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% Kuwahara filter function
function outputImage = kuwaharaFilter(inputImage)

    inputImage = double(inputImage);
    [rows, cols] = size(inputImage);
    outputImage = zeros(rows, cols);
    avgFilter = ones(3) / 9;

    paddedImage = padarray(inputImage, [2, 2], 'symmetric');

    for i = 1:rows
        for j = 1:cols
            % 5x5 neighborhood extraction
            neighborhood = paddedImage(i:i+4, j:j+4);

            % Four overlapping 3x3 neighborhoods
            A = neighborhood(1:3, 1:3);
            B = neighborhood(1:3, 3:5);
            C = neighborhood(3:5, 1:3);
            D = neighborhood(3:5, 3:5);

            % Variance of each neighborhood
            varA = var(A(:), 1);
            varB = var(B(:), 1);
            varC = var(C(:), 1);
            varD = var(D(:), 1);

            % Neighborhood with the lowest variance
            [~, minIdx] = min([varA, varB, varC, varD]);

            % Mean of the neighborhood with the lowest variance
            switch minIdx
                case 1
                    outputImage(i, j) = mean(A(:));
                case 2
                    outputImage(i, j) = mean(B(:));
                case 3
                    outputImage(i, j) = mean(C(:));
                case 4
                    outputImage(i, j) = mean(D(:));
            end
        end
    end

    outputImage = uint8(outputImage);
end

inputImage = imread('Mona_Lisa_GS2.jpg');
inputImage = rgb2gray(inputImage);

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```
filteredImage = kuwaharaFilter(inputImage);  
figure, imshow(inputImage,[]), title('Original Image');
```

Original Image



```
figure, imshow(filteredImage,[]), title('Kuwahara Filtered Image');
```

Kuwahara Filtered Image

