German International University of Applied Sciences
Informatics and Computer Science
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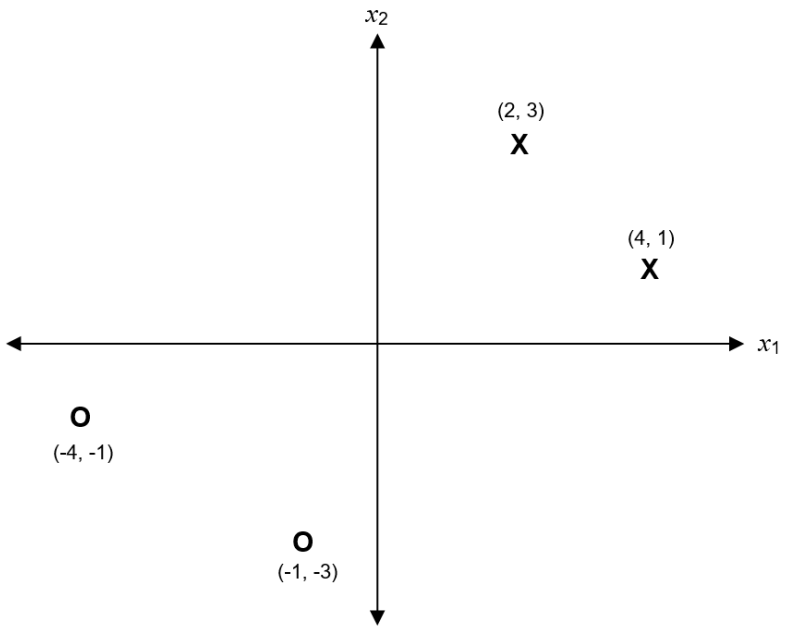
Machine Learning, Winter 2022
Practice Assignment 8

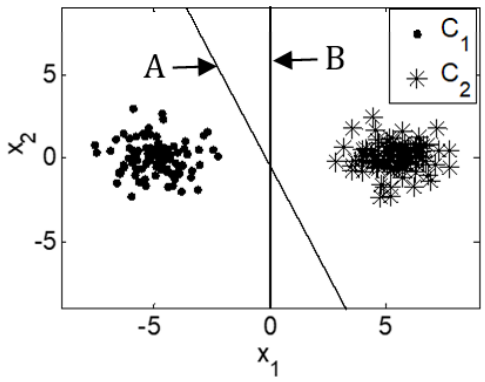
Exercise 8-1

For the data given below, use Fisher's linear discriminant whose weight vector is given by $w = 0.1S_w^{-1}(m_2 - m_1)$ to find a decision boundary between the two classes.



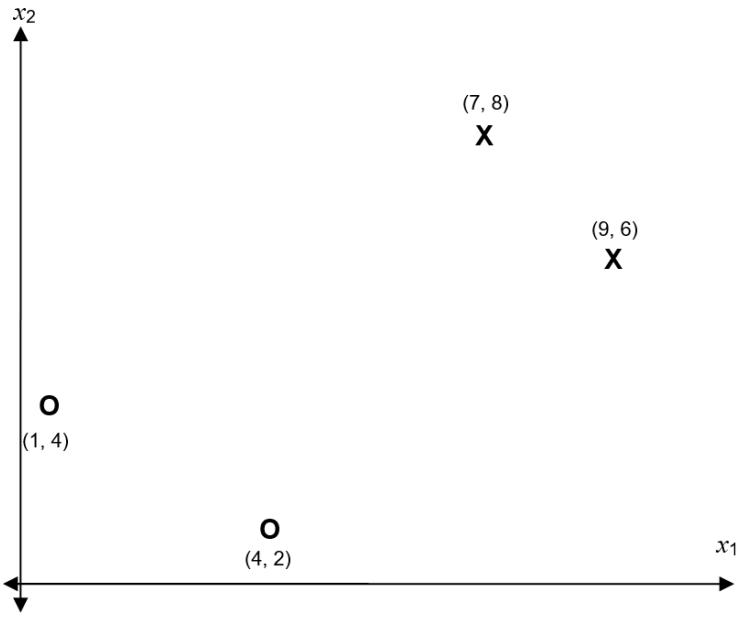
Exercise 8-2

Which of the decision boundaries shown below (A or B) represents the output of Fisherâs linear discriminant? State the reason for your choice.



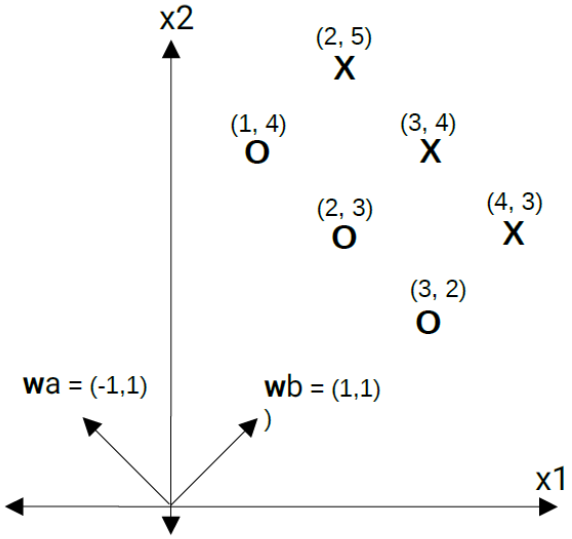
Exercise 8-3

For the data given below, use Fisher's linear discriminant whose weight vector is given by $w \propto S_w^{-1}(m_2 - m_1)$ to find a decision boundary between the two classes. Given that the data is not symmetric around the origin, a decision boundary that passes through the origin would not be sufficient. Suggest a method to find the bias term such that the decision boundary separates the data to the required two classes. Apply the method you suggest to the data.



Exercise 8-4

For the dataset given below, find the value of Fisherâs criterion given by $J(w) = \frac{(m_2-m_1)^2}{s_1^2+s_2^2}$ for each of the weight vectors $\mathbf{w}_a$ and $\mathbf{w}_b$ shown on the figure, where m_1 and m_2 are the means of the data points in classes 1 and 2, respectively, while s_1^2 and s_2^2 are the variances of the data points in classes 1 and 2, respectively. **Explain** your answer.



Exercise 8-5 Coding Question

Solve Exercise 1, 3 & 4 using Python.