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# LAB SESSION 2

# IMAGE ENHANCEMENT

**Instructions:** Please do the following lab works. Provide evidences after you have completed for each task. First, you may copy those codes into MATLAB and then you can take screenshot/image/m-file of your work and embed/insert those under each section.

## GRAY LEVEL TRANSFORMATIONS OPERATIONS

The simplest image enhancement technique that involves point or pixel-level processing is gray level transformation operations. These operations are applied on each pixel of an image f(x,y), using one of the transformation function, T, producing a transformed pixel of the output image, g(x,y). Transformation operation may be represented as, G(x,y) = T(f(x,y)). Some basic gray level trasnformations functions discussed in this section are negative, log, gamma correction, thresholding, contrast stretching, gray level slicing and bit-plane slicing.

## 2.1 Image Negatives

Negative or complement of an image is obtained by using the transformation function:

G(x,y) = T(f(x,y)), where T = L-1 – f(x,y); L = max gray level values

**LABWORK 2.1**

A grayscale image can be negated using the command imcomplement (). The following MATLAB commands will produce the image expected.

```
% Transforms image to its photographic negative.
i = imread('brain.jpg');
j = imcomplement(i);
```

| Original | After |
|---|---|
|  |  |

**Work Proof:**

## 2.2 Log Transformation

When an i, it may be visually enhanced using log transformation function. The function compresses the range of intensities using equation:
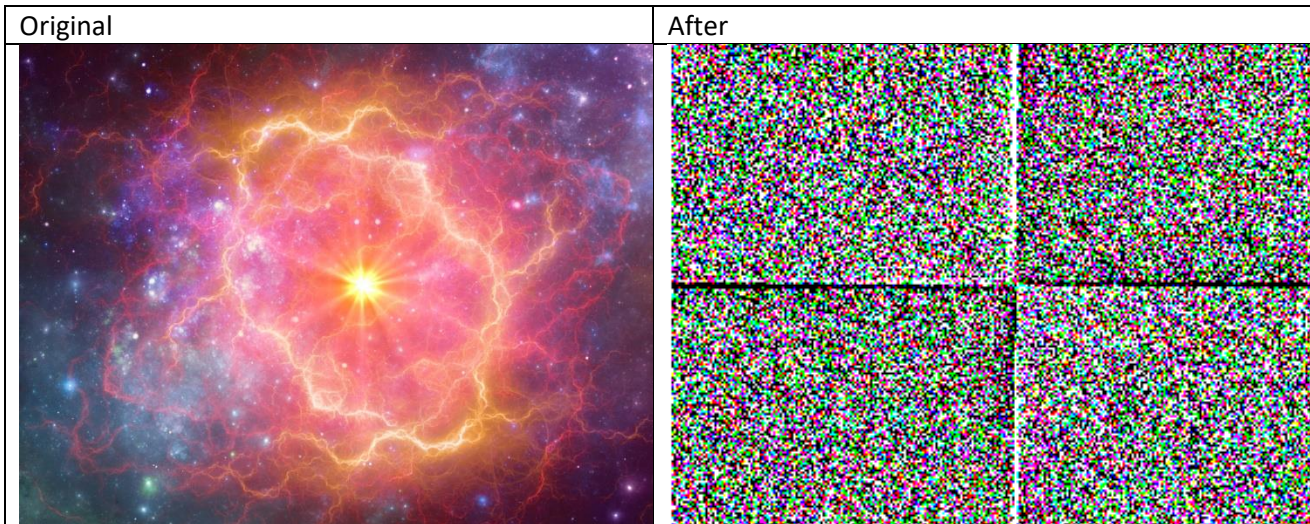
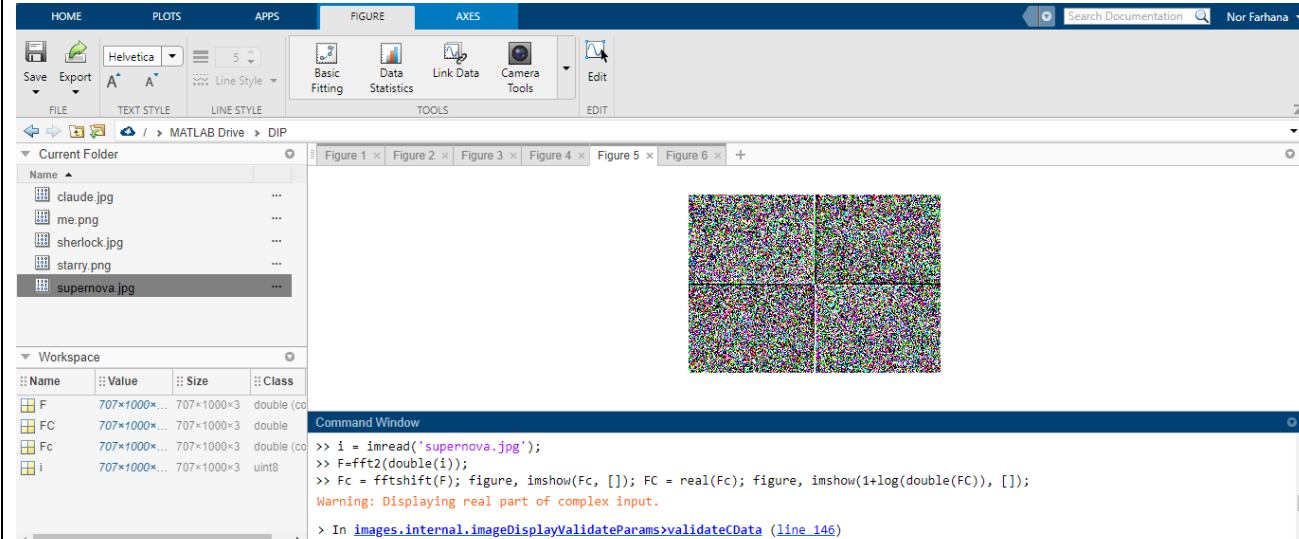G(x,y) = T(f(x,y)), where T = c log(1+f(x,y)); c: constant

