TD2 - Mathematical morphology
Binary image filtering

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Objectives :

The two exercises illustrate the erosion, dilation, opening and closing operations. All tasks imply that you implement the methods using Matlab. In each task a number of appropriate commands will be suggested.
Exercice 1: 30min
Exercice 2: 15min
Exercice 3: 45min

Exercice 1 - Corner extraction by morphology

Corners are frequently employed in pattern recognition. They correspond to the pixels where the curvature is high, or in other words, they are the significant turns along the boundary of the considered shape. In this exercise, you are supposed to write a Matlab script to extract the corners of a binary shape. The input image is a binary image of a tree (tree.jpg), as shown in Figure 1.

Figure 1: A tree and its corners

⇒ Comment your choices (structuring elements, sequence of operations) and results.

Useful commands : strel, im2bw, imerode, imdilate, imopen, imclose

Exercice 2 - Segmentation of dashed lines

In this exercise, your goal is to remove the horizontal dashed lines and preserve the dashed lines with the direction 45°, as shown in Figure 2.

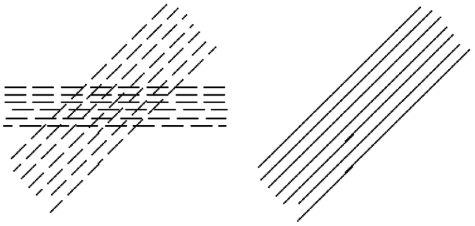

Figure 2: Initial image and the expected result.

Exercice 3 - Examen pratique 2010-2011

In this exercise, you are supposed to write a Matlab script to decompose a circuit board in its main parts, as shown in Figure 3. The input image is a binary image of a printed circuit board (circuit.jpg).

⇒ Analysing the geometry of the circuit board, determine appropriate structuring elements and operations to segment :

1. holes (yellow)
2. square islands (red)
3. circle islands (green)
4. rectangular islands (blue)

⇒ Provide one image per type of objects. Note that it is not mandatory to respect the object order given above.
⇒ Comment your choices (structuring elements, sequence of operations) and results.

Useful commands : strel, bwareaopen, imclearborder, imerode, imdilate, imopen, imclose

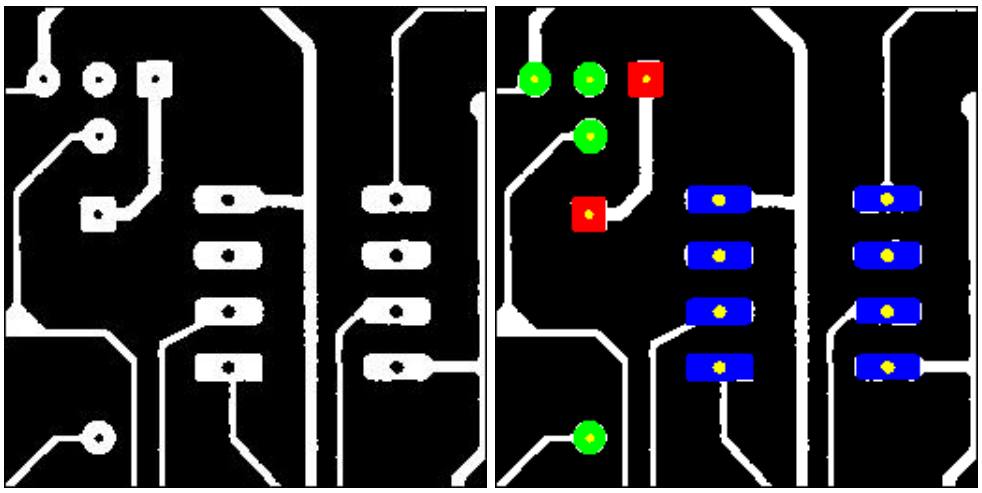

Figure 3: Circuit board and its main components