数字图像处理　Problem4

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✥result image:

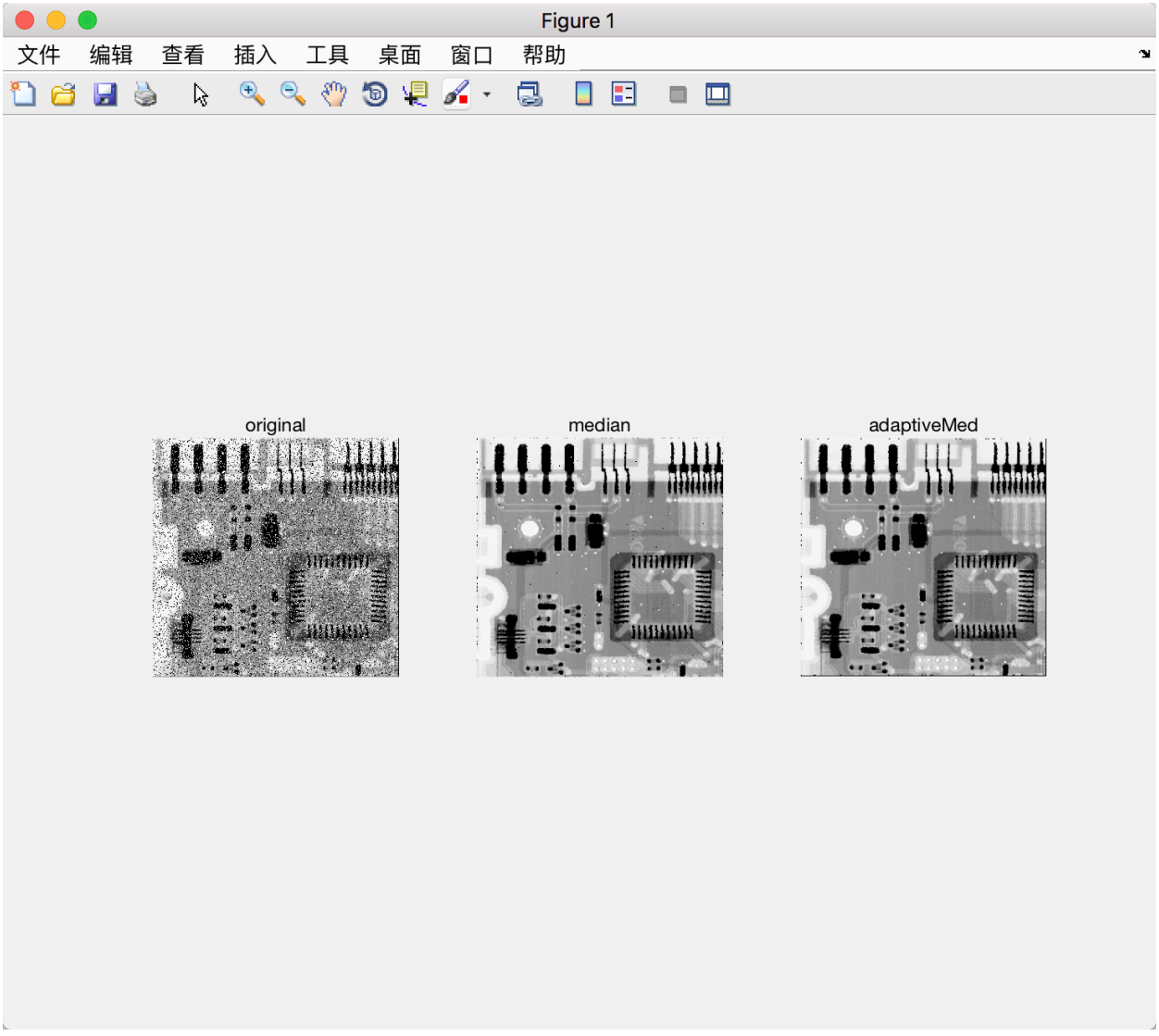
The picture in the middle uses median filter in Matlab;

the picture on the right uses adaptive median filter implemented by myself in ***homework1_(2)***

Analysis:

we can see the result of adaptive median filter have a better result than median filter provided by Matlab.

- The adaptive median filter can handle much more spatially dense impulse noise, and also performs some smoothing for non-impulse noise
- The key insight in the adaptive median filter is that the filtersize changes depending on the characteristics of the image



✥code:

```
img=imread('Q_2.tif');
figure;
% Using median filtering
img_med = medfilt2(img);
% Using adaptiveMedian filtering
img_adaptive = adaptiveMedianFilter(img,11);

% original image
subplot(1,3,1);
imshow(img);
title('original')

% noised image
subplot(1,3,2);
imshow(img_med);
title('median')

% adaptive median filter image
subplot(1,3,3);
imshow(img_adaptive);
title('adaptiveMed')

function[img_result] = adaptiveMedianFilter(img_noi,max_window)

padding_width = (max_window-1)/2;
[m ,n] = size(img_noi);
% Initialize a image equal size with img_noi to receive pixels after
Adaptive Median Filter
img_result = img_noi;
% Fill pixels at the edge of the original image
img_noi = padarray(img_noi,[padding_width padding_width],0);

for i = padding_width+1:padding_width+m
    for j = padding_width+1:padding_width+n
        Zxy = img_noi(i,j);
        window = 3;
        while(window <= max_window)
            %Take the window of the filter plate
            tmp = img_noi(i-(window-1)/2:i+(window-1)/2,...
            j-(window-1)/2:j+(window-1)/2);
            Zmin = min(min(tmp));
            Zmax = max(max(tmp));
            Zmed = median(tmp(:));
            if((Zmed > Zmin) && (Zmed < Zmax))
                if((Zxy > Zmin) && (Zxy < Zmax))
                    img_result(i-padding_width,j-padding_width) = Zxy;
                else
```

```
                    img_result(i-padding_width,j-padding_width) = Zmed;
                end
                break;
            end
            window = window+2;
        end
        img_result(i-padding_width,j-padding_width) = Zmed;
    end
end
end
```