

Sessió 11

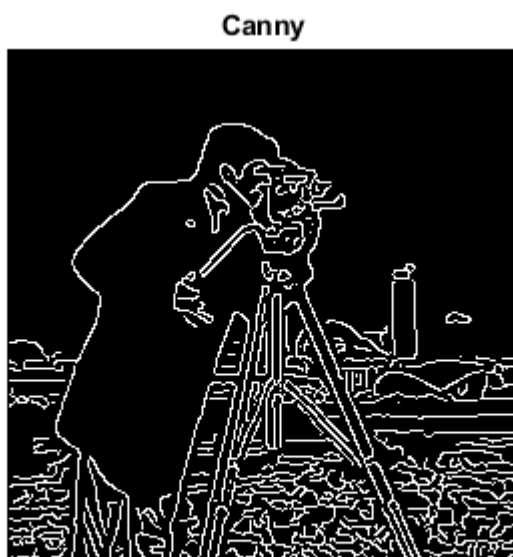
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```
im= imread('cameraman.jpg');  
imshow(im), title('Imatge original')
```

Imatge original

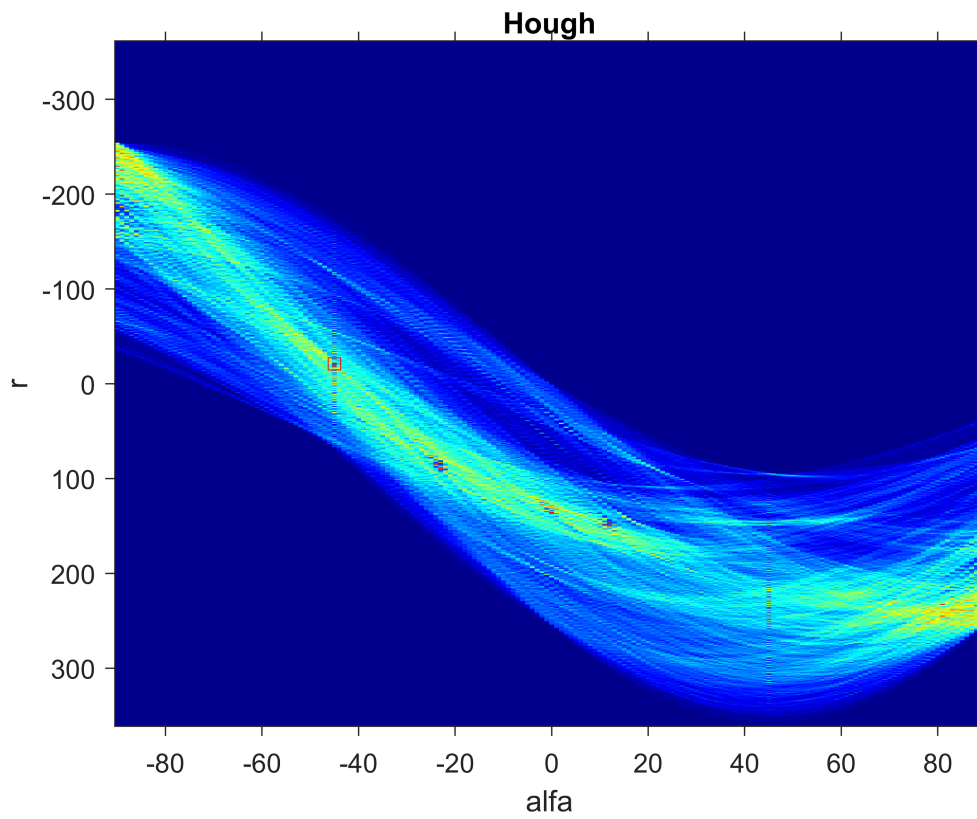


```
bw=edge(im, 'canny');  
figure,imshow(bw), title('Canny')
```



Taula de Hough

```
%TAULA DE HOUGH
[H,alfa,r] = hough(bw);
figure, imshow(mat2gray(H),'XData',alfa,'Ydata',r,'InitialMagnification','fit')
xlabel('alfa')
ylabel('r')
axis on
axis normal
colormap('jet')
title('Hough')
[fil a col] = find(H==max(max(H)));
x = alfa(col);
y = r(fila);
hold on
plot(x,y,'s','color','red')
hold off
```



