

Exercises

Theory Sheet 4

Remark:

- Submit your solutions within two weeks after your laboratory. Submission tool: OLAT (eLearning platform)
- **Important note, valid for all exercise sheets:** An extension of the deadline can not be accepted since template solutions will be made available.

Exercise T-3.1: Decision boundaries

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?

Exercise T-3.2: Decision region for two-dimensional Gaussian data

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.