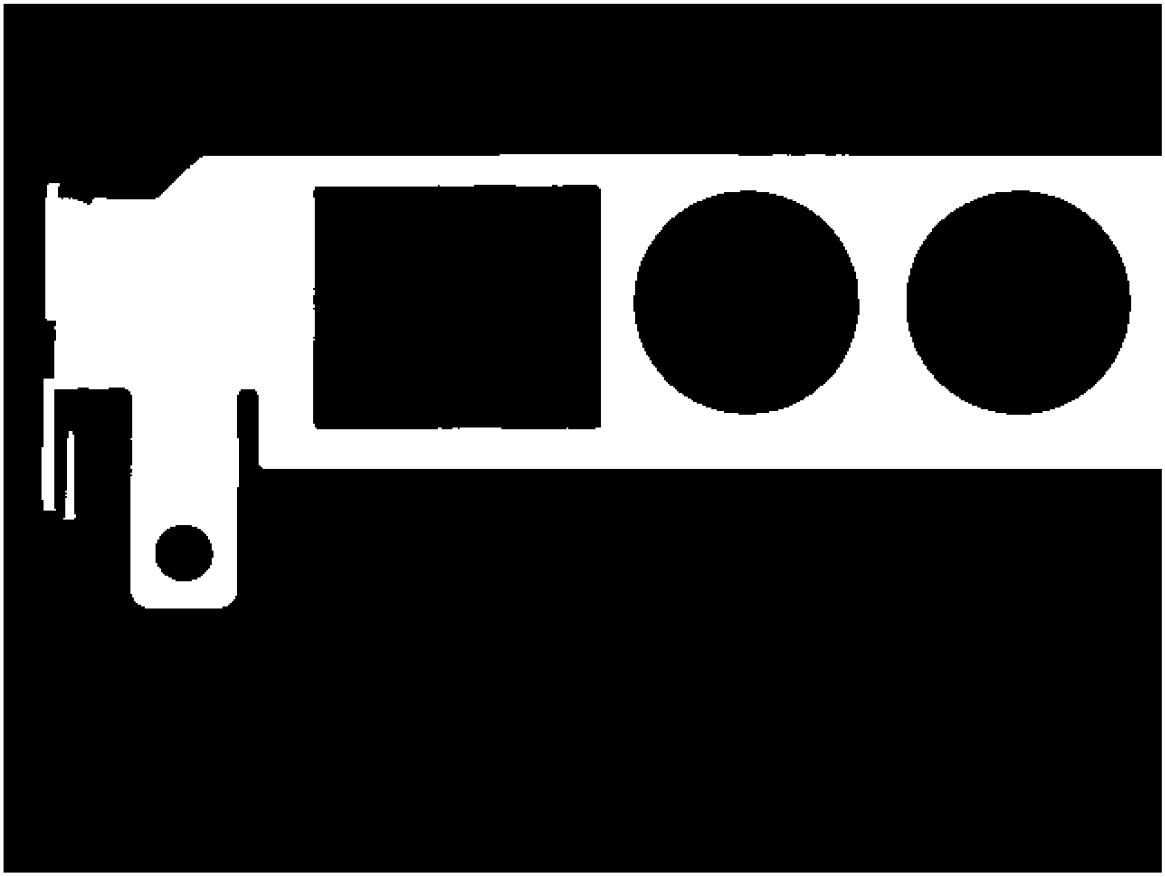
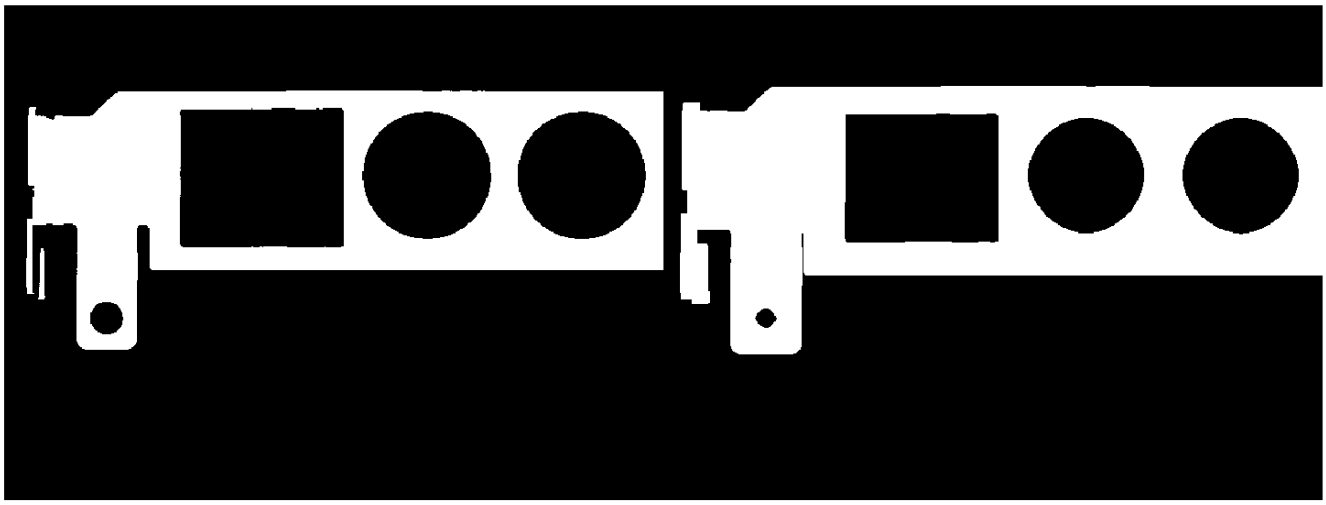
Processat morfològic d'imatges I