```

a = x*pi/180;
r=y;
[MAXY MAXX]=size(im);
x1 = 0;
y1 = r/sin(a);
x2 = MAXX;
y2 = (r-MAXX*cos(a))/(sin(a));
imshow(im),title('R amb x1 = 0 i x1 = MAX(x)')
hold on
line([x1, x2],[y1,y2],'color','g');

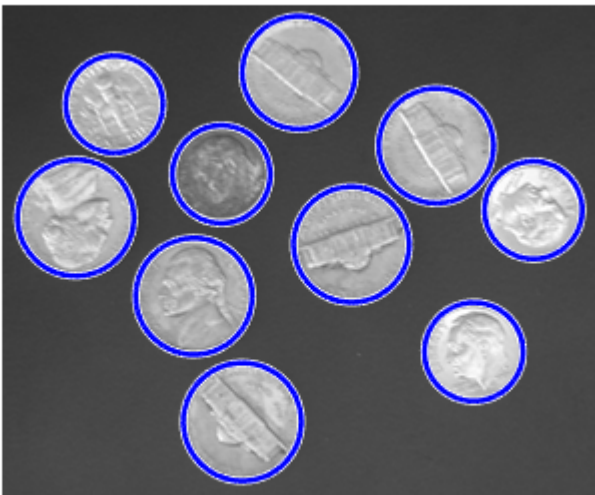
```

R amb x1 = 0 i x1 = MAX(x)



```
im=imread('coins.png');  
figure, imshow(im)  
[c r m] = imfindcircles(im,[15 30]);  
viscircles(c,r,'EdgeColor','b'),title('Cercles');
```

Cercles

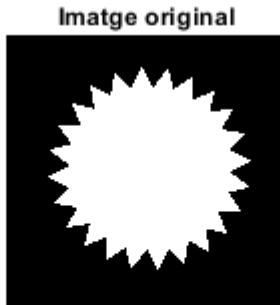


```
ans =  
Group with properties:  
Children: [2x1 Line]  
Visible: 'on'  
HitTest: 'on'
```

Show all properties

Taula de Harris

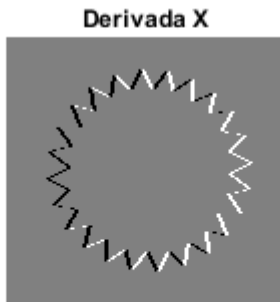
```
im = imread('gear.tif');  
figure,imshow(im), title('Imatge original');
```



