Machine Learning

Home Assignment

S. Vamsi
208W1A1260

10)

P.C

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

Consider the above confusion matrix and calculate. TPR, FPR, TNR, FNR, accuracy by considering A, B as (+)ve class & C, D, E, F as negative class

(Solution)

P.C

A.C	(+)ve	(−)ve	
(+)ve	19+4+50+15 = 88 (TP)	12+48+25+2+40+25+10+9 = 171 (FN)	259
(−)ve	21+32+20+28+2+17+6+30 = 157 (FP)	12+5+32+15+5+19+45+35+25+36+23+50+25+14+32+ = 396 (TN)	553
	245	567	812 - Total

$$TPR = \frac{TP}{TP + FN} = \frac{88}{88 + 191} = \boxed{0.33}$$

$$FPR = \frac{FP}{FP + TN} = \frac{157}{157 + 396} = \boxed{0.78}$$

$$TNR = \frac{TN}{TN + FP} = \frac{396}{396 + 157} = \boxed{0.71} \quad (\text{or}) \quad (1 - FPR)$$

$$FNR = \frac{FN}{FN + TP} = \frac{171}{171 + 88} = \boxed{0.66} \quad (\text{or}) \quad 1 - TPR)$$

$$\text{Accuracy} = \frac{TP + TN}{\text{total}} = \frac{88 + 396}{812} = \boxed{0.59}$$

92) If the predicted word vector is $[-1, +1, -1, +1, -1]$, find out the class label to be predicted by considering the following output code matrix

$$\begin{bmatrix} 0 & +1 & -1 & -1 & 0 \\ -1 & -1 & +1 & 0 & -1 \\ +1 & 0 & -1 & -1 & +1 \\ -1 & -1 & 0 & +1 & 0 \end{bmatrix} \qquad W = [-1, +1, -1, +1, -1]$$

$$d[w, c] = \sum_i (1 - w_i c_i)/2$$

$$c_1 = (1-0)/2 + (1-1)/2 + (1-1)/2 + (1+1)/2 + (1-0)/2$$

$$= 1/2 + 0 + 0/2 + 1 + 1/2$$

$$= 3$$

$$c_2 = (1-1)/2 + (1+1)/2 + (1+1)/2 + (1-0)/2 + (1-1)/2$$

$$= 0 + 1 + 1 + 1/2 = 2.5$$

$$c_3 = (1+1)/2 + (1-0)/2 + (1-1)/2 + (1+1)/2 + (1+1)/2$$

$$= 1 + 1/2 + 0 + 1 + 1 = 3.5$$

$$c_4 = (1-1)/2 + (1+1)/2 + (1-0)/2 + (1-1)/2 + (1-0)/2$$

$$= 0 + 1 + 1/2 + 1/2 = 2$$

$\therefore$ c_4 is class label.