

1.

```
im1 = im2double(imread('images/chest.jpg'));
im2 = im2double(imread('images/baby.jpg'));
im3 = im2double(imread('images/shanghai.jpeg'));
im4 = im2double(imread('images/qingdao.jpeg'));
```



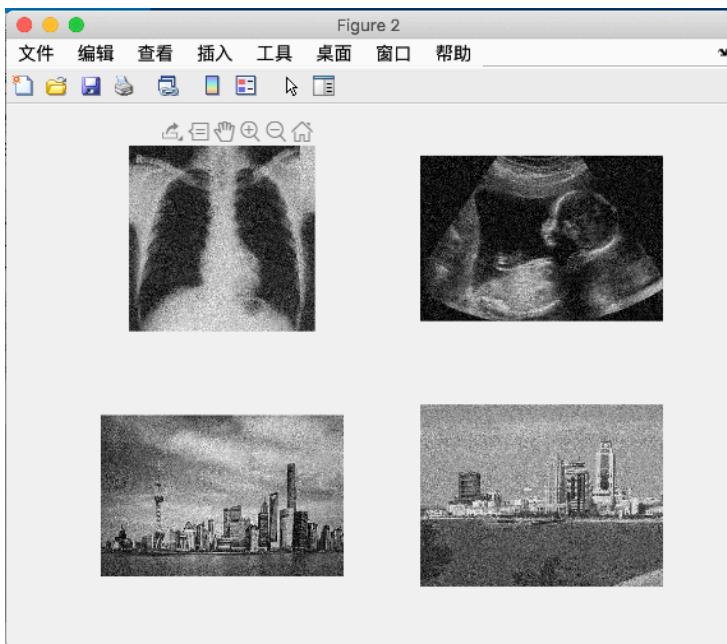
2.

```
im1_ycbcr = rgb2ycbcr(im1);
im2_ycbcr = rgb2ycbcr(im2);
im3_ycbcr = rgb2ycbcr(im3);
im4_ycbcr = rgb2ycbcr(im4);
```

```
y1 = im1_ycbcr(:,:,1);
y2 = im2_ycbcr(:,:,1);
y3 = im3_ycbcr(:,:,1);
y4 = im4_ycbcr(:,:,1);
```

3.

```
y1_n = imnoise(y1,'gaussian');
y2_n = imnoise(y2,'gaussian');
y3_n = imnoise(y3,'gaussian');
y4_n = imnoise(y4,'gaussian');
figure();
subplot(2,2,1); imshow(y1_n);
subplot(2,2,2); imshow(y2_n);
subplot(2,2,3); imshow(y3_n);
subplot(2,2,4); imshow(y4_n);
```



