Project #2

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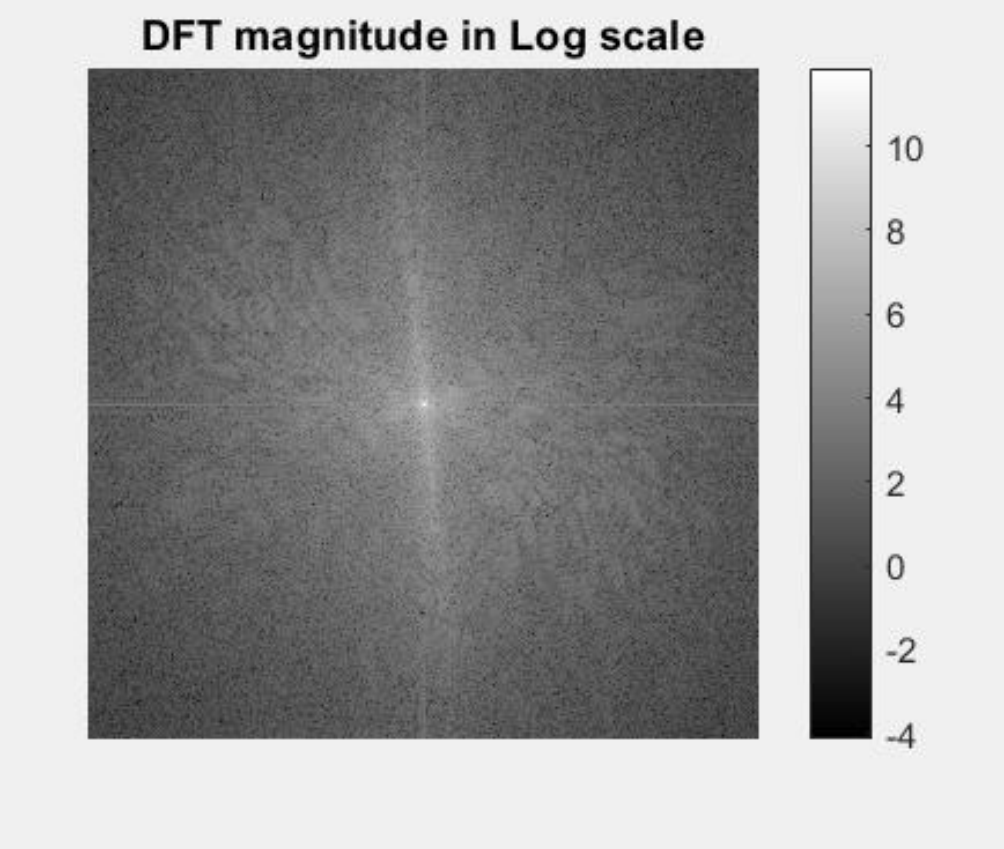
- Source codes

```
%%  Plot of DFT magnitude in Log scale
a = imread('Bird 2.tif');
b = im2double(a);
[m,n] = size(b);
d = zeros(m,n);
for i = 1:m
    for j = 1:n
        d(i,j) = b(i,j).*(-1).^(i + j);
    end
end
e = fft2(d);
F2 = log(abs(e));
subplot(2,1,1);
imshow(F2,[]); colorbar;title('DFT magnitude in Log scale');

%%  Image constructed by DFT
z = zeros(m,n);
for i = 1:m
    for j = 1:n
        z(i,j) = sqrt((i-m/2).^2 + (j-n/2).^2);
    end
end
H = zeros(m,n);
K = zeros(m,n);
for i = 1:m
    for j = 1:n
        if z(i,j) <= 30
            H(i,j) = 1;
            K(i,j) = 0;
        else
            H(i,j) = 0;
            K(i,j) = 1;
        end
```

```
    end
end
h1 = e.*H;
h2 = ifft2(h1);
h3 = zeros(m,n);
k1 = e.*K;
k2 = ifft2(k1);
k3 = zeros(m,n);
for i = 1:m
    for j = 1:n
        h3(i,j) = h2(i,j).*((-1).^(i+j));
        k3(i,j) = k2(i,j).*((-1).^(i+j));
    end
end
subplot(2,1,2);
imshow([b real(h3) real(k3)]);
title('input image              radius < 30 pixels
radius > 30 pixels ');
%%  Table of top 25 DFT frequencies
mag = zeros(m,n/2);
mag = (abs(e(:,1:n/2)));
magSort = sort(mag(:),'descend');
magList = zeros(25,3);
for k = 1:25
    for i = 1:m
       for j = 1:n/2
         if(mag(i,j)==magSort(k))
            magList(k,1) = e(i,j);
            magList(k,2) = i;
            magList(k,3) = j;
          end
        end
    end
end
T = array2table(magList,'VariableNames',{'abs(magnitude)','u','v'});
fig = uifigure;
uit = uitable(fig,'Data',T);
```

- Plot of DFT magnitude in Log scale



- Image constructed by DFT coefficients inside the circular region with radius = 30 pixels

- Image constructed by DFT coefficients outside the circular region with radius = 30 pixels

- Table of top 25 DFT frequencies (u,v) in the left half frequency region

abs(magnitude)	u	v
8.4215e+03 - 1.0099e+04i	257	255
1.2305e+04 - 1.2497e+03i	257	256
-7.2493e+03 + 1.9012e+03i	256	256
-4.4522e+03 + 5.2929e+03i	258	256
-2.4393e+03 + 4.8717e+03i	258	255
4.6347e+03 - 2.0804e+03i	254	256
-3.4553e+03 + 2.7541e+03i	260	255
-2.9490e+03 - 2.3762e+03i	259	256
-3.0246e+03 - 9.7509e+02i	260	256
6.0311e+02 - 2.6186e+03i	254	255
-1.6129e+03 - 2.1279e+03i	257	254
4.3548e+02 + 2.4964e+03i	259	253
-1.7599e+03 + 1.7533e+03i	255	255
1.8508e+03 - 1.5566e+03i	259	254
-2.3152e+03 - 2.1807e+02i	253	254
2.0088e+03 + 1.0646e+03i	249	256
6.1319e+02 - 2.0465e+03i	255	256
-2.1055e+03 - 2.5741e+02i	255	253
9.1967e+02 - 1.8397e+03i	261	255
-2.0480e+03 - 1.5053e+02i	263	256
1.8597e+03 - 7.1229e+02i	255	254
1.9013e+03 + 4.8237e+01i	256	253
1.6389e+03 - 9.0301e+02i	256	255
-1.5151e+03 + 9.7347e+02i	253	256
-1.4187e+03 + 1.0379e+03i	262	255