Final

Ahmed Shakib Reza
id: 23341130
sec: 02 [CSE 428]

Q1

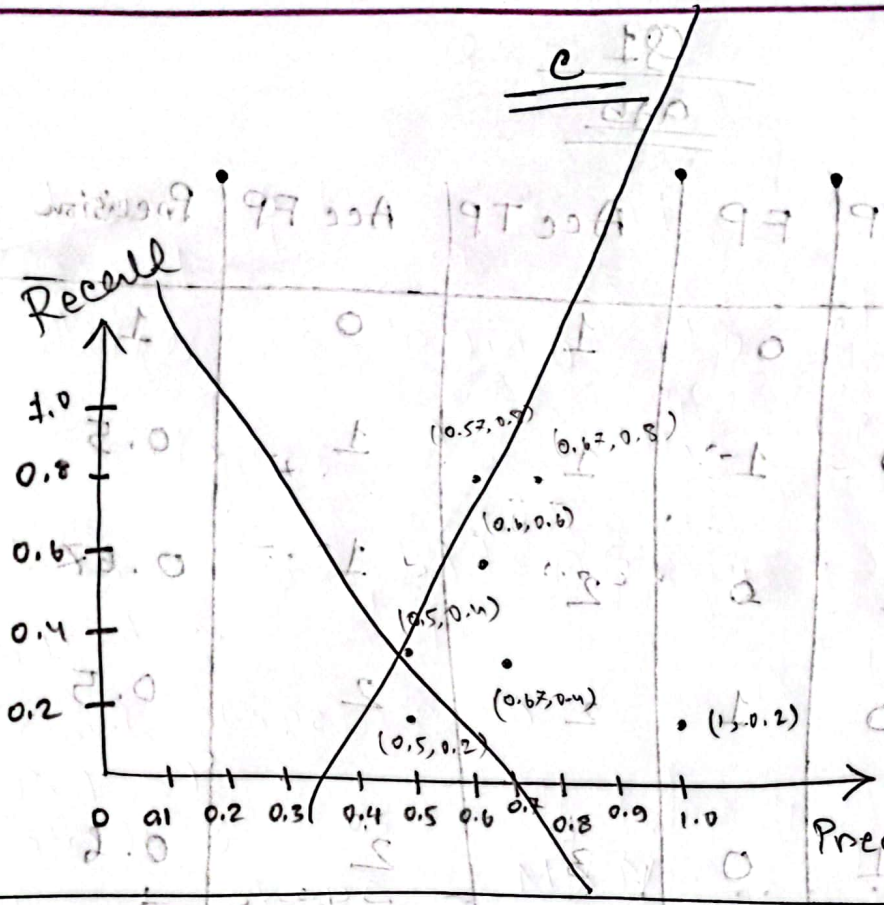
a+b

Img	Confi	TP	FP	Acc TP	Acc FP	Precision	Recall
3	92	1	0	1	0	1	0.2
2	90	0	1	1	1	0.5	0.2
1	86	1	0	2	1	0.67	0.4
3	73	0	1	2	2	0.5	0.4
2	70	1	0	3	2	0.6	0.6
1	65	1	0	4	2	0.67	0.8
2	56	0	1	4	3	0.57	0.8

