

01 Matlab Code

1. Scale Function

설명 : 스케일 변환을 도와주는 함수

```
% Scaling transformation function
function y = Scale(x, max_value, min_value) %x is image matrix
y = (255/(max_value-min_value)*(x-min_value));
end
```

2. Making LPF Mask Function

설명 : 반지름 50 의 LPF 를 만드는 함수

```
function y = LPF_Round(s,r) % Making LPF Mask function, s is size of image
and r is radius

Sx = s(1);
Sy = s(2);

Mx = Sx/2;
My = Sy/2;

for i = 1:Sx
    for j = 1:Sy
        R = sqrt((i-Mx).^2 + (j-My).^2);
        if R > r
            y(i,j) = 0;
        else
            y(i,j) = 1;
        end
    end
end
end
```

3. Making HPF Mask Function

설명 : 반지름 50 의 LPF 를 만드는 함수

```
function y = HPF_Round(s,r) % Making HPF Mask function, s is size of image
and r is radius

Sx = s(1);
Sy = s(2);

Mx = Sx/2;
My = Sy/2;

for i = 1:Sx
    for j = 1:Sy
        R = sqrt((i-Mx).^2 + (j-My).^2);
        if R > r
            y(i,j) = 1;
        else
            y(i,j) = 0;
        end
    end
end
```

4. Main Code

```
%%% Robot Vision%%%
%%% Dept. of Electronic Engineering
%%% 201314651 Lee Wonjai

% read the targeted image
IM_Rose = imread('C:\Users\user\OneDrive\ìÛÁÁ È-.é\2019 È¯°, 4ÇÐ³â\4ÇÐ³â
2ÇÐ³â\·î°¿°ñÀü\Original Images\dipum_images_ch02\Fig0206(a)(rose-
original).tif');

% Size of Image
S_Rose = size(IM_Rose);

%LPF
% Visualizing Test
LFT_Rose1 = fft2(IM_Rose);
LFT_Rose2 = abs(LFT_Rose1);
LFT_Rose3 = Scale(LFT_Rose2, max(max(LFT_Rose2)), min(min(LFT_Rose2)));
LFTS_Rose_test = fftshift(LFT_Rose3);

LR_Mask = LPF_Round(S_Rose,50);
LF_Rose_test = LFTS_Rose_test.*LR_Mask;

% Real Mask Filtering in Frequency Domain
LFTS_Rose = fftshift(LFT_Rose1);
LF_Rose = LFTS_Rose.*LR_Mask;
LF_Rose1 = ifftshift(LF_Rose);
LPF_Rose = uint8(ifft2(LF_Rose1));

%HPF
% Visualizing Test
HFT_Rose1 = fft2(IM_Rose);
HFT_Rose2 = abs(HFT_Rose1);
HFT_Rose3 = Scale(HFT_Rose2, max(max(HFT_Rose2)), min(min(HFT_Rose2)));
HFTS_Rose_test = fftshift(HFT_Rose3);

HR_Mask = HPF_Round(S_Rose,50);
HF_Rose_test = HFTS_Rose_test.*HR_Mask;

% Real Mask Filtering in Frequency Domain
HFTS_Rose = fftshift(HFT_Rose1);
HF_Rose = HFTS_Rose.*HR_Mask;
HF_Rose1 = ifftshift(HF_Rose);
HPF_Rose = uint8(ifft2(HF_Rose1));

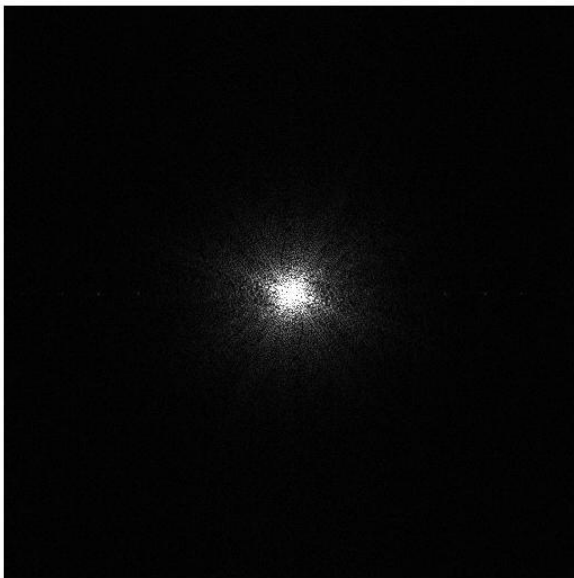
figure, imshow(LFTS_Rose_test)
figure, imshow(LF_Rose_test)
figure, imshow(LP_F_Rose)
figure, imshow(HF_Rose_test)
figure, imshow(HPF_Rose)
```

