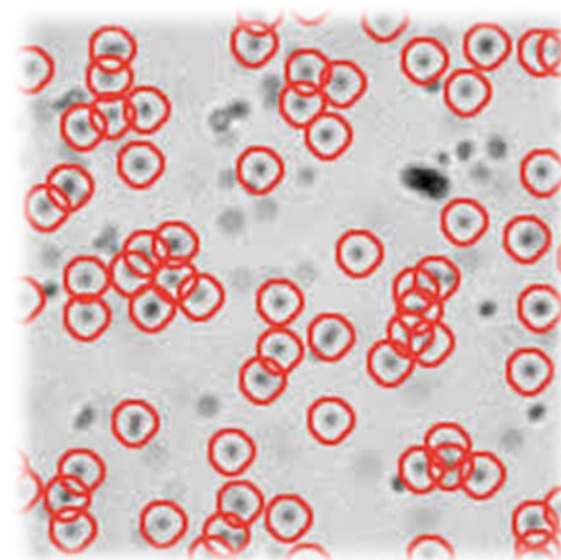- Exercise 2: Principle Basic Image Processing

- Introduction to concept of computer vision using OpenCV Linux computation
- Practical exercise with defect detection (in partnership with ext company)

- Basic computer vision introduction

- Principle : demo using OpenCV Linux

- Topics to cover the entire flow of defect detection :
- Image binarization
- Image centering
- Image filtering in 2D (sharpen/morphogy)
- Image feature extraction (blob / corner / contour)
- Image feature attributes (shape, position, number, color….)
- Image masking
- ……
- To Higher level image classification

- Basic computer vision introduction

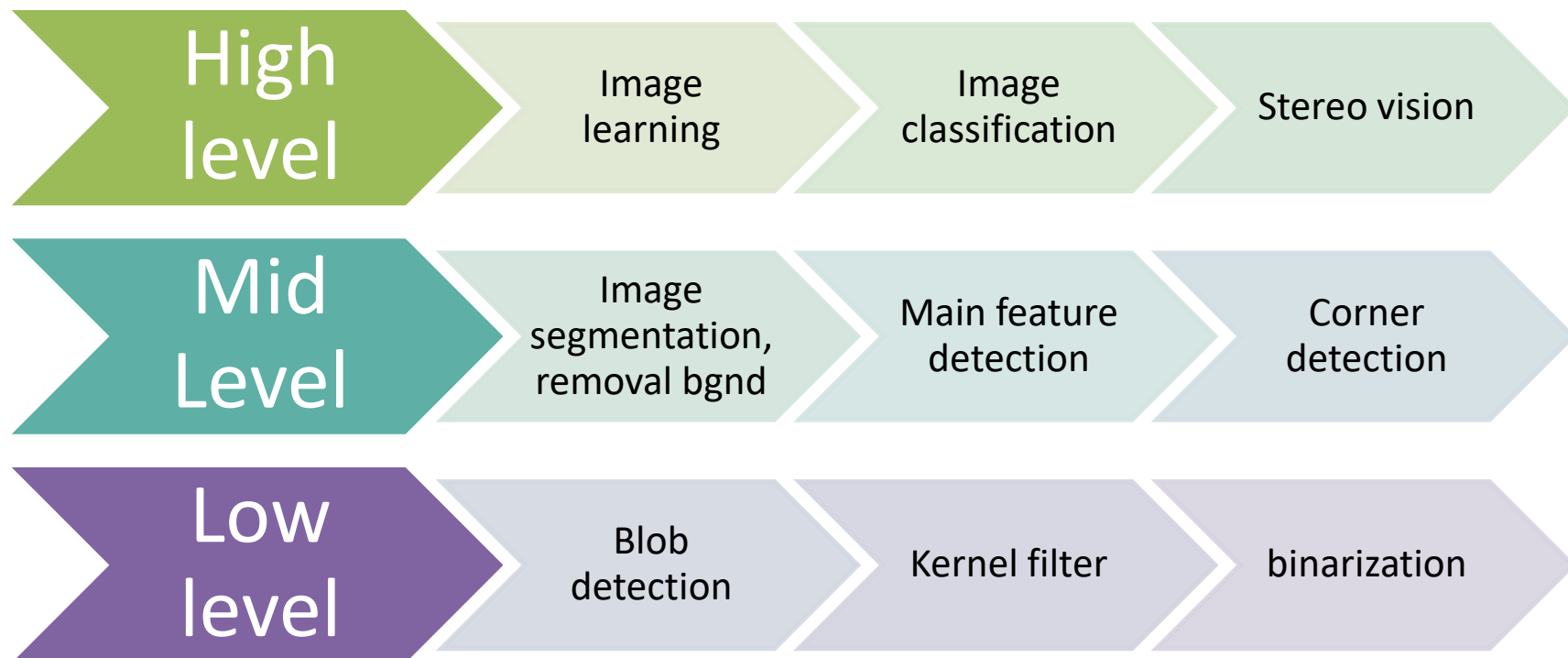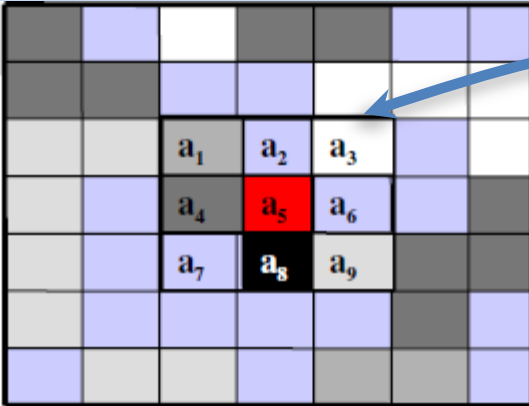- Principle : demo using OpenCV Linux

