

Project #3

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Source codes:

```
clear all; close all; clc;

origin_img = imread('Bird 1.tif');
fft_img = fftshift(fft2(origin_img, 1024, 1024));

%512*512*2 = 524288
for u = 1:1024
    for v = 1:1024
         $H(u, v) = ((u-512).^2 + (v-512).^2)/524288;$ 
    end
end
filter_img = fft_img.*H;
fft_filter_img = filter_img;
abs_filter_img = abs(fft_filter_img);

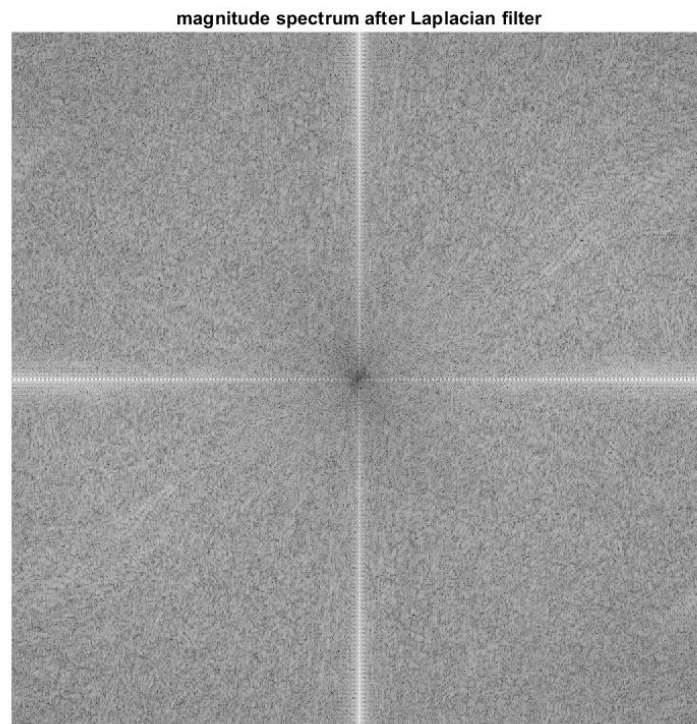
freq_table = sort(abs_filter_img(:), 'descend');
location = find(abs_filter_img >= freq_table(25));

img = ifft2(ifftshift(fft_filter_img));
output_img = img(1:512, 1:512);

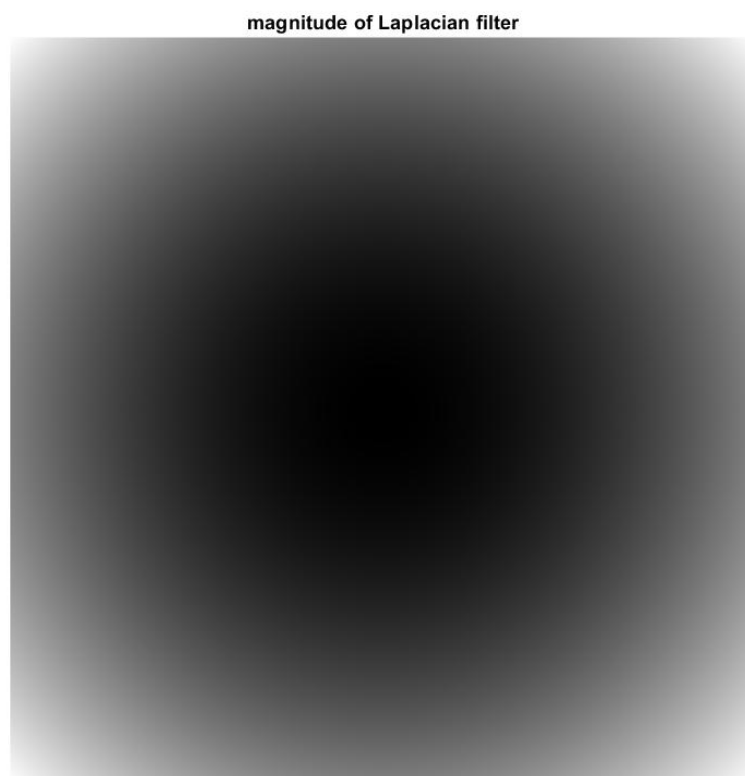
figure;
subplot(2,2,1), imshow(origin_img), title('origin image');
subplot(2,2,3), imshow(H.*255, []), title('magnitude of Laplacian filter');
subplot(2,2,4), imshow(log(1+abs_filter_img), []), title('magnitude spectrum after Laplacian filter');
subplot(2,2,2), imshow(abs(output_img)), title('output image');
```

