

```
% date - 25/01/2026
% created by - Saurabh Singh
clc;
clear all;
close all;

% Read input image
I = imread('I.jpg');

% Display initial image (as it is)
figure;
imshow(I);
title('Initial Image');

% Convert to grayscale if needed
if size(I,3) == 3
    Ig = rgb2gray(I);
else
    Ig = I;
end

% Display grayscale image
figure;
imshow(Ig);
title('Grayscale Image');

% 2-D Discrete Wavelet Transform on grayscale image
[LL, LH, HL, HH] = dwt2(Ig, 'haar');

figure;
imshow(mat2gray(LL));
title('Approximation (LL)');

figure;
imshow(mat2gray(LH));
title('Vertical Detail (LH)');

figure;
imshow(mat2gray(HL));
title('Horizontal Detail (HL)');

figure;
imshow(mat2gray(HH));
title('Diagonal Detail (HH)');

% Image reconstruction using inverse DWT
recover = idwt2(LL, LH, HL, HH, 'haar');
recover = uint8(recover);

figure;
imshow(recover);
title('Recovered Image');
```

Initial Image



Grayscale Image



Approximation (LL)



Vertical Detail (LH)



Horizontal Detail (HL)



Diagonal Detail (HH)



Recovered Image