4.

```

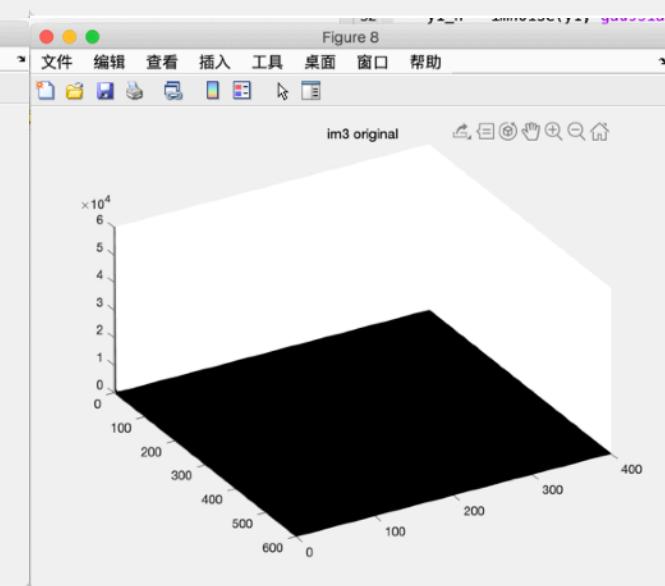
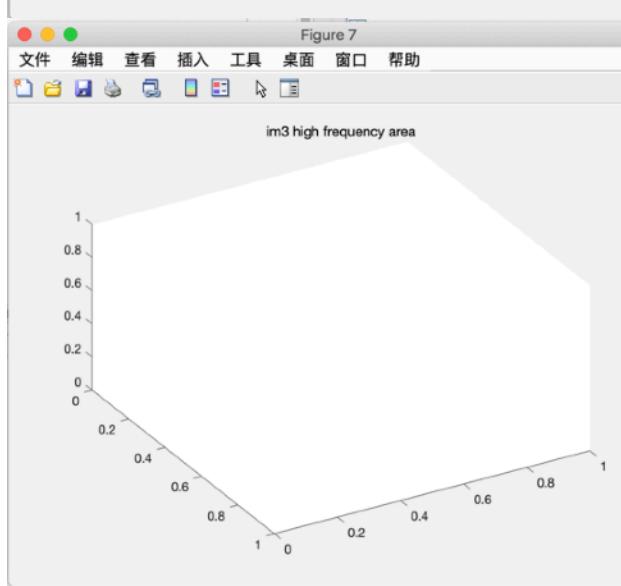
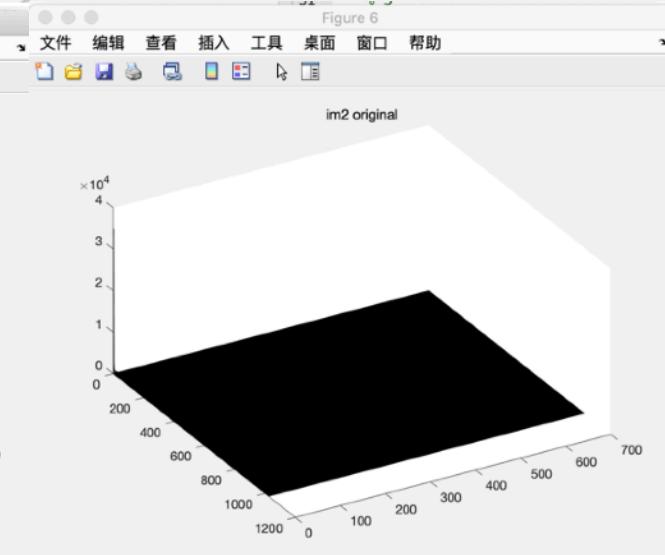
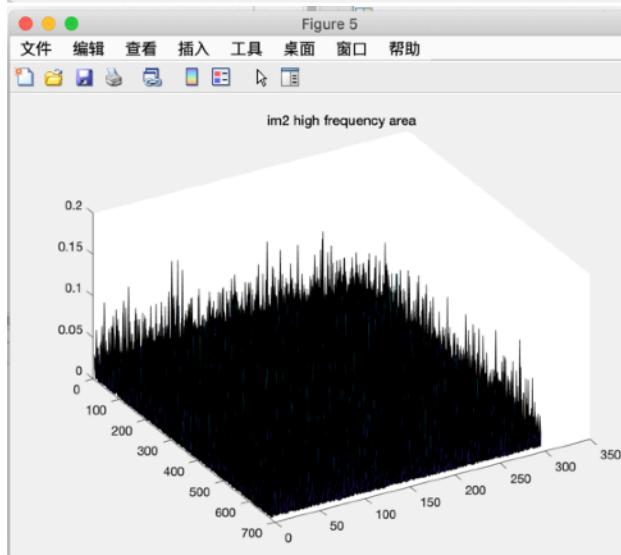
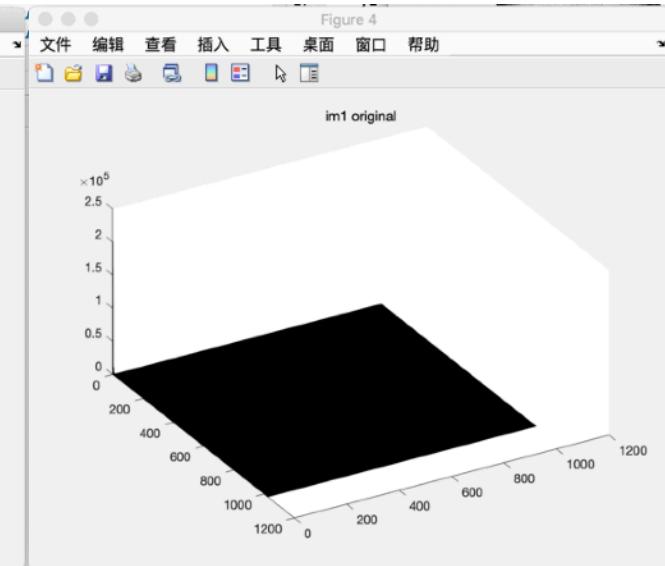
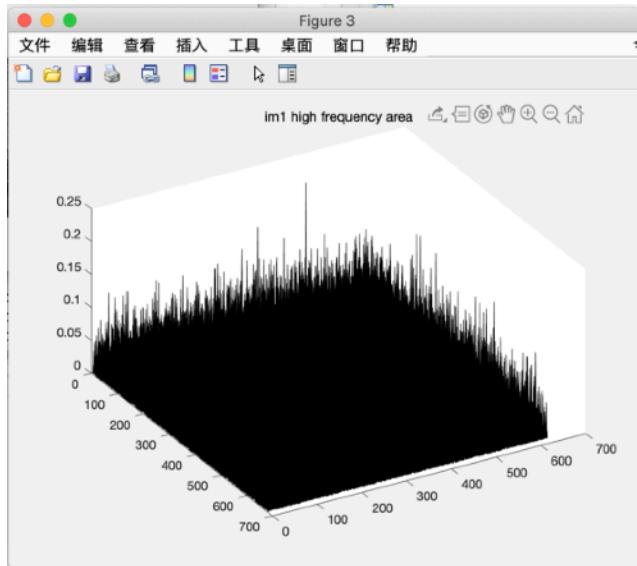
function [im_dct,n,xo,yo,xq,yq,original,quadrant] = ddct(im)
    s = size(im');
    im_dct = dct2(im);
    original = im_dct.*im_dct;
    quadrant = im_dct(0:end,344:end).*im_dct(400:end,344:end);
    s_o = size(original');
    s_q = size(quadrant');
    xo = [1:s_o(1)];
    yo = [1:s_o(2)];
    xq = [1:s_q(1)];
    yq = [1:s_q(2)];
    [xo,yo] = meshgrid(xo,yo);
    [xq,yq] = meshgrid(xq,yq);
    n = mean(mean(quadrant));
end

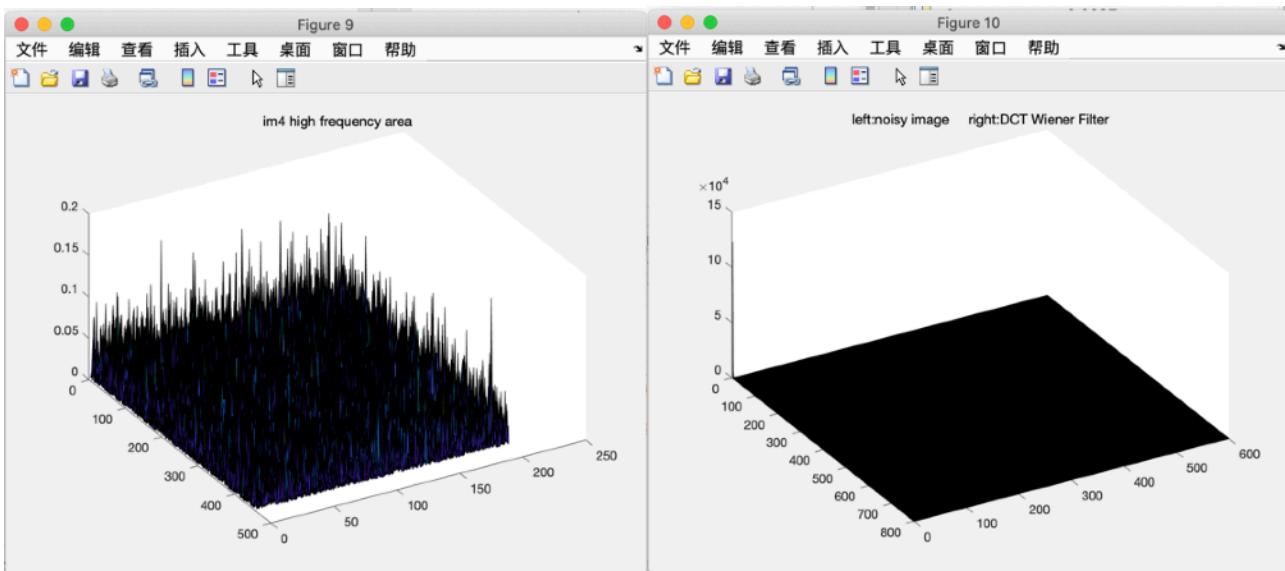
[dct_im1,n1,xo1,yo1,xq1,yq1,original1,quadrant1] = ddct(y1_n);
[dct_im2,n2,xo2,yo2,xq2,yq2,original2,quadrant2] = ddct(y2_n);
[dct_im3,n3,xo2,yo3,xq3,yq3,original3,quadrant3] = ddct(y3_n);
[dct_im4,n4,xo3,yo4,xq4,yq4,original4,quadrant4] = ddct(y4_n);

figure();surface(xq1,yq1,quadrant1);view(60,45);title('im1 high frequency area');
figure();surface(xo1,yo1,original1);view(60,45);title('im1 original');
figure();surface(xq2,yq2,quadrant2);view(60,45);title('im2 high frequency area');
figure();surface(xo2,yo2,original2);view(60,45);title('im2 original');
figure();surface(xq3,yq3,quadrant3);view(60,45);title('im3 high frequency area');
figure();surface(xo3,yo3,original3);view(60,45);title('im3 original');

