Exercise Sheet SoSe 2014
Wirtschaftsinformatik und Maschinelles Lernen (ISMLL)
Prof. Dr. Dr. Lars Schmidt-Thieme, Carlotta Schatten, M.Eng.

Exercise Sheet Image Processing 9

Submission: 15.07.14 09:00 to voss@ismll.de & schatten@ismll.de

Exercise 1   Theory   (9 Points)

a) What is the main advantage of the Canny representation?   (1 Points)

b) Which steps of Canny edge detection algorithm could be parallelized? Why?   (2 Points)

c) What is the role of the Non-Maximal suppression in the Canny algorithm? What is the role of the hysteresis sampling?   (2 Points)

d) Considering the Hough Transform, how could it be determined if a pixel is a foreground one?   (2 Points)

e) What kind of geometric forms can be detected by the Hough transform? Make 2 examples.   (2 Points)

Exercise 2   Marr-Hildreth   (10 Points)

a) Compute the LoG matrix for the Marr-Hildreth algorithm considering the discrete convolution defined as follows:

$$y(m,n) = x(m,n) \otimes h(m,n) = \sum_{i=0}^{2} \sum_{j=0}^{2} x(i,j)h(m-i,n-j); \quad (1)$$

Keep the axis as follows: m and i increasing moving to the right and n and j increasing moving downward in the image.
(Hint: http://www.songho.ca/dsp/convolution/convolution2d_example.html)
(8 Points)

b) What is the difference between the convolution algorithm proposed to compute a) and the one in the Sobel algorithm?   (2 points)