Seminar 11

DEDP

Remaining exercises from 2 weeks ago

1. Consider the k-NN algorithm with the following training set:

- Class A:

$$\mathbf{v}_1 = \begin{bmatrix} 2 \\ -4 \end{bmatrix} \quad \mathbf{v}_2 = \begin{bmatrix} 1.5 \\ -5 \end{bmatrix} \quad \mathbf{v}_3 = \begin{bmatrix} -2.5 \\ 6 \end{bmatrix} \quad \mathbf{v}_4 = \begin{bmatrix} -3 \\ 4.5 \end{bmatrix} \quad \mathbf{v}_5 = \begin{bmatrix} 2.5 \\ -5 \end{bmatrix}$$

- Class B:

$$\mathbf{v}_6 = \begin{bmatrix} 3 \\ 1.5 \end{bmatrix} \quad \mathbf{v}_7 = \begin{bmatrix} -1 \\ 1 \end{bmatrix} \quad \mathbf{v}_8 = \begin{bmatrix} -4 \\ -3 \end{bmatrix} \quad \mathbf{v}_9 = \begin{bmatrix} -3 \\ 0 \end{bmatrix} \quad \mathbf{v}_10 = \begin{bmatrix} -2.5 \\ 3 \end{bmatrix}$$

Compute the class of the vector $\mathbf{x} = \begin{bmatrix} -2.5 \\ 5 \end{bmatrix}$ using the k-NN algorithm, with $k = 1$, $k = 3$, $k = 5$, $k = 7$ and $k = 9$

2. Consider the following data

$$\mathbf{v} = \{v_i\} = [1.1, 0.9, 5.5, 0.6, 5, 6, 1.3, 4.8, 6, 0.8]$$

Use the k-Means algorithm to find the two centroids $\mathbf{c}_1$ and $\mathbf{c}_2$, starting from two random values $\mathbf{c}_1 = 0.95$ and $\mathbf{c}_2 = 0.96$