

Exercise: Pattern Classification

A researcher makes two measurements per sample on a set of 10 normal and 10 abnormal samples.

The set of feature vectors for the normal samples is

{[2 6], [22 20], [10 14], [10 10], [24 24], [8 10], [8 8], [6 10], [8 12], [6 12]}.

The set of feature vectors for the abnormal samples is

{[4 10], [24 16], [16 18], [18 20], [14 20], [20 22], [18 16], [20 20], [18 18], [20 18]}.

Create a scatter plot of the samples from both classes. Design a linear decision function to classify the samples with lowest possible error of misclassification. Express the decision rule mathematically.

Two new samples $x_1 = [12 \ 15]$ and $x_2 = [14 \ 15]$ are provided. Classify them using your decision rule. Also classify them with a k-nearest neighbor classifier with $k = 7$. Discuss briefly, the results obtained in both cases.