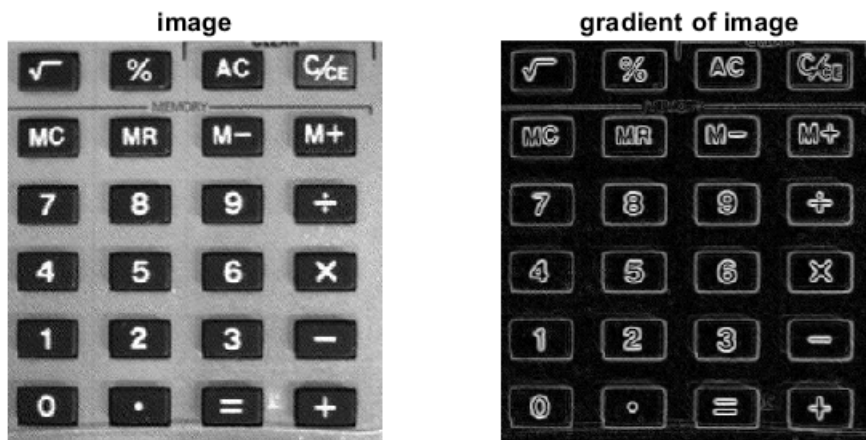


Práctica 7

Yimin Pan, grup 12

```
im = imread('calc.tif');
gmag = imgradient(im);
figure;
subplot(1,2,1); imshow(im); title('image');
subplot(1,2,2); imshow(gmag, []); title('gradient of image');
```



Making the foreground marker

```
se = strel('cube', 25);
Ie = imerode(im, se);
Iobr = imreconstruct(Ie, im);
figure; subplot(2, 2, 1); imshow(Iobr);
title('Opening-by-Reconstruction')

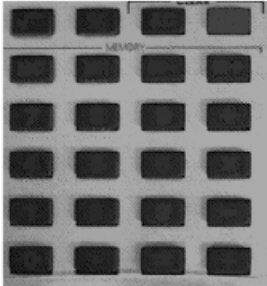
Iobrd = imdilate(Iobr, se);
Iobrcbr = imreconstruct(imcomplement(Iobrd), imcomplement(Iobr));
Iobrcbr = imcomplement(Iobrcbr);
subplot(2, 2, 2); imshow(Iobrcbr);
title('Opening-Closing by Reconstruction')

se2 = strel(ones(5,5));
fgm = imregionalmin(Iobrcbr);
fgm2 = imclose(fgm, se2);
```

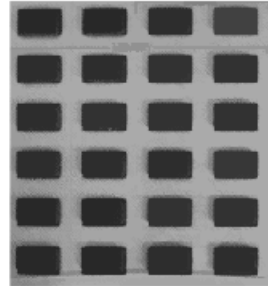
```
fgm3 = imerode(fgm2,se2);
fgm4 = bwareaopen(fgm3,20);
subplot(2, 2 ,3); imshow(fgm4);
title('Regional Min (foreground marker)')

I3 = labeloverlay(im,fgm4);
subplot(2, 2 ,4); imshow(I3);
title('Marker on Image')
```

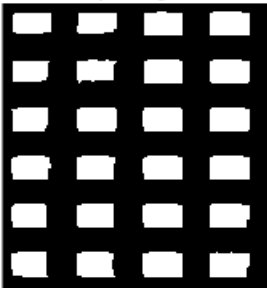
Opening-by-Reconstruction



Opening-Closing by Reconstruction



Regional Min (foreground marker)



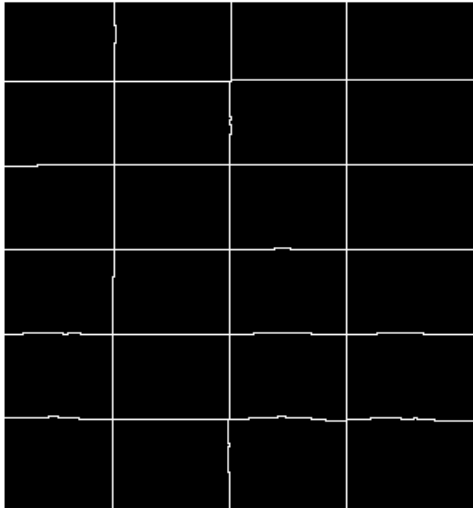
Marker on Image



Making the background marker

```
bw = imbinarize(Iobrcbr);
bw = ~bw;
D = bwdist(bw);
DL = watershed(D);
bgm = DL == 0;
figure; imshow(bgm); title('Watershed Ridge Lines (background marker)');
```

Watershed Ridge Lines (background marker)



Watershed with marker

```
gmag2 = imimposemin(gmag, fgm|bgm);  
L = watershed(gmag2);  
  
labels = imdilate(L==0,ones(3,3));  
C = [1, 0, 0];  
I4 = labeloverlay(im, labels, 'Colormap', C);  
  
figure; subplot(1,2,1); imshow(im); title('Image');  
subplot(1,2,2);imshow(I4); title('Image with the objects boundray marked')
```

Image



Image with the objects boundray marked