```
im = double(im);  
k = 0.04;  
th = 0.42;  
h = ones(5);  
[rows cols] = size(h);  
h = h./(rows * cols);
```

Opció 1: Basic convolutions

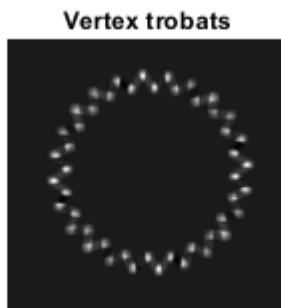
```
derivada = [-1 0 1];  
iX=imfilter(im,derivada,'conv');  
iY = imfilter(im,derivada','conv');  
imshow(iX,[]), title('Derivada X')
```



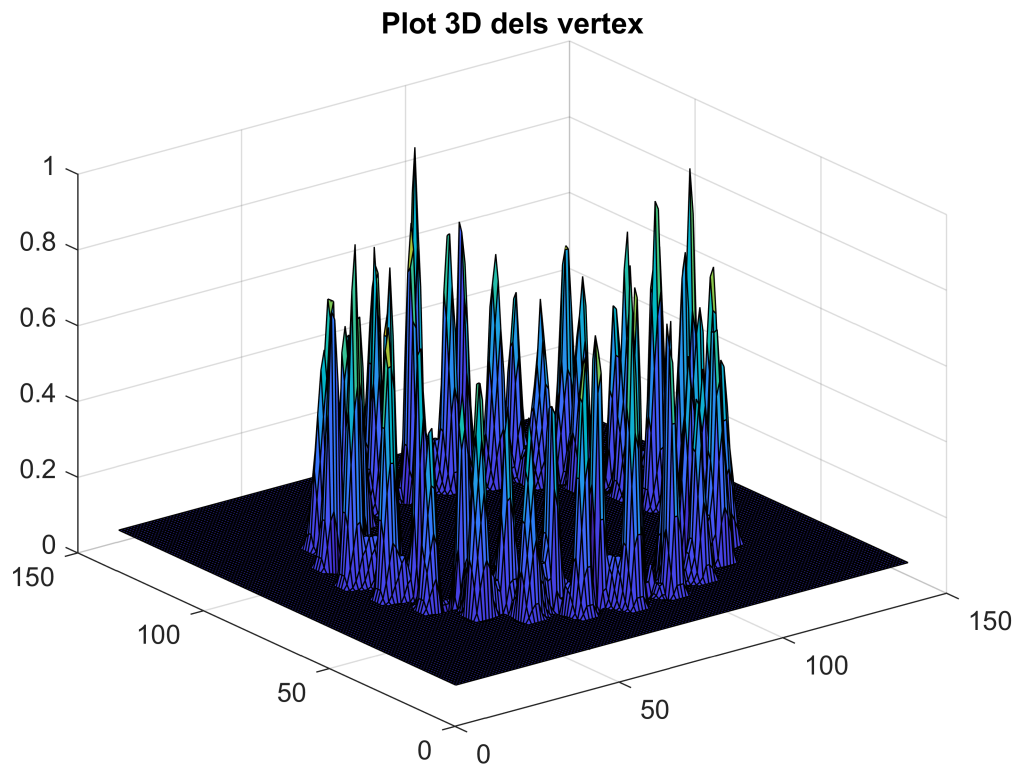
```
imshow(iY,[]), title('Derivada Y')
```



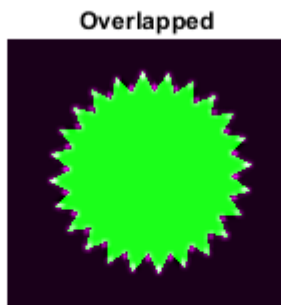
```
R = (imfilter(iX.^2,h,'conv').*imfilter(iY.^2,h,'conv')) - imfilter(iX.*iY,h,'conv').^2-k.*(im
representacioR = mat2gray(R);
figure,imshow(representacioR), title('Vertex trobats')
```



```
figure, surf(representacioR), title('Plot 3D dels vertex')
```



```
overlapped = imfuse(im,representacioR);
figure,imshow(overlapped), title('Overlapped')
```



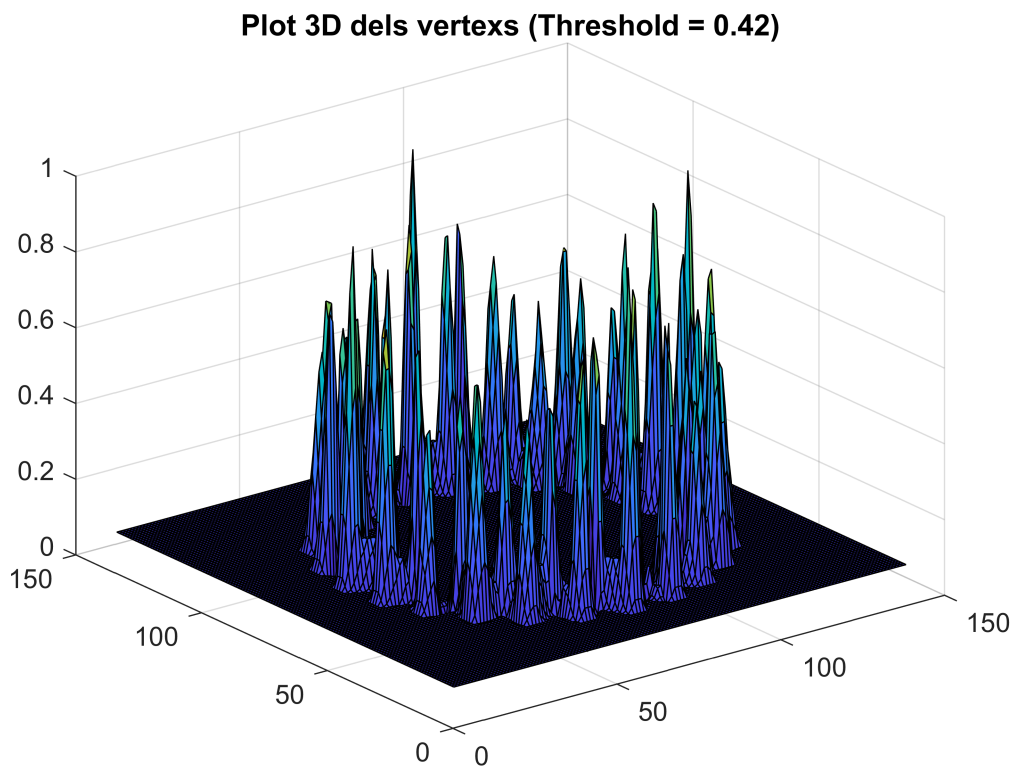
Opció 2: threshold

