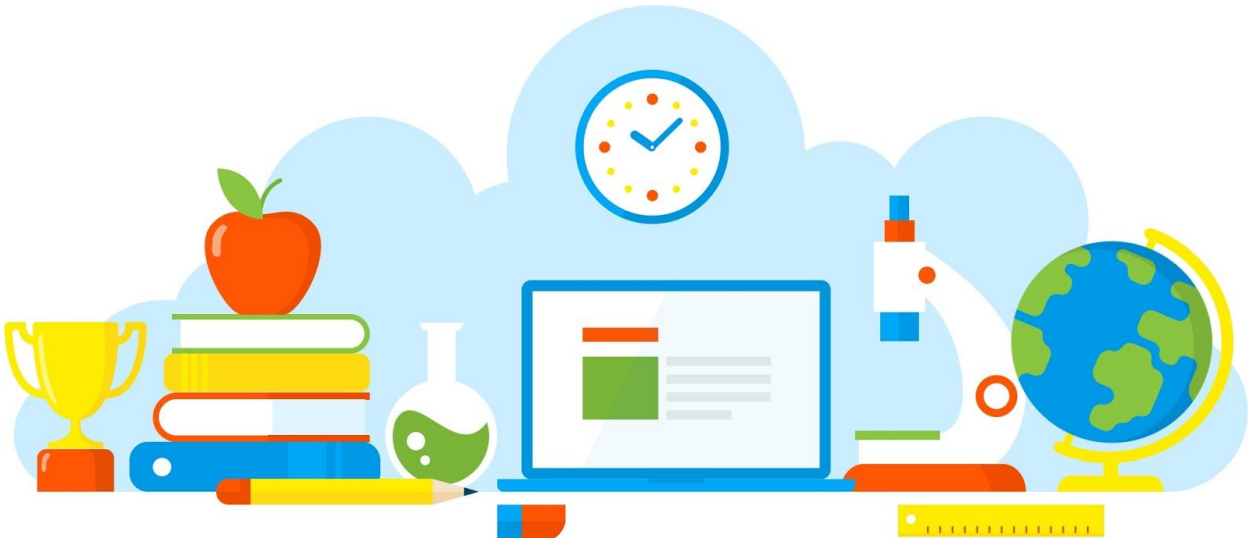


Assignment 4

Roll Number - 2018121004

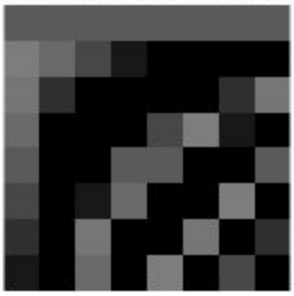
Anurag Sahu
11 - Apl - 2019

Q1.1.a

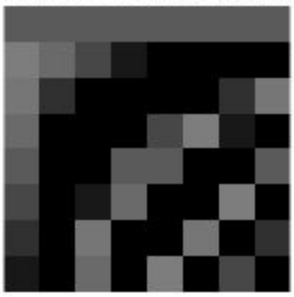
```
function F =  create_mat_dct(N)
    F = zeros(N);
    for v = 1:N
        for u = 1:N
            r = sqrt(2/N);
            if v==1
                r = sqrt(1/N);
            end
            F(v,u) =r*cos((pi * (2*(u-1)+1)*(v-1))/(2*N));
        end
    end
end
```

Observation:

Dct Matrix from my function



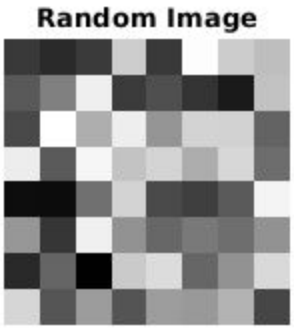
Dct Matrix from inbuilt function

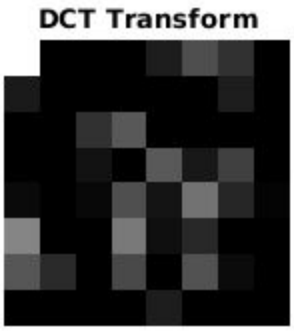


Q1.1.b

```
function transformed_im =  myDCT(im,F)
    transformed_im = F*im*transpose(F);
end
```

Observation :





Q1.1.c

```
function inverse = myIDCT(im,F)
    inverse = transpose(F)*im*F;
end
```

Observation :

Q1.1.d

```
function imqDCT = myDCT_quantization(imDCT,qm,c)
    imqDCT = imDCT./(c*qm);
end
```

Q1.1.e

```
function imqIDCT = myDCT_dequantization(imqDCT,qm,c)
    imqIDCT = imqDCT.*(c*qm);
end
```

Q1.1.f

```
function RSME_er = RSME(im1,im2)
    % Get the Dimentions of the image
    [im1_len, im1_bre] = size(im1);
    [im2_len, im2_bre] = size(im2);

    difference_in_len = im1_len - im2_len;
    difference_in_bre = im1_bre - im2_bre;

    pad_im1_len = 0;
    pad_im2_len = 0;
    pad_im1_bre = 0;
    pad_im2_bre = 0;

    if(difference_in_len < 0)
        pad_im1_len = - difference_in_len;
    elseif(difference_in_len > 0)
        pad_im2_len = difference_in_len;
    end
    if(difference_in_bre < 0)
        pad_im1_bre = - difference_in_bre;
    elseif(difference_in_bre > 0)
        pad_im2_bre = difference_in_bre;
    end

    % zero padding the images
    im1 = padarray(im1,[pad_im1_len,pad_im1_bre],'post');
    im2 = padarray(im2,[pad_im2_len,pad_im2_bre],'post');
    [im_len, im_bre] = size(im1);
    err = im1 - im2;
    RSME_er = sqrt(sum(sum(err .* err))/im_len*im_bre);

end
```

