

Topic.....

Date.....

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$$a) \text{ sensitivity} = \frac{TP}{TP+FN} = 0.9, \text{ specificity} = \frac{TN}{TN+FP} = 0.9$$

$$\text{prevalence} = \frac{TP+FN}{TP+FN+TN+FP} = 0.5\% = 0.005$$

$$\text{Population} = 1,00,000$$

$$TP+FN = 0.005 \times 1,00,000$$

$$= 500$$

$$\text{from sensitivity, } TP = 0.9 \times 500$$

$$= 450$$

$$\therefore FN = 500 - 450$$

$$= 50$$

$$TN+FP = TN+TP+FN+FP - (TP+FN)$$

$$= 1,00,000 - 500 = 99,500$$

~~from~~ from specificity

$$TN = 0.9 \times 99,500 = 89,550$$

$$FP = 950$$

	Pred		
	P	N	
Confusion matrix:	4500	500	P Actual
	9500	89500	N

~~1000 to 5~~

$$\text{This result is } FP \text{ percent} = \frac{9500}{1,00,000} = 9.5\%$$

$$FN = \frac{500}{1,00,000} = 0.5\%$$

9500 + 4500 = 14000

i)  $\frac{FP}{FP + FN} = \frac{2500}{9500 + 4500} = 67.86\%$

$\frac{FP}{FP + FN}$

ii)  $\frac{FN}{FP + FN} = \frac{8500}{9500 + 4500} = 58.1\%$

$\frac{FN}{FP + FN}$

Q1(c)

$$x_1 = (0.2, 0.3)$$

$$h_0 = u_0 = (0.1, 0.2, 0.3)$$

$$f_x = \sigma(w_x x + w_h h)$$

$$w_x = \begin{pmatrix} 0.1 & 0.1 \\ 0.1 & 0.1 \\ 0.1 & 0.1 \end{pmatrix}$$

$$w_h = \begin{pmatrix} 0.1 & 0.1 & 0.1 \\ 0.1 & 0.1 & 0.1 \\ 0.1 & 0.1 & 0.1 \end{pmatrix}$$

$$w_x x_1 = \begin{pmatrix} 0.05 \\ 0.05 \\ 0.05 \end{pmatrix}$$

$$w_h h_0 = \begin{pmatrix} 0.06 \\ 0.06 \\ 0.06 \end{pmatrix}$$

$$f_1 = \sigma \begin{pmatrix} 0.11 \\ 0.11 \\ 0.11 \end{pmatrix} = \begin{pmatrix} 0.527 \\ 0.327 \\ 0.527 \end{pmatrix} = o_1 = i_1$$

$$E_1 = \tanh(w_x x_1 + w_h h_1)$$

$$= \tanh \begin{pmatrix} 0.11 \\ 0.11 \\ 0.11 \end{pmatrix}$$



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Q2a)

1)

Image with some padding

0	0	0	0	0	0	0
0	1	2	10	3	10	0
0	8	6	9	10	12	0
0	6	20	5	10	5	0
0	20	0	10	2	1	0
0	10	0	0	5	2	0
0	0	0	0	0	0	0

11)

central pixel uses

6	8	10
20	5	10
0	10	2

filter

1	2	1
0	0	0

-1 -2 -1

$$\text{value} = 6 \times 1 + 8 \times 2 + 10 \times 1 + 20 \times 0 + 5 \times 0 + 10 \times 0 + (-1) \times 0 + (-2) \times 10 + (-1) \times 2$$

$$= 6 + 16 + 10 + 0 + 0 + 0 - 20 - 2$$

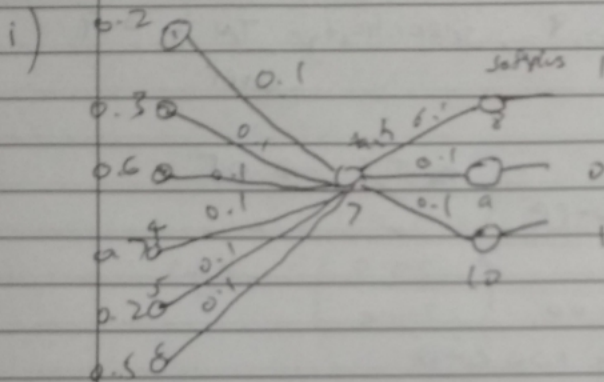
$$= 10 //$$

Q14)

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ii) Forward pass

$$O_7 = 0.1 \times 0.2 + 0.1 \times 0.3 + 0.1 \times 0.6 + 0.1 \times 0.7 + 0.1 \times 0.2 + 0.1 \times 0.2 + 0.1 \times 0.5$$

$$f(0.25) = \frac{1 - e^{-0.25}}{1 + e^{-0.25}} = \frac{1 - 0.6065}{1 + 0.6065}$$

$$0.25 \times 0.1 = 0.025$$

$$= \frac{0.273}{1.6065} = 0.2449$$

$$0.8 = O_9 = 0.1 \times 0.2449$$

$$= f(0.02449)$$

$$= \ln(1 + e^{0.02449})$$

$$= 0.7055$$