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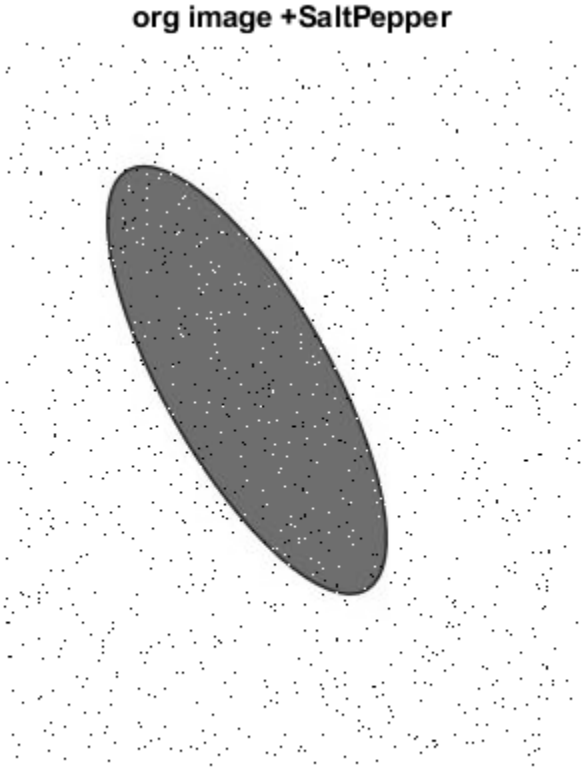
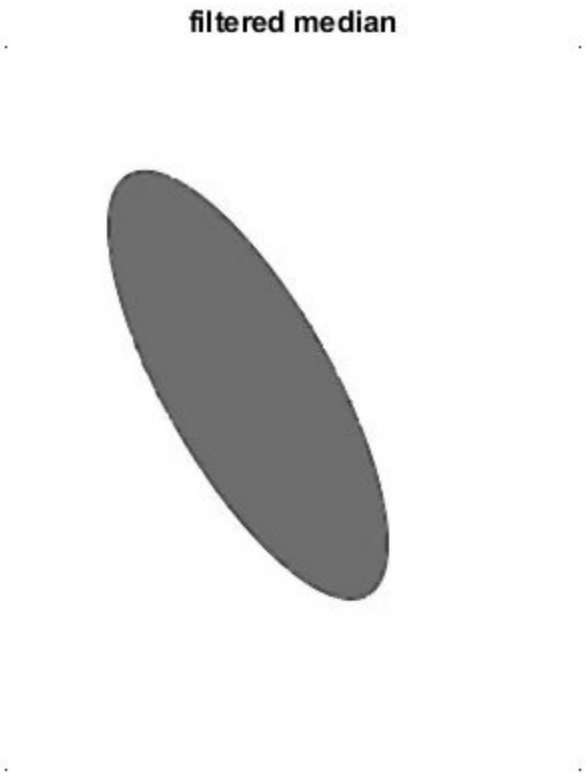
```
close all
clear all

addpath('D:\code2018\ellipseDetection')
addpath('D:\code2018\frangi_filter_version2a')
```

read

```
img= imread('ellipse4.JPG');
img=rgb2gray(img);
%add noise

imgNoised = imnoise(img,'salt & pepper', 0.02);

figure
imshow(imgNoised);title('org image +SaltPepper')

%filter
img = medfilt2(imgNoised);
figure
imshow(img);title('filtered median')
```

