

The midpoint between the two groups on the two derived variables is $\frac{1}{2}(\mu_{Y_1} + \mu_{Y_2})$, where $\mu_{Y_i} = I^T \mu_i$. To allocate an object with feature vector \mathbf{x}_0 the first step is to compute $y_0 = I^T \mathbf{x}_0$. The allocation rule is to assign the object with feature vector \mathbf{x}_0 to group c_1 if $y_0 > \frac{1}{2}(\mu_{Y_1} + \mu_{Y_2})$, else to c_2 . If this rule is converted back to the original scale, it becomes: assign the object with feature vector \mathbf{x}_0 to group c_1 if

$$(\mu_1 - \mu_2)^T \Sigma^{-1} \mathbf{x}_0 > \frac{1}{2}(\mu_1 - \mu_2)^T \Sigma^{-1} (\mu_1 + \mu_2) \quad (7.26)$$