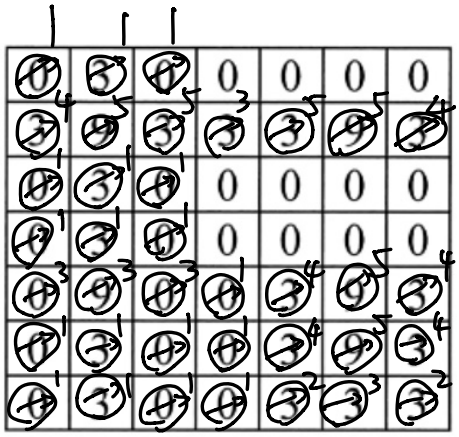
2351 Q1

Solution

(a) $[\frac{1}{3}\ \frac{1}{3}\ \frac{1}{3}]$ padding : 1

0	3	0	0	0	0	0
3	9	3	3	3	9	3
0	3	0	0	0	0	0
0	3	0	0	0	0	0
0	9	0	0	3	9	3
0	3	0	0	3	9	3
0	3	0	0	3	3	3



1 1 1 0 0 0 0

4 5 5 3 5 5 4

1 1 1 0 0 0 0

1 1 1 0 0 0 0

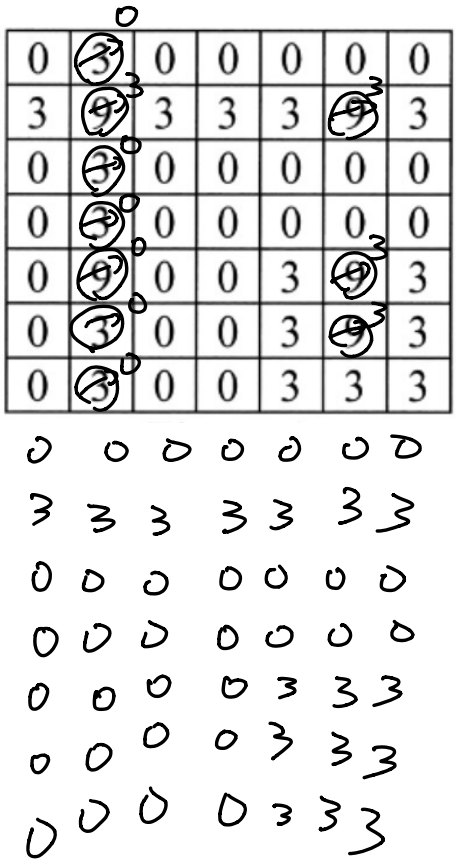
3 3 3 1 4 5 4

1 1 1 1 4 5 4

1 1 1 1 2 3 2

(b) median filter

0	3	0	0	0	0	0
3	9	3	3	3	9	3
0	3	0	0	0	0	0
0	3	0	0	0	0	0
0	9	0	0	3	9	3
0	3	0	0	3	9	3
0	3	0	0	3	3	3



c) g_1 ① reduce random noise

② but blur sharp edges, such as vertical line

g_2 ① remove "salt-and-pepper" noise

② preserves edge

③ however, the vertical line is missing

6222 2022-2023

1. (a) filter $h = [\frac{1}{3}\ \frac{1}{3}\ \frac{1}{3}]$ 1×3 $\sum_{j=1}^{3} h(1,j) f(x, y-i)$

$g(x,y) = f(x,y) * h(x,y) = \sum_{j=-1}^{1} \sum_{i=0}^{1} h(i,j) f(x-i, y-j)$

$g_1(x,y) =$

1	1	1	0	0	0	0
4	5	5	3	5	5	4
1	1	1	0	0	0	0
1	1	1	0	0	0	0
3	3	3	1	4	5	4
1	1	1	1	4	5	4
1	1	1	1	2	3	2

(b)

$g_2(x,y) =$

0	0	0	0	0	0	0
3	3	3	3	3	3	3
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	3	3	3
0	0	0	0	3	3	3
0	0	0	0	3	3	3

? (c) $g_1(x,y)$ ⇒ mean method $g_2(x,y)$ ⇒ median method

~~horizontal~~: median better

vertial:

Mean filter 'blurs' the image details. Spread the noise.

Median filter does not 'blur' the edge. remove the noise.

horizontal and a square.

median may remove the noise, lost some features.

mean & contrary.