Lab Report 02

Submitted by:

Name: Shaikat Hazra Pranto

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Course: CSE438

Section: 2

Submitted To:

Md Ashraful Haider Chowdhury

Lecturer

Department of Computer Science and Engineering

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Problem 01:

```
clear all;
close all;

% Read the image
I = imread('Picture1.jpg');

stretched_img = imadjust(I, stretchlim(I, [0.01, 0.99]), []);

subplot(1,2,1); imshow(I); title('Original Image');
subplot(1,2,2); imshow(stretched_img); title('Contrast Stretched Image');

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```

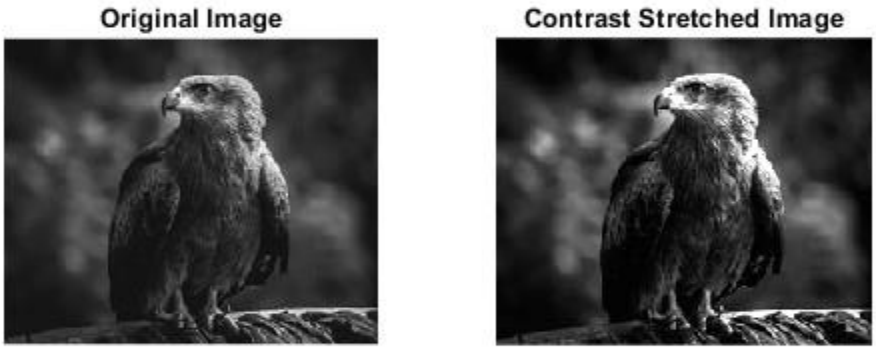

Problem 02:

```
clear all;
close all;
clc;

% Read the image
I = imread('Picture1.jpg');

% Convert to grayscale if the image is RGB
if size(I, 3) == 3
   I = rgb2gray(I);
end

% Get the correct size of the grayscale image
[rows, cols] = size(I);

% Create an array to store bit planes
bit_planes = zeros(rows, cols, 8, 'uint8');

% Extract bit planes
for i = 1:8
   bit_planes(:,:,i) = uint8(bitget(I, i) * 255); % Extract i-th bit and scale to 0-255
end

% Display the bit planes
figure;
for i = 1:8
   subplot(2,4,i);
   imshow(bit_planes(:,:,i)); % Show bit plane
```

