Contents

```matlab
%Code written by Vansh Bhavsar

clear;
close all;
clc;
```

Read the input image

```matlab
img = imread('lena_color.tiff');
figure;
imshow(img); title('Original Image');
```

Original Image

Convert to grayscale

```
if size(img, 3) == 3
    img = rgb2gray(img);
end
```

Convert to double for processing

```
img = im2double(img);
```

Perform single-level 2D Discrete Wavelet Transform (DWT)

```
[LL, LH, HL, HH] = dwt2(img, 'haar'); % Using Haar wavelet
```
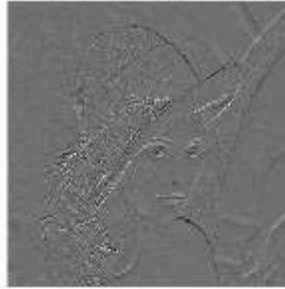
Display the original and decomposed images

```
figure;
subplot(2,2,1); imshow(LL, []); title('Approximation (LL)');
subplot(2,2,2); imshow(LH, []); title('Horizontal Detail (LH)');
subplot(2,2,3); imshow(HL, []); title('Vertical Detail (HL)');
subplot(2,2,4); imshow(HH, []); title('Diagonal Detail (HH)');
```
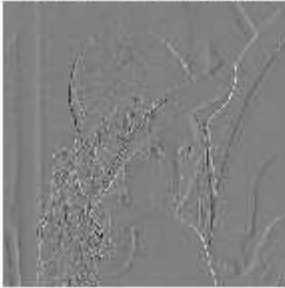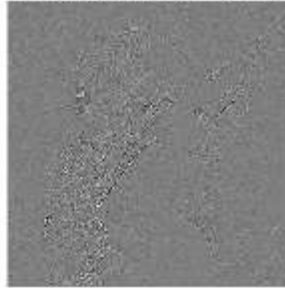
Approximation (LL) **Horizontal Detail (LH)**

Vertical Detail (HL) **Diagonal Detail (HH)**

Reconstruct the image using inverse DWT

```
reconstructed_img = idwt2(LL, LH, HL, HH, 'haar');
```

Display the reconstructed image

```
figure;
imshow(reconstructed_img, []); title('Reconstructed Image from DWT');
```

Reconstructed Image from DWT