

20I T6302:- MACHINE LEARNINGHOME ASSIGNMENT-1

2)

		P	P	N
	Predicted/True	PersNorm	PersLow	PersHigh
P	PersNorm	689	102	57
P	PersLow	103	672	44
N	PersHigh	110	52	771

considered the above confusion matrix and calculate TPR, FPR, TNR, FNR, accuracy by considering the persnorm and perslow as positive class and perhigh as negative class.

$$TP = 689 + 103 + 102 + 672 = 1566$$

$$TN = 771$$

$$FP = 57 + 44 = 101$$

$$FN = 110 + 52 = 162$$

$$TPR = \frac{TP}{TP + FN} = \frac{1566}{1566 + 162} = 0.906$$

$$\boxed{TPR = 0.906}$$

$$FPR = \frac{FP}{FP + TN} = \frac{101}{101 + 771} = 0.115$$

$$\boxed{FPR = 0.115}$$

$$TNR = \frac{TN}{FP + TN} = \frac{771}{101 + 771} = 0.884$$

$$TNR = 0.884$$

$$FNR = \frac{FN}{TP + FN} = \frac{162}{1566 + 162} = 0.093$$

$$FNR = 0.093$$

$$Accuracy = \frac{TP + TN}{TP + FP + FN + TN} = \frac{1566 + 771}{1566 + 101 + 162 + 771}$$

$$Accuracy = 0.898$$

14) If the Predicted word vector is $[+1, -1, +1, +1]$, find out the class label to be decided by consider the following output code matrix.

+1	-1	-1	-1
-1	-1	+1	-1
-1	+1	-1	-1
-1	-1	-1	+1

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

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

$$\begin{aligned} d(w, c_1) &= \frac{1 - (+1)(+1)}{2} + \frac{1 - (-1)(-1)}{2} + \frac{1 - (+1)(-1)}{2} + \frac{1 - (+1)(-1)}{2} \\ &= 0 + 0 + 1 + 1 \\ &= 2 \end{aligned}$$

$$\begin{aligned} d(w, c_2) &= \frac{1 - (+1)(-1)}{2} + \frac{1 - (-1)(-1)}{2} + \frac{1 - (+1)(+1)}{2} + \frac{1 - (+1)(-1)}{2} \\ &= 1 + 0 + 0 + 1 \\ &= 2 \end{aligned}$$

$$\begin{aligned} d(w, c_3) &= \frac{1 - (+1)(-1)}{2} + \frac{1 - (-1)(+1)}{2} + \frac{1 - (+1)(-1)}{2} + \frac{1 - (+1)(-1)}{2} \\ &= 1 + 1 + 1 + 1 \\ &= 4 \end{aligned}$$

$$\begin{aligned}
 d(w, c_4) &= \frac{1 - (+1)(-1)}{2} + \frac{1 - (-1)(-1)}{2} + \frac{1 - (+1)(-1)}{2} + \frac{1 - (+1)(+1)}{2} \\
 &= 1 + 0 + 1 + 0 \\
 &= 2
 \end{aligned}$$

The predicted word vector $[+1, -1, +1, +1]$ belongs to class 3.