Dilatació

```
I = imread('Bracket1.tif');
BW = I < 128;
imshow(BW);
```

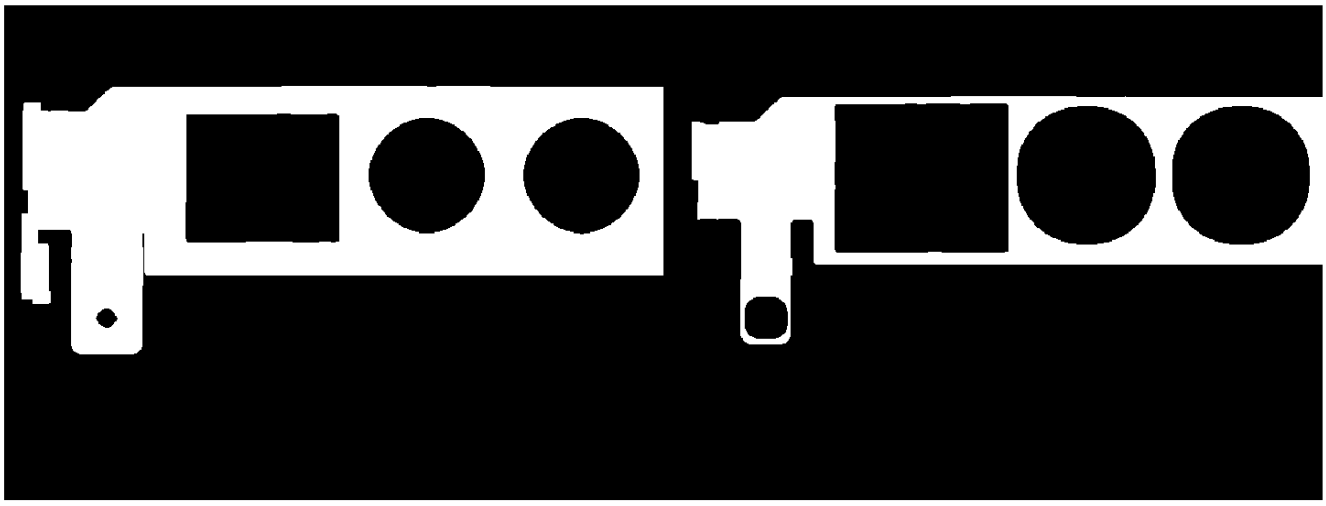


```
ES = ones(11,11);
BWD = imdilate(BW, ES);
montage({BW,BWD});
```



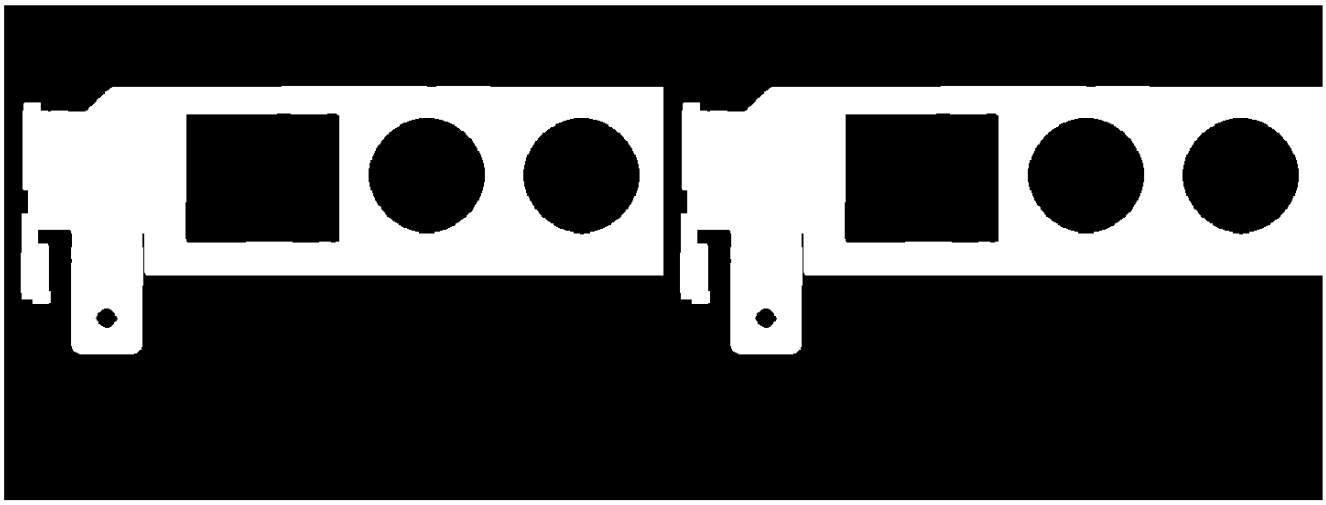
Erosió

```
I = imread('Bracket1.tif');
BW = I < 128;
ES = ones(11,11);
BWE = imerode(BW, ES);
montage({BWD,BWE});
```