Magnetic agitator

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High level	Image learning	Image classification	Stereo vision
Mid Level	Image segmentation, removal bgnd	Main feature detection	Corner detection
Low level	Blob detection	Kernel filter	binarization

OpenCV python

Input image

Kernel grid

Output image
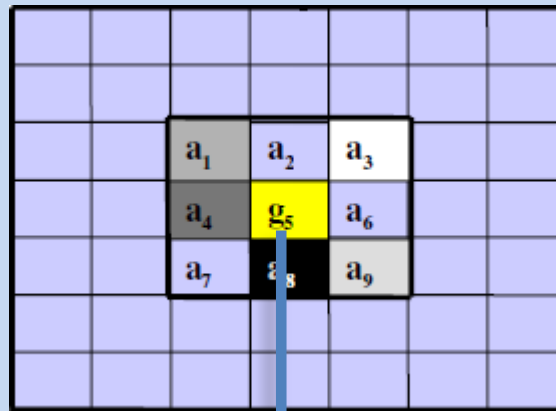
$$G_5 = (a_1 \times b_1) + (a_2 \times b_2) + \ldots + (a_9 \times b_9)$$
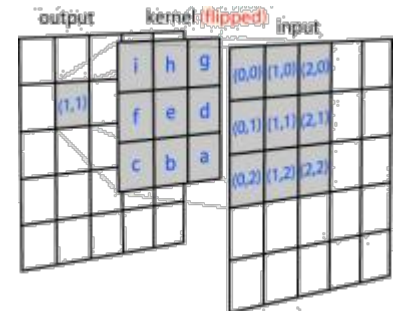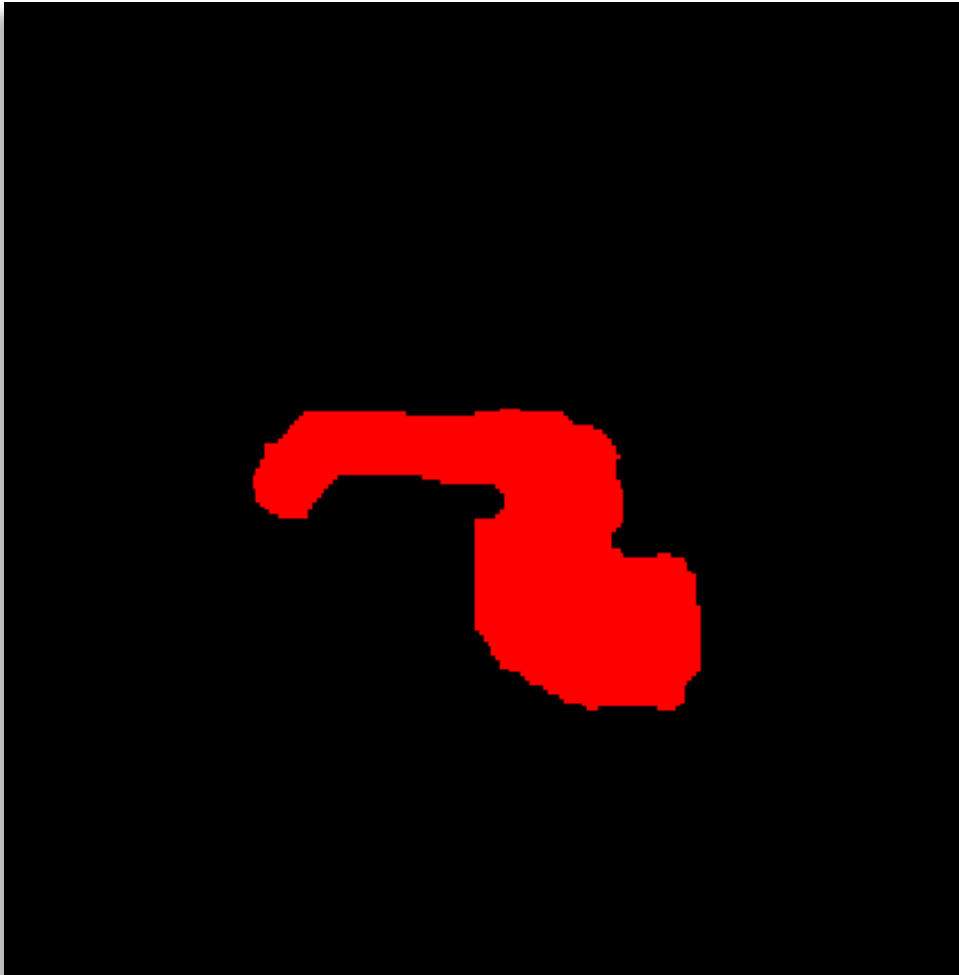
- ✓ **Area**
- ✓ Perimeter
- ✓ Convex hull
- ✓ Circularity
- ✓ Rectangularity
- ✓ Roughness/Compactness
- ✓ Width
- ✓ Height
- ✓ Length
- ✓ Principal/Secondary axis
- ✓ Principal axis angle
- ✓ Center of gravity
- ✓ …

