Exercise Sheet Image Processing 04

Submission: 03.06.14 09:00

Exercise 1   Unblurring   (8 Points)

0	1	2	1	0
1	3	5	3	1
2	5	9	5	2
1	3	5	3	1
0	1	2	1	0

Table 1: Blurred Image

a) Given the blurred image above, compute its unblurred image, considering
that the blur was caused by an object moving from the left to the right.
Use $w = 5$.   (4 Points)

b) In case of motion blur which are the 2 assumptions required to apply the
unblurring formula in the scripts? Explain the problematics that arise if
the 2 assumptions are not given and how to solve them.   (4 Points)

Exercise 2   Convolutions   (7 Points)

a) Explain the connection between filtering and convolution. Explain first
what convolution and filtering mean.   (3 Points)

b) Mention at least 4 image processing operations you studied that can be
represented as convolution.   (2 Points)

c) Which operations cannot be represented by convolution? Why?   (2
Points)

Exercise 3   Fourier Transformation   (5 Points)

a) What is the main concept behind the Fourier Transformation? For which
type of functions is it defined? Which mathematical concept is used to
compute the coefficients and why? Explain the relationship between the
real Fourier Series representation and the complex one.   (5 Points)