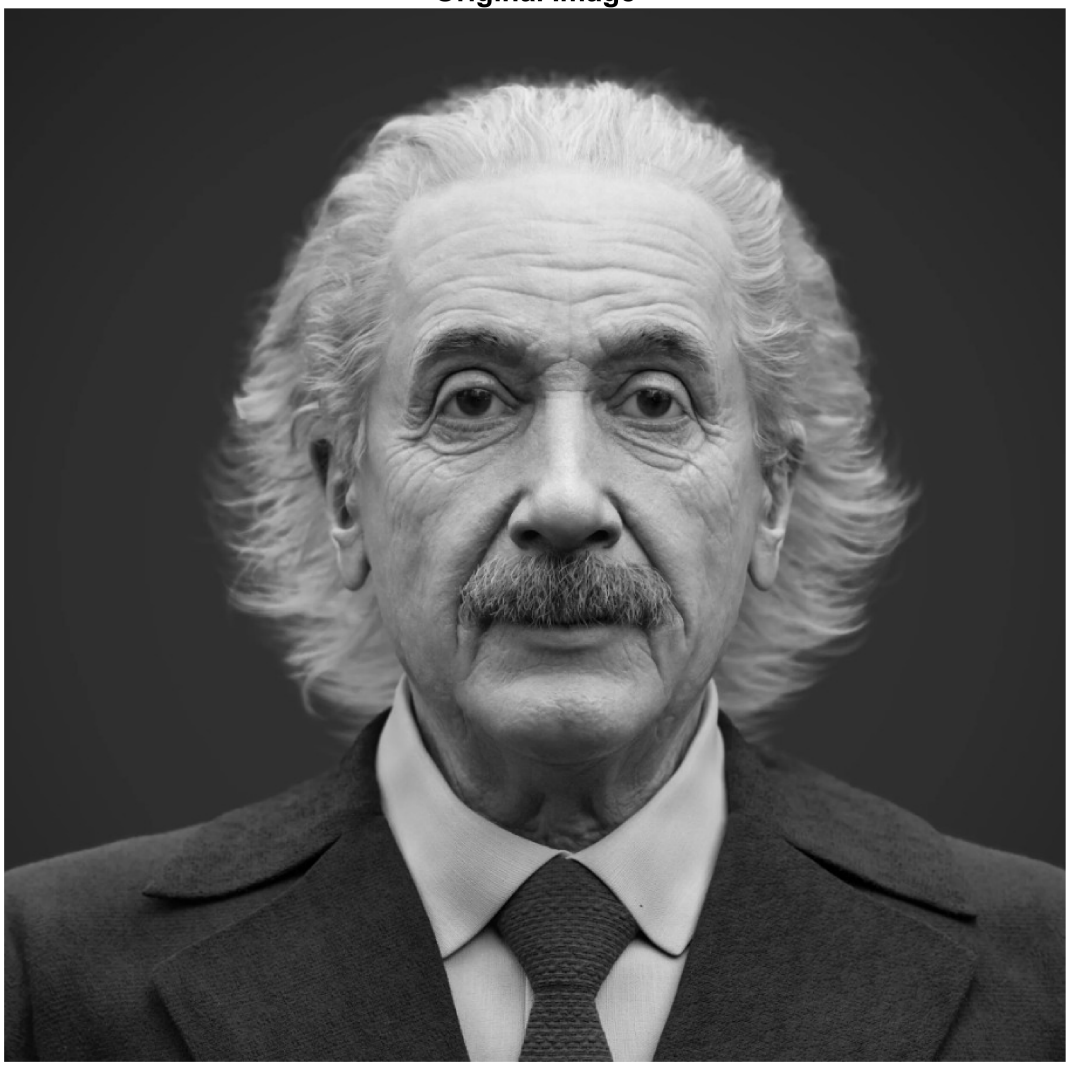
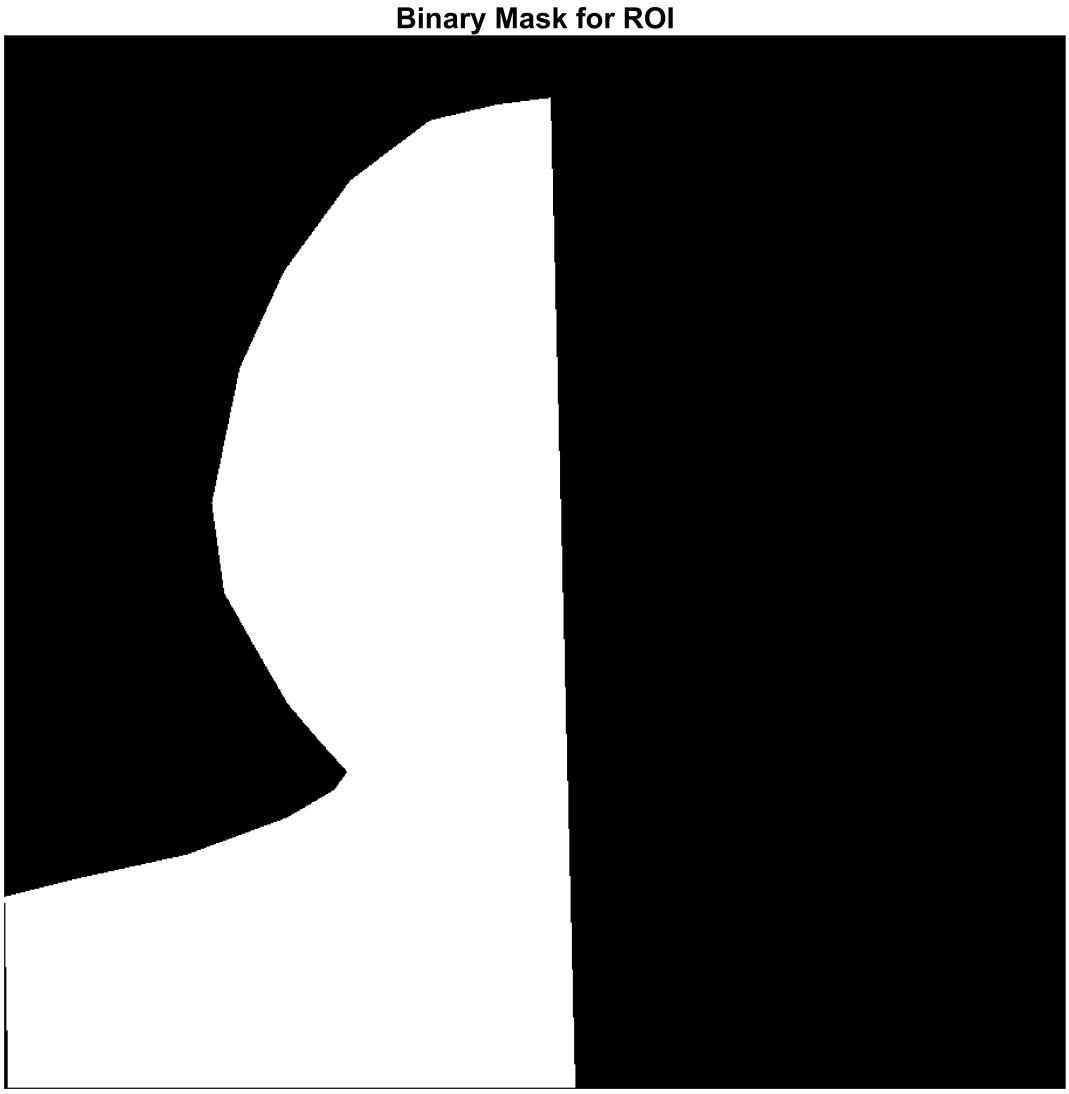
```
% Image reading and conversion to grayscale
image = imread('image (1).jpg');
grayImage = rgb2gray(image);

% Defining the ROI
figure, imshow(image);
title('Select the Region of Interest (ROI) and double-click to confirm.');
roi = roipoly;
close;

% Binary mask creation for the ROI
binaryMask = roi;



% Gaussian filter (15x15 kernel, sigma = 2) on the ROI
