

1, 已知两类样本的数据如下:

$$\omega_1: \{(5,37), (7,30), (10,35), (11.5,40), (14,38), (12,31)\}$$

$$\omega_2: \{(35,21.5), (39,21.7), (34,16), (37,17)\}$$

试用 Fisher 判别函数法, 求出最佳投影方向  $W$ , 及分类阈值  $y_0$

$$\begin{aligned} \text{解: } \mu_1 &= \begin{bmatrix} 9.92 \\ 35.17 \end{bmatrix}, \mu_2 = \begin{bmatrix} 36.25 \\ 19.05 \end{bmatrix} & \therefore W^* &= S_w^{-1}(\mu_1 - \mu_2) = \begin{bmatrix} -2.6066 \\ 1.4943 \end{bmatrix} \\ \therefore \Sigma_1 &= \begin{bmatrix} 9.37 & 2.76 \\ 2.76 & 13.14 \end{bmatrix} & \therefore y_0 &= \frac{W^{*T}(\mu_1 + \mu_2)}{2} = -39.32 \\ \Sigma_2 &= \begin{bmatrix} 3.69 & 2.39 \\ 2.39 & 6.63 \end{bmatrix} \\ \therefore S_w &= \begin{bmatrix} 13.06 & 5.15 \\ 5.15 & 19.77 \end{bmatrix} \\ \therefore S_w^{-1} &= \begin{bmatrix} 0.085 & -0.022 \\ -0.022 & 0.056 \end{bmatrix} \end{aligned}$$