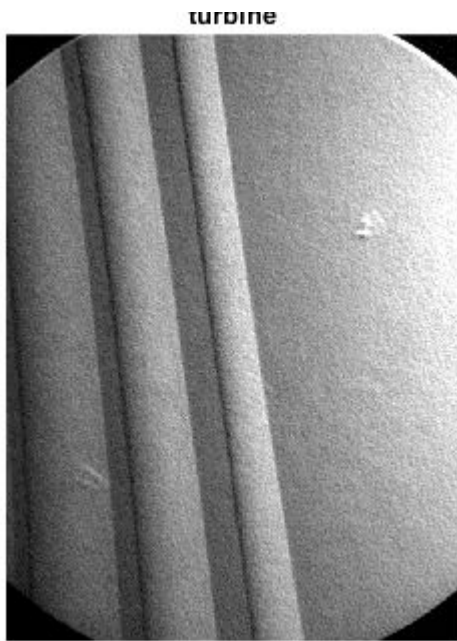


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ex1

```
turbine=imread("turbine_blade_black_dot.tif");  
imshow(turbine,[])  
title('turbine')
```



```
t=[-1 -1 -1;-1 8 -1;-1 -1 -1];  
turbine2=filter2(t,turbine,'valid');  
imshow(abs(turbine2),[])  
title('turbine2')
```

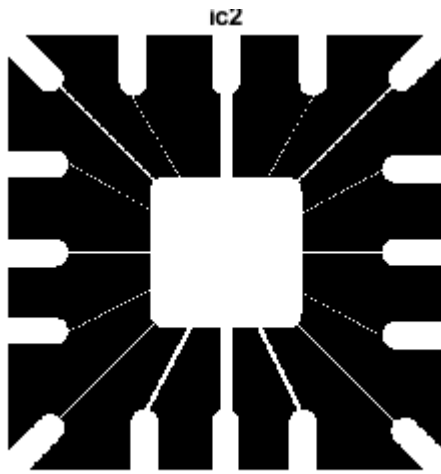
turbine2



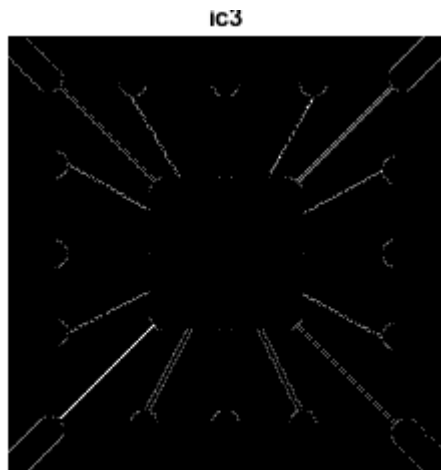
```
turbine3= 0.9*max(abs(turbine2(:)));  
imshow(abs(turbine3),[])
```

ex2

```
ic2=imread("ic2.tif");  
imshow(ic2,[])  
title('ic2')
```



```
t1=[-1 -1 2;-1 2 -1;2 -1 -1];
ic3=filter2(t1,ic2,"valid");
imshow(abs(ic3),[])
title('ic3')
```

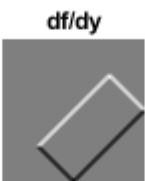


ex3

```
I1=[zeros(50, 25), 255*ones(50,25)]';
I1=imrotate(I, 45);
imshow(I,[])
```



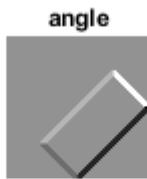
```
t2=[-1 -1 -1; 0 0 0; 1 1 1];  
I2=filter2(t2,I1,"same");  
imshow(I2,[])  
title('df/dy')
```



```
t3=[-1 0 1; -1 0 1; -1 0 1];  
I3=filter2(t3,I1,"same");  
imshow(I3,[])  
title('df/dx')
```

