

## IMAGE PROCESSING

### LABORATORY 1 ( in groups of maximum 2 students)

This activity will be graded on Thursday 14-02-2019

#### Requirements

- Review [OpenCV Tutorial C++](#)
- Install OpenCV
- Perform the class activities ([Download image examples](#))

#### Activities:

- a.) **(5 points)** Read the "Cameraman.jpg" or "lena.jpg" image.
- a.1) Show the original image and the images that correspond to each bit-plane. Show the images together on one window.
- a.2) Then reconstruct the original image by approaching it with the bit plane images starting from the most important bit image and adding the image of the most important bit and so on. Show the images together on one window.
- b.) **(5 points)** Read the "Cameraman.jpg" or "lena.jpg" image. Apply a Piecewise-Linear Transformation to the image and show on one window the original image and the image result of the transformation (**You can apply any piecewise-linear operation**).  
Note: You could review the SAUCE code [View algorithm](#)

$$\begin{aligned}a(x,y) &= g(x,y) - \frac{d}{2} \\ b(x,y) &= g(x,y) + \frac{d}{2} \\ g(x,y) &= I(x,y) * G(x,y) \\ G(x,y) &= \frac{1}{2\pi\sigma^2} e^{-\frac{x^2+y^2}{2\sigma^2}} \\ \hat{I}(x,y) &= \begin{cases} 0 & I(x,y) < a(x,y) \\ 1 & I(x,y) \geq b(x,y) \\ \frac{(I(x,y) - a(x,y))}{d} \times 1, & \text{otherwise} \end{cases}\end{aligned}$$