Dilatació = Erosió del fons

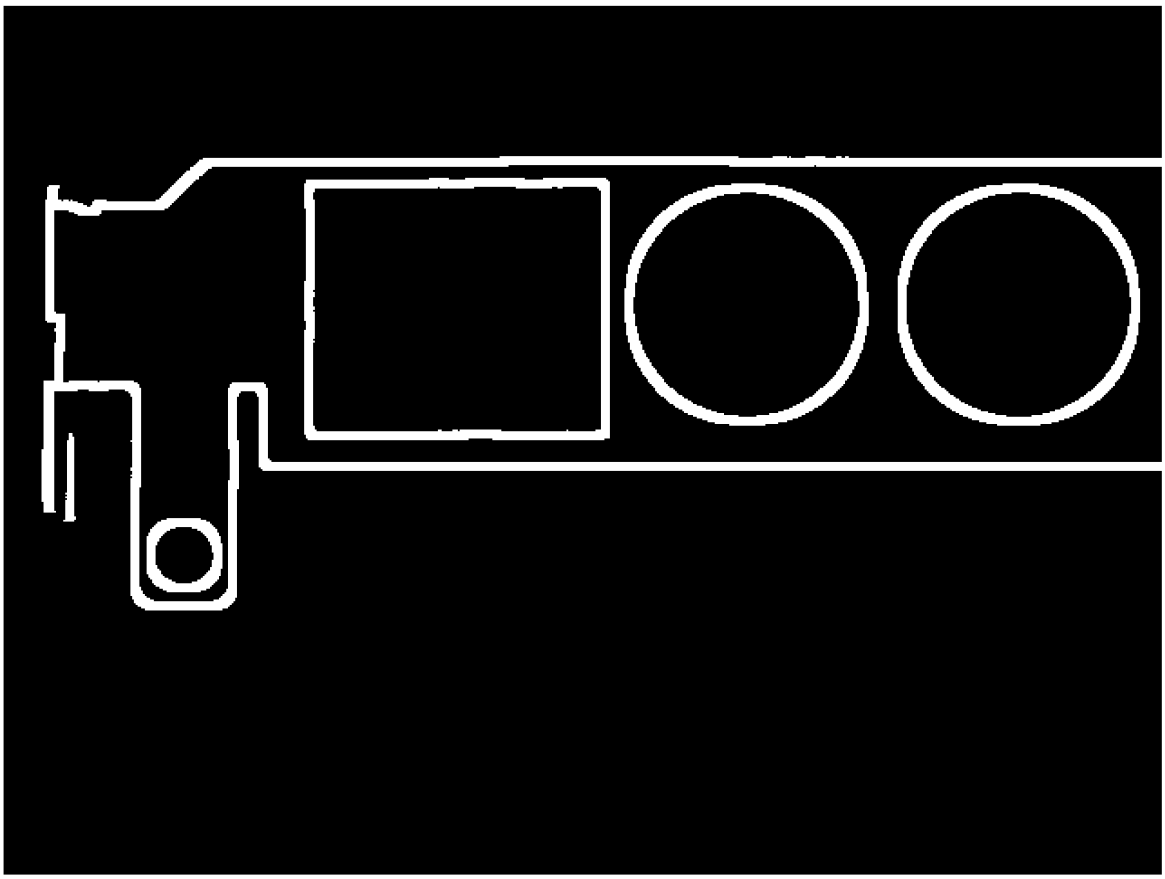
```
I = imread('Bracket1.tif');
BW = I < 128;
ES = ones(11,11);
BWD2 = not(imerode(not(BW), ES));
montage({BWD,BWD2});
```



Residus

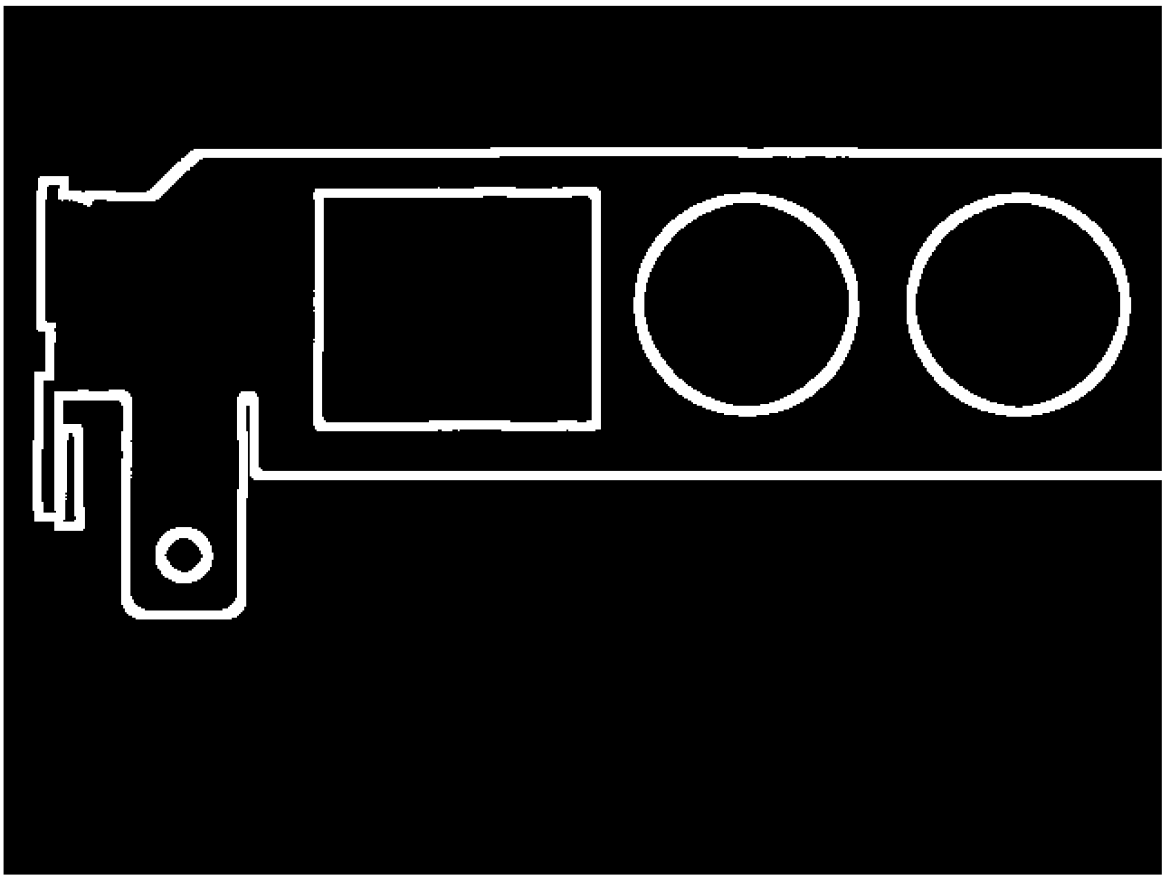
Residu intern

```
RI = BW & not(BWE);
imshow(RI);
```



