

IMAGE PROCESSING  
SPECTRAL FILTERING  
LABORATORY 4 ( groups of maximum 2 students)

Requirements

- Review [OpenCV Tutorial C++](#)
- OpenCV
- Perform the class activities

Activities:

a.) **(4 points)** **This activity will be graded on Friday 15-03-2019**

Filter the image "Lenna.jpg" with a low pass filter and a high pass filter in the frequency domain (you should select any kind of filter).

- a.1) Get Fourier transforms of the filter and image, multiply them and reverse the effect on the field.
- a.2) Show the measure of the centered DFT of the filter and the filtered image.
- a.3) Apply the same filters on the spatial domain.
- a.4) Display on the screen all results.

b.) **(4 points)** **This activity will be graded on Friday 15-03-2019**  
Read an image with error pattern.

- b.1) Create a GUI to select a pixel on the screen (spectrum image)
- b.2) Select the undesirable pixels on spectral image in order to build the filter/mask which allows delete that "wrong" information.
- b.3) Apply the filter and display all results.

c.) **(4 points)** **This activity should be written on a document and included in the .zip file of this lab on Friday 15-03-2019**

Demonstrate the Periodicity of the DFT

- In two dimensions:

$$f[m,n](-1)^{m+n} \Leftrightarrow F(k-M/2, l-N/2)$$

and  $F(0,0)$  is now located at  $(M/2, N/2)$ .

Note: You could find some information on page 259 (R. Gonzalez and R. Woods. Digital Image Processing, Prentice Hall, 3<sup>rd</sup> edition)