$$\text{Precision} = \frac{TP}{\text{all detections}}$$

$$\text{Recall} = \frac{TP}{\text{all ground Truths}}$$

c



for 2nd Row,

Acc TP = 1

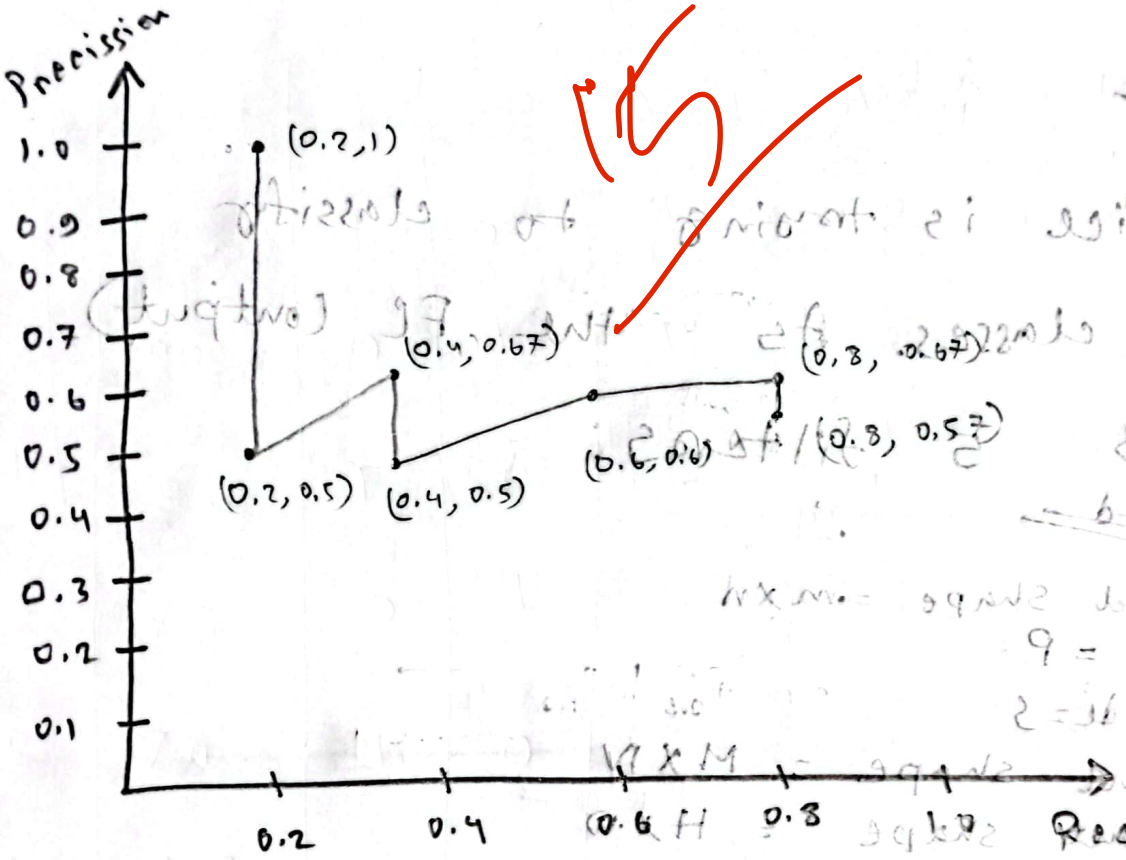
All detection = 2

All ground truth = 5

$\therefore$ Precission = $\frac{1}{2}$ = 0.5

$\therefore$ Recall = $\frac{1}{5}$ = 0.2

C


Precision
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
(0.2,1)
(0.4,0.67)
(0.6,0.6)
(0.8, 0.57)
(0.2, 0.5)
(0.4, 0.5)
0.2
0.4
0.6
0.8
Recall

Q3

a.

Alice is trying to classify 5 classes. As the FC (output) has 5 filters.

b+c+d

Kernel shape = m x n
Pad = P
stride = S
Input shape = M x N
Output shape = H x W

$$H = \text{floor}\left(\frac{M+2p-m}{s}+1\right), \quad W = \text{floor}\left(\frac{N+2p-n}{s}+1\right)$$

Conv - 1

M = 56, m = 7, p = 3, s = 1

$$\therefore H = \frac{56+2\times3-7}{1}+1$$

$$= 56$$

$$\therefore W = 56$$

and, 3rd channel = 10 (num of filters)

Layers	Input Dimention	Filter Size	Pad width	Num of filters	output Dime	Memory (KByte)	FLOPs (in M)
Conv - 1	56X56X3	7 X 7	3	10	56X56X10	245	4.6
Pool - 1	56X56X10	2X2	0	–	28X28X10	61.25	0.31
Conv - 2	28X28X10	5X5	2	20	28X28X20	122.5	3.92
Pool - 2	28X28X20	4X4	0	–	7X7X20	7.65	0.31
Flatten	7X7X20	–	–	–	20	7.65	0
fc (output)	980	–	–	5	5		4.9×10^{-3}

Pool - 1

$$H = \frac{56 + 2\times0 - 2}{2} + 1$$

$$= 28$$

Conv - 2

$$H = \frac{28 + 2\times2 - 5}{1} + 1$$

$$= 28$$

Pool - 2

$$H = \frac{28 + 0 - 4}{4} + 1$$

$$= 7$$

Memory:

$$\text{Memory} = \frac{(H \times W \times C \times 8)}{1024} \text{ K Byte}$$

Conv-1

$$\text{Memory} = \frac{56 \times 56 \times 10 \times 8}{1024} \text{ K Byte}$$

$$= 245 \text{ K Byte}$$

FLOPs:

$$\text{Flops} = \frac{(\text{output volume} \times \text{filter volume})}{10^6} \text{ M}$$

Conv 1

$$\text{Flops} = \frac{56 \times 56 \times 10 \times 7 \times 7 \times 3}{10^6} \text{ M}$$