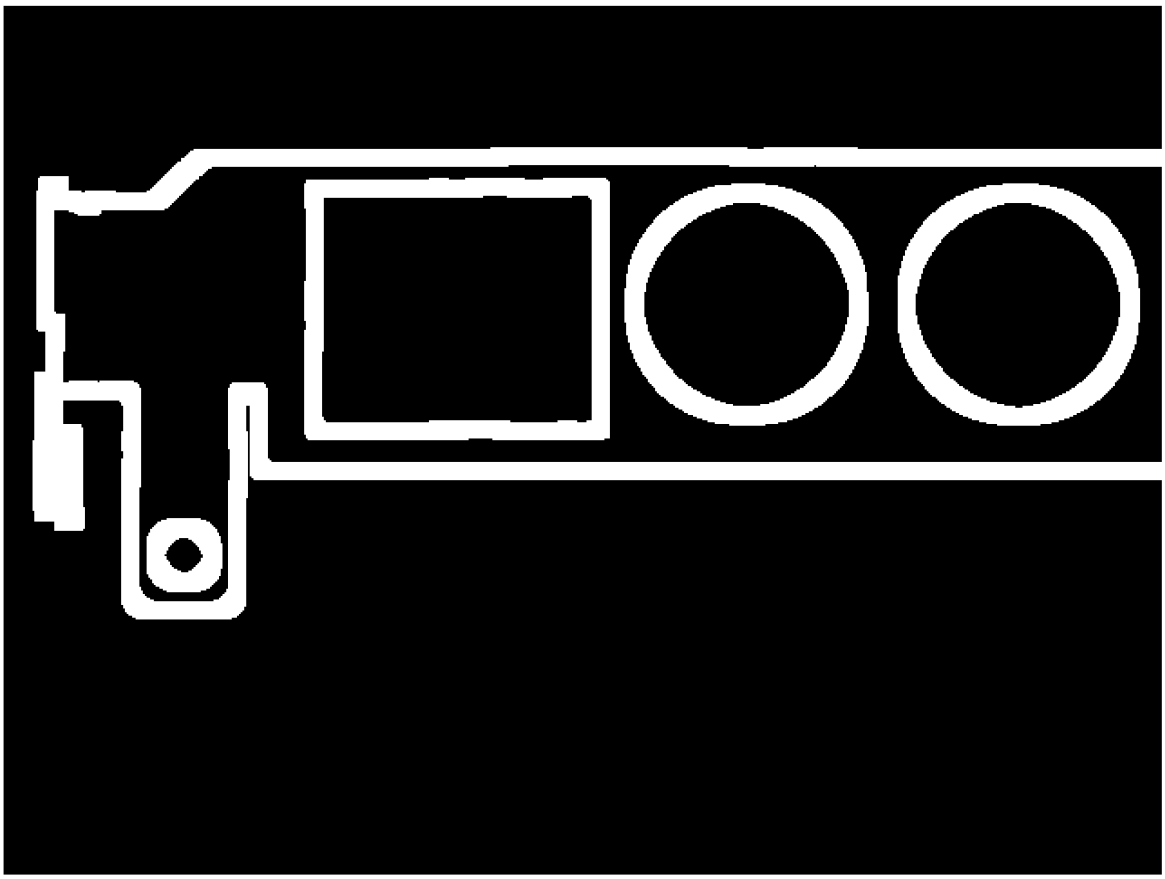
Residu extern

```
RE = BWD & not(BW);
imshow(RE);
```



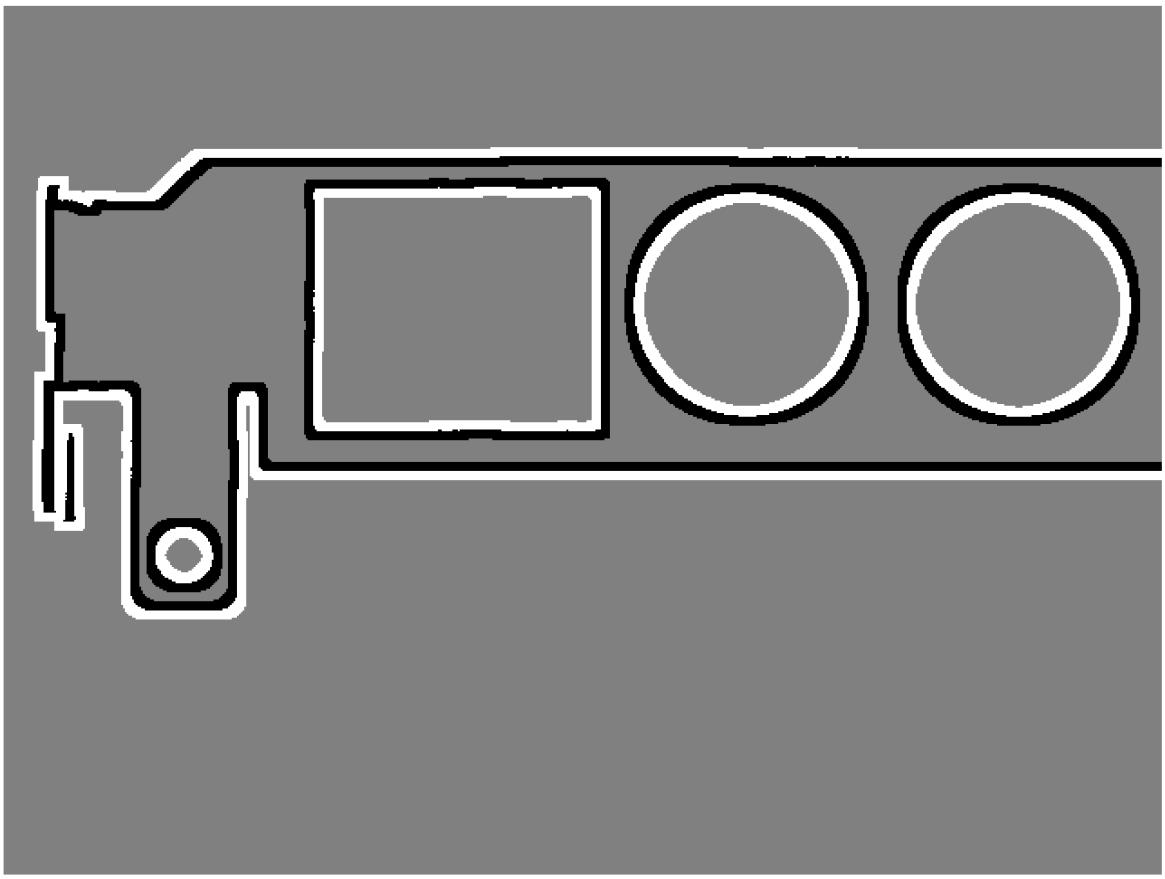
Residu doble

```
RD = BWD & not(BWE);
imshow(RD);
```