```

```
figure();surface(xq4,yq4,quadrant4);view(60,45);title('im4 high frequency area');
figure();surface(xo4,yo4,original4);view(60,45);title('im4 original');
```



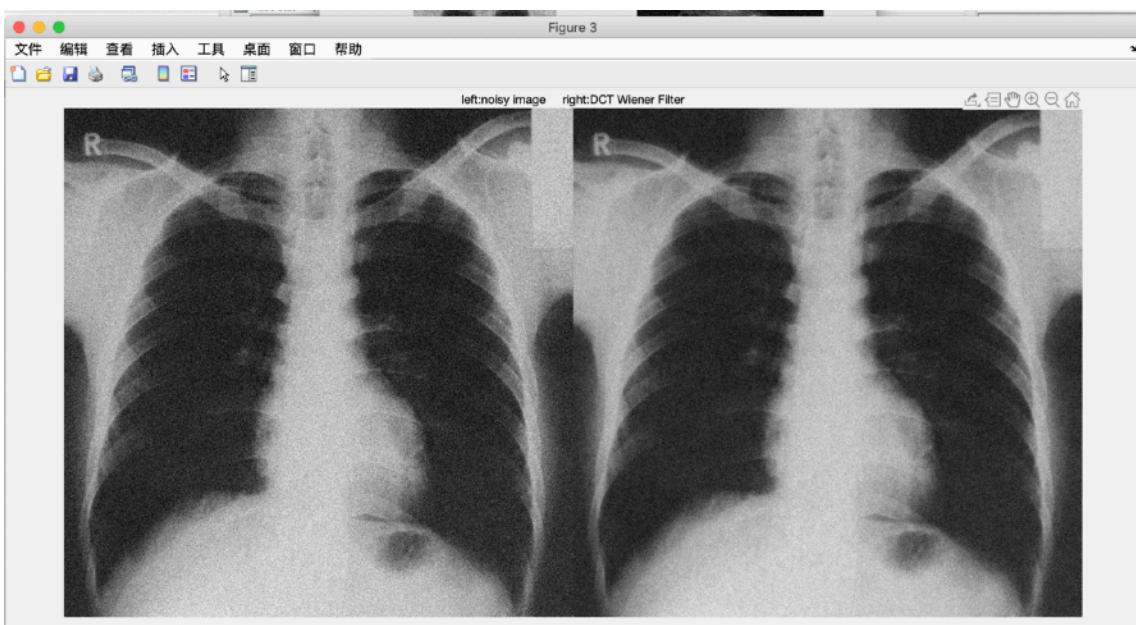


	n1	0.0097
	n2	0.0082
	n3	0.0104
	n4	0.0103

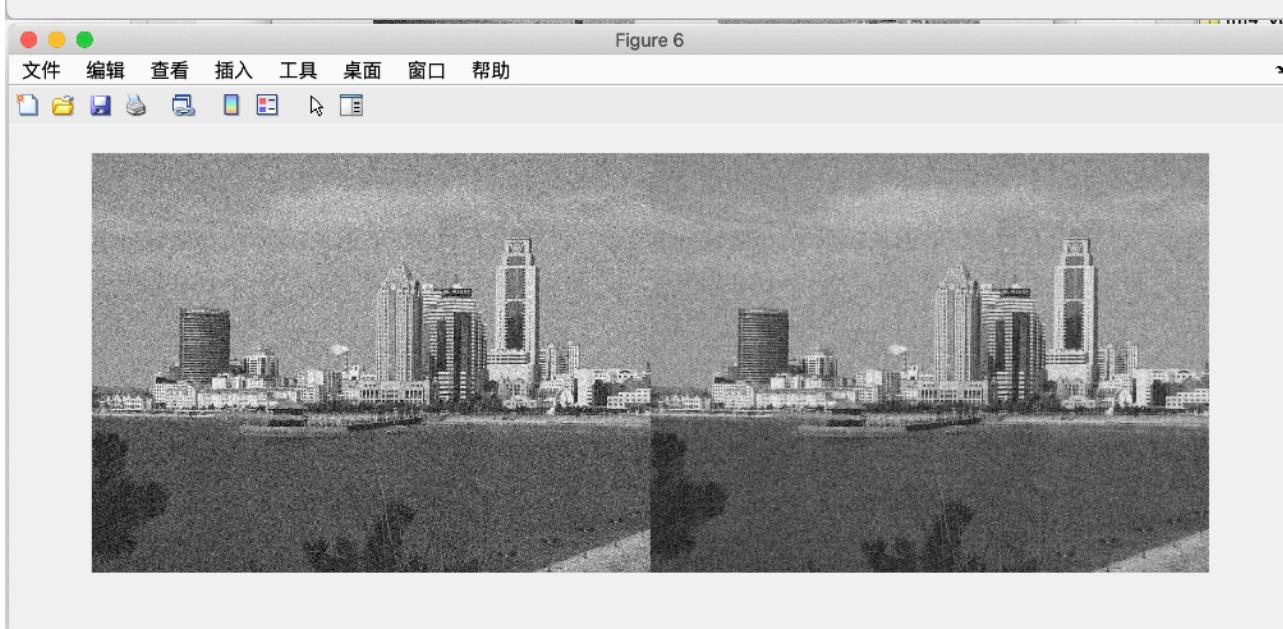
5.

```
function wiener(im1,im2,n)
    s_var = im2.*im2 + 0.001;
    wiener_filter = 1./(1 + (n./s_var));