```
R = R(R>th);
figure,imshow(representacioR), title('Vertex trobats utilitzant un threshold de 0.42')
```

Vertex trobats utilitzant un threshold de 0.42



```
figure, surf(representacioR), title('Plot 3D dels vertexs (Threshold = 0.42)')
```

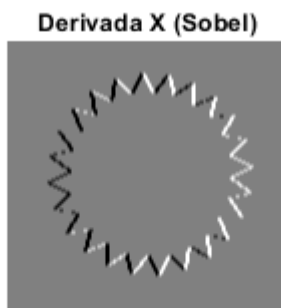


```
overlapped = imfuse(im,representacioR);  
figure,imshow(overlapped), title('Overlapped')
```




Opció 3: Sobel

```
sobel = [-1 0 1;  
        -2 0 2;  
        -1 0 1];  
  
iX=imfilter(im,sobel,'conv');  
iY = imfilter(im,sobel','conv');  
imshow(iX,[]), title('Derivada X (Sobel)')
```



```
imshow(iY,[]), title('Derivada Y (Sobel)')
```

Derivada Y (Sobel)

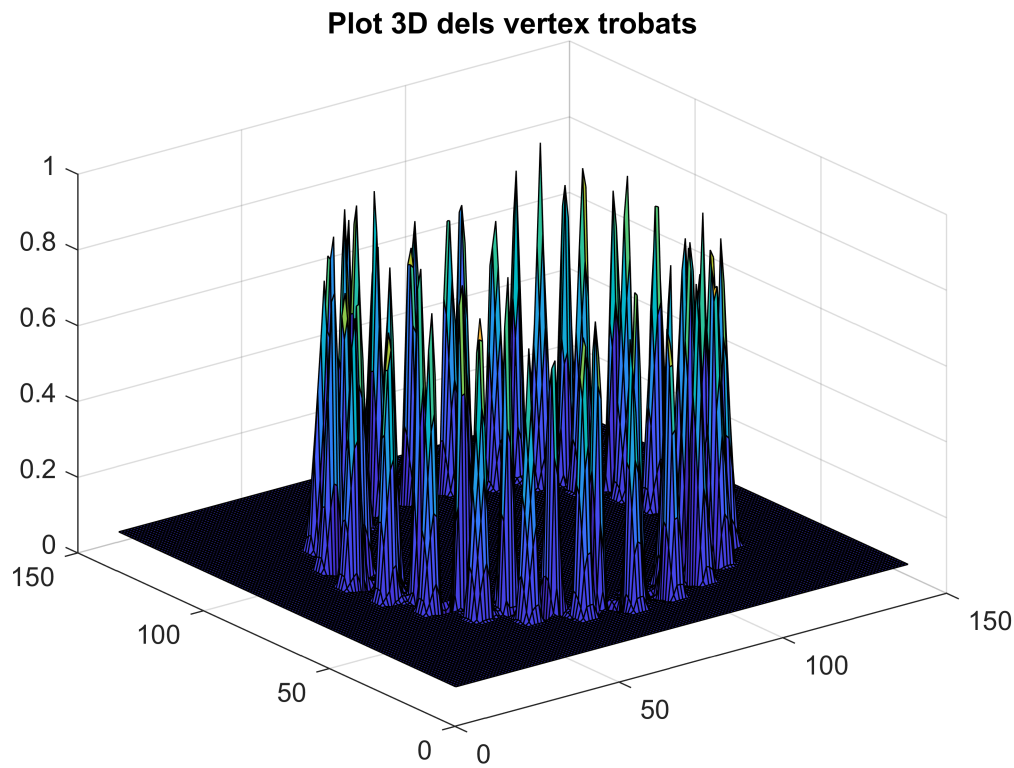