✓ Area
✓ **Perimeter**
✓ Convex hull
✓ Circularity
✓ Rectangularity
✓ Roughness/Compactness
✓ Width
✓ Height
✓ Length
✓ Principal/Secondary axis
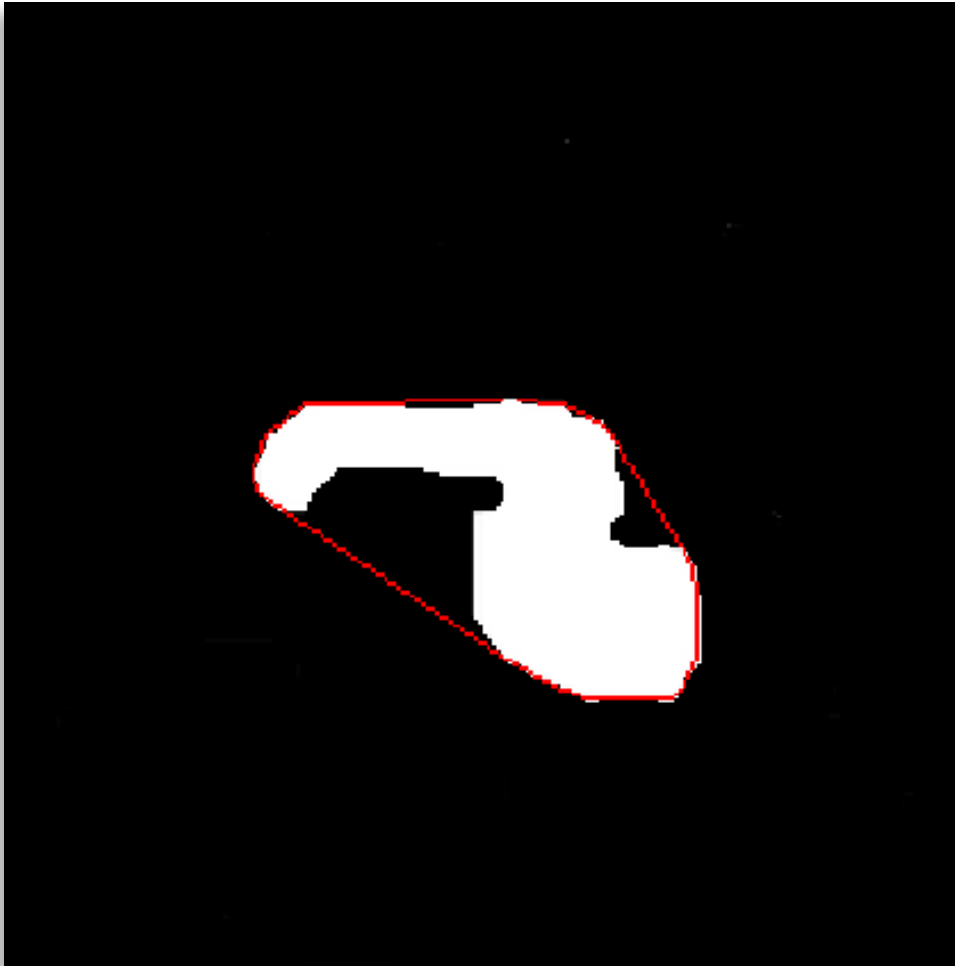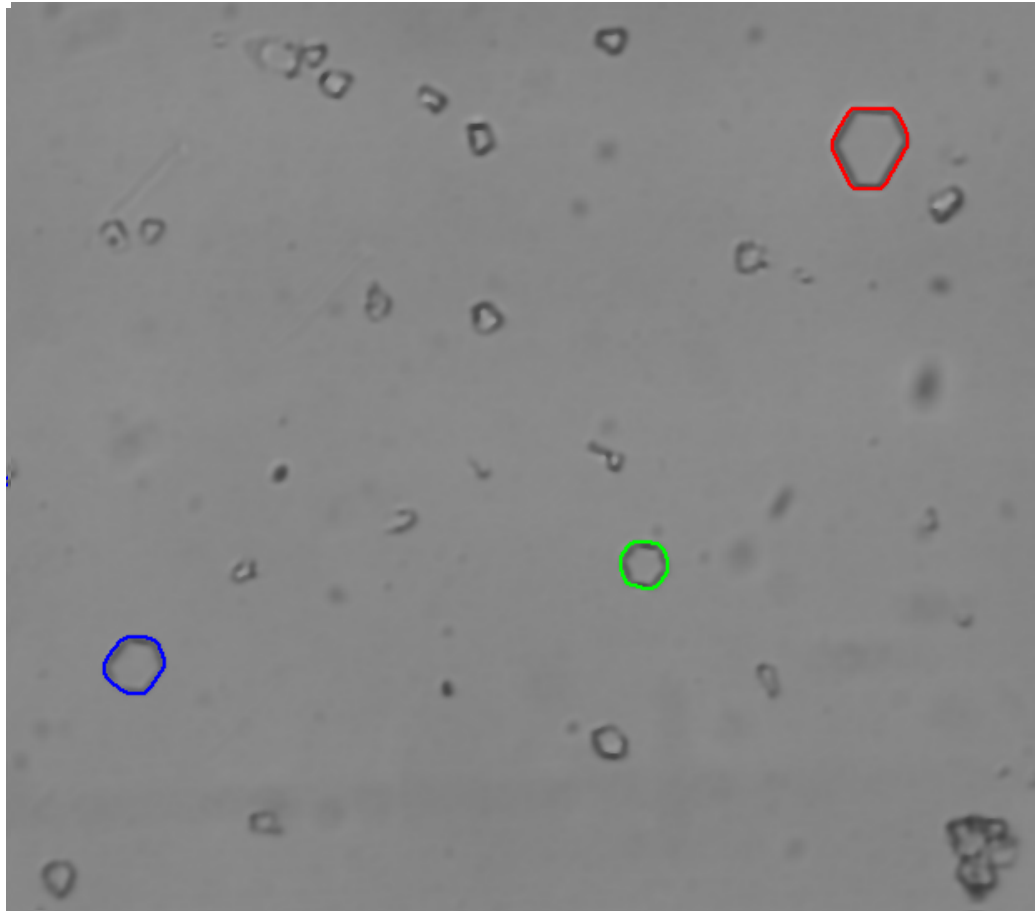✓ Principal axis angle
✓ Center of gravity
✓ ...

