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img = imread('peppers.png');

% Convert to grayscale
img = rgb2gray(img);

% Apply pre-write filter (Sharpening filter)
sharpening_filter = [0 -1 0; -1 5 -1; 0 -1 0];
pre_write_img = imfilter(img, sharpening_filter, 'replicate');

% Create a binary mask for the region of interest
% This example creates an elliptical mask
[rows, cols] = size(pre_write_img);
[X, Y] = meshgrid(1:cols, 1:rows);
centerX = cols/2;
centerY = rows/2;
a = cols/3; % horizontal radius
b = rows/2.5; % vertical radius
mask = ((X - centerX).^2 / a^2 + (Y - centerY).^2 / b^2) <= 1;

% Apply the mask to the pre-write filtered image
masked_img = pre_write_img .* uint8(mask);

% Apply low-pass filters
% Gaussian filter
gaussian_filter = fspecial('gaussian', [7 7], 1.5);
gaussian_filtered = imfilter(masked_img, gaussian_filter, 'replicate');

% Average filter
average_filter = fspecial('average', [7 7]);
average_filtered = imfilter(masked_img, average_filter, 'replicate');

% Apply high-pass filters
% Laplacian filter
laplacian_filter = fspecial('laplacian', 0.2);
laplacian_filtered = imfilter(masked_img, laplacian_filter, 'replicate');

% Display results
figure;

subplot(3,3,1), imshow(img), title('Original Image');
subplot(3,3,2), imshow(pre_write_img), title('Pre-write Filtered');
subplot(3,3,3), imshow(masked_img), title('Masked Image');
subplot(3,3,4), imshow(gaussian_filtered), title('Gaussian Filter');
subplot(3,3,5), imshow(average_filtered), title('Average Filter');
subplot(3,3,6), imshow(laplacian_filtered, []), title('Laplacian Filter');

```

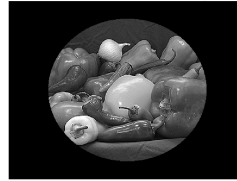
Original Image



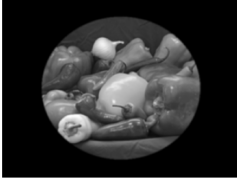
Pre-write Filtered



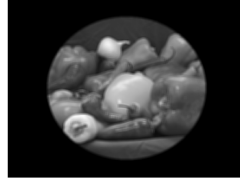
Masked Image



Gaussian Filter



Average Filter



Laplacian Filter

