Assignment 2

2d Spatial Data, Histogram, Transfer Function, Filter

10 Points for Homework

Due Wednesday, May 20th, 23:59 (Paderborn time)

Upload your solutions to PANDA using the upload tool entitled with "Assignment 2". Your submission has to include the source code, screenshot(s) of your solution and text input.

1. In class assignment:

Given is the 5x5 data set below.

0	0	0	0	0
0	2	100	4	0
0	3	2	3	4
0	4	4	100	4
0	0	0	4	4

(a) Draw a profile line through the center line. Draw scales.
(b) Draw a profile line through the line before the last one. Draw scales.
(c) Calculate the mean value and the variance value.
(d) Draw a histogram (bar chart / line graph); a PDF; a CDF.
(e) Rescale values to range between 0 and 7 using a (piecewise) linear Transfer Function.
(f) What non-linear Transfer Function would work?
(g) Use a 3x3 boxcar filter on the data set.
(h) Use a 3x3 median filter on the data set.

2. Homework:

Please use data set slice150.raw (one slice of a CT angiographic scan). Data set and descriptions (TermsOfUse_slice150.txt and DataCharacteristics_slice150.txt) are provided under PANDA → Assignment 2. Data is stored as 16-bit integer values! Draw scales and coordinate axes where necessary.

(a) Draw a profile line through line 256 of this 2D data set.
(b) Calculate the mean value and the variance value of this 2D data set.
(c) Display a histogram of this 2D data set (instead of bars you may use a line graph to link occurrences along the x-axis).
(d) Rescale values to range between 0 and 255 using a linear transformation.
(e) Rescale values to range between 0 and 255 using a different (e.g. non-linear) transformation.
(f) Use an 11x11 boxcar smoothing filter on the 2D data set.
(g) Use an 11x11 median filter on the 2D data set.

Create an image (no histogram) for the subtasks (d)-(g), add comments to your code to identify which code fragments belong to which subtask and submit a screenshot (as ***.jpg** or ***.png**) and the code. You must code (d) through (g) yourself (no libraries allowed). Submit mean value and variance value as text input via PANDA for (b).

The points you will receive for this assignment depend upon:

- correctness of solution
- effectiveness of visual representation
- completeness of solution