- ✓ Area
- ✓ Perimeter
- ✓ **Convex hull**
- ✓ Circularity
- ✓ Rectangularity
- ✓ Roughness/Compactness
- ✓ Width
- ✓ Height
- ✓ Length
- ✓ Principal/Secondary axis
- ✓ Principal axis angle
- ✓ Center of gravity
- ✓ ...

8
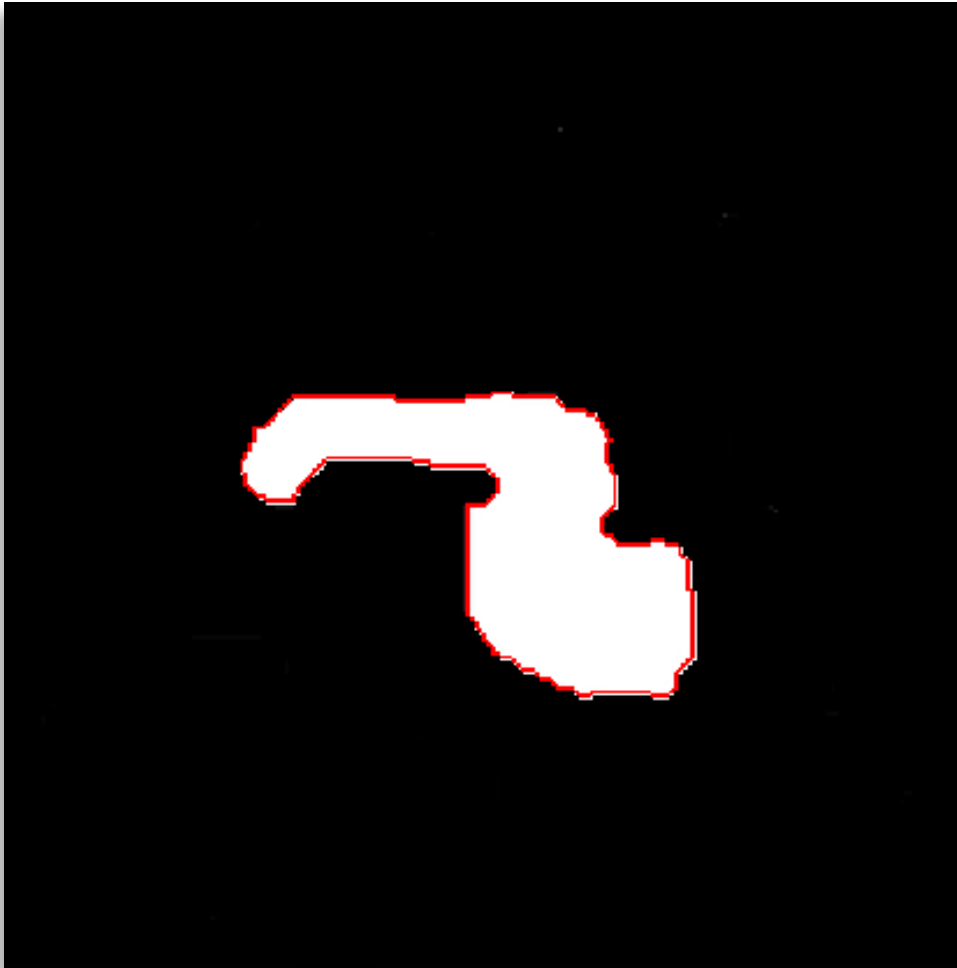
Objective: locate hexagonal crystals in the image

Step 1: extract blobs without any restrictions

Step 2: filter blob with a criteria on area. Only blobs with an area in a given range are kept.

Step 3: filter blob with a criteria on entropy. Only blobs with an entropy in a given range are kept. Entropy measure consists in a statistical analysis of the gray level inside a blob.

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EXERCISE 2

- Based on the script demo about basic computer vision

Can you describe in sub groups the main steps to program to identify cracks inside a Syringes 1,5ml filled at 0,5ml with a heavy dense suspension viscosity 1?

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