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% Kuwahara filters are a family of filters in which the variance of several
regions in the neighborhood are computed, and the output is the mean of the
region with the lowest variance.
% The simplest version takes a 5 × 5 neighborhood of a given pixel p and
looks at the four overlapping 3 × 3 neighborhoods of which it is a corner.
%The Kuwahara filter is a non-linear, edge-preserving smoothing filter that
divides the region around a pixel into multiple overlapping subregions.
% The filter computes the local mean and variance for each subregion, and
then assigns the value of the pixel to the mean of the subregion that has
the smallest variance. This way,
% it preserves the edges by avoiding blurring across boundaries, while still
reducing noise in homogeneous regions.
%
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% Read the input image
x = imread('tint1.jpg');

% Convert the image to grayscale
x_gray = rgb2gray(x);

% Convert the grayscale image to double precision
cd = double(x_gray);

% Apply the mean filter
cdm = imfilter(cd, ones(3) / 9, 'symmetric');  % Mean filter with a 3x3
kernel

% Apply the squared filter (for variance calculation)
cd2f = imfilter(cd.^2, ones(3) / 9, 'symmetric');  % Squared filter

% Compute the variance (cdv)
cdv = cd2f - cdm.^2;  % Variance

% Display the variance image
imshow(cdv, []);  % Display with auto-scaling
```