Marmara University Electrical and-Electronics Engineering EE7025-Fundamentals of Digital Image Processing

PROJECT 2 REPORT

Mehmet Çağrı Aksoy ID: 525019007

Due: 16 November 2020
Handled: 8 November 2020

Abstract

In this report is written for lecture project ongoing Marmara University lecture of Fundamentals of Digital Image Processing. Problem solutions and some sample code blocks are described this report. MATLAB code and the referenced images are attached in delivered project folder also. More information and code blocks can be found at my github page /mcagriaksoy. To solving the problems, MATLAB 2020b version is used with Windows 10 1909 Operation system.

1 Introduction

There is a theory which states that if ever anyone discovers exactly what the Universe is for and why it is here, it will instantly disappear and be replaced by something even more bizarre and inexplicable. There is another theory which states that this has already happened.

2 Answers

2.1 Question-1

Write a program that can compute the histogram of a grayscale image (assuming 256 levels of gray). and display the histogram as a stem plot besides the image (for example, using "subplot" function if you use MATLAB). Apply your program to Figure 3.23(a) and show the results. Answer:

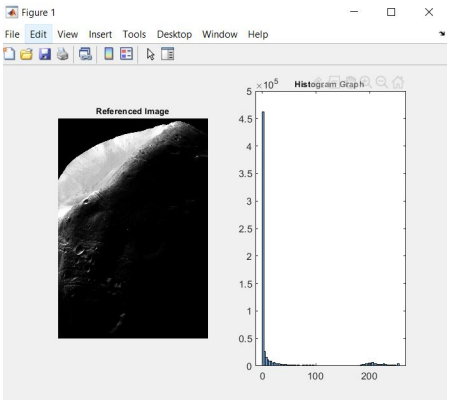

Figure 1: Histogram graph is shown from related image

In this problem, I have developed the histogram solution and displayed both input image and histogram graph. To do the histogram image "histogram" function of MATLAB is used.

2.2 Question-2

Write a program that performs histogram equalization on a gray-scale image. Answer: In this problem, histogram equalization is used to enhance the input image. The only difference between question 1 and 2 is "histeq" function usage. With this function histogram equalization is happened and results are displayed via "subplot" and via "histogram" to compare original, referenced and histogram graphs.

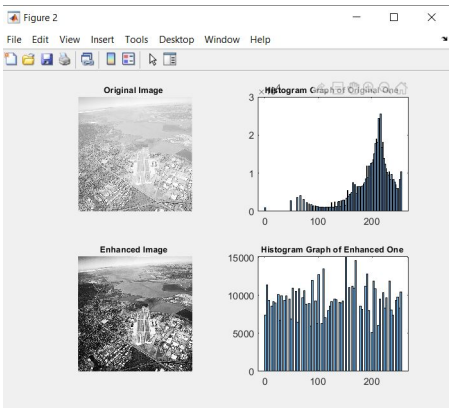

Figure 2: Original image with its histogram graph and Histogram equalized image with its graph comparison

2.3 Question-3

Write program to perform spatial filtering of an image. You can fix the size of the spatial mask at 3 x 3, but the coefficients need to be variables that can be input into your program. Answer: When k = 1 we get unsharp masking, if k1,

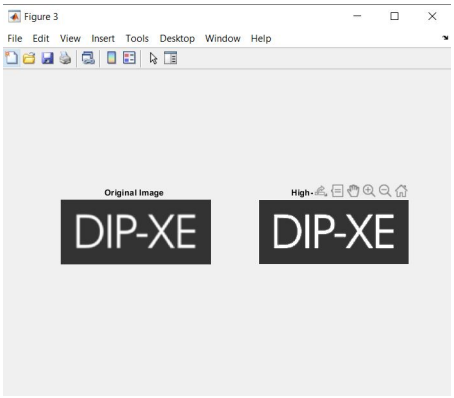

Figure 3: Original and high-boosted image comparison

we obtain high-boost filtering. SO I have defined k as 30 and image is boosted with the function of high-boost. Firstly image has been blurred and blurred image is decreased from original one. Then it multiplies with const k and it is decreased from original one again.

```
img3=imread('Fig0340(a)(dipxe_text).tif');
k = 30;
mask = ones(3)/9;
```

```
img_masked = imfilter(img3,mask);
img_boost = k*(img3 - img_masked);
img_boost = img3 + img_boost;
figure(3),
```

2.4 Question-4

Use the program that you developed in Question 3 to implement the Laplacian enhancement technique Answer: In this problem, laplacian enhancement tech-

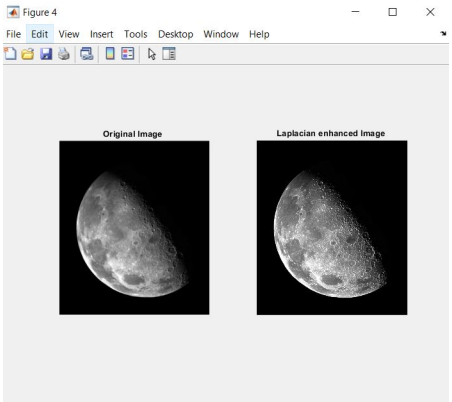

Figure 4: Original and Laplacian enhanced image comparison

nique is used with the mask of ones and 8 on the middle. When I defined the mask, I have performed that filtering with original image on the mask. Then I have decided to sum masked image with original one to enhance the image with laplacian enhancement method. The results are great and output image's contrast is higher that original one.

```
laplacian_mask = -1 * ones(3);
laplacian_mask(2,2) = 8;
img4_laplacian = conv2(img4, laplacian_mask, 'same');
img4_laplacian = img4 + uint8(img4_laplacian);
```

3 Conclusion

In this project, the given project has been completed and I have learnt that how to look and perform histogram graph, perform histogram equalization, spatial filtering, highboost enhancement and laplacian enhancement. MATLAB solution is attached and the codeblock is explained in this report.