Assignment 2

2d Spatial Data, Histogram, Transfer Function, Filter

10 Points for Homework

Due Tuesday, May 7th, 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 scale would work well?
(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.txt and DataCharacteristics.txt) are provided under PANDA → Assignment 2. Data is stored as 12-bit values! Draw scales and coordinate axes where necessary.

(a) Draw a profile line through the center line 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 a 11x11 smoothing filter on the 2D data set.
(g) Use a 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