Matlab Code :

% Hemal Ketan Dave Biomedical Image Processing Project 1

%% Part A

% clear all the workspace & figures.

clc;

close all;

clear all;

% read the image which is given.

ImageA = imread('BME7112\_Data\_File\_1.tif');

% select the object

ImageB = imcrop(ImageA,[150 82 85 34]);

% max and minimum gray scale value

max\_ImageA = max(max(ImageA));

min\_ImageA = min(min(ImageA));

% size Of image A

[height\_a,width\_a] = size(ImageA);

% size of ImageB

[height\_b,width\_b] = size(ImageB);

% save Image B

imwrite(ImageB,'BME7112\_HW1A\_DAVE\_ImageB.png');

%finding the bit depth

i = imfinfo('BME7112\_Data\_File\_1.tif');

% plot the image.

subplot(1,2,1)

imshow(ImageA);

title({'Image A';[' Image Size = ',num2str(width\_a),' x ',num2str(height\_a),' (Width x Height)'];['Maximum Grayscale = ',num2str(max\_ImageA)];['Minimum Grayscale = ',num2str(min\_ImageA)]});

% displaying the cropped image.

subplot(1,2,2)

imshow(ImageB);

title({'Image B';[' Image Size = ',num2str(width\_b),' x ',num2str(height\_b),' (Width x Height)']});

Part B: for even number gray scale number.

clc;

clear all;

close all;

% no of gray scale level enter & also chnage this number on the j variable.

a = 28\*10;

%% intialisation of matrix:

% data = matrix(50,100);

matrix\_zeros = zeros(round(a/2),a);% making the matrix of zeros

Matrix\_ones = ones(a/2,round(a/2));% making matrix of once

matrix\_zeros(1:round(a/2),(round(a/2)+1):a) = Matrix\_ones;% combine both matrix

data = matrix\_zeros;

%% doing grey scale:

max\_gray = 1;

min\_gray = 0;

[x,y] = size(data);%finding size of matrix

j = 28 ;% no of gray scale level

count = -1;

for i = 1:x

count = count + 1;

average = (max\_gray+min\_gray)/j;% finding the average of the image accordinf to gray scale.

data(i,1:round(y/j+1)) = 0;

for k = 1:j-1

Average = k\*average;

data(i,round(k\*y/j+1):(round(((k+1)\*y)/j+1)-1)) = Average;% adding each gray scale average value.

end

data(i,:) = data(i,:)./max(data(i,:));% normalise the data so shuld be in the range of [0,1]

end

% for j =1:x

%

% average = (max+min)/2;

% matrix\_zeros(j,1:round(y/3)) = zeros(j,round(y/3));

% matrix\_zeros(j,round(y/3):round(2\*y/3)) = average;

% matrix\_zeros(j,round(2\*y/3):round(3\*y/3)) = ones;

%

% end

%% Plot the grayscale matrix;

imshow(data);

Part b: for odd number of gray scale number.

clc;

clear all;

close all;

a = 35\*3;% enter the gray scale level also change the variable j

%% intialisation of matrix:

% data = matrix(50,100);

matrix\_zeros = zeros(round(a/2),a);% matrix of zeros

Matrix\_ones = ones(round(a/2),round(a/2));% matrix of onces

matrix\_zeros(1:round(a/2),(round(a/2)):a) = Matrix\_ones;% combining both matrix

data = matrix\_zeros;

%% doing grey scale:

max\_gray = 1;

min\_gray = 0;

[x,y] = size(data);%finding size of matrix

j = 35;% gray scale level

count = -1;

for i = 1:x

count = count + 1;

average = (max\_gray+min\_gray)/j;% find the average value according to the gray scale.

data(i,1:round(y/j+1)) = 0;

for k = 1:j-1

Average = k\*average;

data(i,round(k\*y/j+1):(round(((k+1)\*y)/j+1)-1)) = Average;% adding each average value equally in the matrix.

end

data(i,:) = data(i,:)./max(data(i,:));%normalise the data

% data(i,:) = max\_gray(data(i,:));

% data(i,:) = normalize(data(i,:));

% data(i,1:round(y/3)) = 0;

% data(i,round(y/3):round(2\*y/3)) = average;

% data(i,round(2\*y/3):round(3\*y/3)) = 1;

end

% Max\_data = max(data);

% data = data./Max\_data;

% for j =1:x

%

% average = (max+min)/2;

% matrix\_zeros(j,1:round(y/3)) = zeros(j,round(y/3));

% matrix\_zeros(j,round(y/3):round(2\*y/3)) = average;

% matrix\_zeros(j,round(2\*y/3):round(3\*y/3)) = ones;

%

% end

% plot the image.

imshow(data);