Figures of the Fourier magnitude and phase spectrum

Magnitude spectrum of the image after Laplacian filtering(log scale)

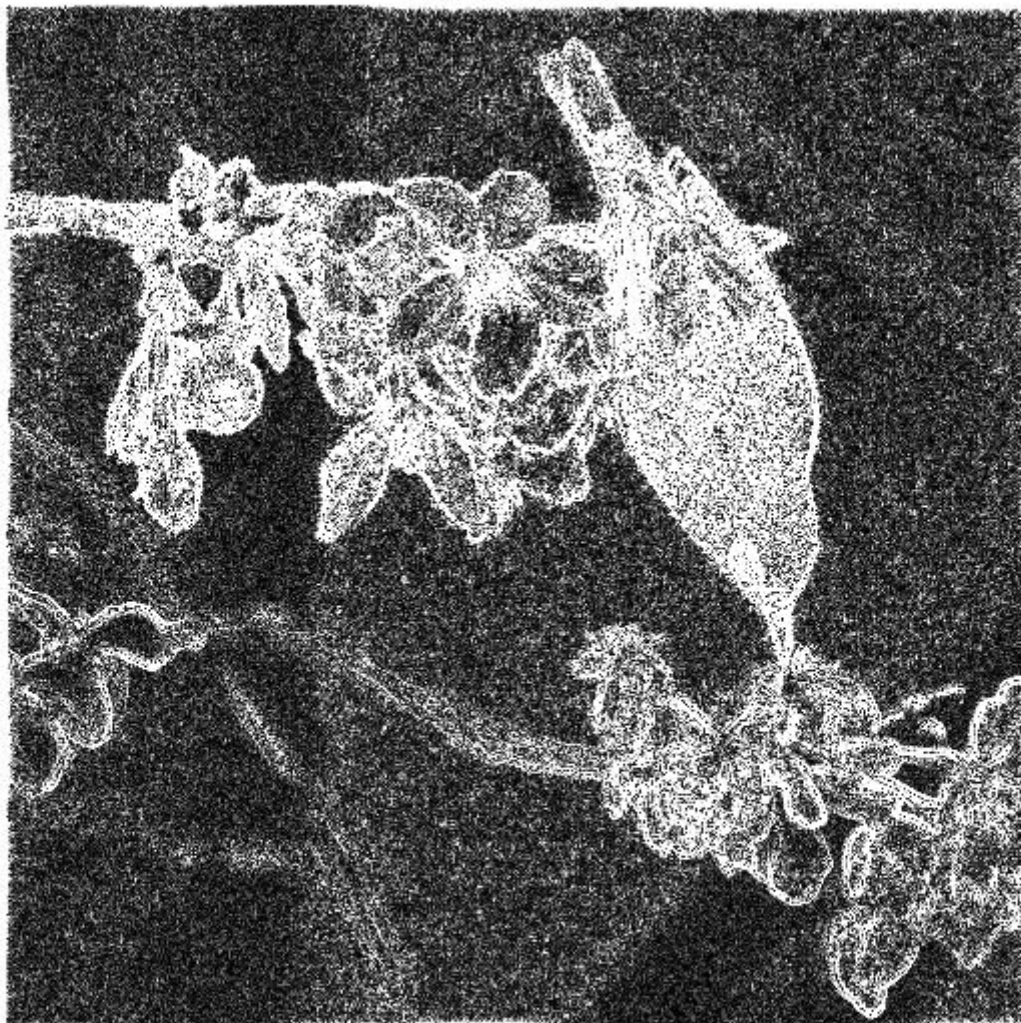


Magnitude spectrum of Laplacian filtering



Output image

output image



Top 25 DFT frequency

number	Frequency	u	v
1	33467.4391209165	513	1022
2	33205.4650952489	513	4
3	33106.5481754617	513	1024
4	32848.4094183973	513	2
5	32751.2131434734	513	1018
6	32492.8229477212	513	8
7	32085.7986364653	513	1012
8	31829.6266448398	513	14
9	31663.7639727894	513	1016
10	31442.2770404228	513	1008
11	31435.8887858071	513	1014
12	31412.9638566033	513	10
13	31352.3558035909	513	1020
14	31189.2225419937	513	18
15	31185.9035826296	513	12
16	31105.9737774746	513	6
17	31056.5625898634	513	1010
18	30845.2406496210	513	1004
19	30807.6141959655	513	16
20	30686.6241045624	513	1002
21	30657.0188952881	513	998
22	30594.9770731607	513	22
23	30436.6333225643	513	24
24	30405.2179974915	513	28
25	30264.9022209016	513	1006