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

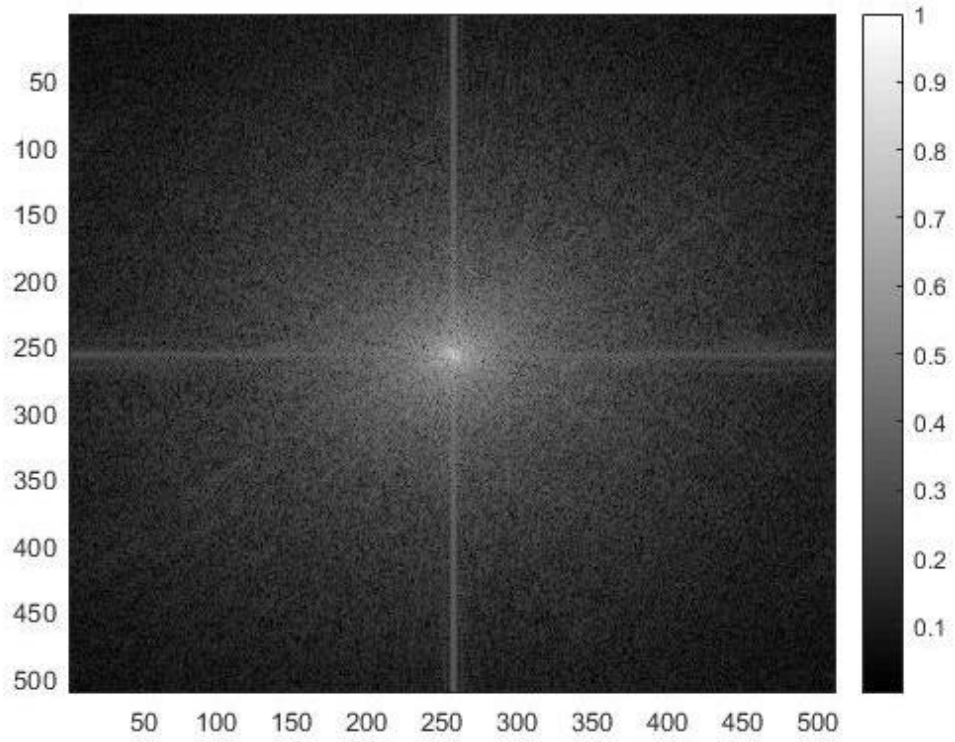

Figure 1 Fourier magnitude spectra of the *bird* image before filtering (normalize and log scale).

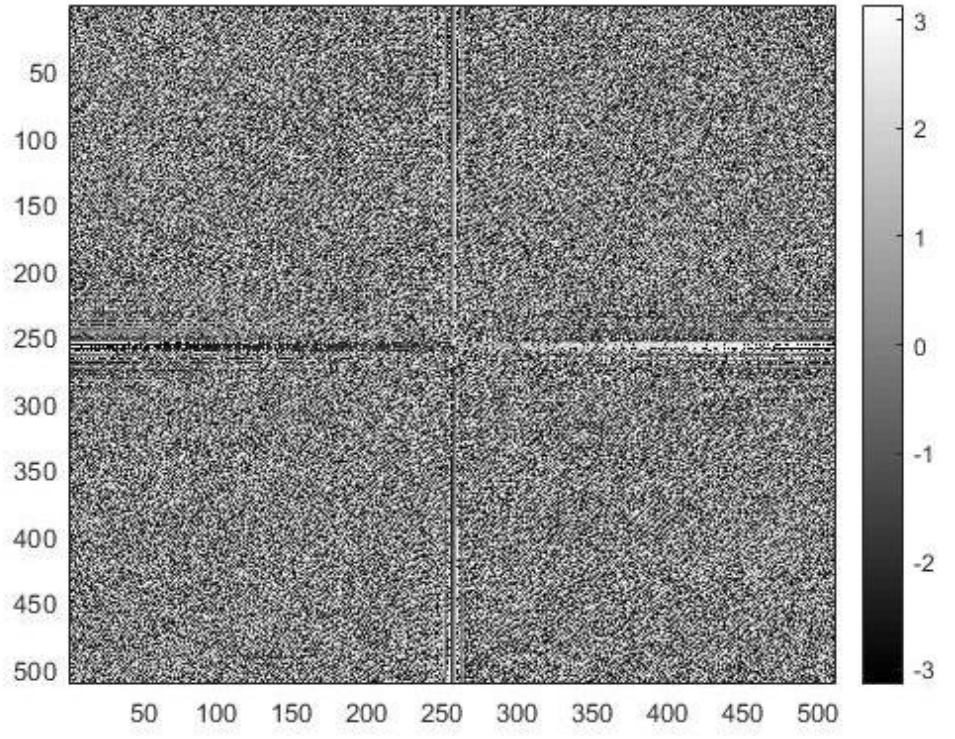

Figure 2 Fourier phase spectra of the *bird* image before filtering.

2. Table of top 25 DFT frequencies *(u, v)*.

top	(u, v)
1	[257,257]
2	[257,255]
3	[257,259]
4	[257,256]
5	[257,258]
6	[256,257]
7	[258,257]
8	[254,256]
9	[260,258]
10	[257,251]
11	[257,263]
12	[256,254]
13	[258,260]
14	[255,256]
15	[259,258]
16	[255,257]
17	[259,257]
18	[257,252]
19	[257,262]
20	[255,254]
21	[259,260]
22	[256,255]
23	[258,259]
24	[255,255]
25	[259,259]

Source code

```
% Clear all command window, temporary variables and close all MATLAB
window
clc;
clear;
close all;

% Read the image, data type: uint8
imdata = imread('Bird 1.tif');

% Show the original image (Bird 1.tif)
figure;
imshow(imdata);
title('Original Image');

% Get Fourier transform of original image and change the data type to
double
F = fft2(im2double(imdata));

% Shift zero-frequency component to center of spectrum
Fsh = fftshift(F);

% Get the absolute of the spectrum of original image (Fourier
magnitude)
S = abs(Fsh);

% Normalize the scale, its range [0 - 1]
c1 = 1 / log(max(S(:))+1);

% Show the Fourier magnitude using log scale
figure;
imagesc(c1.* log(S+1));
colorbar; % show color bar
colormap gray; % Let the image present gray-level

% Get the phase from the spectrum of original image
F_ph = angle(Fsh);
```

```
% Show the phase spectrum, its range [-pi - pi]
figure;
imagesc(F_ph);
colorbar;
colormap gray;

% Find coordinates (u, v) of the top 25 frequency components from
original image
input_top25_freq=[]; % Initial variable to store results
% Sorting the frequency components from Fourier magnitude. It returns
value and index to M and I with descending
[M,I] = sort(S(:), 'descend');
% Get the coordinates of top 25 frequency components
for kk=1:25
    if mod(I(kk),512) == 0
        row = 512;
    else
        row = mod(I(kk),512);
    end
    col = ceil(I(kk) / 512);
    input_top25_freq{kk,1} = [row, col];
end
```