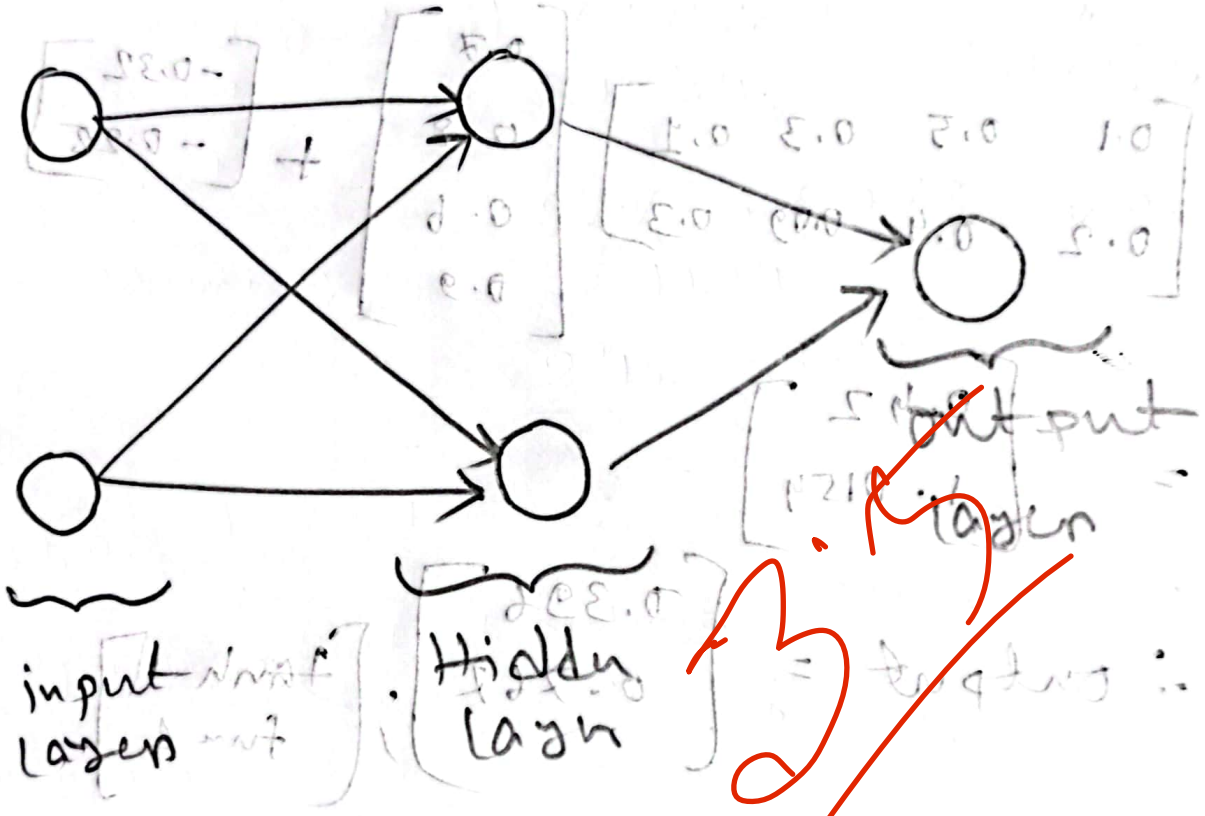
$$= 4.6 \text{ M}$$

Q2

(a)

Because we need to classify in descrite classed. So, we need a prediction between 0 and 1. So that we can either pick 0 or 1 for certain threshold.

(b)



3.5

input to-hidden:

$$\begin{bmatrix} 0.1 & 0.5 & 0.3 & 0.1 \\ 0.2 & 0.4 & 0.09 & 0.3 \end{bmatrix} \begin{bmatrix} 0.7 \\ 0.8 \\ 0.6 \\ 0.9 \end{bmatrix} + \begin{bmatrix} -0.32 \\ -0.28 \end{bmatrix}$$

$$= \begin{bmatrix} 0.42 \\ 1.0154 \end{bmatrix}$$

$$\therefore \text{output} = \begin{bmatrix} 0.396 \\ 0.767 \end{bmatrix}, \begin{bmatrix} \tanh \\ \text{func} \end{bmatrix}$$

output:

$$\begin{bmatrix} 0.5 & 0.9 \end{bmatrix} \begin{bmatrix} 0.396 \\ 0.767 \end{bmatrix} + [0.5]$$

$$= 1.3883$$

$$\therefore \text{output} = \frac{1}{1 + e^{-1.3883}}$$

$$= 0.80 \approx 1$$

∴ it's Light (Label: 1)