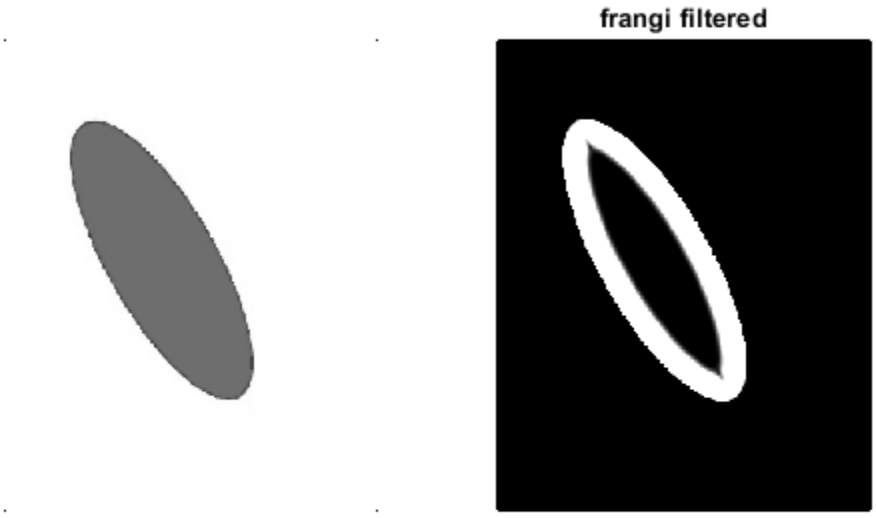

org image +SaltPepper



frangi

```
Ivessel=FrangiFilter2D(double(img));
figure
subplot(1,2,1), imshow(img,[]);
subplot(1,2,2), imshow(Ivessel,[0 0.25]);title('frangi filtered')
```

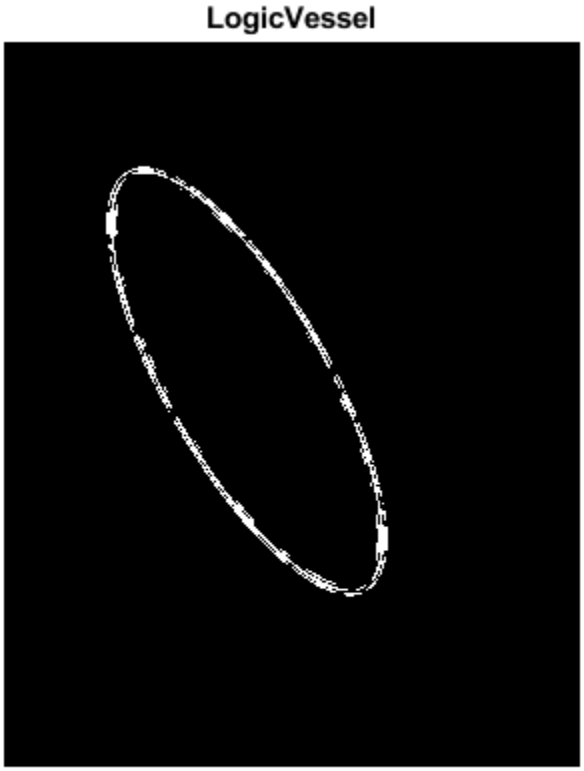
```
Current Frangi Filter Sigma: 1
Current Frangi Filter Sigma: 3
Current Frangi Filter Sigma: 5
Current Frangi Filter Sigma: 7
Current Frangi Filter Sigma: 9
```

