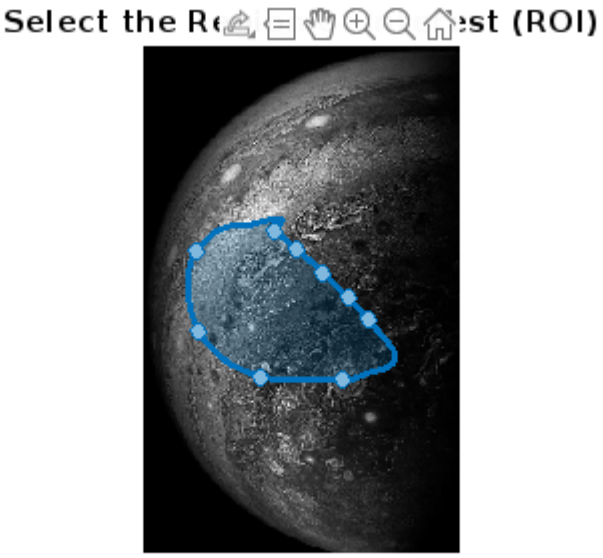
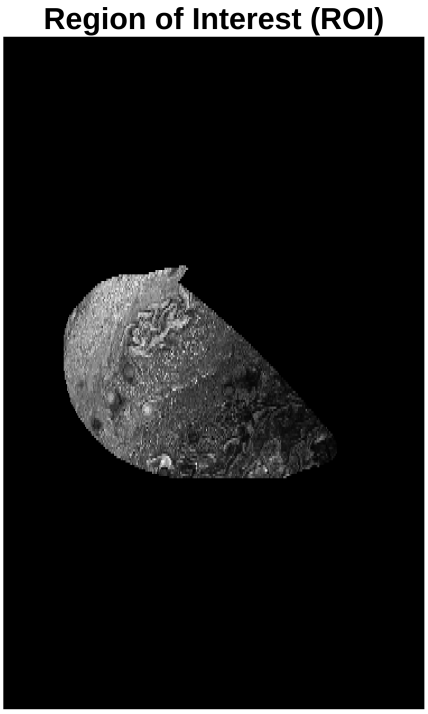
```
% Load the image
img = imread("img2.jpg");
grayImg = rgb2gray(img); % Convert to grayscale

% Display the image and select the ROI
figure, imshow(grayImg);
title('Select the Region of Interest (ROI)');
roi = drawfreehand; % Allows freehand selection of ROI
```




```
binaryMask = createMask(roi); % Create binary mask

% Apply the binary mask to the grayscale image
roiImg = grayImg .* uint8(binaryMask);
figure, imshow(roiImg);
title('Region of Interest (ROI)');
```



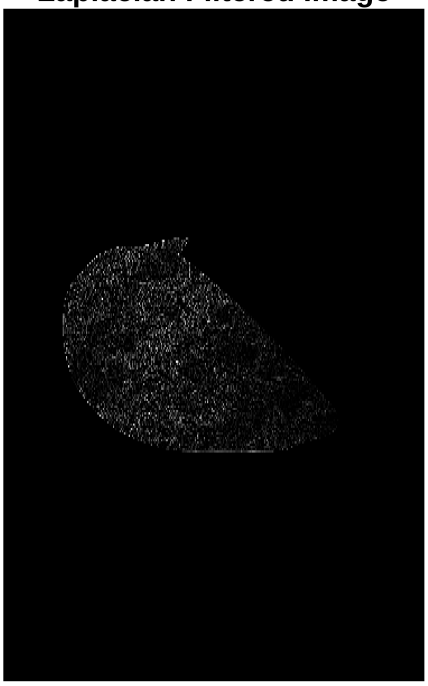

```
% Low-Pass Filters
% 1. Gaussian Filter
gaussianFiltered = imgaussfilt(roiImg, 2); % Sigma of 2 for smoothness
figure, imshow(gaussianFiltered);
title('Gaussian Filtered Image');
```


```
% 2. Average Filter
averageFiltered = filter2(fspecial('average', [5 5]), roiImg) / 255;
figure, imshow(averageFiltered);
title('Average Filtered Image');
```

Average Filtered Image

```
% High-Pass Filters
% 1. Laplacian Filter
laplacianFilter = fspecial('laplacian', 0.2); % 0.2 is a scaling factor
laplacianFiltered = imfilter(roiImg, laplacianFilter, 'replicate');
figure, imshow(laplacianFiltered, []);
title('Laplacian Filtered Image');
```

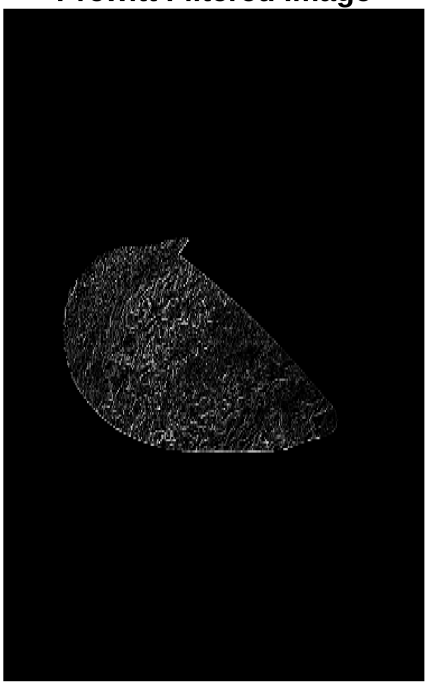
Laplacian Filtered Image



```
% 2. Prewitt Filter
prewittFilterX = fspecial('prewitt'); % Horizontal edges
prewittFilteredX = imfilter(roiImg, prewittFilterX, 'replicate');
prewittFilterY = prewittFilterX'; % Vertical edges
prewittFilteredY = imfilter(roiImg, prewittFilterY, 'replicate');

% Combine Prewitt filters to get edge magnitude
prewittFiltered = sqrt(double(prewittFilteredX).^2 +
double(prewittFilteredY).^2);
figure, imshow(prewittFiltered, []);
title('Prewitt Filtered Image');
```

Prewitt Filtered Image



```
% Display final images
figure;
subplot(2,2,1), imshow(gaussianFiltered), title('Gaussian Filter');
subplot(2,2,2), imshow(averageFiltered), title('Average Filter');
subplot(2,2,3), imshow(laplacianFiltered, []), title('Laplacian Filter');
subplot(2,2,4), imshow(prewittFiltered, []), title('Prewitt Filter');
```

Gaussian Filter

Average Filter

Laplacian Filter

Prewitt Filter

```
% Save the final images
imwrite(gaussianFiltered, 'Gaussian_Filtered_Image.jpg');
imwrite(averageFiltered, 'Average_Filtered_Image.jpg');
imwrite(laplacianFiltered, 'Laplacian_Filtered_Image.jpg');
imwrite(prewittFiltered, 'Prewitt_Filtered_Image.jpg');
```