CS 5710 – Assignment 1 (22002)

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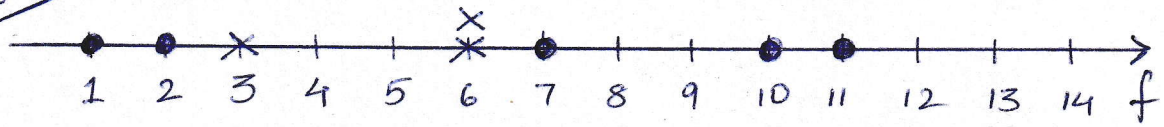
Question - 10

Part-1



Assume Class A = [1, 2, 7, 10, 11]

Class B = [3, 6, 6]

Data Points	Class
1	A
2	A
3	B
6	B
6	B
7	A
10	A
11	A

Splitting 8 data points to 2 sets (equal)

dp_train = [1, 2, 3, 6]
class_train = [A, A, B, B]

dp_test = [6, 7, 10, 11]
class_test = [B, A, A, A]

KNN where K=3

Euc. Dist = $\sqrt{(x-x_1)^2}$ as there is only 1 feature

dp_test[0] = 6 ⇒

dp_test[0]	dp_train	dist	class_train
6	1	5	A
6	2	4	A → K=3
6	3	3	B → K=2
6	6	0	B → K=1

eg $\sqrt{(6-1)^2}$

⇒ $\sqrt{25} = 5$

Majority ⇒ B ∴ Prediction = B

dp_test[1] = 7

dp_test[1]	dp_train	class_train	dist
7	1	A	6
7	2	A	5 ⇒ k=3
7	3	B	4 ⇒ k=2
7	6	B	1 ⇒ k=1

Majority = B

∴ Pred = B

dp_test[2] = 10

dp_test[2]	dp_train	class_train	dist
10	1	A	9
10	2	A	8 ⇒ k=3
10	3	B	7 ⇒ k=2
10	6	B	4 ⇒ k=1

Majority = B

∴ Pred = B

dp_test[3] = 11

dp_test[3]	dp_train	class_train	dist
11	1	A	10
11	2	A	9 ⇒ k=3
11	3	B	8 ⇒ k=2
11	6	B	5 ⇒ k=1

Majority = B

∴ Pred = B

∴ dp_test = [6, 7, 10, 11]

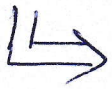
class_test = [B, A, A, A] ⇒ Actual Classification

pred_test = [B, B, B, B] ⇒ Predicted Output

Part-2

Assuming A ⇒ Positive
B ⇒ Negative

Confusion Matrix



		Actual: Positive	Actual: Negative
Pred	P	TP	FP
	N	FN	TN

In this case

	P	N
P	0	3
N	0	1

⇒ Confusion Matrix

Now,

Accuracy = $\frac{TN + TP}{TN + TP + FN + FP} = \frac{1}{4} = 0.25$

Accuracy = 25%

Sensitivity = $\frac{TP}{TP + FN} = \frac{0}{0}$ ⇒ Worst case sensitivity is represented by 0.

Sensitivity = 0%

Specificity = $\frac{TN}{TN + FP} = \frac{1}{4} = 0.25$

Specificity = 25%