g1 = fspecial('gaussian', [15, 15], 2);
gaussianFilteredROI = imfilter(grayImage, g1);
gaussianFilteredROI(~binaryMask) = grayImage(~binaryMask);

% Average filter on the ROI
f1 = fspecial('average', 5);
averageFilteredROI = imfilter(grayImage, f1);
averageFilteredROI(~binaryMask) = grayImage(~binaryMask);



% Laplacian filter on the ROI
laplacianFilter = fspecial('laplacian', 0.2);
laplacianFilteredROI = imfilter(grayImage, laplacianFilter, 'replicate');
laplacianFilteredROI(~binaryMask) = grayImage(~binaryMask);

% Prewitt filter on the ROI
prewittFilterX = fspecial('prewitt');
prewittFilteredX = imfilter(grayImage, prewittFilterX, 'replicate');
prewittFilteredY = imfilter(grayImage, prewittFilterX', 'replicate');
prewittFiltered = prewittFilteredX + prewittFilteredY;
prewittFilteredROI = prewittFiltered;
prewittFilteredROI(~binaryMask) = grayImage(~binaryMask);




% Original image
figure, imshow(image), title(['Original Image']);
```

Original Image

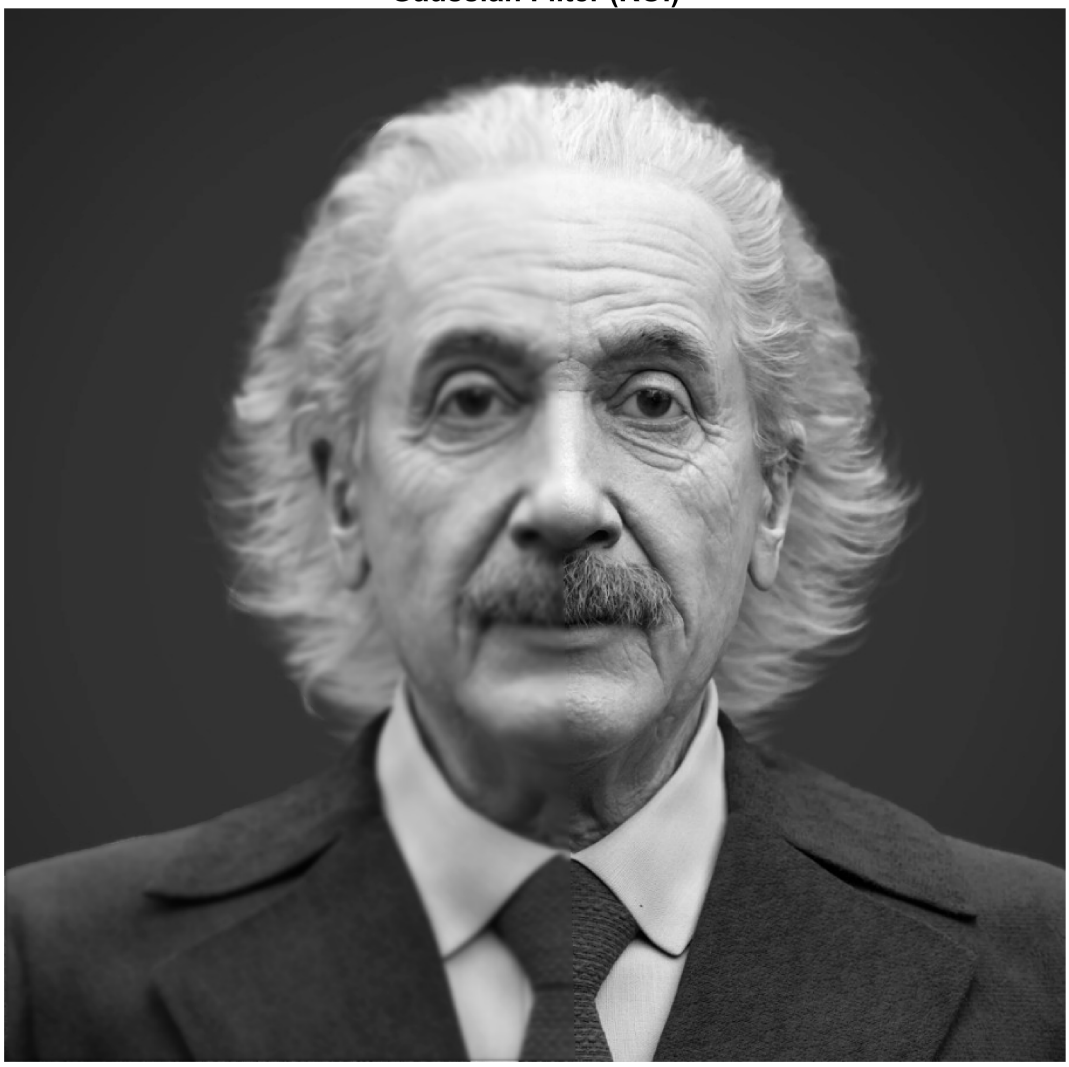


```
% Binary mask for ROI
figure, imshow(binaryMask), title('Binary Mask for ROI');
```



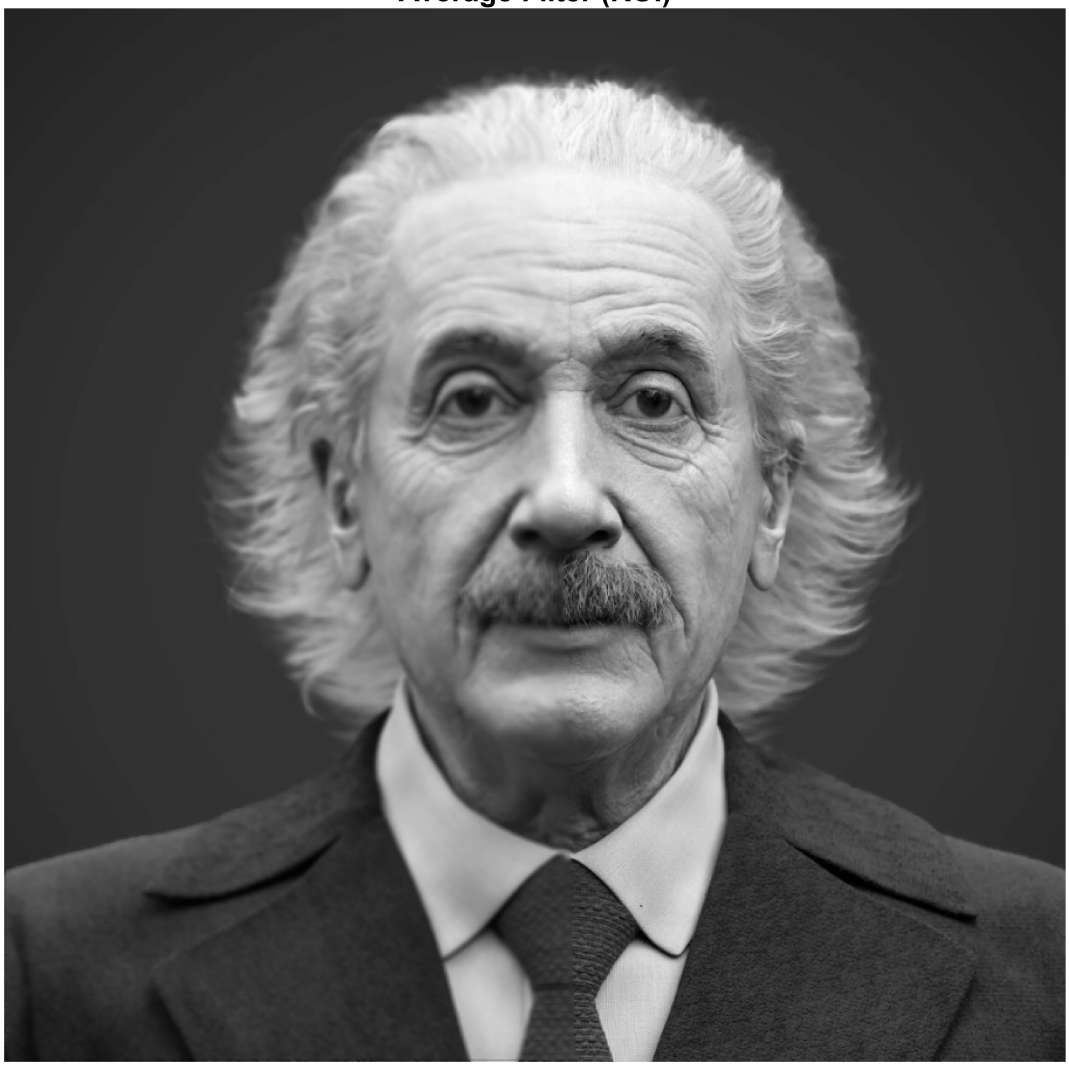

```
% Gaussian filter on ROI
figure, imshow(gaussianFilteredROI, []), title('Gaussian Filter (ROI)');
```

Gaussian Filter (ROI)