    dct_f = im2.*wiener_filter;
    dct_f_im = idct2(dct_f);
    dct_f_im = 255.*imadjust(dct_f_im,[],[0,1]);
    figure();
    imshowpair(im1,uint8(dct_f_im),'montage');title('left:noisy image      right:DCT Wiener
Filter');
end

wiener(y1_n,dct_im1,n1);
```



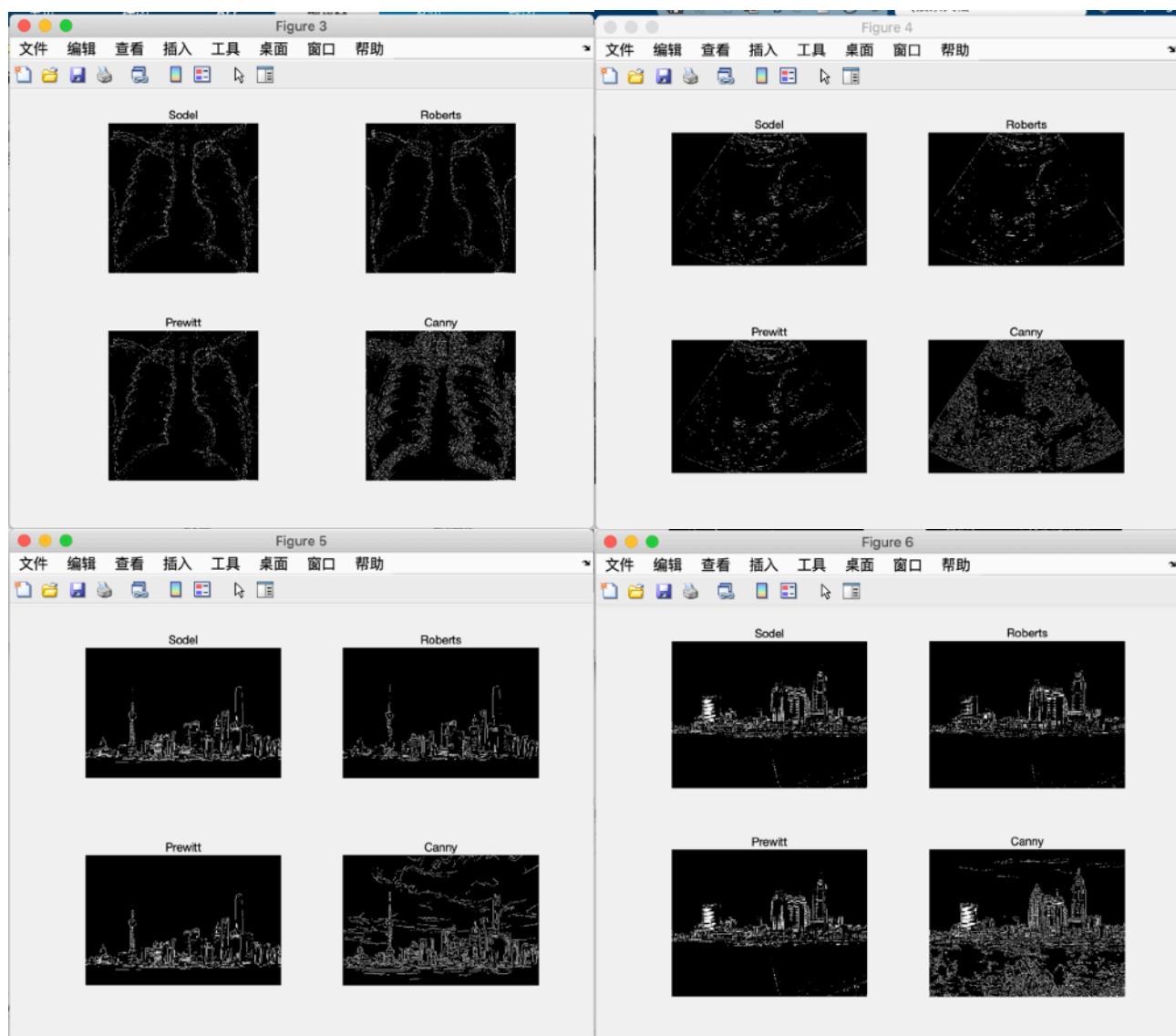
```
wiener(y2_n,dct_im2,n2);  
wiener(y3_n,dct_im3,n3);  
wiener(y4_n,dct_im4,n4);
```



