Minor I
ELL715
(2017-18)

Marks: 25

It is closed book exam

1. A 3x3 filter F is given as,

$$F = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 9A-1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$$

Here A>1, Can you explain its behavior with justification

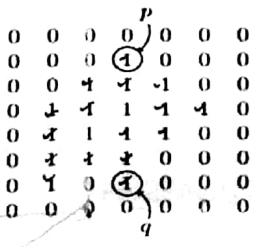
2. Is a Sobel operator linear?
Please use the Sobel operator S

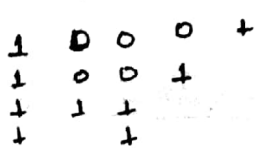
$$S = \begin{bmatrix} 1 & 2 & 1 \\ 0 & 0 & 0 \\ -1 & -2 & -1 \end{bmatrix}$$

on the image given and evaluate the output corresponding to 2nd and 3rd row

0	0	0	0	0	0	0	0
0	13	0	13	6	8	3	0
0	0	0	4	7	9	6	0
0	14	0	7	3	12	7	0
0	0	9	9	6	1	3	0
0	8	5	15	11	4	12	0
0	0	13	1	0	7	0	0
0	0	0	0	0	0	0	0

3. The boundary of region R of an image is the set of pixels that have one or more neighbors that are not in the region R. In the image given below all the pixel with value 1 constitute a region





a. Draw the boundary in 4 neighbor and 8 neighbor sense of R, show boundary pixel as '1' and rest as '0'

b. In the boundary image with 4 neighbors, calculate Chess board and m-distance between p&q.

c. In the boundary image with 8 neighbors, calculate City block and m-distance between p&q.

4. Find the transform which will change the image histogram to required histogram.

Histogram of given image 0<i<256	Histogram of intended image 0<i<256
(a) h(i)=10*i	g(i)=10
(b) h(i)=10	$g(i)=10*(i-128)^2$

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5. Let a point (X,Y,Z) in 3D plane is first rotated along z direction by 90 degree and then translated by (4,1,0).

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Determine the values for a,b and theta if the following transformation is to be identical to the above
trans(a,b,0) rot(z, theta)

$S_r = 255 \times \int_0^r p_i \cdot di$

$255 \times Sr^2$

$\frac{n(n+1)}{2}$

$\frac{255 \cdot 256}{x}$

$\frac{x \times}{255 \times 5 \times 256}$

$\frac{255 \times 5 \times 256}{256}$

$\begin{bmatrix} 0 & -1 & 6 \\ 1 & 0 & 1 \\ 0 & 0 & 0 \end{bmatrix} \begin{bmatrix} x \\ y \\ 0 \end{bmatrix}$

-4

128
64

$\frac{128}{2}$

255