PÉCSI TUDOMÁNYEGYETEM
UNIVERSITY OF PÉCS

University of Pecs
Faculty of Engineering and Information Technology

Advanced Image Processing
Homework No. 1.

1. load the „pattern_X.tif" 8×8 image. Convert to grayscale only if it is needed. Compute the result when the pattern is convolved with each of the masks (a) to (d) shown. Pad the image with zeroes.

a) $\begin{matrix} -1 & -1 & 0 \\ -1 & 0 & 1 \\ 0 & 1 & 1 \end{matrix}$ b) $\begin{matrix} 0 & -1 & -1 \\ 1 & 0 & -1 \\ 1 & 1 & 1 \end{matrix}$ c) Laplacian filter d) $\begin{matrix} -1 & -1 & -1 \\ -1 & 8 & -1 \\ -1 & -1 & -1 \end{matrix}$

tasks:

- show the magnified image;
- show its values;
- calculate the outputs using the convolution masks;
- show the output values and magnified images.

2. load the captured „sample_X.tif" RGB image. Calculate the center of the shape on the image.

tasks:

- load and show the image;
- transform it into grayscale;
- calculate and show its histogram;
- make some arithmetic operations (brightness, contrast, gamma …etc) on the image;
- make some filtering (edge sharpening, find edges, Laplacian, …etc) on the image;
- remove noise and unwanted regions;
- threshold and binarize the image;
- calculate the center of the shape.

Note: the „X" means a sample or a pattern name that you can download and you can find the respective names on the next page.

Have a good work!

Adam Schiffer, PhD

1.	BNVNLF	pattern_e.tif	sample_e.jpg
2.	XZPAYO	pattern_f.tif	sample_f.jpg
3.	XEWS8F	pattern_g.tif	sample_g.jpg
4.	VINQ0M	pattern_h.tif	sample_h.jpg
5.	TYR95I	pattern_e.tif	sample_i.jpg
6.	VCXIFG	pattern_f.tif	sample_j.jpg
7.	EUZ95C	pattern_g.tif	sample_k.jpg
8.	GJ05LJ	pattern_h.tif	sample_l.jpg
9.	BHZPGK	pattern_a.tif	sample_m.jpg

Documentation:

Please produce a pdf or use Python Jupyter Notebook.

I.
   a. task description
   b. input image (magnified, 8x8 pixel!!!)
   c. input values (8x8) as a matrix
   d. convolution masks
   e. convolution equation
   f. output images (magnified, 8x8 pixel!!!)
   g. output values (8x8)
   h. PYTHON source

II.
   a. task description
   b. RGB input image
   c. GRAYscale input image
   d. input image histogram
   e. if brightness/contrast is applied, its parameters
   f. if filtering is applied, its parameters
   g. binarized image and threshold value
   h. center of the shape (coordinates)
   i. output image with the „cross” sign on the center
   j. PYTHON source