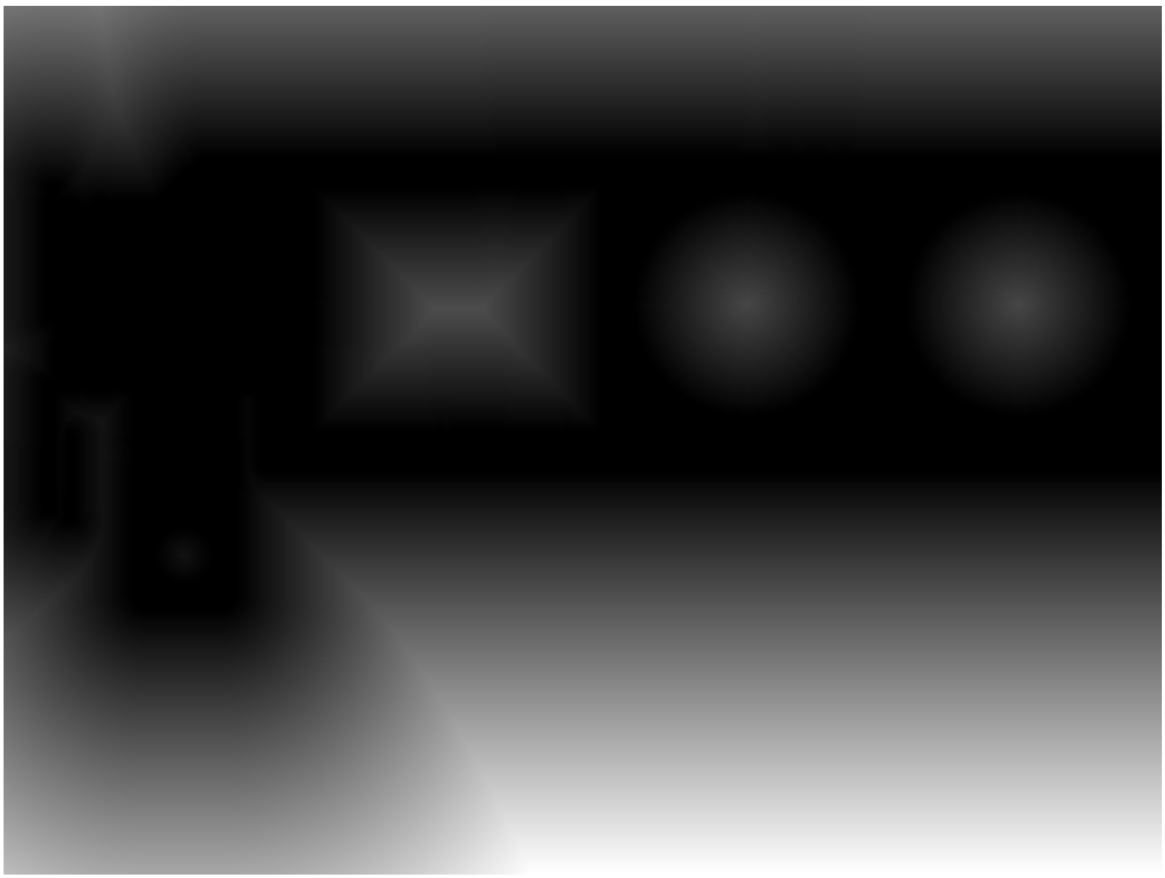
Residu Laplacià

```
RL = double(BWD) - double(BW) - double(BW) + double(BWE);
imshow(RL, []);
```