Q1.1.g

```
function en = entrpy(im1)
    [im_len, im_bre] = size(im1);
    [count,binlocations] = imhist(im1);
    count(count==0)=[];
    count = count/(im_len*im_bre);
    en = -sum(count.*log2(count));
end
```

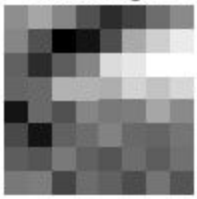
Q1.2

```
%% Question 1.2
lake_image = im2double(imread("LAKE.TIF"));
lake_image_1 = lake_image(420:420+7, 45:45+7);
lake_image_2 = lake_image(427:427+7, 298:298+7);
lake_image_3 = lake_image(30:30+7, 230:230+7);

im_dct_1 = myDCT(lake_image_1,F);
im_dct_2 = myDCT(lake_image_2,F);
im_dct_3 = myDCT(lake_image_3,F);

figure,imshow(im_dct_1), title("lake_img_1 DCT");
figure,imshow(im_dct_2), title("lake_img_2 DCT");
figure,imshow(im_dct_3 ), title("lake_img_3 DCT");

c = 2;

figure,imshow(myDCT_quantization(im_dct_1,qm,c)), title("lake_img_1 DCT_qua");
figure,imshow(myDCT_quantization(im_dct_2,qm,c)), title("lake_img_2 DCT_qua");
figure,imshow(myDCT_quantization(im_dct_3,qm,c)), title("lake_img_3 DCT_qua");

figure,imshow(myDCT_dequantization(im_dct_1,qm,c)), title("lake_img_1 DCT_qua");
figure,imshow(myDCT_dequantization(im_dct_2,qm,c)), title("lake_img_2 DCT_qua");
figure,imshow(myDCT_dequantization(im_dct_3,qm,c)), title("lake_img_3 DCT_qua");
```

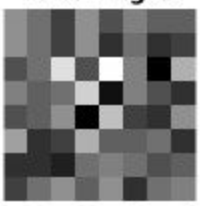
Observation:

lake img 1

lake img 2

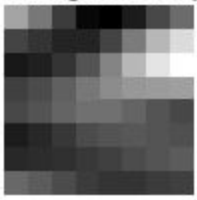


lake img 3



lake img 1 DCT qua

lake img 2 DCT qua



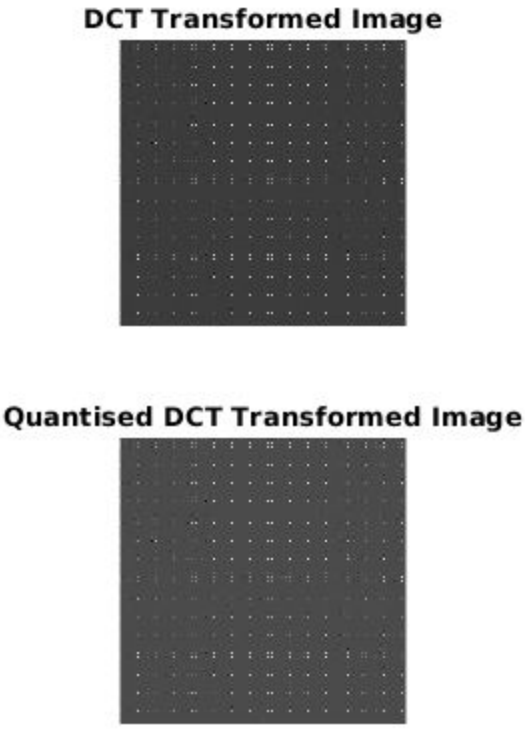
lake img 3 DCT qua

In the above image it can be clearly seen that the pixels in the image haves lost their individuality and have more of a gradient factor in them and as we go on increasing the Value of C it will increase.

Q1.3

```
c = 1;  %% Change this for changing the Value of C in Q4

DCT_quant = DCT_whole_quant(lake_image,F,qm,c);
figure,imshow(DCT_quant),title("Transformed Image");
```

Observation :



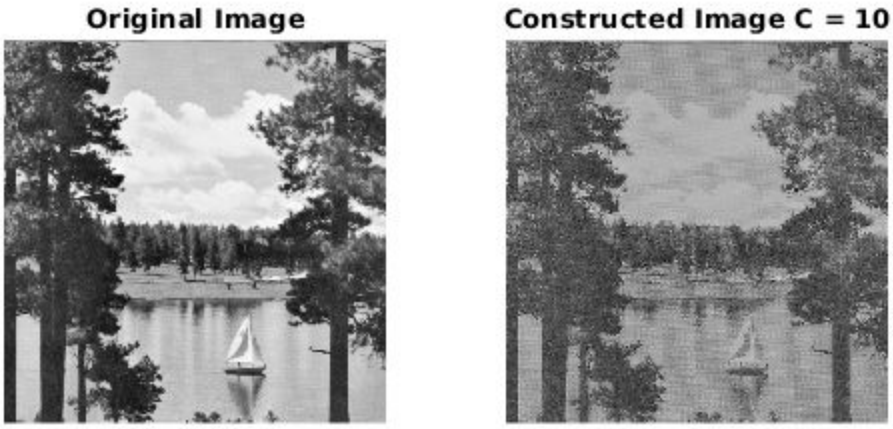
It can be see that the most of the pixel values in the above examples have black more all over with some

points at top left of each 8X8 pixels images.

Q1.4

```
%% Question 1.4
DCT_dequant = DCT_whole_dequant(lake_image,F,qm,c);
figure,imshow(DCT_dequant),title("Retransformed Image");
```

Obsevation:



As we go on Increasing the value to C the image goes on to go more and more Blur.