

"MACHINE - LEARNING"

CODE : 20IT6302

HOME - ASSIGNMENT - 1

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	A	B	C	D	E	F
A	19	4	12	48	25	2
B	50	15	40	25	10	9
C	21	36	12	5	32	15
D	20	29	5	19	45	35
E	2	17	25	36	23	50
F	6	30	25	14	36	23

Consider the above confusion matrix & calculate TPR, FPR, TNR, FNR, Accuracy by considering the A, B as positive classes and C, D, E, F as negative classes.

→ The confusion matrix will be

	+ve	-ve
+ve	$19 + 4 + 50 + 15 = 88$ (TP)	$12 + 48 + 25 + 2 + 40 + 25$ $+ 10 + 9 = 171$ (FN)
-ve	$21 + 36 + 20 + 29$ $+ 2 + 17 + 6 + 30$ $= 157$ (FP)	$12 + 5 + 32 + 15 + 5 + 19 + 45$ $+ 35 + 45 + 23 + 23 + 50$ $+ 25 + 14 + 36 + 23 = 396$ (TN)

$$TP + FP = 245$$

$$FN + TN = 567$$

$$TP + FN = 359$$

$$FP + TN = 553$$

$$1) \quad TPR = \frac{TP}{TP + FN} = \frac{88}{88 + 171} = 0.33$$

$$2) \quad FPR = \frac{FP}{FP + TN} = \frac{157}{157 + 396} = 0.28$$

$$3) \quad TNR = \frac{TN}{TN + FP} = \frac{396}{396 + 157} = 0.71$$
$$= (1 - TPR) \Rightarrow (1 - 0.33) \Rightarrow 0.71$$

$$4) \quad FNR = \frac{FN}{FN + TP} = \frac{171}{171 + 88} \Rightarrow 0.66$$
$$= (1 - TPR) \Rightarrow 0.66$$

$$5) \quad \text{Accuracy} = \frac{TP + TN}{\text{TOTAL}} = \frac{88 + 396}{812} = 0.59$$

$$\left(\because \text{TOTAL} = TP + TN + FP + FN = 812 \right)$$

Q2

If the predicted vector of word is $[-1, +1, -1, +1, -1]$
Find out the class label to be decided by considering the
Following Output code Matrix:

$$\begin{bmatrix} 0 & +1 & -1 & -1 & 0 \\ -1 & -1 & +1 & 0 & -1 \\ +1 & 0 & -1 & -1 & +1 \\ -1 & -1 & 0 & +1 & 0 \end{bmatrix}$$

$$W = [-1, +1, -1, +1, -1]$$

$$d(W, c) = \sum (1 - W_i c_i) / n$$

$$\begin{aligned} C_1 &= \frac{1-0}{2} + \frac{1-1}{2} + \frac{1-1}{2} + \frac{1+1}{2} + \frac{1-0}{2} \\ &= \frac{1}{2} + 0 + \frac{0}{2} + 1 + \frac{1}{2} \\ &= 3 \end{aligned}$$

$$\begin{aligned} C_2 &= \frac{1-1}{2} + \frac{1+1}{2} + \frac{1+1}{2} + \frac{1-0}{2} + \frac{1-1}{2} \\ &= 0 + 1 + 1 + \frac{1}{2} \Rightarrow 2.5 \end{aligned}$$

$$C_3 = \frac{1+1}{2} + \frac{1-0}{2} + \frac{1-1}{2} + \frac{1+1}{2} + \frac{1+1}{2}$$

$$C_3 = 1 + \frac{1}{2} + 0 + 1 + 1$$

$$C_3 = 3.5$$

$$C_4 = \frac{1-1}{2} + \frac{1+1}{2} + \frac{1-0}{2} + \frac{1-1}{2} + \frac{1-0}{2}$$

$$= 0 + 1 + \frac{1}{2} + 0 + \frac{1}{2}$$

$$= 2$$

∴ " C_4 " is the class Label.