Transformada distància

```
TD = bwdist(BW,"euclidean");
imshow(TD,[]);
```

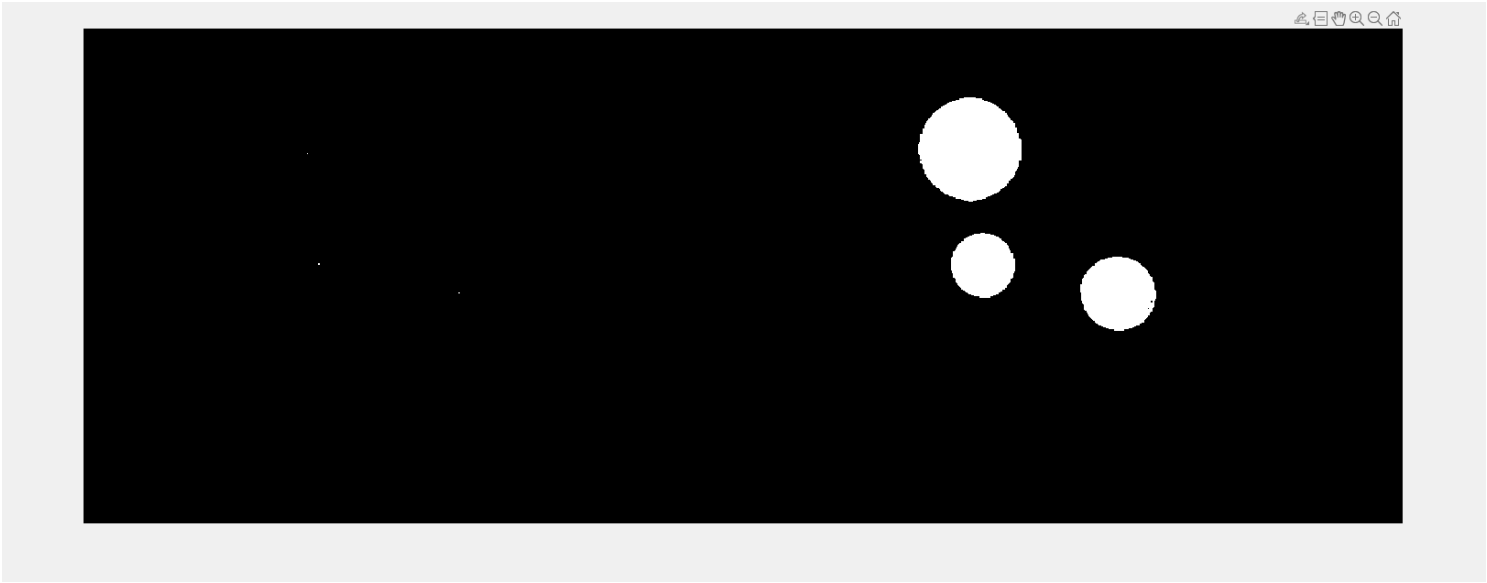


Dilatació condicional

Reconstrucció amb marques interactives

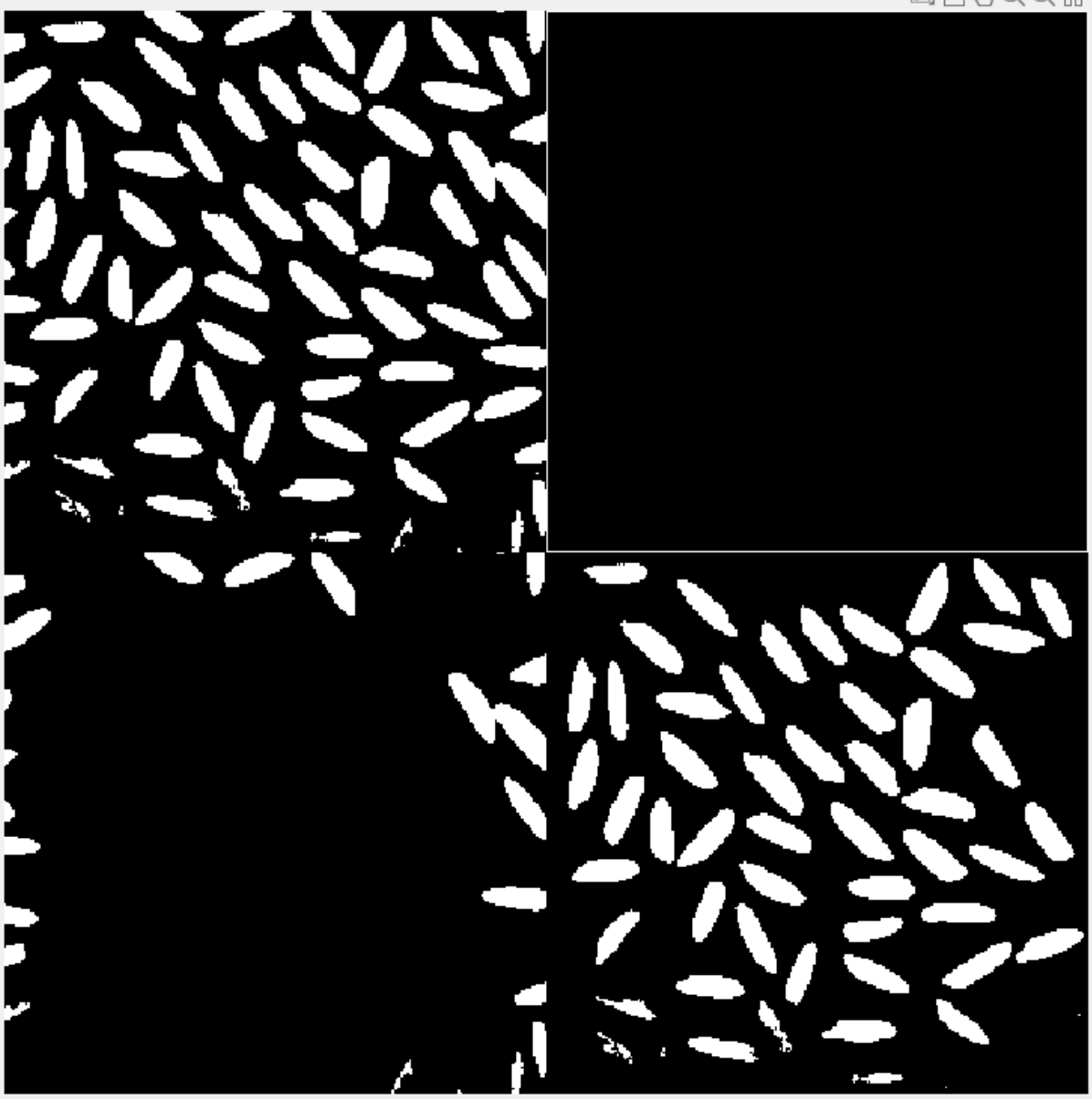
```
I = imread("money.tif");
imshow(I);
[x,y] = getpts;
```

```
BW = I > 128;
MARK = false(size(I));
for i=1:size(x)
    MARK(uint16(y(i)),uint16(x(i))) = 1;
end
REC = imreconstruct(MARK,BW,8);
montage({MARK,REC});
```



