DSIP ASSIGNMENT

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BE COMPS B-50

Q. For the 3-bit image shown, apply averaging Filter by.
① Zero padding
② Pixel Replication.

Soln.

Given Image $f(x,y)$ =

4	3	2	5
0	2	1	6
7	6	5	2
1	2	3	5

A 3 x 3 averaging mask is shown below.

$$w(x,y) = \frac{1}{9}$$

1	1	1
1	1	1
1	1	1

Filtering is performed using the convolution operation
i.e. $g(x,y) = f(x,y) * w(x,y)$

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① Zero Padding:

Here, we zero pad the image before performing the filtering operation. This gives us a 6 × 6 image.

$f(x, y)$ =

0	0	0	0	0	0
0	4	3	2	5	0
0	0	2	1	6	0
0	7	6	5	2	0
0	1	2	3	5	0
0	0	0	0	0	0

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We move the averaging mask over this image starting from the top-left corner as follows:

$$\therefore g(x,y) = f(x,y) * w(x,y)$$

$$= \frac{1}{9}$$

0	0	0	0	0	0
0	4	3	2	5	0
0	0	2	1	6	0
0	7	6	5	2	0
0	1	2	3	5	0
0	0	0	0	0	0

$0\times1 + 0\times1 + 0\times1 +$
$0\times1 + 4\times1 + 3\times1 +$
$0\times1 + 0\times1 + 2\times1$

$= 9$

$$= \frac{1}{9}$$

9	12	19	14
22	30	32	21
18	27	32	22
16	24	23	15

$=$

1	1.34	2.12	1.56
2.45	3.34	3.56	2.34
2	3	3.56	2.45
1.78	2.67	2.56	1.67

$=$

1	1	2	2
2	3	4	2
2	3	4	2
2	3	3	2

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(2) Pixel Replication

$f(x,y)$ =

4	4	3	2	5	5
4	4	3	2	5	5
0	0	2	1	6	6
7	7	6	5	2	2
1	1	2	3	5	5
1	1	2	3	5	5

We move the averaging mask over the image starting from top-left corner below.

$\therefore g(x,y) = f(x,y) * w(x,y)$

=

2.23	2.34	3.23	4.12
2.67	3.34	3.56	3.78
2.89	3	3.56	3.89
3.12	3.34	3.67	3.89

=

2	2	3	4
4	3	4	4
3	3	4	4
3	3	4	4

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