

~/Downloads/lab11a.m

```
1 % a. DFT-Domain Low Pass Filtering
2
3 % Read the image
4 img = imread('rgb.jpeg');
5
6 % Convert the image to grayscale
7 gray_img = rgb2gray(img);
8
9 % Perform 2D DFT (Discrete Fourier Transform)
10 F = fft2(double(gray_img));
11
12 % Shift zero-frequency component to the center (using fftshift)
13 F_shifted = fftshift(F);
14
15 % Get the size of the image
16 [M, N] = size(gray_img);
17
18 % Create a low-pass filter mask
19 D0 = 50; % Cutoff frequency (controls the filter's radius)
20 [u, v] = meshgrid(-floor(N/2):floor(N/2), -floor(M/2):floor(M/2));
21 D = sqrt(u.^2 + v.^2); % Distance matrix
22
23 % Low-pass filter mask (circular mask)
24 H = double(D <= D0);
25
26 if size(H) ~= size(F_shifted)
27     H = imresize(H, size(F_shifted));
28 end
29
30 % Apply the low-pass filter in the DFT domain
31 F_filtered = F_shifted .* H;
32
33 % Shift back the zero-frequency component (inverse fftshift)
34 F_filtered = ifftshift(F_filtered);
35
36 % Inverse DFT to get the filtered image
37 filtered_img = real(ifft2(F_filtered));
38
39 % Display the original and filtered images
40 figure;
41 subplot(1, 2, 1);
42 imshow(gray_img);
43 title('Original Image');
44
45 subplot(1, 2, 2);
46 imshow(uint8(filtered_img));
47 title('LPF Image (DFT Domain)');
48
```