Eliminar objectes de les bores

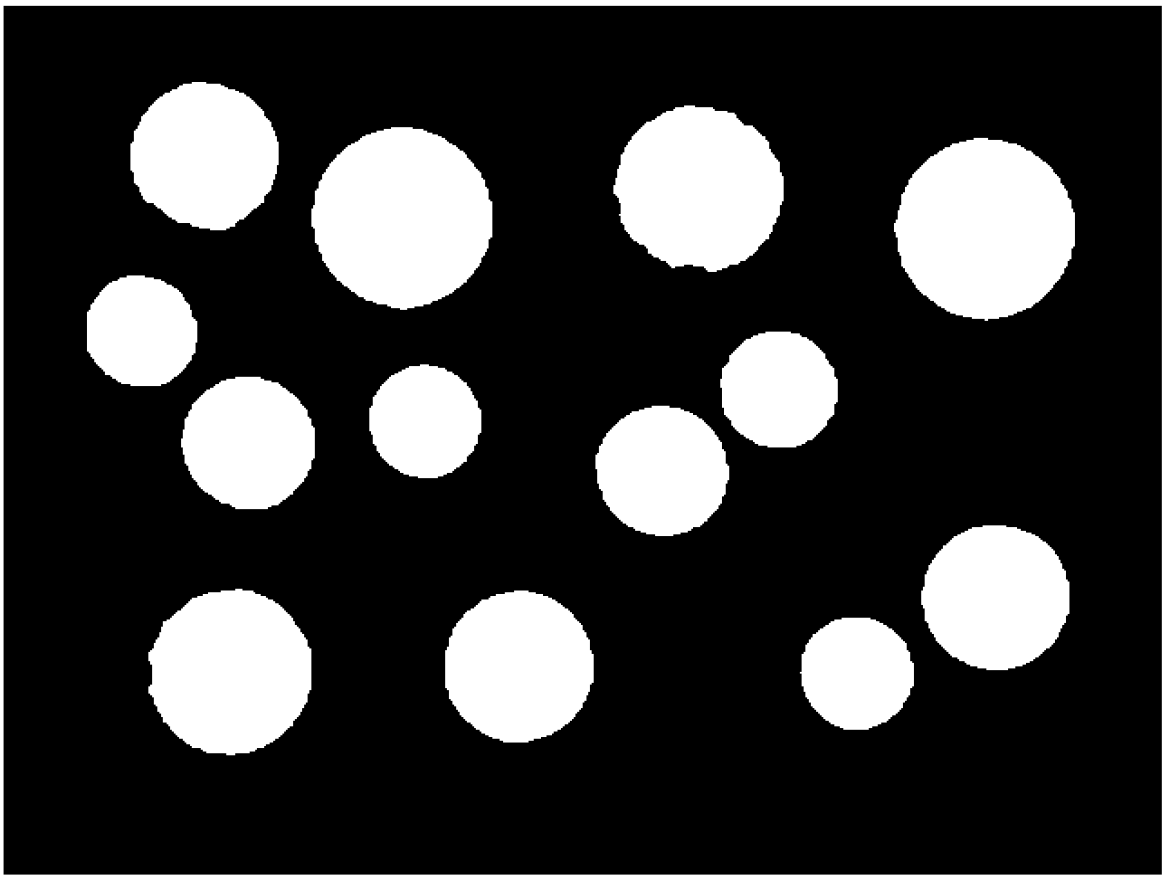
```
I = imread('arros.tif');
BW = I > 128;
MARK = false(size(BW));
MARK(1,:) = 1;
MARK(:,1) = 1;
MARK(end,:) = 1;
MARK(:,end) = 1;
REC = imreconstruct(MARK,BW,8);
montage({BW,MARK, REC, BW&not(REC)});
```



Close

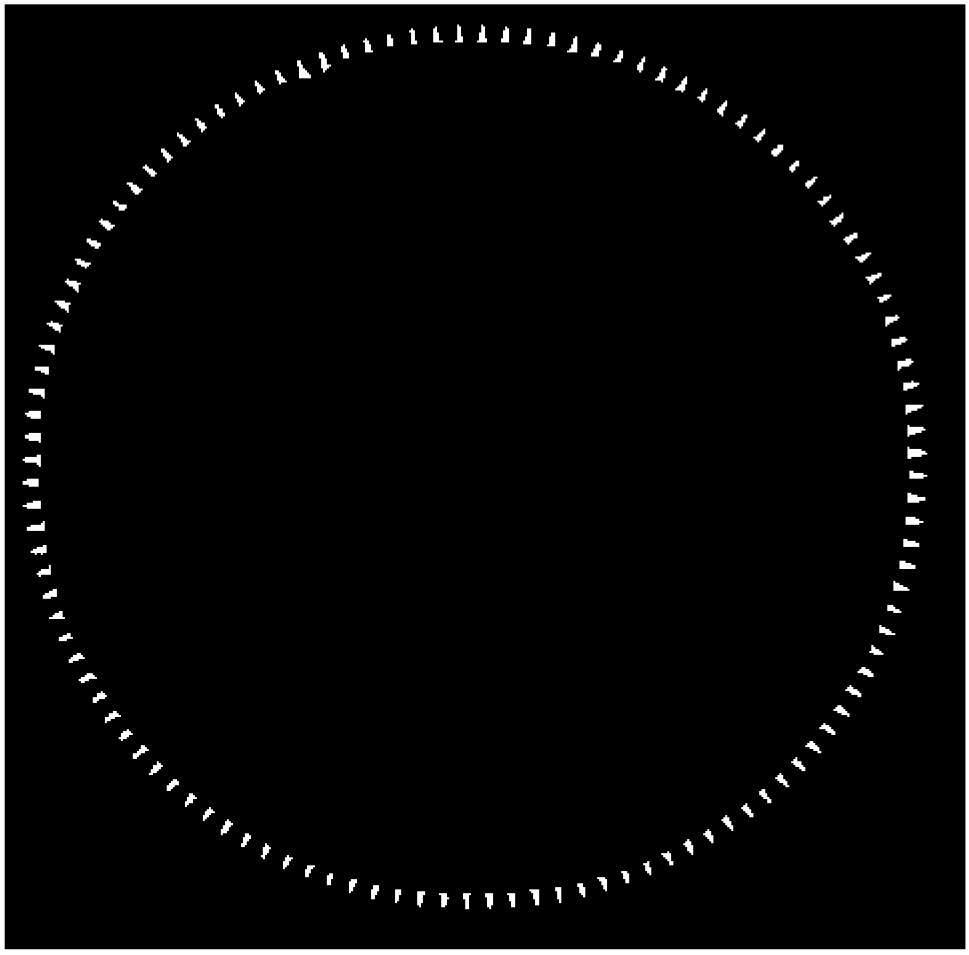
Dilatar, i després erosionar amb el mateix element estructurant

```
I = imread("money.tif");
BW = I > 128;
ES = strel('disk',5);
BWC = imclose(BW,ES);
imshow(BWC);
```

