

引入松弛变量 $\xi_i \geq 0$ 则得到

$$\begin{aligned} (5) \quad \min_{\vec{w}, b, \xi} \quad & \frac{1}{2} \|\vec{w}\|^2 + C \sum_{i=1}^m \xi_i \quad C \text{ 是正的常数.} \\ \text{s.t.} \quad & \begin{cases} (\vec{w}^T \vec{x}_i + b) y_i - 1 + \xi_i \geq 0 \\ \xi_i \geq 0 \end{cases} \end{aligned}$$

(5) 对应的 Lagrange 函数:

$$\begin{aligned} \mathcal{L}(\vec{w}, b, \xi, \alpha, \mu) = & \frac{1}{2} \|\vec{w}\|^2 + C \sum_{i=1}^m \xi_i + \sum_{i=1}^m \alpha_i (1 - \xi_i - y_i (\vec{w}^T \vec{x}_i + b)) \\ & - \sum_{i=1}^m \mu_i \xi_i \end{aligned}$$