Wavelet Transform

```matlab
clc;

clear all;

close all;



% Read input image

I = imread('D:\DIP_Images\lab2_part1.jpg');



% Rotate if required

% I = imrotate(I,90);



% Convert to grayscale

% Ig = rgb2gray(I);

Ig = I;



% Display original and grayscale image

figure;



subplot(2,3,1);

imshow(I);

title('Original Image');



subplot(2,3,2);

imshow(Ig);
```

```matlab
title('Grayscale Image');


% Apply DWT using Haar wavelet
[Ia, Iv, Ih, Id] = dwt2(Ig,'haar');


% Convert for display
Ia = uint8(Ia);

Iv = uint8(Iv);

Ih = uint8(Ih);

Id = uint8(Id);


% Display DWT components
subplot(2,3,3);

imshow(Ia);

title('Approximation (LL)');


subplot(2,3,4);

imshow(Iv);

title('Vertical Detail (LH)');


subplot(2,3,5);

imshow(Ih);

title('Horizontal Detail (HL)');


subplot(2,3,6);
```

```matlab
imshow(Id);

title('Diagonal Detail (HH)');



% Reconstruct image

I_recover = idwt2(Ia, Iv, Ih, Id, 'haar');

I_recover = uint8(I_recover);



% Display recovered image

figure;

imshow(I_recover);

title('Recovered Image');
```

Figure 1

Original Image Grayscale Image Approximation (LL)

Vertical Detail (LH) Horizontal Detail (HL) Diagonal Detail (HH)

Figure 2

Recovered Image