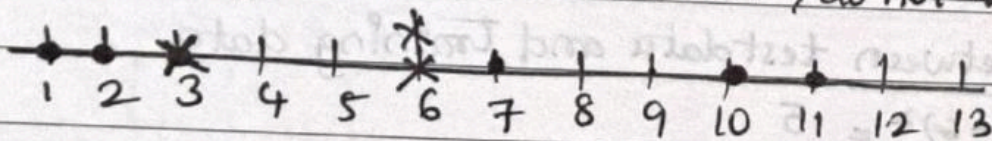


# ML Assignment.

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10. The diagram below shows a dataset with 2 classes and 8 data points, each with only one feature value, labeled  $f$ . Note that there are two data points with same feature value of 6. These are shown as two x's one above the other. Provide Stepwise mathematical sol<sup>n</sup>, ~~do not write~~



i. Divide this data equally into two parts. Use first part as training and second part as testing. Using KNN classifier, for  $k=3$ , what would be predicted outputs for the test samples? show that ~~how to~~

ii) Compute the confusion matrix for this and calculate accuracy, sensitivity and specificity values.

Sol<sup>n</sup>: consider

Id	Input	Label
1	1	0
2	2	0
3	3	1
4	6	1
5	6	1
6	7	0
7	10	0
8	11	0

0 for dot's

1 for x's.



We consider

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Input	Label
1	0
2	0
3	1
6	1

training data

Input	Label
6	1
7	0
10	0
11	0

test data.

Distance between test data and training data

$$(6, 1) = \sqrt{(1-6)^2} = 5$$

$$(6, 2) = \sqrt{(2-6)^2} = 4 \text{ --- Rank-3.}$$

$$(6, 3) = \sqrt{(3-6)^2} = 3 \text{ --- Rank-2}$$

$$(6, 6) = \sqrt{(6-6)^2} = 0 \text{ --- Rank-1 Label (1)}$$

$$(7, 1) = \sqrt{(1-7)^2} = 6$$

$$(7, 2) = \sqrt{(2-7)^2} = 5 \text{ --- Rank 3.}$$

$$(7, 3) = \sqrt{(3-7)^2} = 4 \text{ --- Rank 2}$$

$$(7, 6) = \sqrt{(6-7)^2} = 1 \text{ --- Rank 1}$$

(1)

$$(10, 1) = \sqrt{(1-10)^2} = 9$$

$$(10, 2) = \sqrt{(2-10)^2} = 8 \text{ --- Rank 3.}$$

$$(10, 3) = \sqrt{(3-10)^2} = 7 \text{ --- Rank - 2}$$

$$(10, 6) = \sqrt{(6-10)^2} = 4 \text{ --- Rank - 1}$$

$$(11, 1) = \sqrt{(1-11)^2} = 10$$

$$(11, 2) = \sqrt{(2-11)^2} = 9 \text{ --- Rank 3}$$

$$(11, 3) = \sqrt{(3-11)^2} = 8 \text{ --- Rank 2}$$

$$(11, 6) = \sqrt{(6-11)^2} = 5 \text{ --- Rank 1}$$



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Input	Label	Pre
6	1	1
7	0	1
10	0	1
11	0	1

Confusion matrix :-

		TN 0	FP 1
a c b y a y	0	0	3
	1	0 FN	1 TP
		Pre	

Accuracy

$$= \frac{(TP+TN)}{(P+N)} = \frac{(1+0)}{1+3} = \frac{1}{4}$$

Specificity

$$= \frac{TN}{(FP+TN)} = \frac{0}{(3+0)} = 0$$