Homework-5 Solutions

Question 1

You are given the following picture:

P =

		8				8	8		
						8	8		
				8	8	8	8		

What picture is obtained if noise cleaning is applied to P, using the technique of smoothing with the following mask:

0.25	0.25
0.25	0.25

This answer is for the mask center chosen at the upper left corner.

	2	2			2	4	2		
	2	2			4	8	4		
					2	4	2		
			2	4	4	4	2		
			2	4	4	4	2		

What picture is obtained if noise cleaning is applied to P, performed by median filtering over a cross shaped neighborhood as shown below:

	X	
X	X	X
	X	

						8	8		
						8	8		
					8	8			

Question 2

The picture P is specified below:

$P =$

	$x=0$	$x=1$	$x=2$	$x=3$	$x=4$	$x=5$	$x=6$	$x=7$
$y=0$	0	0	0	9	9	9	9	9
$y=1$	0	0	0	9	9	9	9	9
$y=2$	0	0	0	9	9	9	9	9
$y=3$	0	0	0	9	9	9	9	9
$y=4$	0	0	0	9	9	9	9	9
$y=5$	0	0	0	9	9	9	9	9
$y=6$	0	0	0	9	9	9	9	9

A.

What picture is obtained if noise cleaning is applied to P, using the technique of smoothing with the following mask:

$$\frac{1}{9}\begin{array}{|c|c|c|}\hline 1 & 1 & 1 \\ \hline 1 & 1 & 1 \\ \hline 1 & 1 & 1 \\ \hline \end{array}$$

Compute the answer only for the window of 3 rows and 5 columns specified below.

	$x=1$	$x=2$	$x=3$	$x=4$	$x=5$
$y=2$	0	3	6	9	9
$y=3$	0	3	6	9	9
$y=4$	0	3	6	9	9

B.

What picture is obtained if noise cleaning is applied to P, performed by median filtering over a cross shaped neighborhood as shown below:

	X	
X	X	X
	X	

Compute the answer only for the window of 3 rows and 5 columns specified below.

	$x=1$	$x=2$	$x=3$	$x=4$	$x=5$
$y=2$	0	0	9	9	9
$y=3$	0	0	9	9	9
$y=4$	0	0	9	9	9

C.

What picture is obtained if the Sobel edge detection technique is applied to P ?
Compute the answer only for the window of 3 rows and 5 columns specified below.

	$x=1$	$x=2$	$x=3$	$x=4$	$x=5$
$y=2$	0	36	36	0	0
$y=3$	0	36	36	0	0
$y=4$	0	36	36	0	0