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$$\mathbf{\Lambda} = (\Lambda_1, ..., \Lambda_n), \tag{1}$$

$$\Lambda(\boldsymbol{\beta_k}, \boldsymbol{w}) = \left(\frac{1}{W}\right) \sum_{q=1}^{n} \beta_{k,q} w_q, \tag{2}$$

$$\mathrm{vs}(\boldsymbol{\beta_k}, \boldsymbol{w}, \boldsymbol{y}) = \left(\frac{1}{W}\right) \sum_{q=1}^{n} \beta_{q,k} w_q u(y_q, y_k), \tag{3}$$

$$\beta_{k,q} = \mathrm{eq}(s(\boldsymbol{a_k}, \boldsymbol{a_q}), c_q) \tag{4}$$

$$u(y_q, y_k) = \begin{cases} 1, \text{if } y_k \geq y_q. \\ 0, \text{otherwise.} \end{cases} \tag{5}$$

$$W = \sum_{q=1}^{n} w_q \tag{6}$$

$$\mathbf{ß} = \begin{bmatrix} 1 & \beta_{2,1} & \dots & \beta_{n,1} \\ \beta_{1,2} & 1 & \dots & \vdots \\ \vdots & \vdots & \ddots & \vdots \\ \beta_{1,n} & \dots & \dots & 1 \end{bmatrix} \tag{7}$$

$$\mathbf{ß} = \begin{bmatrix} \beta_{1,1} & \dots & \beta_{n,1} \\ \vdots & \ddots & \vdots \\ \beta_{1,n} & \dots & \beta_{n,n} \end{bmatrix} \tag{8}$$

$$\boldsymbol{\beta_k} = (\beta_{k,1}, ..., \beta_{k,n}) \tag{9}$$

$$\boldsymbol{\beta_q} = (\beta_{q,1}, ..., \beta_{q,n}) \tag{10}$$

$$\gamma_k = \mathrm{sq}(\boldsymbol{\tilde{a}_k}) \tag{11}$$

$$c_k = c(\boldsymbol{a_k}, \gamma_k) = \left(\frac{1}{m}\right) \sum_{i=1}^{m} \theta_i^k \tilde{a}_i^k, \tag{12}$$

$$\theta_i^k = \mathrm{eq}\left(\frac{a_i^k}{\max a_j^k}, \gamma_k\right) \tag{13}$$

$$\boldsymbol{\theta_k} = (\theta_1^k, ..., \theta_m^k) \tag{14}$$

$$\boldsymbol{\theta_q} = (\theta_1^q, ..., \theta_m^q) \tag{15}$$

$$\boldsymbol{\theta_n} = (\theta_1^n, ..., \theta_m^n) \tag{16}$$

$$\mathbf{\Theta} = \begin{bmatrix} \theta_1^1 & \dots & \theta_m^1 \\ \vdots & \ddots & \vdots \\ \theta_1^n & \dots & \theta_m^n \end{bmatrix} \tag{17}$$

$$\mathrm{sq}(\boldsymbol{x}) = \mathrm{mlv}(\boldsymbol{x}) + \frac{\tilde{\sigma}_x}{2} \left\{ (1 + 2\tilde{\sigma}_x)[1 - \mathrm{mlv}(\boldsymbol{x})] - \frac{\tilde{\sigma}_x}{2} \right\}, \tag{18}$$

$$\tilde{\sigma}_x = \frac{\sigma_x}{\max \sigma_x}, \tag{19}$$

$$\boldsymbol{x} \in [0, 1] \tag{20}$$