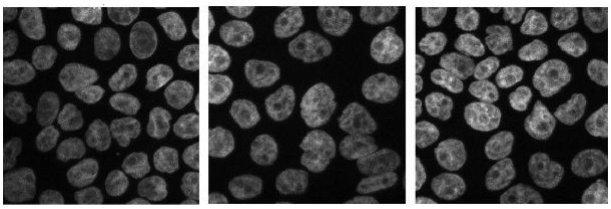
E7: Segmentació

SEGMENTACIÓ BINÀRIA

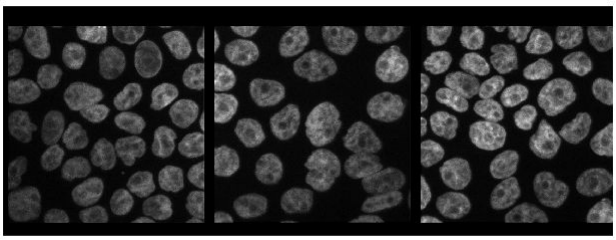
Watershed: segmentació per àrea

- Separació de cèl·lules (Sobre marcadors o sobre mínims locals per la transformada de la distància)

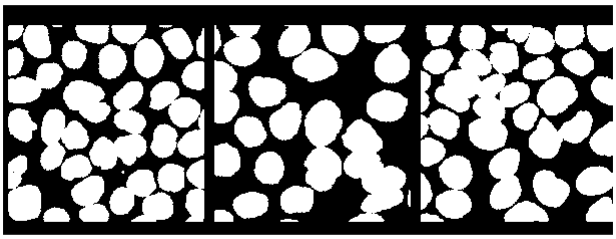
```
I = rgb2gray(imread("cellsegmentationcompetition.png"));
imshow(I);
```



```
BW = I > 250;
M = false(size(I));
M(:,1) = 1;
M(:,end) = 1;
M(1,:) = 1;
M(end,:) = 1;

REC = imreconstruct(M,BW);

REC = imdilate(REC, strel("square", 5));

I = I - 255*uint8(REC);

imshow(I);
```

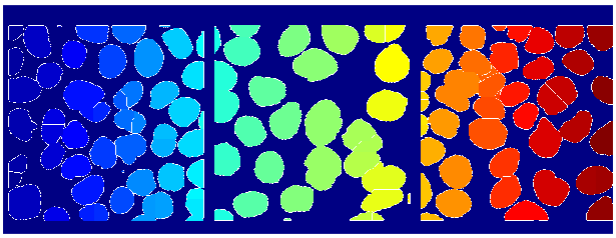


```
I = medfilt2(I, [3, 3]);
BW = I > 16;
BW = imopen(BW,strel("square", 3));

% cèl·lues binaritzades
imshow(BW);
```

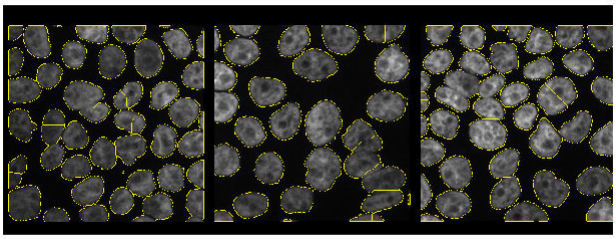


```
% quan de prop està cada píxel del centre de la cèl·lula
TD = -bwdist(not(BW), "quasi-euclidean");

% filtrar TD perquè té masses mínims locals
TD = medfilt2(TD, [6, 6]);

imshow(TD,[])
```

```
TD(not(BW)) = -Inf; % per evitar la propagació de l'aigua en el Background

% WS -> imatges d'etiquetes de pous
WS = watershed(TD);

IB = WS == 0;

RGB = label2rgb(WS);

imshow(RGB);
```

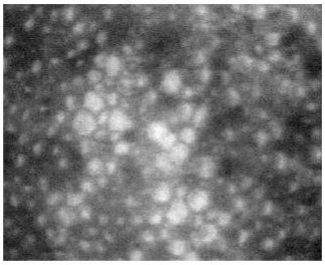


```
O = imoverlay(I, IB);

imshow(O);
```