02 Result 1

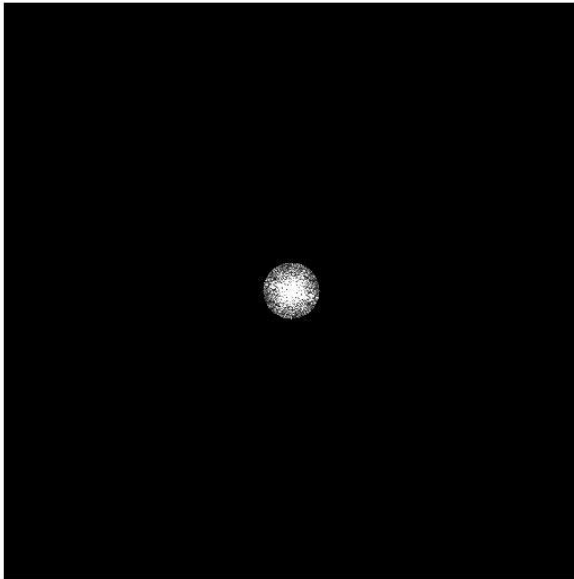
1. Original Image



2. Frequency Domain of Rose Image



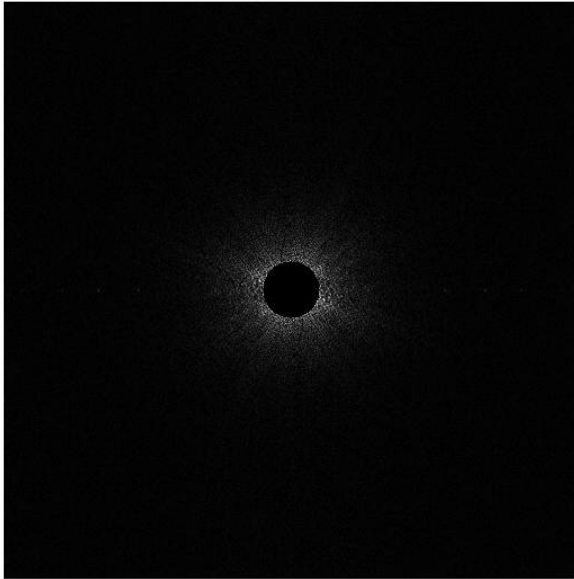
3. LPF Filtered Rose Image in Frequency Domain



4. LPF Filtered Rose Image in Time Domain



5. HPF Filtered Rose Image in Frequency Domain



6. HPF Filtered Rose Image in Time Domain



Conclusion

1. Matlab

- LPF, HPF - $x^2+y^2 = r^2$ 의 공식을 이용하여 반지름 50의 LPF와 HPF를 구함
- 주의점
 1. 이미지의 주파수 대역의 형태를 확인하기 위해서 절댓값을 씌우고, 스케일 변환을 한 후 fftshift 시킨다.
 2. 그러나 LPF, HPF등 Mask 계산을 할 때에는 절댓값, 스케일 변환 없이 fftshift를 시킨 후 계산을 하고, 다시 ifftshift시켜 원상복귀를 해줘야 한다.
 3. 따라서 코드 작성시 시각화 변수 따로, 실 계산 변수 따로 나눠 계산해야 한다.