Processat Morfològic - Aina Garcia Espriu i Marti Ramon Ros

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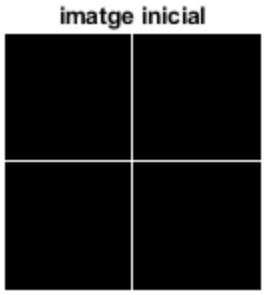
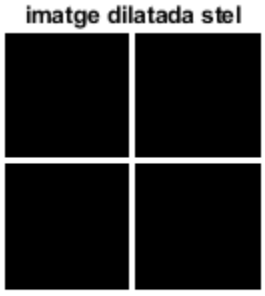
Dilatació

```
im = false(128);
im(64,:) = 1;
im(:,64) = 1;

figure, imshow(im), title('imatge inicial');

m = false(3, 3);
m(2,:) = true;
m(:,2) = true;

imDilatada = false(128);

[x, y] = size(im);

for i = 2:x-1
    for j = 2:y-1
        if (im(i,j)||im(i-1,j)||im(i+1,j)||im(i,j+1)||im(i, j-1))
            imDilatada(i, j) =  true;
        end
    end
end

figure, imshow(imDilatada), title('imatge dilatada manual');

ee = strel('disk',1);
dil = imdilate(im, ee);
figure, imshow(dil), title('imatge dilatada stel');

im = imread('blob.tif');
ee = strel('disk', 5);
dil = imdilate(im, ee);
figure, imshow(dil), title('imatge dilatada disk r:5');

ero = imerode(im, ee);
```

```
figure, imshow(ero), title('imatge erosionada disk r:5');

op = imdilate(ero, ee);
figure, imshow(op), title('imatge open disk r:5');

op2 = imopen(im, ee);
figure, imshow(op2), title('imatge open disk r:5 w/imopen');

cl = imclose(im, ee);
figure, imshow(cl), title('imatge open disk r:5 w/imclose');
```





imatge dilatada disk r:5

imatge erosionada disk r:5

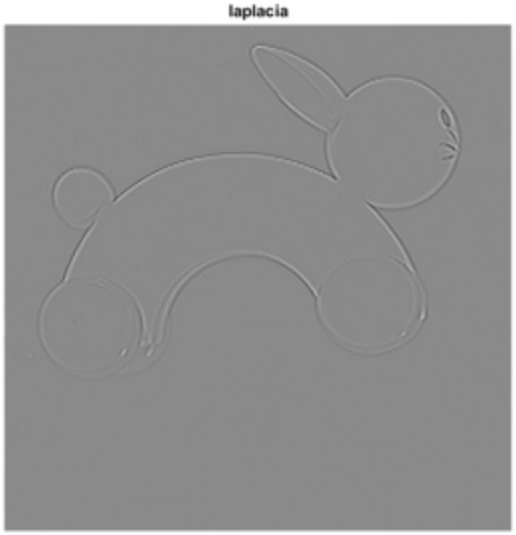
imatge open disk r:5

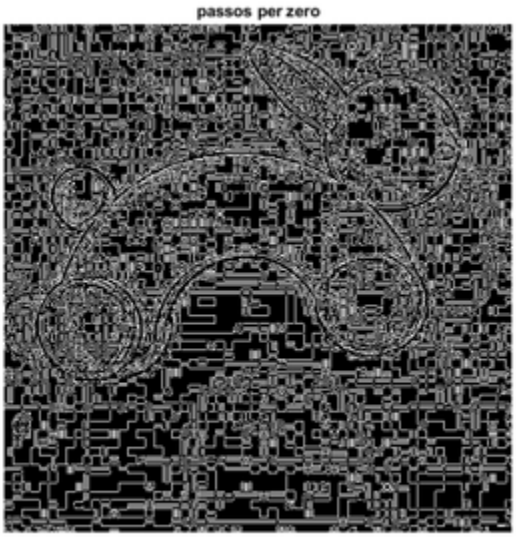
Part 2 - Residus

```
im3 = imread('rabbit.jpg');
w = [0, -1, 0; -1, 4, -1; 0, -1, 0];
lap = imfilter(double(im3), w);
figure, imshow(lap, []), title('laplacia');
neg = lap<0;
pos = lap>0;
negdil = imdilate(neg, strel('disk',1));
ppz = negdil&pos;
figure, imshow(ppz), title('passos per zero');
```

```
im = imread('blob3.tif');
ee = strel('disk', 1);
```

```
dil = imdilate(im, ee);
ce = imsubtract(dil, im);
figure, imshow(ce), title('contorn extern');

ero = imerode(im, ee);
ci = imsubtract(im, ero);
figure, imshow(ci), title('contorn intern');

cd =  imfuse(ce, ci);
figure, imshow(cd), title('fusio dels contorns');

lap = imsubtract(double(ci), double(ce));
figure, imshow(lap, []), title('laplacia');
%improfile
```

