

```

% Read the image
img = imread('beach.jpg'); % Replace with your image file

% Creating a binary mask for the region of interest (ROI)
mask = false(size(img, 1), size(img, 2));
mask(50:200, 100:300) = true;

% Convert to grayscale
if size(img, 3) == 3
    grayImage = rgb2gray(img);
else
    grayImage = img;
end

% Low-pass filters
% Gaussian filter
gaussianFilter = fspecial('gaussian', [5, 5], 2); % Adjust size and sigma
filteredGaussian = imfilter(grayImage, gaussianFilter);

% Average filter
averageFilter = fspecial('average', [5, 5]); % Adjust size as needed
filteredAverage = imfilter(grayImage, averageFilter);

% High-pass filters
% Laplacian filter
laplacianFilter = fspecial('laplacian', 0.2); % Adjust the alpha value as
needed
filteredLaplacian = imfilter(grayImage, laplacianFilter);

% Prewitt filter
prewittFilterX = fspecial('prewitt');
prewittFilterY = prewittFilterX';

Gx = [-1 0 1;
      -1 0 1;
      -1 0 1]; % Horizontal kernel

Gy = [1 1 1;
      0 0 0;
      -1 -1 -1]; % Vertical kernel

% Prewitt filter using convolution
filteredX = imfilter(double(grayImage), Gx); % Horizontal gradients
filteredY = imfilter(double(grayImage), Gy); % Vertical gradients
gradientMagnitude = sqrt(filteredX.^2 + filteredY.^2);
gradientMagnitude = uint8(255 * mat2gray(gradientMagnitude));

% Masking the results
maskedGaussian = filteredGaussian .*uint8(mask);

```

```

maskedAverage = filteredAverage .*uint8(mask);
maskedLaplacian = filteredLaplacian .*uint8(mask);
maskedPrewitt = gradientMagnitude .*uint8(mask);

% Display results
figure;

subplot(3, 2, 1);
imshow(grayImage);
title('Original Grayscale Image');

subplot(3, 2, 2);
imshow(mask);
title('Binary Mask');

subplot(3, 2, 3);
imshow(maskedGaussian, []);
title('Gaussian Filtered (Masked)');

subplot(3, 2, 4);
imshow(maskedAverage, []);
title('Average Filtered (Masked)');

subplot(3, 2, 5);
imshow(maskedLaplacian, []);
title('Laplacian Filtered (Masked)');

subplot(3, 2, 6);
imshow(maskedPrewitt, []);
title('Prewitt Filtered (Masked)');

```

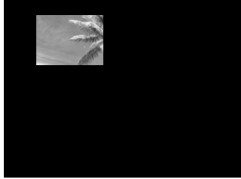
Original Grayscale Image



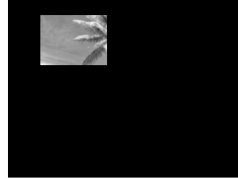
Binary Mask



Gaussian Filtered (Masked)



Average Filtered (Masked)



Laplacian Filtered (Masked)



Prewitt Filtered (Masked)

