theoretical exercise 4

Pattern Recognition (2018)

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Exercise T-3.1

Problem

Consider a two-category classification problem and show that - in a specific case - the decision boundary for a MAP classifier is given by setting the log-likelihood ratio to zero. What is the special condition required in that case?

Solution

Exercise T-3.2

Problem

We consider a two-category (ω_1, ω_2) two-dimensional (x_1, x_2) classification problem. Assume that the given 4 data points for each class

$$\begin{aligned} \omega_1 : &\quad \{(3,8),(2,6),(3,4),(4,6)\} \\ \omega_2 : &\quad \{(3,0),(3,-4),(1,-2),(5,-2)\} \end{aligned}$$

are normally distributed and that the priors of both classes are equal.

Compute the decision boundary and specify it as a function of x_1 , i.e. $x_2 = f(x_1)$. Illustrate the boundary together with the two point clouds in an appropriate diagram.

It is not allowed to use a computer (Octave, Matlab, ...) to solve this task.

Solution