CSCI 576 - Computer Vision
Assignment #1

- *Please work on this assignment by yourself. Do not use ChatGPT or similar tools. If you have any problem just contact me.*
- For each question of the following, write each code in a separate file and name each file as follows yourLastNAme_QuestionNumber. Also, submit a **word file** that contains the code and a sample run for each question and the output. Submit all files on D2L. You can program the questions using Python, C++, or Matlab.

1. [10 Points] Write the required code that loads a gray image and ask the user to input 2 integer numbers R and C that as lower than the number of rows and columns in the image respectively. The code modifies the image by deleting R rows and C columns randomly. The code should save the resulting image as a jpg file.

2. [10 points] Given the image grayMan.png with the assignment images and its corrupted versions with different types of noise (grayMan_saltandpepper.png and grayMan_gaussian.png).
    a. Try to design an averaging filter and apply it to the corrupted images to remove the noise and restore it to its original state. Save the resulting images using the names fnAsb.jpg and fnAg.jpg. Use the default JPEG quality.
    b. Try to design a median filter and apply it to the corrupted image to remove the noise and restore it to its original state. Save the resulting images using the names fnMsb.jpg and fnMg.jpg. Use the default JPEG quality.
    c. Use Laplacian filter to restore any missing details from the previous steps. Save the resulting images using the name fnAsbL.jpg, fnMsbL.jpg, fnAgL.jpg and fnMgL.jpg. Use the default JPEG quality.
    d. Compare your results of using the average and the median filters.

    Submit all your codes and the resulting images from this question.

3. [15 Point] Choose bad gray scale images that will be enhanced by performing the following operations on them **separately (independently)**. For each of the following, provide the input and the output images and your code. Write the code for each in a separate file and name it as yourNumber_Q3_x where x is the question letter. In a comment inside the file describe why did you choose the image and the effect of applying the operation on your image.
    a. Brighten the image using suitable power transform.
    b. Apply histogram equalization on the image.
    c. Apply local histogram equalization on the image.
    d. Apply log transform on the image.
    e. Apply contrast stretching on the image.

4. [15 Point] Given the images (Q4_original.png and Q4_corrupted) with the assignment images, perform the required operations to get the image Q4_corrupted as close as possible to Q4_original. Explain your answer through comments included in your code and discuss your solution and result in the report file.