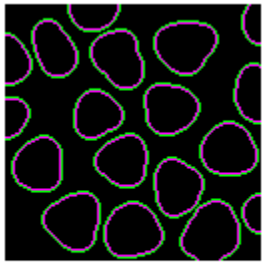


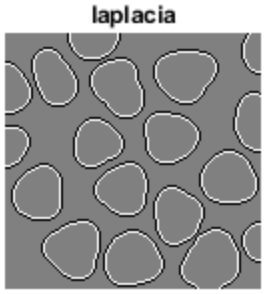


contorn extern

contorn intern

fusio dels contorns





Part 3 - dilatació condicional

```
mark=im;
mark(2:end-1, 2:end-1)=0;
figure, imshow(mark), title('markers');
dil = imdilate(mark, ee);
dilc = dil&im;
figure, imshow(dilc), title('dilatacio condicional');

dilc = imdilate(dilc, ee)&im;
dilc = imdilate(dilc, ee)&im;
dilc = imdilate(dilc, ee)&im;
dilc = imdilate(dilc, ee)&im;
dilc = imdilate(dilc, ee)&im;
dilc = imdilate(dilc, ee)&im;
dilc = imdilate(dilc, ee)&im;
dilc = imdilate(dilc, ee)&im;
dilc = imdilate(dilc, ee)&im;
dilc = imdilate(dilc, ee)&im;
dilc = imdilate(dilc, ee)&im;
dilc = imdilate(dilc, ee)&im;

figure, imshow(dilc), title('dilatacio condicional');

rec = imreconstruct(mark, im);
figure, imshow(rec), title('imatge reconstruida');

noBores = imsubtract(im, rec);
figure, imshow(noBores), title('imatge sense celules a les bores');
```

markers

dilatacio condicional

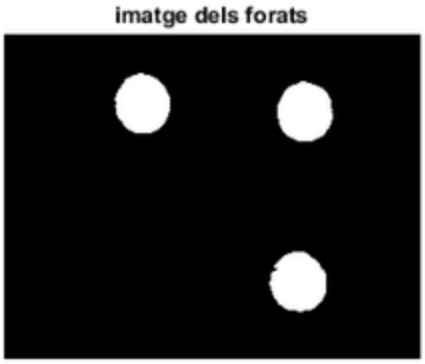
dilatacio condicional

imatge reconstruida

imatge sense celules a les bores

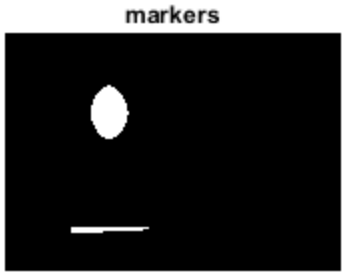
PCB Holes, exercici

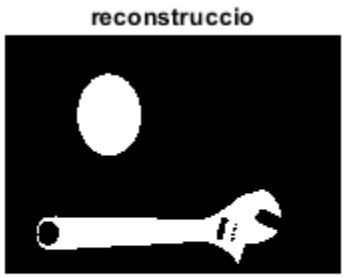
```
im2 = imread('pcbholes.tif');

im2 =~ im2;
mark=im2;
mark(2:end-1, 2:end-1)=0;
rec = imreconstruct(mark, im2);

res = imsubtract(im2, rec);
figure, imshow(res), title('imatge dels forats');
```

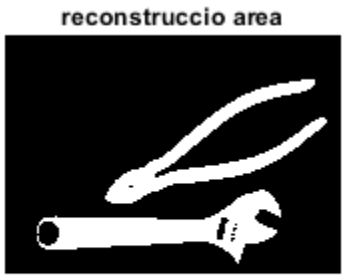


Tools

```
im = imread('tools.tif');
figure, imshow(im), title('imatge tools original');
ee = strel('disk', 7);
mark = imerode(im, ee);
figure, imshow(mark), title('markers');
rec = imreconstruct(mark,im);
figure, imshow(rec), title('reconstruccio');
mark2 = bwareaopen(im, 1200);
rec2 = imreconstruct(mark2, im);
figure, imshow(rec2), title('reconstruccio area');
```

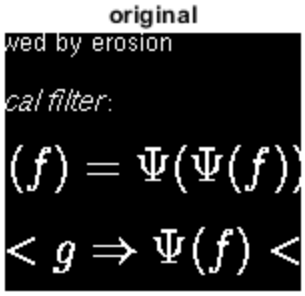


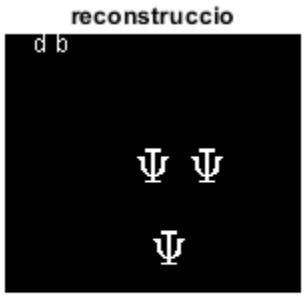




Letters

```
im = imread('letters.tif');
figure, imshow(im), title ('original');
ee = strel('line', 15, 90);
mark = imerode(im, ee);
rec = imreconstruct(mark, im);
figure, imshow(rec), title ('reconstruccio');
```





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