdots & c_{i=I} \end{matrix} \\ \begin{matrix} 1 \\ 2 \\ 3 \\ \vdots \\ j \end{matrix} \begin{bmatrix} & & \\ & V(c_i)_j & \\ & & \end{bmatrix} \end{array}$$

$$y_j = argmax(V(c_i)_j)$$

$$\theta^* = \{1, 0, 1\}\ N_P = \begin{array}{c} \\ p_1 \\ p_2 \\ \vdots \end{array} \begin{array}{c} \begin{array}{ccc} c_1 & c_2 & c_3 \end{array} \\ \begin{bmatrix} \frac{3}{3} & 0 & 0 \\ \frac{1}{3} & \frac{2}{3} & 0 \\ \vdots & \vdots & \vdots \end{bmatrix} \end{array}$$

$$V(c_1)_1 = 1 \times \frac{3}{3} + (1-1) \times n^A_{1,1}$$
$$V(c_2)_1 = 0 \times 0 + (1-0) \times n^A_{1,2}$$
$$V(c_3)_1 = 1 \times 0 + (1-1) \times n^A_{1,3}$$

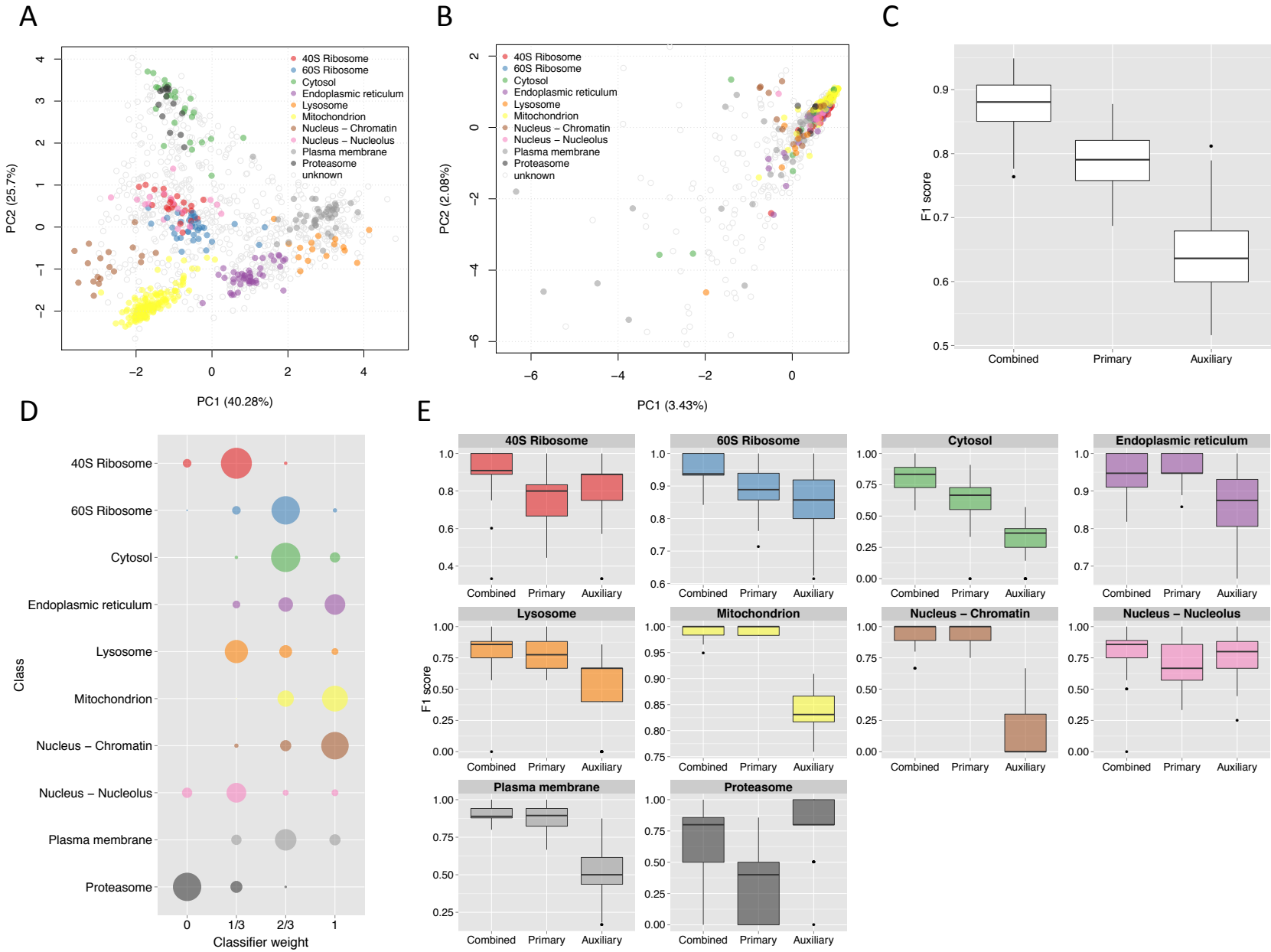
$$V(c_1)_2 = 1 \times \frac{1}{3} + (1-1) \times n^A_{1,1}$$
$$V(c_2)_2 = 0 \times \frac{2}{3} + (1-0) \times n^A_{1,2}$$
$$V(c_3)_2 = 1 \times 0 + (1-1) \times n^A_{1,3}$$

Class-weighted classifier (unlabelled)

$$V(c_i)_j = \theta^* n^P_{ij} + (1-\theta^*) n^A_{ij}$$

$$\begin{array}{c} \\ 1 \\ 2 \\ \vdots \\ j \end{array} \begin{array}{c} \begin{array}{ccc} c_1 & c_2 & c_3 \end{array} \\ \begin{bmatrix} V(c_1)_1 & V(c_2)_1 & V(c_3)_1 \\ V(c_1)_2 & V(c_2)_2 & V(c_3)_2 \\ & \vdots & \\ & & \end{bmatrix} \end{array}$$

$$y_j = argmax(V(c_i)_j)$$



Data from mouse stem cells (E14TG2a).