

National University of Science and Technology
School of Electrical Engineering and Computer Science

Department of Software Engineering

EE433: Digital Image Processing

Class: BESE-5

Assignment 1

Announcement Date: Thursday, 28th Sep 2017

Submission Date: Thursday, 5th Oct 2017 at 11:59pm

Instructor: Dr. Muhammad Moazam Fraz

Course Learning Outcomes (CLOs)			
Upon completion of the course, students should demonstrate the ability to:		PLO Mapping**	BT Level*
CLO 1	Understanding the fundamentals and basic concepts of image processing	PLO 1	C2
CLO 2	Analyze images using mathematical transformations and operations	PLO 2	C4
CLO 3	Develop solutions by using modern tools to solve practical problems.	PLO 5	C5
* BT= Bloom's Taxonomy, C=Cognitive domain, P=Psychomotor domain, A=Affective domain			
** The details of PLOs are given on departmental website			

Assignment Learning Outcome

CLO 2	Analyze images using mathematical transformations and operations
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Problem 1:

Which is the best way to find the difference between two monochrome images, Explain?

- a. Pixel-by-pixel subtraction
- b. Pixel-by-pixel division
- c. Absolute difference
- d. XOR

Problem 2:

What will be the resulting monochrome image if you:

- a. Add a uint8 monochrome image to itself
- b. Add a double monochrome image to itself
- c. Multiply a uint8 monochrome image with itself
- d. Divide a uint8 monochrome image from itself
- e. Divide a double monochrome image from itself

Problem 3:

An 8-bit image has a minimum grey level of 140 and a maximum grey level of 195 and a maximum grey level of 195. Describe the effect on the histogram of this image after each of these operations is performed (separately):

- (a) Subtraction of 120 from all pixels gray levels (histogram sliding).
- (b) Histogram stretching
- (c) Histogram equalization

Problem 4:

What will be the effect of performing contrast stretching on the attached image **Einstein.png**? What will be the effect of performing contrast stretching again on the resulting image? Write a MATLAB/PYTHON script for this task and explain the results.

Problem 5:

Write a MATLAB/PYTHON function to perform brightness correction for monochrome images based on arithmetic or logical operations. It should take as arguments:

- a. A monochrome image
- b. Brightness percentage

- c. A parameter which indicates the required correction(brighten, dark)

Use above mentioned function to correct attached Child_1.png and Child_2.png images. Attach the resulting images with your assignment.

*Name of your function must be **Problem5.m** or **Problem5.py**

Problem 6:

Repeat above problem, this time develop two functions based on the following transformations for brightness correction:

- a. Power law transformation
- b. Log transformation

Arguments of the function change with respect to the coefficients in power law transformation and log transformation equations. Attach the resulting images with your assignment.

*Name of your function must be **Problem6.m** or **Problem6.py**

Problem 7:

Write a MATLAB/PYTHON script based on color thresholding to find the number of yellow, red, and blue circles from **blobs.png** image. Find average area of yellow circles, blue circles, and red circles separately.

*Name of script must be **Problem7.m** or **Problem7.py**

Problem 8:

Write a MATLAB/PYTHON script that implements region-based histogram equalization and your script must allow the user to interactively select (with the mouse) a region of interest (ROI) within an image to which the histogram equalization operation will be applied.

*Name of script must be **Problem8.m** or **Problem8.py**

Problem 9:

Load the image **script.png** in MATLAB/PYTHON, remove noise from the image and extract the characters from it and write each character in a separate image file.

*Name of script must be **Problem9.m** or **Problem9.py**

Submission Instructions

1. Make a word file for this assignment and upload it on LMS. Avoid plagiarism as plagiarism check will be imposed via **Turnitin** submission link on LMS.
2. Carefully follow the instructed nomenclature for your codes.

3. Code must be well commented with name of author and CMS ID properly mentioned in each file.
4. Make a main file and call all the tasks from within this file. All your tasks must be runnable from this main file otherwise no credit will be granted.
5. All the images should be read/loaded from the root folder, i.e from same folder where code files are located. Do not use absolute paths for loading the images in your program.
6. Name of main file should be **StudentName_CMSID.m** or **StudentName_CMSID.py**
7. **Failing to comply by the instruction would result in loss of credit, (which is not desirable by the instructor)**

HOW to Submit

1. Zip All code files and MSWord File in one archive, name it as **StudentName_CMSID.zip** and submit on LMS.