```
    title(['Bit Plane ', num2str(i)]);
end

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```

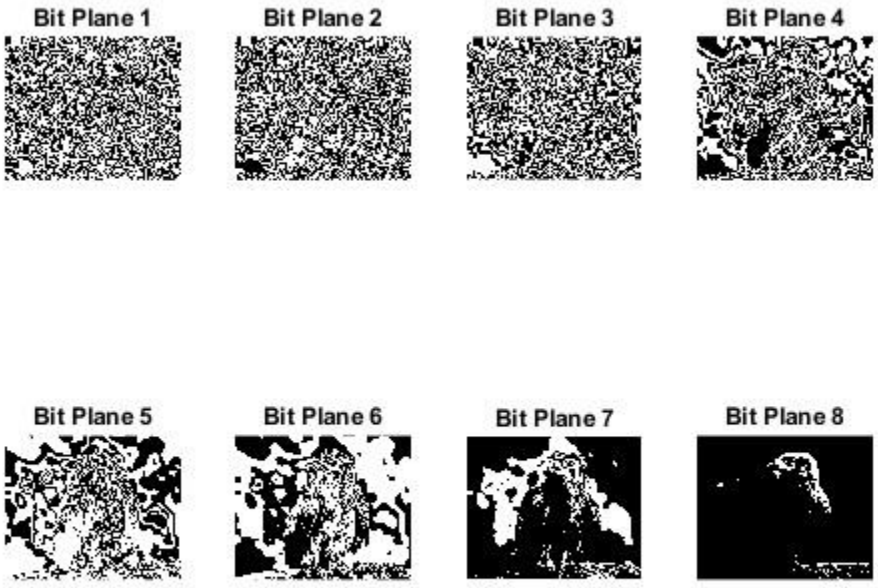

Problem 03:

```
clear all;
close all;
clc;

% Read the image
I = imread('Picture2.png');

% Convert to grayscale if RGB
if size(I, 3) == 3
    I = rgb2gray(I);
end

% Convert to double for transformations
I_double = double(I);

% Logarithmic Transformation
c_log = 255 / log(1 + double(max(I(:)))); % Compute scaling constant
I_log = c_log * log(1 + I_double); % Apply transformation
I_log = uint8(I_log); % Convert back to uint8

% Power-law (Gamma) Transformation
gamma = 0.5; % Experiment with values (e.g., 0.5, 1.5, 2.0)
I_gamma = 255 * ((I_double / 255) .^ gamma); % Apply power-law transformation
I_gamma = uint8(I_gamma); % Convert back to uint8

% Display Results
figure;
```

```
subplot(1,4,1);
imshow(I);
title('Original Image');

subplot(1,4,2);
imshow(I_log);
title('Logarithmic Transformation');

subplot(1,4,3);
imshow(I_gamma);
title(['Power-law Transformation']);

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```

Problem 04:

```
clear all;
close all;
clc;

% Read the images
I = imread('Picture3.jpg');
Ref = imread('Picture4.png');

% Convert images to grayscale if they are RGB
if size(I, 3) == 3
    I = rgb2gray(I);
end
if size(Ref, 3) == 3
    Ref = rgb2gray(Ref);
end

% Perform histogram matching
I_matched = imhistmatch(I, Ref);

% Display Images
figure;
subplot(1,3,1);
imshow(I);
title('Original Image');

subplot(1,3,2);
imshow(Ref);
title('Reference Image');
```

```
subplot(1,3,3);
imshow(I_matched);
title('Matched Output Image');

% Display Histograms
figure;
subplot(1,3,1);
imhist(I);
title('Histogram of Original Image');

subplot(1,3,2);
imhist(Ref);
title('Histogram of Reference Image');

subplot(1,3,3);
imhist(I_matched);
title('Histogram of Matched Output Image');

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```
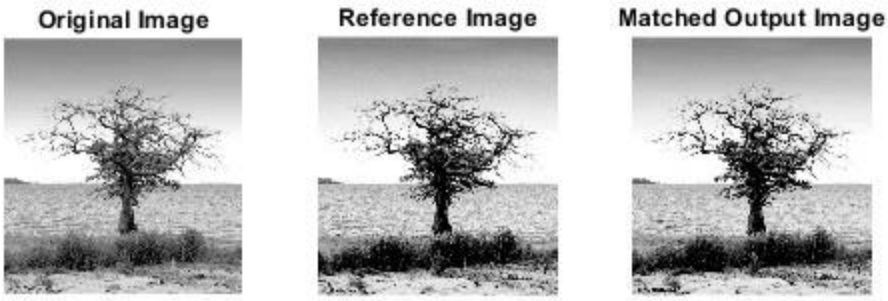
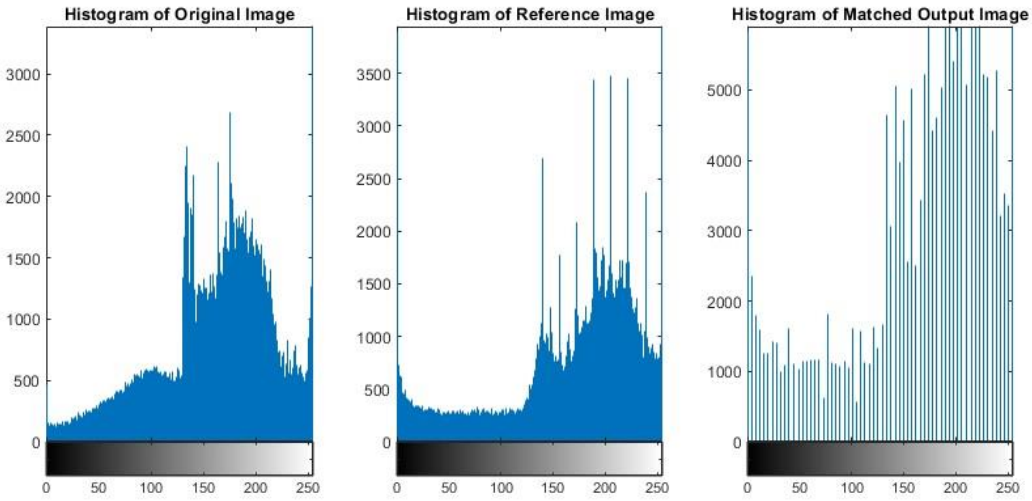
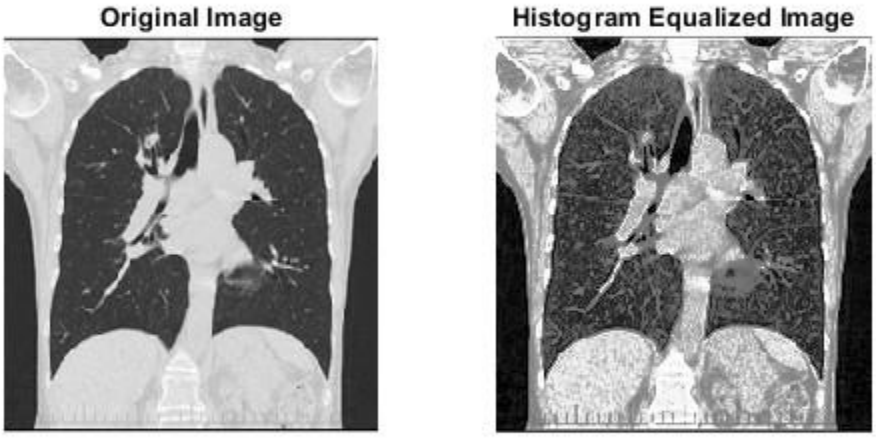