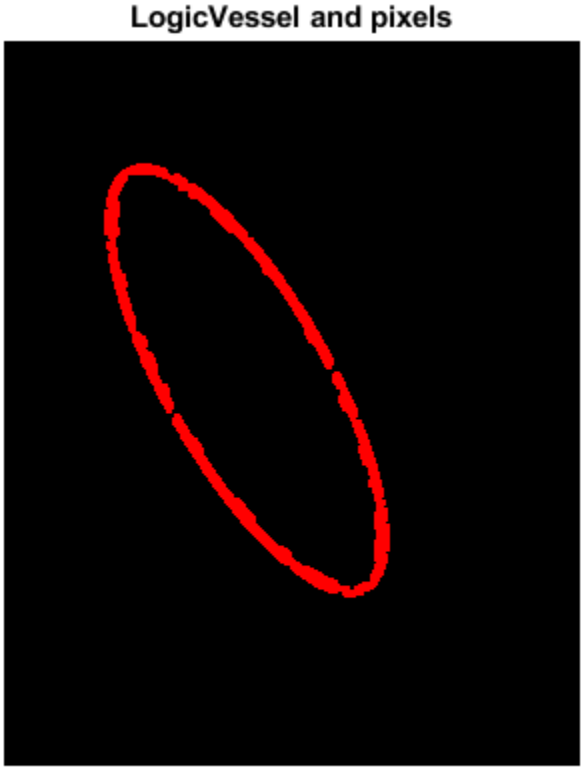


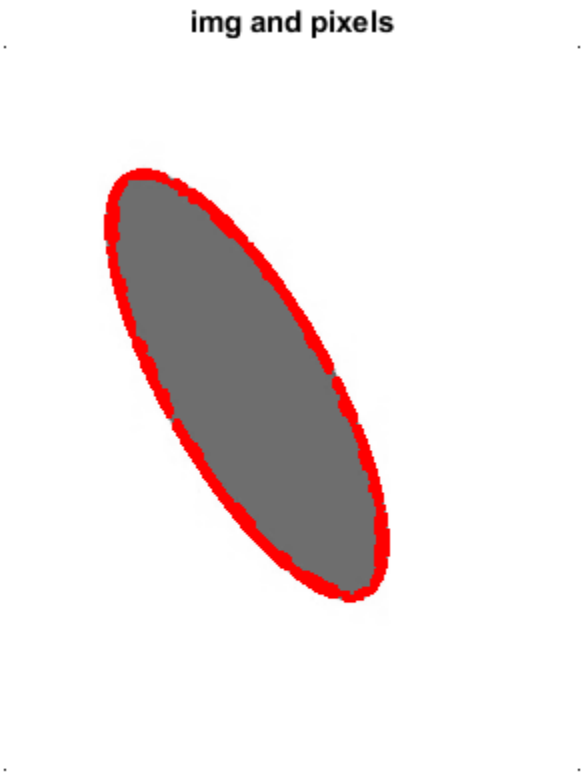
detect ellipse

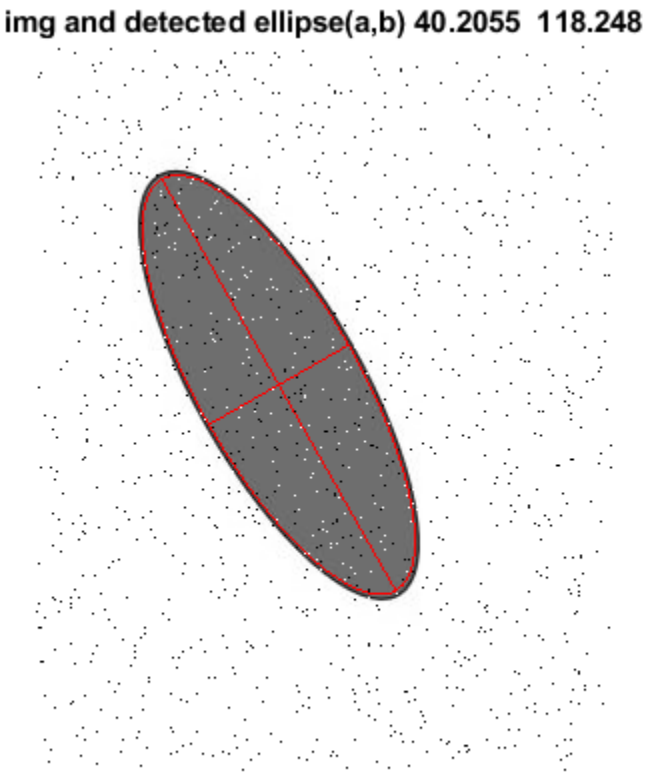
```
maxIv = max(Ivessel(:));
LogicVessel = Ivessel>0.9*maxIv;
figure
imshow(LogicVessel);title('LogicVessel')

% detect positive pixels
ind = find(LogicVessel);
[jj,ii] =  ind2sub(size(LogicVessel),ind);

figure()
imshow(LogicVessel);title('LogicVessel and pixels')
hold on;
plot(ii,jj,'r.')

figure()
imshow(img);title('img and pixels')
hold on;
plot(ii,jj,'r.')

detected_ellipses = fit_ellipse(ii ,jj);

disp(detected_ellipses)
plot_ellipse(detected_ellipses,imgNoised);
```

```
          a: 40.2055
          b: 118.2480
        phi: 0.5171
         X0: 22.0640
         Y0: 207.7860
      X0_in: 121.9058
      Y0_in: 169.7080
  long_axis: 236.4961
 short_axis: 80.4110
     status: ''
```




