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Quiz-2.

1. $x(n) = \delta(n) + 2\delta(n-1) + 2\delta(n+1)$

$h(n) = 5\delta(n) - 6\delta(n-2) + 9\delta(n+1)$

$x(n)$	$h(n)$
$x(0) = 0, \; \delta(0) = 1$	$x(0) = 5$
$x(-1) = 2$	$x(2) = -6$
$x(1) = 2$	$x(-1) = 9$

	9	5	0			9	5	0	-6
2	18	10	-12		2	18	10	0	-12
1	9	5	-6		1	9	5	0	-6
2	18	10	-12		2	18	10	0	-12

$y(n) = \{18, 19, 4, 4, -12\}$

$L = 3 + 3 - 1 = 5.$ $y(n) = \{18, 19, 23, -2, -6, -12\}$

linear $\longrightarrow$

$\rightarrow$ Since both have 3 samples $N=3$, w.r.p linear convolution with 3.

- at $0 = 18 + (-2) = 16$
  $= 19 + (-6) = 13$
  $= 23 - 12 = 11$

$y_c P = [16, 13, 11]$

iii) Auto correlation: $x_n = [0, 2, 1, 2]$

$\cdot[0] = 2^2 + 1^2 + 2^2 = 9$

$[1] = (2 \times 1) + (1 \times 2) = 4$

$[2] = (2 \times 2) = 4$

fire negative it is symmetric

$$R_{xx}[k] = [4, 4, 9, 4, 4] \quad , k = -2 \text{ to } 2$$

iv) cross correlation:

$x(n) = [2, 1, 2] \qquad h = [4, 5, 0, 6]$

$[-12, -6, -2, 23, 19, 18]$

$\quad \; 3 \quad\; 2 \quad 1 \quad\; 0 \quad -1 \quad -2$

$i/p = \begin{bmatrix} 1 & 5 & 7 & 8 \\ 9 & 3 & 2 & 6 \\ 1 & 2 & 3 & 4 \end{bmatrix}$
Kernel $= \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 1 \end{bmatrix}$

a) $1 + 7 + 3 + 1 + 3 = 15$

b) $5 + 8 + 2 + 2 + 9 = 26$

$size = \dfrac{((3-3) + 1)}{1} \times \dfrac{(4-3+1)}{1} = 1 \times 2$

$$o/p = [15, 26].$$

Q.3   i/p $= \begin{bmatrix} 1 & 5 & 7 & 8 \\ 9 & 3 & 2 & 6 \\ 1 & 2 & 3 & 9 \end{bmatrix}$

Mat arr 1 $= [1, 5, 7, 9, 3, 2, 1, 2, 3]$

avg $= 1+5+7+9+3+2+1+2+3 = 33/9 = 3.67$

median $= 3$

Max $= 9$

Mat arr 2 $= [5, 7, 8, 3, 2, 6, 2, 3, 9]$

avg $= 45/9 = 5$

Median $= 5$

Max $= 9$.

a) Average $= [3.67 \quad 5]$

b) Median $= [3 \quad 5]$

c) Max $= [9 \quad 9]$

4)   i/p $= \begin{bmatrix} 1 & 5 & 7 \\ 9 & 3 & 2 \\ 1 & 2 & 3 \end{bmatrix}$

$\dfrac{df}{dx} =$ row substraction $= \begin{bmatrix} 8 & -2 & -5 \\ -8 & -1 & 1 \\ -1 & -2 & -3 \end{bmatrix}$

$\dfrac{df}{dy} =$ colum substraction $= \begin{bmatrix} 4 & 2 & -7 \\ -6 & -1 & -2 \\ 1 & -1 & -3 \end{bmatrix}$

iii] Laplacian using 4-neighbour

$$i/p = \begin{bmatrix} 1 & 5 & 7 \\ 4 & 3 & 2 \\ 1 & 2 & 3 \end{bmatrix}$$

$$o/p = \begin{bmatrix} 10 & -9 & -21 \\ -31 & -6 & 5 \\ 7 & -1 & -8 \end{bmatrix}$$

$$f(x,y) = f(x+1,y) + f(x-1,y) + f(x,y+1) + f(x,y-1) + 4 \times f(x,y)$$

ex = for $f(0,0) = 1 \Rightarrow$
$\qquad$ $5 + 9 + 0 + 0 + (4 \times 1) = 10$
$f(2,2) = 3 \Rightarrow$
$\qquad$ $5 + 9 + 2 * 2 + (4 \times 3) = 6$