Original Image
Reference Image
Matched Output Image

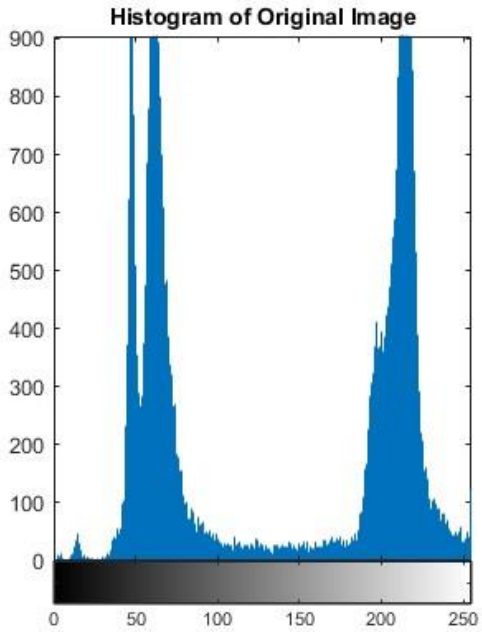

Histogram of Original Image
Histogram of Reference Image
Histogram of Matched Output Image
0
500
1000
1500
2000
2500
3000
3500
4000
5000
0
50
100
150
200
250

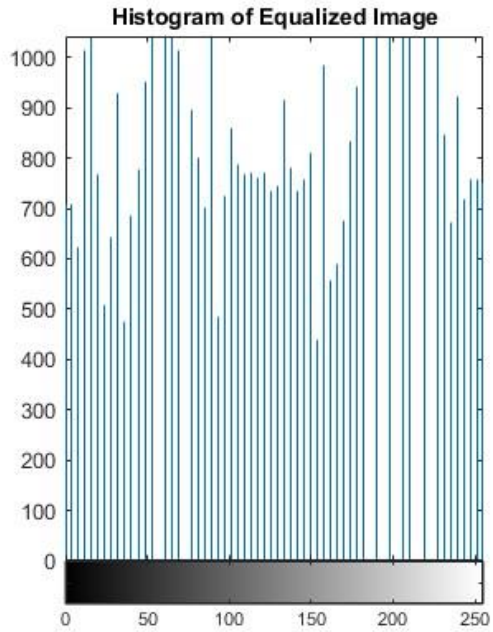
Problem 05:

```
clear all;
close all;
clc;

% Read the image
I = imread('Picture5.jpg');  % Input image

% Convert to grayscale if it is RGB
if size(I, 3) == 3
   I = rgb2gray(I);
end

% Apply Histogram Equalization
I_eq = histeq(I);

% Display the images
figure;
subplot(1,2,1);
imshow(I);
title('Original Image');

subplot(1,2,2);
imshow(I_eq);
title('Histogram Equalized Image');

% Display Histograms
figure;
subplot(1,2,1);
```

```
imhist(I);
title('Histogram of Original Image');

subplot(1,2,2);
imhist(I_eq);
title('Histogram of Equalized Image');

% ID: 2020-1-60-072
```




Histogram of Original Image
900
800
700
600
500
400
300
200
100
0
0
50
100
150
200
250


Histogram of Equalized Image
1000
900
800
700
600
500
400
300
200
100
0
0
50
100
150
200
250