6.

```
function MyEdges(y)
    edge_s = edge(y,'sobel');
    edge_r = edge(y,'roberts');
    edge_p = edge(y,'prewitt');
    edge_c = edge(y,'canny');
    figure();
    subplot(2,2,1);imshow(edge_s);title('Sobel');
    subplot(2,2,2);imshow(edge_r);title('Roberts');
    subplot(2,2,3);imshow(edge_p);title('Prewitt');
    subplot(2,2,4);imshow(edge_c);title('Canny');
end
```

```
MyEdges(y1);
MyEdges(y2);
MyEdges(y3);
MyEdges(y4);
```

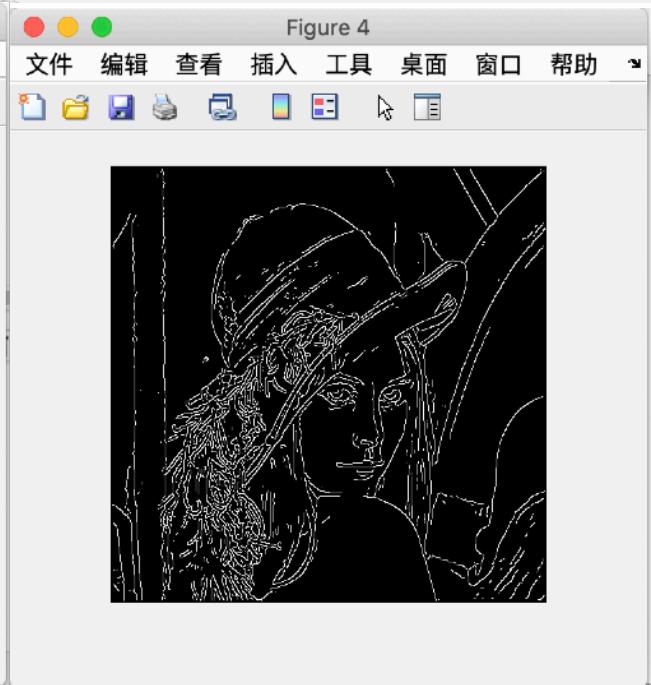
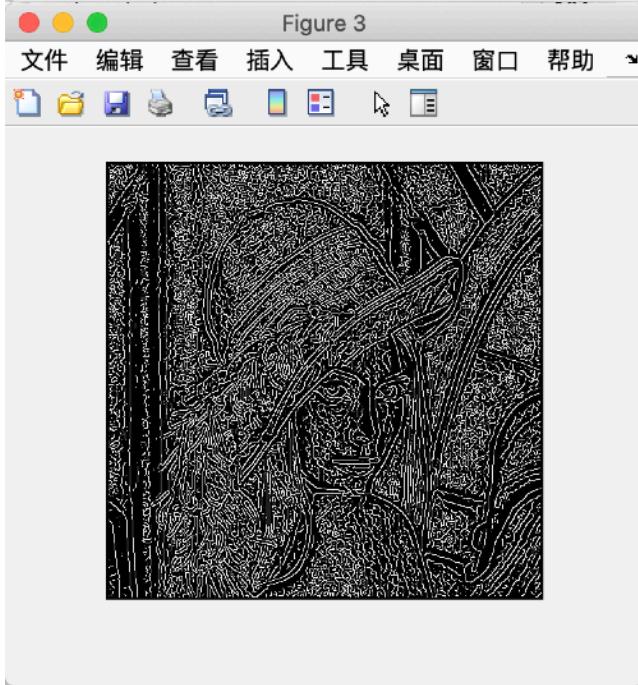
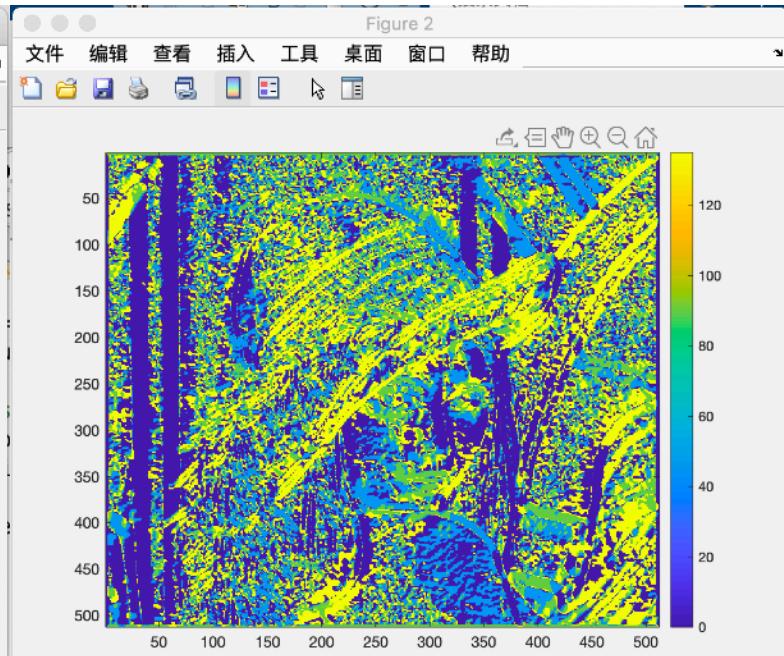
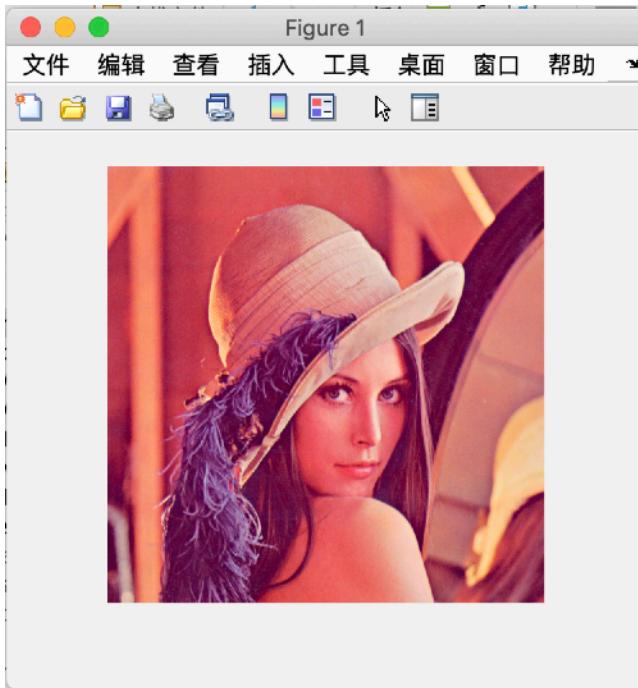


7.

% Value for Thresholding

T_Low = 0.095;

T_High = 0.1;



8.

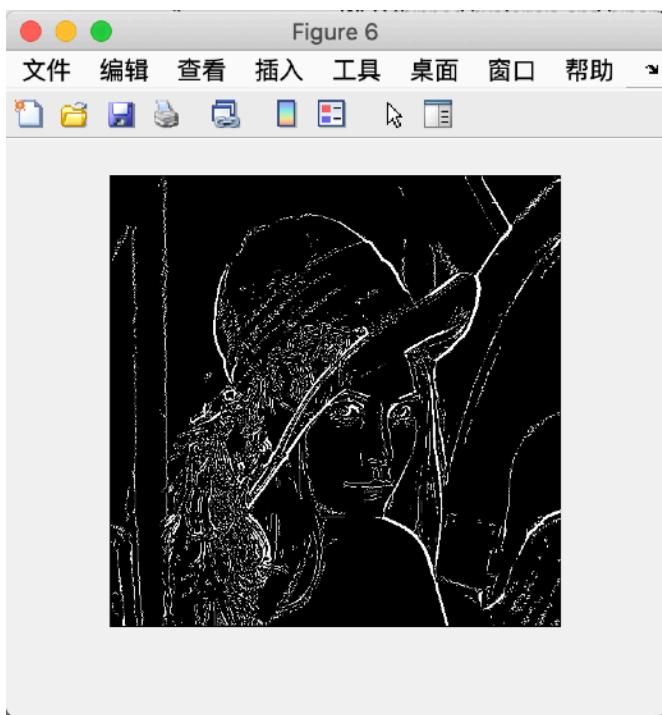
%Value for Thresholding

T_Low = 0.09;

T_High = 0.3;

9.

The image in the 8 is clearer than the image in the 7, because the line in the 8 is thinner. We can see more detail in the 8.