**LABWORK 2.2**

A log () function provided in MATLAB performs logarithmic process on the image. Therefore, an image intensities may be compressed by performing the following commands:

```
% Compress an image's intensities
i = imread('cameraman.tif');

% Convert to Fourier transform

F=fft2(double(i));
Fc = fftshift(F);
figure, imshow(Fc,[]);
FC = real(Fc);
figure,imshow(1+log(double(FC)), []);
```

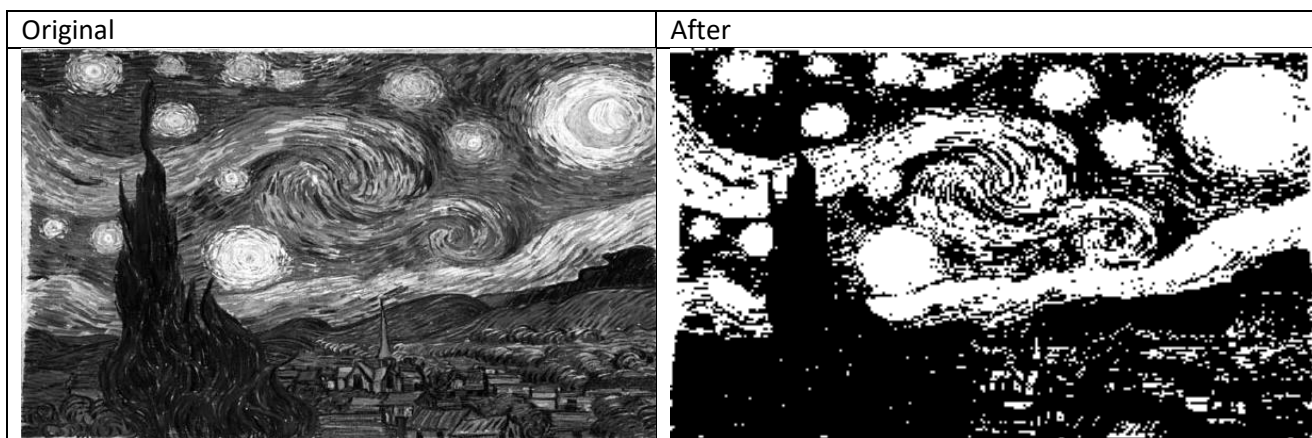| Original | After |
|---|---|
|  |  |

Work proof:



## 2.3 Thresholding

Thresholding is the process of creating a binary image from a grayscale image. A threshold value determines which pixels in the image is converted to balck or white.
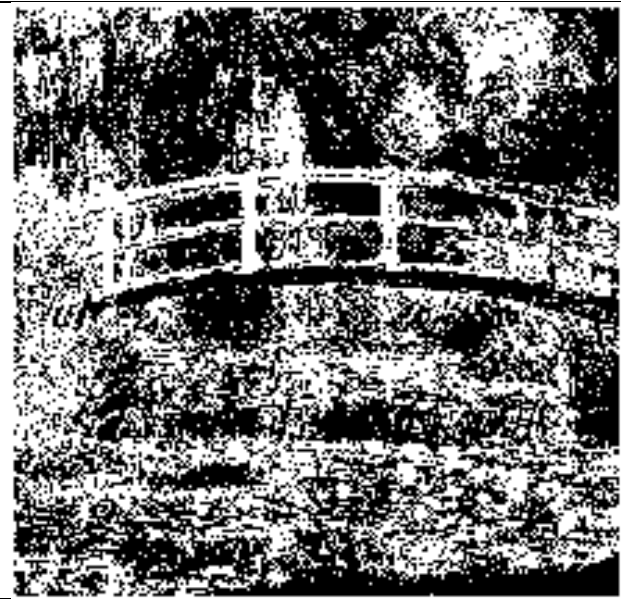
**LABWORK 2.3**

