



CNG 466 – FUNDAMENTAL IMAGE PROCESSING TECHNIQUES

Assignment 1

Image Enhancement in Spatial Domain (Lectures 1-3)

Objectives:

The purpose of this assignment is to familiarize yourselves with the fundamental spatial domain image enhancement techniques. The assignment is organized in three parts each of which requires different techniques. For each part, you are required to develop your own algorithm based on the techniques you learned in the lectures and tune them for specific images.

Description:

1) Decode the encoded text in the image:

In this part, you are required to decode the hidden text in *EncodedText.png* shown in Fig.1 which is digitally processed to hide the secret text in the image. Your job is to first investigate the colour *histogram* of the image and then *enhance* it so that the hidden text becomes visible. However, making it visible is not enough for grading purposes. The resulting image should have a distribution of colours between 0 and 255 which is as close as possible to the uniform distribution.

Implement your solution as a MATLAB script named *Q1_StudentID.m* which processes the image named *EncodedText.png*. After running the script, an image named *DecodedText.png* should be created as the reconstruction. Solutions specific to this image will be penalized severely. Hence, implement a generic algorithm using the knowledge you gained in the lectures.

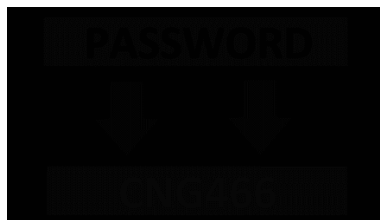


Fig.1: *EncodedText.png*

2) Enhance the quality of image by using contrast stretching:

In this part you are required to enhance the quality of an image *Lena.jpg* shown in Fig.2.

Implement your solution as a MATLAB script named *Q2_StudentID.m* which processes the image named *Lena.jpg*. After running the script, an image named *EnhancedImage.png* should be created as the reconstruction.



Fig.2: *Lena.jpg*

3) Highlight flowers in the image:

In this part you are required to emphasise the bright details of the image *Flower.png* shown in Fig.3. You should develop a filter and apply it to enhance the bright details in the image.

Implement your solution as a MATLAB script named *Q3_StudentID.m* which processes the image named *Flower.png*. After running the script, an image named *EnhancedFlowers.png* should be created as the reconstruction shown in Fig.4.

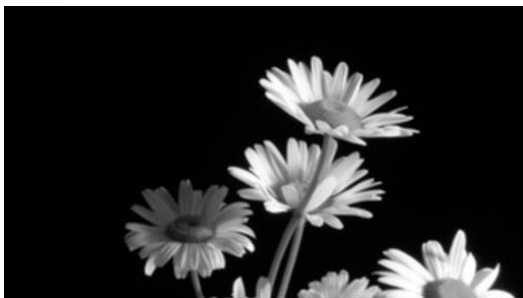


Fig.3: *Flower.png*

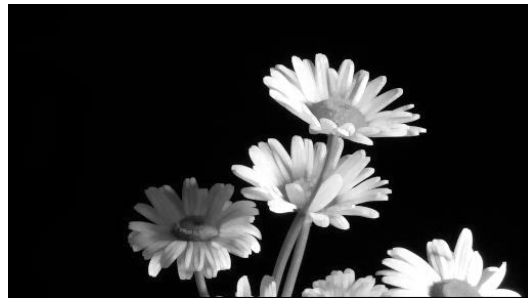


Fig.3: *EnhancedFlower.png*

Regulations:

1) Programming Language: You must code your program in MATLAB. You must use comments to explain what your code is doing step by step. You are expected to make sure your code runs successfully.

2) Implementation: In your solutions you are NOT allowed to use any function from Image Processing Toolbox of MATLAB other than `imread`, `imwrite`, `imshow` and `imtool`.

If you are not sure which functions belong to image processing toolbox, check from the following link or please ask to me:

https://www.mathworks.com/help/images/referencelist.html?type=function&tid=CRUX_topnav

Some other functions that you cannot use: `histeq`, `stretchlim`, `conv` (any function related to convolution)...

You must use exactly same input and output format given to you, including file names.

3) Submission: Submit three .m files, do not zip them.

4) Deadline: 18/11/2021 @23:00

5) Late Submission: Late submission is not allowed.

6) Cheating: Please read carefully cheating policy from the course syllabus.

Please note that failing to do any of the above regulations may result as zero grade.