10.

```
clc;
```

```
clear all;
```

```
close all;
```

```
I = imread('images/building.jpg');
```

```
I = rgb2gray(I);
```

```

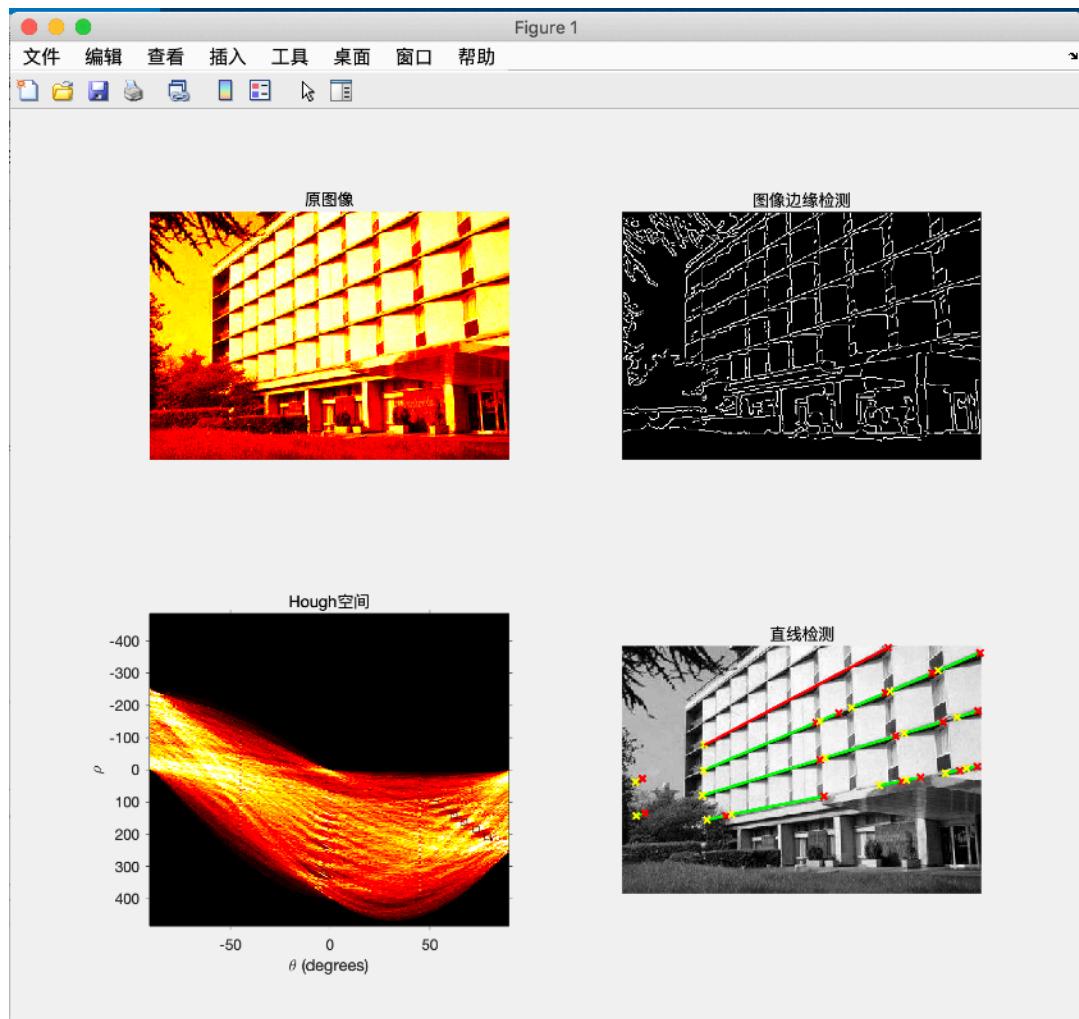
rotl = imrotate(l,0,'crop');
subplot 221
fig1 = imshow(rotl);
BW = edge(rotl,'canny');
title('原图像');
subplot 222
imshow(BW);
[H,theta,rho] = hough(BW);
title('图像边缘检测');
subplot 223
imshow(imadjust(mat2gray(H)),[],'XData',theta,'YData',rho,...
    'InitialMagnification','fit');
xlabel('\theta (degrees)'), ylabel ('\rho');
axis on, axis normal, hold on;
colormap(hot)
P = houghpeaks(H,5,'threshold',ceil(0.7*max(H(:)))); 
x = theta(P(:,2));
y = rho(P(:,1));
plot(x,y,'s','color','black');
lines = houghlines(BW,theta,rho,P,'FillGap',5,'MinLength',7);
title('Hough空间');
subplot 224, imshow(rotl), hold on
max_len = 0;
for k = 1:length(lines)
    xy = [lines(k).point1; lines(k).point2];
    plot(xy(:,1),xy(:,2),'LineWidth',2,'Color','green');

    % Plot beginnings and ends of lines
    plot(xy(1,1),xy(1,2),'x','LineWidth',2,'Color','yellow');
    plot(xy(2,1),xy(2,2),'x','LineWidth',2,'Color','red');

    % Determine the endpoints of the longest line segment
    len = norm(lines(k).point1 - lines(k).point2);
    if ( len > max_len)
        max_len = len;
        xy_long = xy;
    end
end

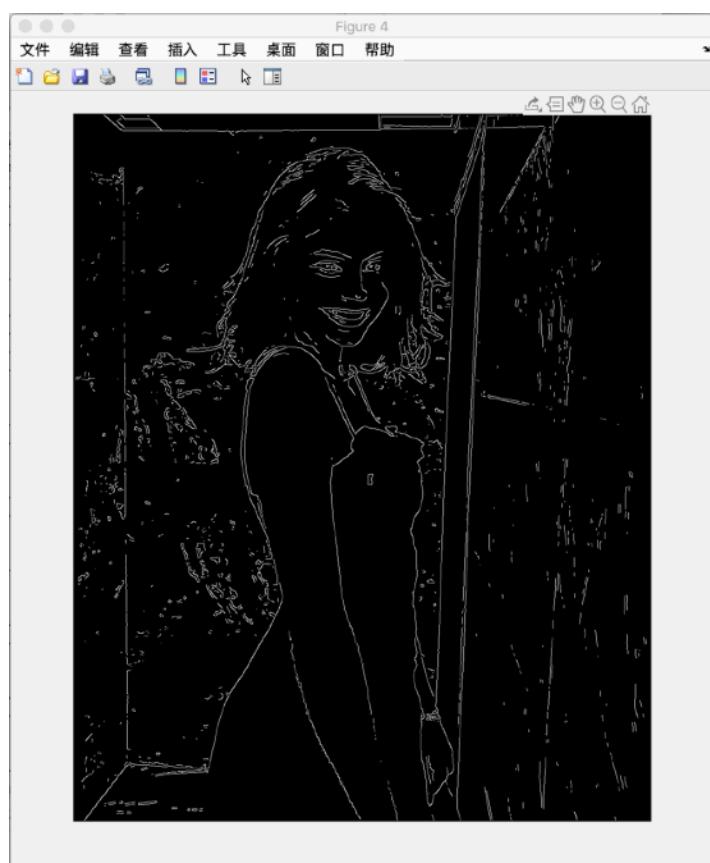
% highlight the longest line segment
plot(xy_long(:,1),xy_long(:,2),'LineWidth',2,'Color','red');
title('直线检测');