```
R = (imfilter(iX.^2,h,'conv').*imfilter(iY.^2,h,'conv')) - imfilter(iX.*iY,h,'conv').^2-k.*(im  
representacioR = mat2gray(R);  
figure,imshow(representacioR), title('Vertex trobats')
```

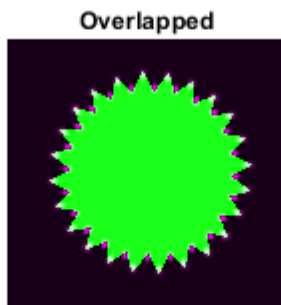
Vertex trobats



```
figure, surf(representacioR), title('Plot 3D dels vertex trobats')
```



```
overlapped = imfuse(im,representacioR);
figure,imshow(overlapped), title('Overlapped')
```



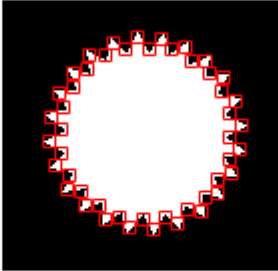
Opció 4: Supressió de no màxims utilitzant Sobel (el que millors resultats dona)

```
% Continuació de l'Opció 3
ee = strel('cube',3);
dilatada = imdilate(R,ee);
R(dilatada>R) = 0;
RL = (R > 0);
```

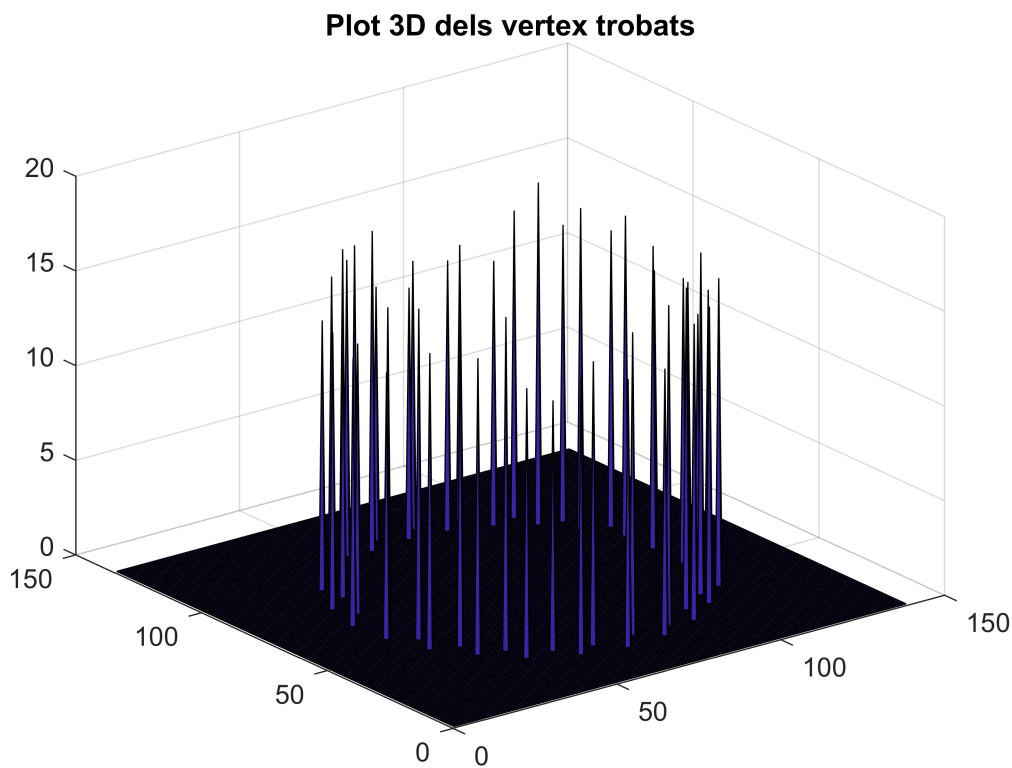
```
figure,imshow(im), title('Gear amb els vertexs trobats (amb Supressió de no-màxims)')
```

```
[ys xs] = find(RL);  
hold on  
plot(xs,ys,'s','color','red')
```

r amb els vertexs trobats (amb Supressió de no-màxi



```
figure, surf(R), title('Plot 3D dels vertex trobats')
```



```
overlapped = imfuse(im,representacioR);  
figure,imshow(overlapped), title('Overlapped')
```

Overlapped