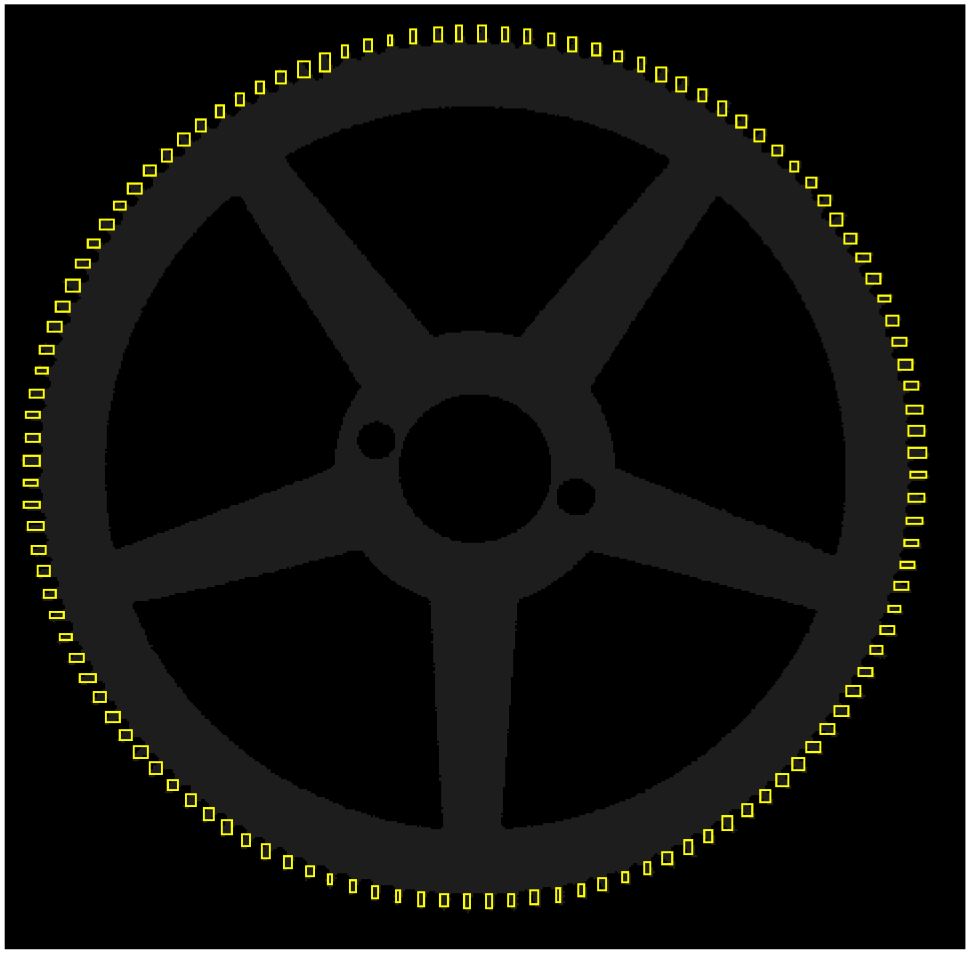


Exercici Mesurar nombre de dents d'una roda dentada

```
I = rgb2gray(imread('Wheel.bmp'));
BW = I > 15;
BW = imfill(BW,'holes');
ES = strel('disk',9);
BWE = imopen(BW, ES);
D = BW & not(BWE);
ES2 = ones([2 2]);
E = imerode(D,ES2);
imshow(E);
```



```
RP = regionprops('table',E,'BoundingBox','Area');
RGB = insertShape(I,'rectangle',RP.BoundingBox);
imshow(RGB);
```

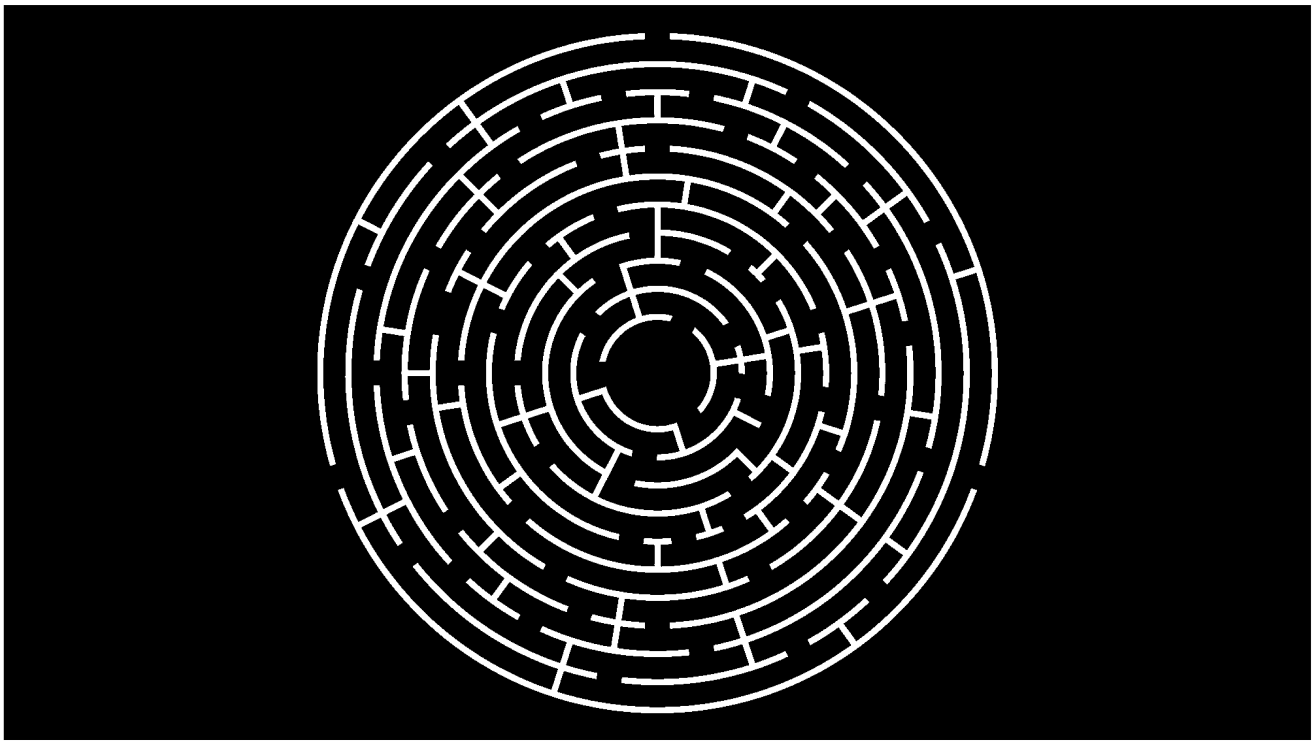


```
size(RP.Area)
```

```
ans = 1×2
   120     1
```

Exercici

```
I = rgb2gray(imread('maze.png'));
BW = I < 128;
imshow(BW);
```



```
ES = strel('disk',3);
J = false(size(BW));
J(1,1) = 1;
imdilate(J,ES);
J = J & BW;
imshow(J);
```