Foreground / Background Estimation

$$E(\mathbf{x}) = \sum_{i \in \mathcal{V}} \psi_i(x_i) + \sum_{i \in \mathcal{V}, j \in \mathcal{N}_i} \psi_{ij}(x_i, x_j)$$

Data term **Smoothness term**

$$x_i = 0 \implies i \in Background$$
$$x_i = 1 \implies i \in Foreground$$

Data term

$$\psi_i(x_i) = \psi_i(0)(1 - x_i) + \psi_i(1)x_i$$

Smoothness term

$$\psi_{ij}(x_i, x_j) = K_{ij}\delta(x_i \neq x_j) = K_{ij}(1 - x_i)x_j + K_{ij}(1 - x_j)x_i$$

Min-Cut problem

$$\mathbf{x}^* = \arg\min_{\mathbf{x}} \sum_{i \in \mathcal{V}} \psi_i(0)(1 - x_i) + \psi_i(1)x_i + \sum_{i,j \in \mathcal{E}} (K_{ij}(1 - x_i)x_j + K_{ij}(1 - x_j)x_i)$$