LogicVessel and pixels


img and pixels

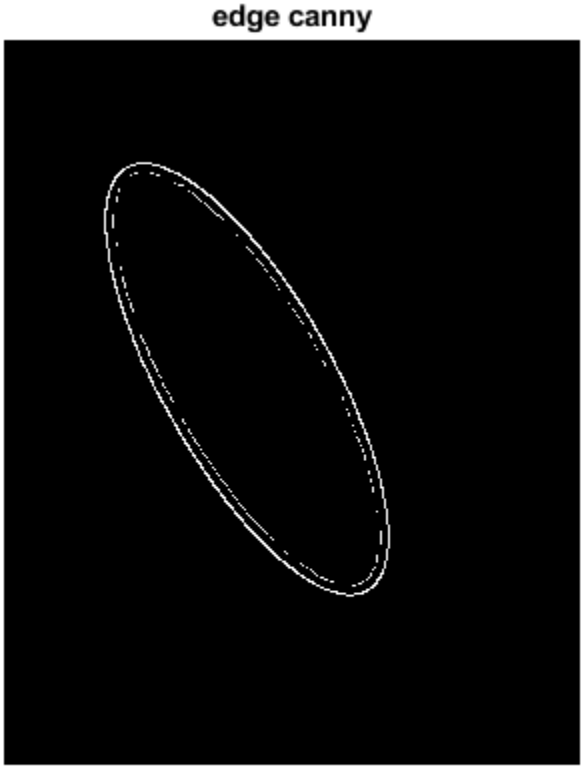


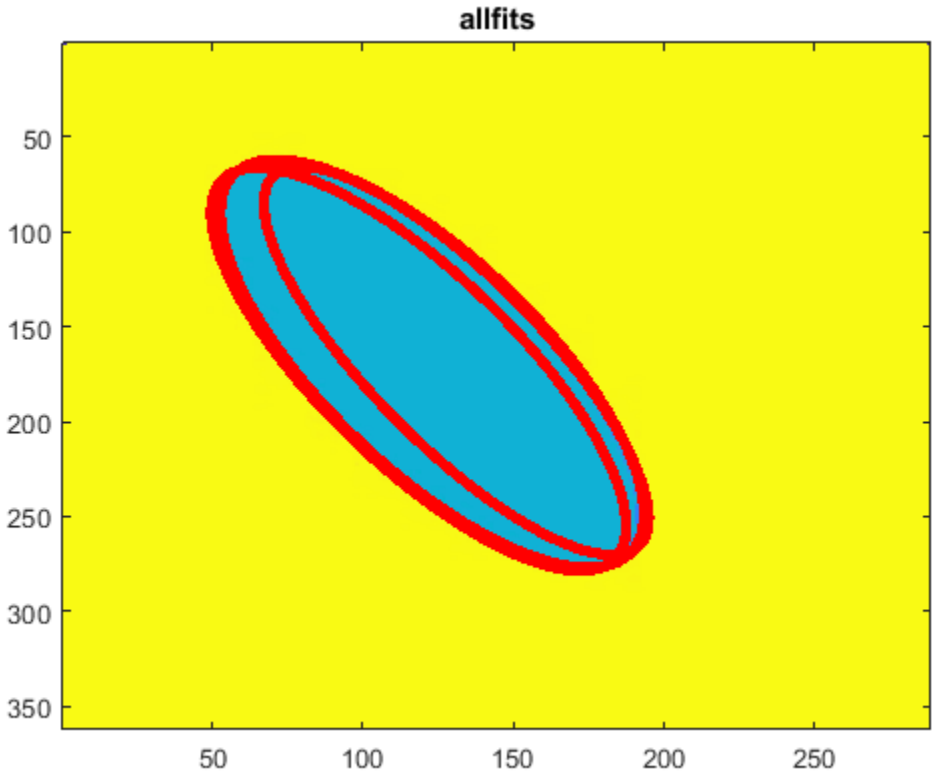
method Hough

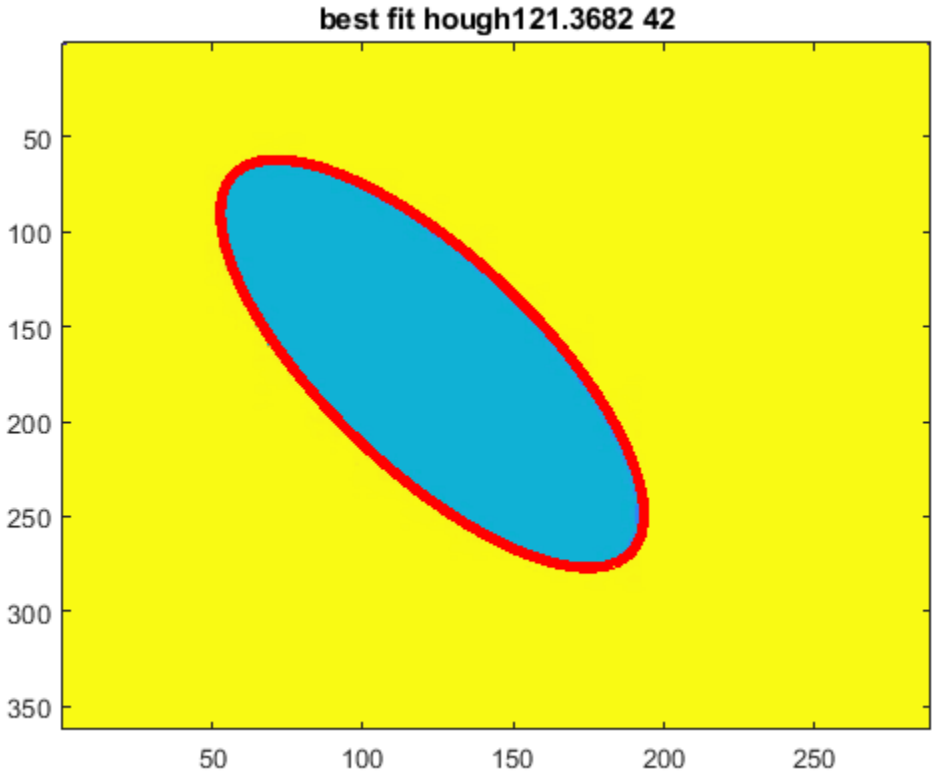
```
E = edge(img,'canny');
figure(), imshow(E);title('edge canny')

% override some default parameters
params.minMajorAxis = 50;
params.maxMajorAxis = 300;

% note that the edge (or gradient) image is used
% [x0 y0 a b alpha score]
bestFits = ellipseDetection(E, params);

fprintf('Output %d best fits.\n', size(bestFits,1));

figure;
image(img);

ellipse(bestFits(:,3),bestFits(:,4),bestFits(:,5)*pi/
180,bestFits(:,1),bestFits(:,2),'R');
title('allfits')

[mx idx] = max(bestFits(:,6));
```

```
figure;
image(img);
ellipse(bestFits(idx,3),bestFits(idx,4),bestFits(idx,5)*pi/
180,bestFits(idx,1),bestFits(idx,2),'R');
 title(['best fit hough', num2str(bestFits(idx,3)),
' ', num2str(bestFits(idx,4)) ])
```

```
Possible major axes: 870 * 870 = 756900
..after distance constraint: 304218
..angular constraint not used
..after randomization: 1740
Output 3 best fits.

an =

    1.0537


an =

    1.0460


an =

    1.0570
```


edge canny


allfits
50
100
150
200
250
300
350
50
100
150
200
250


best fit hough121.3682 42
50
100
150
200
250
300
350
50
100
150
200
250

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