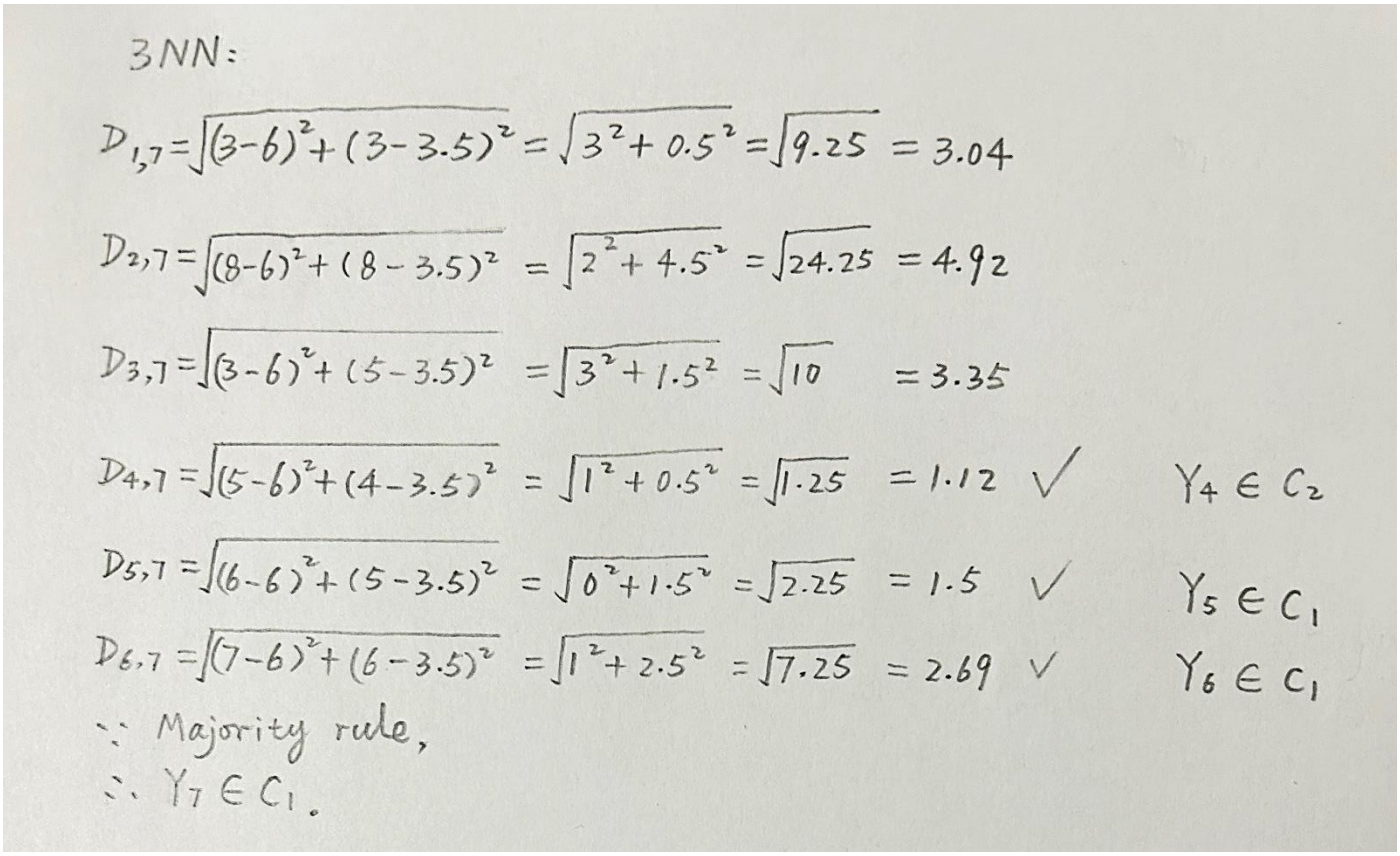
Instance based Learning Exercise Solution

Question & Solution:

In a laparoscopic surgical tool detection task, it is known that the surgical tool components come from one of two classes, C_1 or C_2. Each sample of a surgical tool component Y has two features, Y = (y_1, y_2). An experiment has collected 6 samples and their feature values and classification are shown in the following table. Answer the following questions by showing details of the working process. An answer without the working process will not receive any marks.

Y = (y_1, y_2)		Classification
y_1	y_2	C
3	3	C_2
8	8	C_1
3	5	C_2
5	4	C_2
6	5	C_1
7	6	C_1
6	3.5	=?

Using the data with known classification, design a KNN classifier with K=3 to classify the unknown sample Y=(6, 3.5) in the last row of the table.



Need to show each step of calculation. The Euclidean distance to the 6 samples are (3.04, 4.92, 3.35, 1.12, 1.5, 2.69).

The classes of the three nearest neighbours are C_2, C_1, C_1. So (6, 3.5) should be classified as C_1.