Image Analysis

Exercise 3

25.9.2003

1. Define *high-pass filtering* by using *low-pass filtering* in the case of 3×3 window.
2. Apply *Sobel operator* for the following 4×4 samples. What can you conclude on the basis of the result? Would the result (in general) be any different if the image was first operated by histogram equalization?

10	10	30	30
10	10	30	30
30	30	30	30
30	30	30	30

SAMPLE 1

0	0	40	40
0	0	40	40
40	40	40	40
40	40	40	40

SAMPLE 2

3. Perform *Canny* edge detection for the same two image samples.
4. Edges can be detected also by using Robert's 2×2 filtering masks shown below. Give formula for calculating the *direction* of the edge.

0	+1
-1	0

+1	0
0	-1

5. Segment the image below by *quadtree* segmentation using the difference of the minimum and maximum values as a dividing criterion (with threshold value 4). Apply the *split-and-merge* method for the resulting segmentation.

10	11	12	13	14	15	16	17
11	12	13	14	15	16	17	18
12	13	**24**	**25**	**26**	**27**	18	19
13	14	**25**	**26**	**27**	**28**	19	20
14	15	**26**	**27**	**28**	19	20	21
15	16	**27**	**28**	19	20	21	22
16	17	18	19	20	21	22	23
17	18	19	20	21	22	23	24