A colour or grayscale image can be converted to binary image by using the im2bw () function.

```
% Converts an image to black and white.
i=imread(,brain2.jpg');
j= im2bw(I, 102/255);
```

| Original | After |
|---|---|
|  |  |

# DBP30103: DIGITAL IMAGE PROCESSING



## Work Proof:

## 2.4 Contrast Stretching

Contrast stretching works by expanding the identified range of intensities, (r1, r2) in the input image so that it spans fully to the specified range, (s1, s2). The process produces various degrees of spread in the gray levels of the output image, thus affecting its contrast.

**LABWORK 2.4**

Gray level slicing and contrast stretching are both achieved using imadjust () function. The following commands sliced the brain tumor from the image brain by using the function and enhanced an image using contrast stretching.

```
% Performs gray level slicing to highlight the brain tumor (Fig. 3.6)
i=imread('brain3.jpg');
j=imadjust(i,[135/255 200/255],[0.5 1]);
figure,imshow(j);

% Performs contrast stretching.(Fig. 3.7)
i=imread('darksophia.jpg');
j=imadjust(i,[5/255 70/255],[0 1]);
figure,imshow(j);
```

| Original | After |
|---|---|
|  | 1. Using first command  |
| | 2. Using second command |
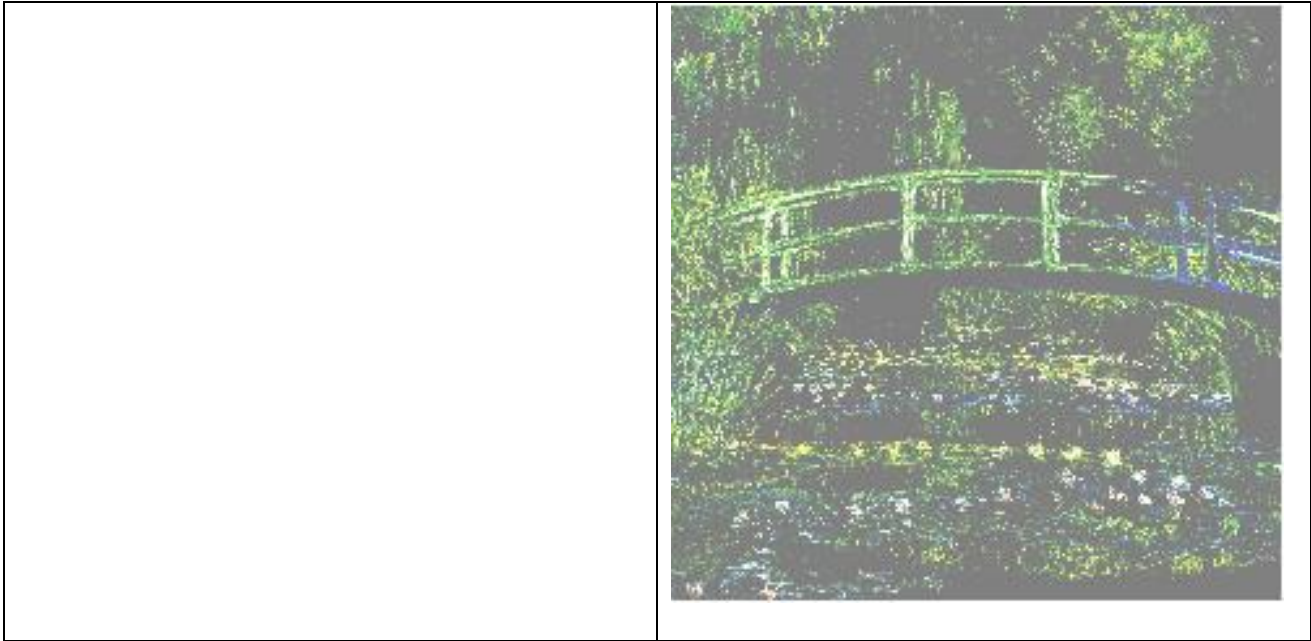
Work proof:

Using first command:



```
>> i=imread('claude.jpg');
>> j=imadjust(i, [135/255 200/255],[0.5 1]);
>> figure,imshow(j);
>>
```

Using second command

Command Window

Invalid expression. When calling a function or indexing a variable, use
parentheses. Otherwise, check for mismatched delimiters.

Did you mean:
>> i=imread('claude.jpg'); j-imadjust(i, [5/255 70/255],[0 1]); figure, imshow(j);
>>