Tutorial 10

Image Processing

1. Filtering Theory

a) Why is Median Filter considered a non-linear filter?

b) What is the advantage of a Median Filter over a Mean Filter?

c) Why are Mean and Median Filters called Filters? What do they Filter?

d) If a Mean Filter makes an image appear more blurry, how would you make an image appear more sharp?

2. Filtering Practice

a) Given the 4 x 4 grid depiction an image lattice below: What is the result of applying a 3x3 Median filter to pixel (1,1)?

b) How about a 3x3 Mean Filter at (1,1)?

c) What is the problem of applying a Median Filter to the point (0,0). How can we overcome this problem?

3	5	9	6	8
2	2	7	9	1
1	1	8	2	2
0	7	6	3	1
	0	1	2	3

3. Adaptive Threshold

a) What is the problem that the adaptive threshold is trying to solve and what basic assumption does it make?

b) Given the following histogram:

Intensity	1	2	3	4	5	6	7	8	9	10
Count	7	2	3	2	0	5	6	4	2	1

What would the value of the adaptive threshold algorithm be after 1 iteration?

4. Contrast

a) Given the 4 x 4 grid depiction an image lattice below, consider the following: If α = 25% and β=75%, what is the α-β based mapping of pixel (1,1)? Assume an 8-bit image.

b)Is this a linear mapping?

c)What is the histogram equalization value of pixel (1,1)?

d)Is this a linear mapping?

3	5	9	6	8
2	2	7	9	1
1	1	8	2	2
0	7	6	3	1
	0	1	2	3