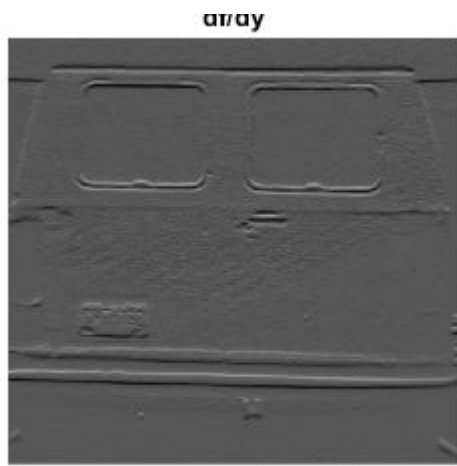


```
I4=atan2(I2,I3);  
imshow(I4,[])  
title('angle')
```



ex4

```
van=imread("van_original.tif");
t2=[-1 -1 -1; 0 0 0; 1 1 1];
van2=filter2(t2,van,"same");
imshow(van2,[])
title('df/dy')
```



```
t3=[-1 0 1; -1 0 1; -1 0 1];
van3=filter2(t3,van,"same");
imshow(van3,[])
title('df/dx')
```

mag

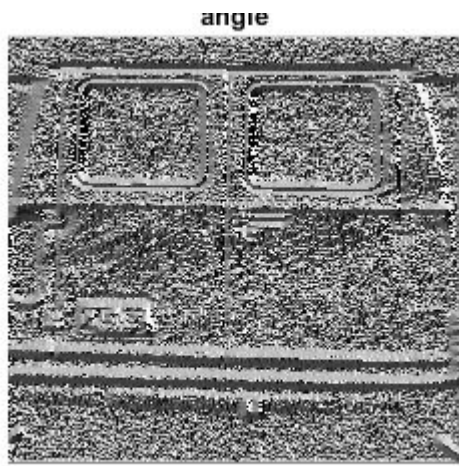


```
imshow(abs(van2+van3),[])  
title('magnitude')
```

magnitude



```
van4=atan2(van2,van3);  
imshow(van4,[])  
title('angle')
```

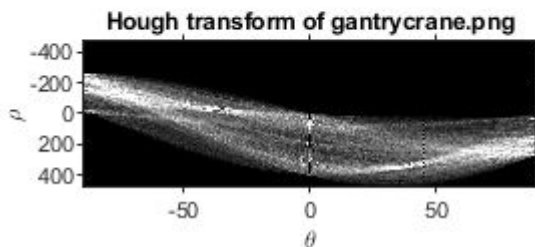


ex5

```

RGB = imread('gantrycrane.png');
I = rgb2gray(RGB); % convert to intensity
BW = edge(I, 'canny'); % extract edges
[H,T,R] = hough(BW, 'RhoResolution', 0.5, 'Theta', -90:0.5:89.5);
% display the original image
subplot(2,1,1);
imshow(RGB);
title('gantrycrane.png');
% display the hough matrix
subplot(2,1,2);
imshow(imadjust(mat2gray(H)), 'XData', T, 'YData', R, ...
'InitialMagnification', 'fit');
title('Hough transform of gantrycrane.png');
xlabel('\theta'), ylabel('\rho');
axis on, axis normal, hold on;

```



```

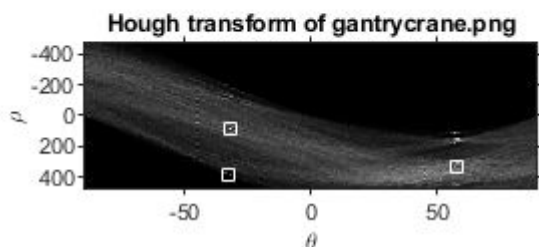
%colormap(gca,hot);

```

```

I = imread('van_original.tif');
rotI = imrotate(I,33,'crop');
BW = edge(rotI,'canny');
[H,T,R] = hough(BW);
imshow(H,[],'XData',T,'YData',R,'InitialMagnification','fit');xlabel('\theta'), ylabel('\rho');
axis on, axis normal, hold on;
P = houghpeaks(H,5,'threshold',ceil(0.3*max(H(:)))));
x = T(P(:,2));
y = R(P(:,1));
plot(x,y,'s','color','white');

```



```

% Find lines and plot them
lines = houghlines(BW,T,R,P,'FillGap',5,'MinLength',7);
figure, imshow(rotI), 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','cyan');

```