

### VC. Exercise 1.1.

#### Image Segmentation: Histogram thresholding.

- 1) Given the image in Fig. 1:
  - i) Calculate its histogram from scratch and make its plot with the pyplot package.
  - ii) Do the same as i) by using the “seaborn” package for all.
  - iii) Obtain a smoothed version of this histogram by using KDE from the “seaborn” package.

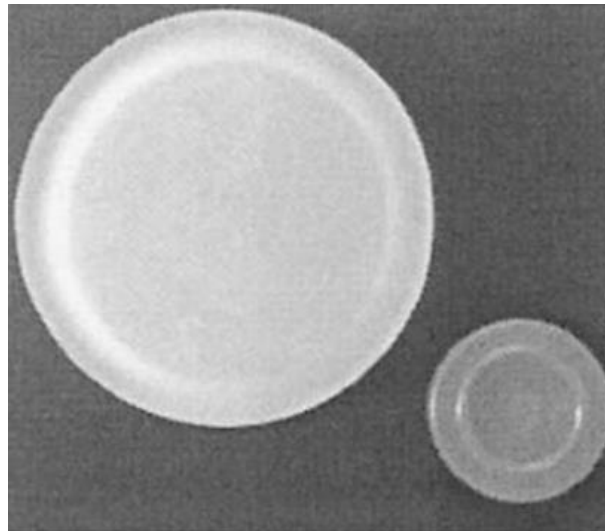


Figure 1

- 2) Given the image in Fig. 1, implement a multilevel threshold algorithm, for  $N$  different levels separated in the output image a distance  $inc$ .

3) Given the image in Figs. 2 and 3:

- i) Check the bimodal distribution of their pixels.
- ii) Perform the segmentation of the object (whitest part of the image), by using the Otsu method.
- iv) Do the same as ii) by using implementing the Otsu method from the scratch, and compare the results obtained.
- iii) Represent in a figure (superimposed) the plots corresponding to the smoothed histogram and the inter-class variance.
- iv) Save the resulting image for future use.



Figure 2



Figure 3

**Note.-** each team of students has to bring a zip file called *lastName1\_lastName1\_VC\_1.1.zip*, to the following address:  
[pablogtahoces@gmail.com](mailto:pablogtahoces@gmail.com).

The subject of the e-mail should be: VC\_E1.1. Inside the zip should be included:

- A jupyter notebook, showing how the software works (see the example).
- An html file of the notebook.
- The .py files with the python functions that were created.
- All the necessary files to verify the correct operation of the application.

**Deadline → December 13, 10:00**