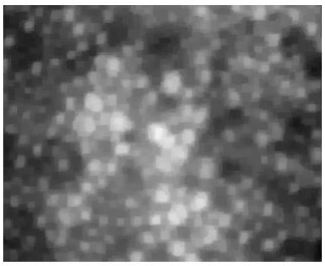


Exercici Cornea

```
I = imread("cornea.tif");
imshow(I);
```



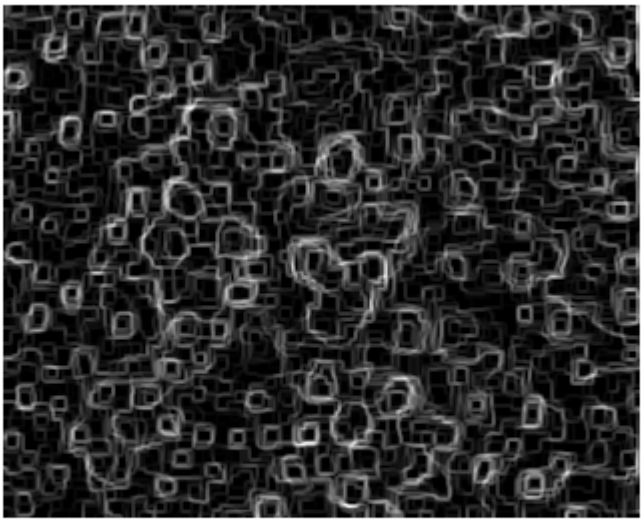
```
% filtrat

SE = ones(5, 5);
IO = imopen(I,SE); % open

IF = imclose(IO, SE); % filtre openclose

imshow(IF);
```



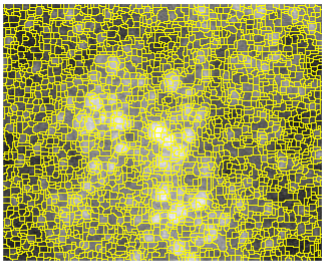
```
% màxims regionals
```

```
MR = bwdist(IF, "quasi-euclidean");
imshow(MR, []);
```

```
% SKIZ

SK = bwskel(not(MR));
SKIZ = bwmorph(SK, "spur", Inf);
SKIZ = SKIZ & not(bwhitmiss(SKIZ, [-1 -1 -1; -1 1 -1; -1 -1 -1]));

% imatge gradient
G = imgradient(IF);
imshow(G, []);
```



```
% Watershed
A = G;
WS = watershed(A);
IB = WS == 0;
RGB = imoverlay(I, IB);
imshow(RGB);
```



SEGMENTACIÓ PER COLOR

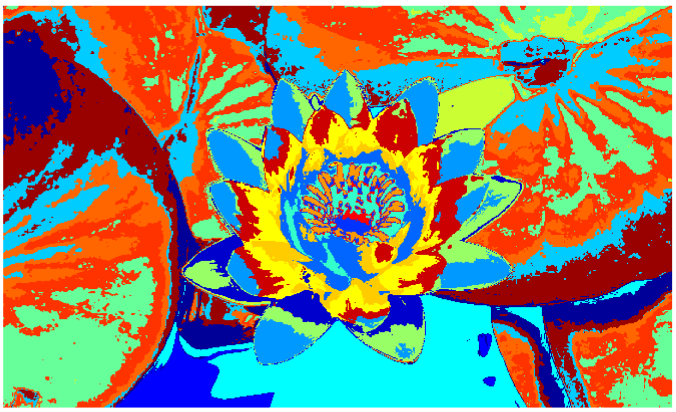
Simplificar el nombre de colors

```
I = imread("nenufar.jpg");
imshow(I);
```

```
[f,c,p] = size(I);
R = I(:,:,1);
G = I(:,:,2);
B = I(:,:,3);
O = [R(:), G(:), B(:)];
[C,Centroide] = kmeans(double(O), 20);
```

```
Warning: Failed to converge in 100 iterations.
```

```
C = reshape(C, [f, c]);
RGB = label2rgb(C);

imshow(RGB);
```



```
RGB2 = I;

for i = 1:f
    for j = 1:c
        rgb = Centroide(C(i,j),:);
        RGB2(i,j,1) = uint8(rgb(1));
```

```
        RGB2(i,j,2) = uint8(rgb(2));
        RGB2(i,j,3) = uint8(rgb(3));
    end
end

imshow(RGB2);
```