```

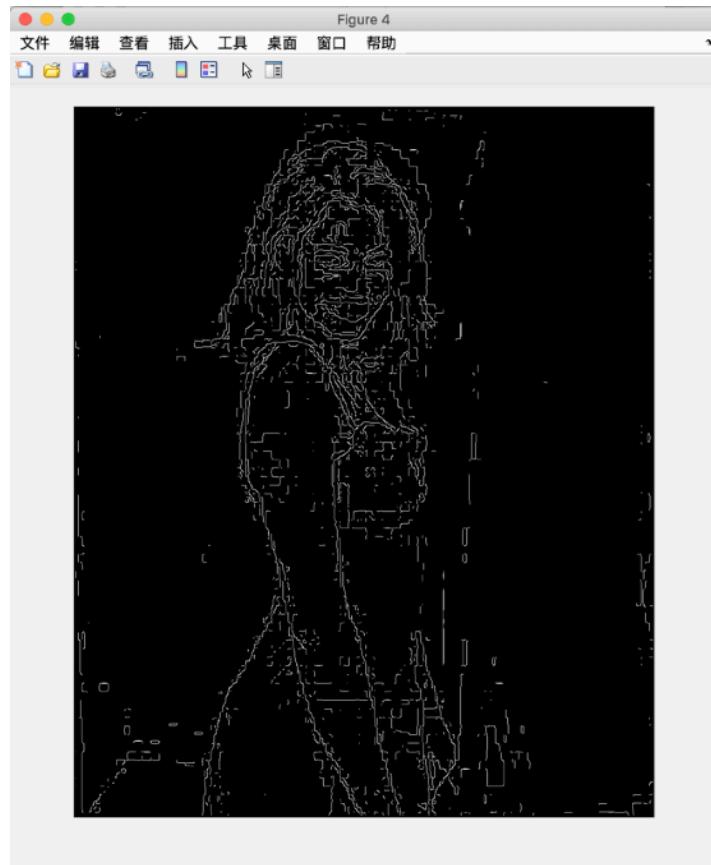


11.

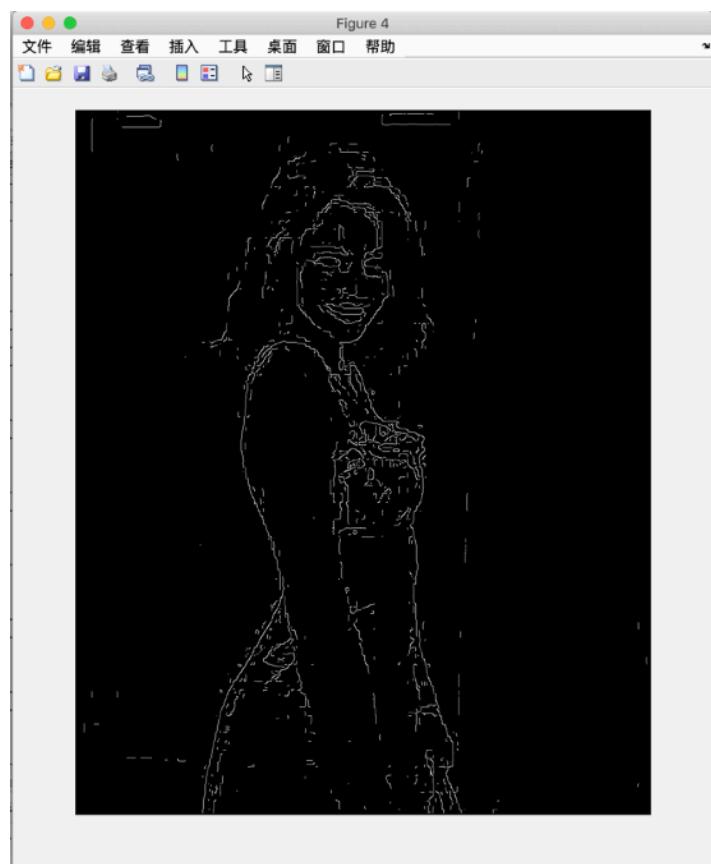
Y channel



Cb channel



Cr channel



We can easily find a face via Y channel, but we can hardly recognize a face in Cb and Cr channel.

12.

