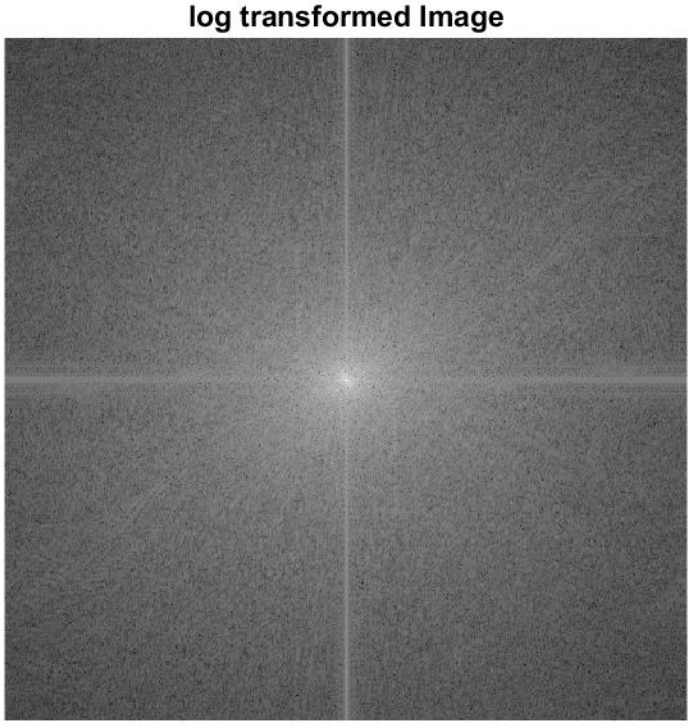
Image Processing Project #2

0510894 電機 4D 翁紹恩

I. Source codes (With Matlab)

```
%%%%%%%%%%% load image %%%%%%%%%%%%%%%
Img=imread('Bird 1.tif');
%%%%%%%%%%% DFT %%%%%%%%%%%%%%%%%
F = fft2(Img,512,512);
%%%%%%%%%%% DFT magnitude %%%%%%%%%%%%%%%
S = abs(F);
%%%%%%%%%%% get the centered spectrume %%%%%%%%%%%%%%%
Fsh = fftshift(F);
%%%%%%%%%%% apply log transform %%%%%%%%%%%%%%%
S2 = log(1+abs(Fsh));
%%%%%%%%%%% plot Fourier magnitude with log scale %%%%%%%%%
figure
imshow(S2,[]);title('log transformed Image')
saveas(gcf,'log transformed Image','png');
%%%%%%%%%%% plot phase spectrum after centering %%%%%%%%%
figure
imshow(angle(Fsh),[]),title('phase Image')
saveas(gcf,'phase Image','png');
%%%%%%%%%%% obtain largest 25 DFT %%%%%%%%%%%%%%%%
temp = abs(Fsh);
linearIndexesOfMaxes = zeros(25,1);
Maxes = zeros(25,3);
for i = 1:25
    [maxValue, linearIndexes] = max(temp(:));
    Maxes(i,3) = maxValue;
    [rowsOfMaxes colsOfMaxes] = find(temp == maxValue);
    Maxes(i,1) = rowsOfMaxes(1,1);
    Maxes(i,2) = colsOfMaxes(1,1);
    temp(Maxes(i,1), Maxes(i,2)) = -inf;
end
```

II. Figures of the Fourier magnitude (using log scale) and phase spectrum (after centering)



III. Table of top 25 DFT frequencies(after centering)

Largest	u	v	frequency
1st	257	257	27969071
2nd	257	255	4463423.53626522
3rd	257	259	4463423.53626522
4th	257	256	4054158.45883519
5th	257	258	4054158.45883519
6th	256	257	3579394.26640888
7th	258	257	3579394.26640888
8th	254	256	1983537.39045987
9th	260	258	1983537.39045987
10th	257	251	1560383.03648136
11th	257	263	1560383.03648136
12th	256	254	1494280.15606182
13th	258	260	1494280.15606182
14th	255	256	1478195.13932275
15th	259	258	1478195.13932275
16th	255	257	1460472.64429113
17th	259	257	1460472.64429113
18th	257	252	1413381.79788163
19th	257	262	1413381.79788163
20th	255	254	1391361.31303222
21st	259	260	1391361.31303222
22nd	256	255	1380798.26236333
23rd	258	259	1380798.26236333
24th	255	255	1339094.24127242
25th	259	259	1339094.24127242

IV. Table of top 25 DFT frequencies(before centering)

Largest	u	v	frequency
1st	1	1	27969071
2nd	1	3	4463423.53626522
3rd	1	511	4463423.53626522
4th	1	2	4054158.45883519
5th	1	512	4054158.45883519
6th	2	1	3579394.26640888

7th	512	1	3579394.26640888
8th	4	2	1983537.39045987
9th	510	512	1983537.39045987
10th	1	7	1560383.03648136
11th	1	507	1560383.03648136
12th	2	4	1494280.15606182
13th	512	510	1494280.15606182
14th	3	2	1478195.13932275
15th	511	512	1478195.13932275
16th	3	1	1460472.64429113
17th	511	1	1460472.64429113
18th	1	6	1413381.79788163
19th	1	508	1413381.79788163
20th	3	4	1391361.31303222
21st	511	510	1391361.31303222
22nd	2	3	1380798.26236333
23rd	512	511	1380798.26236333
24th	3	3	1339094.24127242
25th	511	511	1339094.24127242