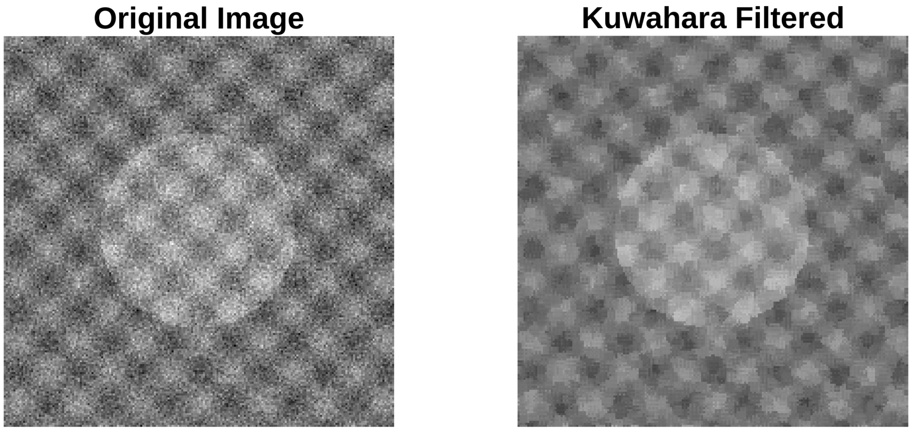
```
img_size = 200;
[X, Y] = meshgrid(1:img_size, 1:img_size);
center = img_size/2;
radius = img_size/4;
img = double(sqrt((X-center).^2 + (Y-center).^2) <= radius);
img = img + 0.5*randn(img_size);
img = mat2gray(img);  % Normalize to [0, 1]

% Add some texture and additional noise to make the effect more visible
[X, Y] = meshgrid(1:img_size, 1:img_size);
texture = sin(X/5) .* cos(Y/5);
img = img + 0.2 * texture + 0.1 * randn(img_size);
img = mat2gray(img);  % Normalize again to [0, 1]

% Kuwahara filter function
function output = kuwahara_filter(input, window_size)
    [h, w] = size(input);
    output = zeros(h, w);
    pad = floor(window_size/2);
    padded = padarray(input, [pad pad], 'replicate');

    for i = 1:h
        for j = 1:w
            window = padded(i:i+window_size-1, j:j+window_size-1);

            % Define the four sub-regions
            r1 = window(1:pad+1, 1:pad+1);
            r2 = window(1:pad+1, pad+1:end);
            r3 = window(pad+1:end, 1:pad+1);
            r4 = window(pad+1:end, pad+1:end);

            % Calculate mean and variance for each sub-region
            m1 = mean(r1(:)); v1 = var(r1(:));
            m2 = mean(r2(:)); v2 = var(r2(:));
            m3 = mean(r3(:)); v3 = var(r3(:));
            m4 = mean(r4(:)); v4 = var(r4(:));

            % Find the sub-region with minimum variance
            [~, idx] = min([v1, v2, v3, v4]);
            means = [m1, m2, m3, m4];

            % Set the output pixel to the mean of the chosen sub-region
            output(i, j) = means(idx);
        end
    end
end

% Apply Kuwahara filter
kuwahara_filtered = kuwahara_filter(img, 5);
```

```
% Display results
figure;
subplot(1,2,1), imshow(img), title('Original Image');
subplot(1,2,2), imshow(kuwahara_filtered), title('Kuwahara Filtered');
```



```
% Calculate and display PSNR and SSIM
psnr_value = psnr(kuwahara_filtered, img);
ssim_value = ssim(kuwahara_filtered, img);

fprintf('Peak Signal-to-Noise Ratio (PSNR): %.2f dB\n', psnr_value);
```

```
Peak Signal-to-Noise Ratio (PSNR): 21.78 dB
```

```
fprintf('Structural Similarity Index (SSIM): %.4f\n', ssim_value);
```

```
Structural Similarity Index (SSIM): 0.4372
```