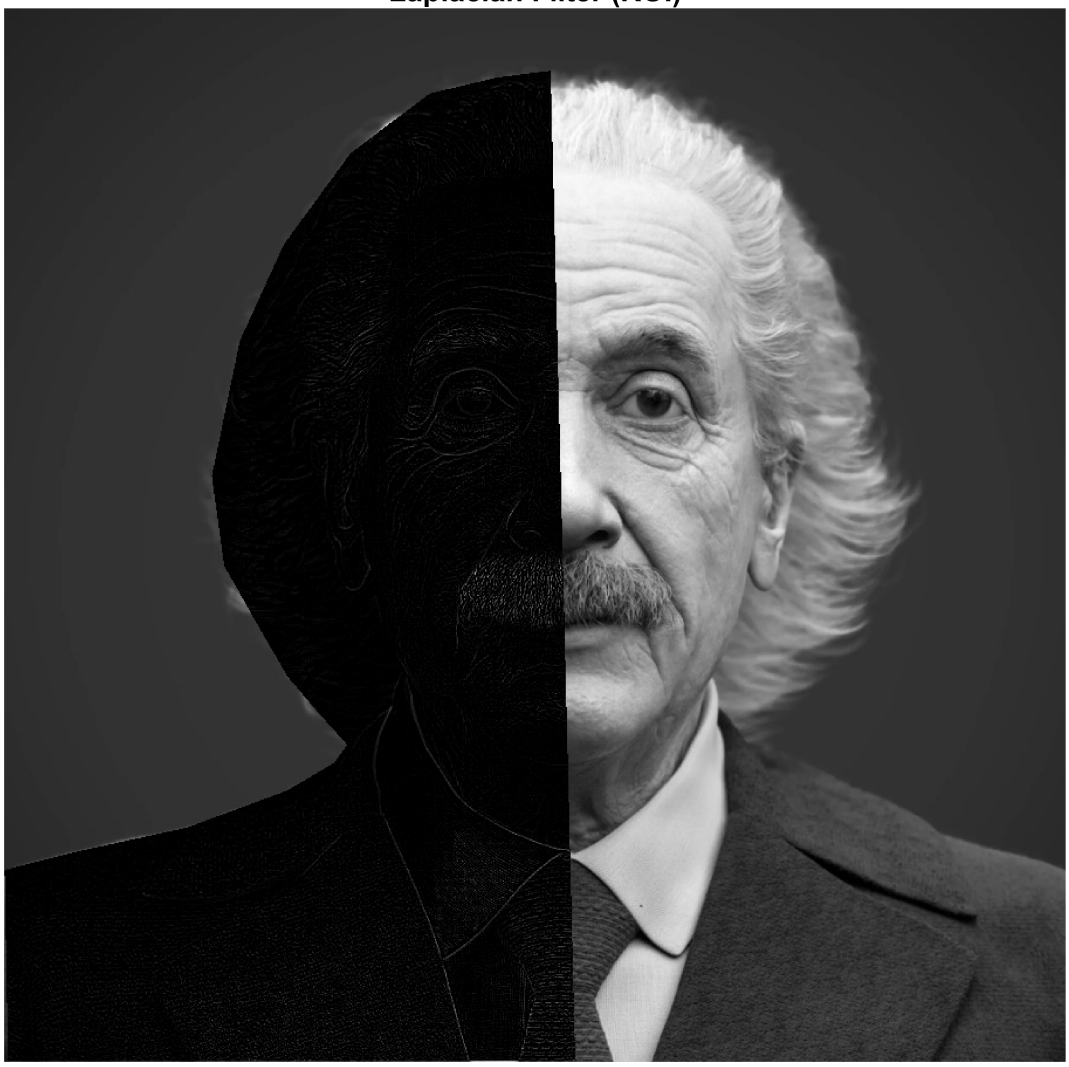
```
% Average filter on ROI
figure, imshow(averageFilteredROI, []), title('Average Filter (ROI)');
```

Average Filter (ROI)



```
% Laplacian filter on ROI
figure, imshow(laplacianFilteredROI, []), title('Laplacian Filter (ROI)');
```

Laplacian Filter (ROI)



```
% Prewitt filter on ROI
figure, imshow(prewittFilteredROI, []), title('Prewitt Filter (ROI)');
```

Prewitt Filter (ROI)