## Aula Prática 5

## Docente: Miguel Tavares Coimbra

## 1. Edge detectors

- Implement a *Sobel* edge detector
  - i. Create the two required masks, one to estimate Gx, and another to estimate Gy.

-1	0	1		-1	-2	-1
-2	0	2		0	0	0
-1	0	1		1	2	1
Sobel - Gx				Sobel - Gy		

- ii. Obtain, for each pixel, the magnitude of the gradient.  $|G| \approx |Gx| + |Gy|$
- iii. Visualize the result in a spatial image format (i.e. display it as values between 0 and 255 for each pixel).
- Implement other edge detector filters.
  - i. Sobel 5x5
  - ii. Laplacian
  - iii. LoG operator
  - iv. Difference of Gaussians



**Figure 1** – Results after applying a 3x3 Laplacian filter to the *lena.jpg* image. Constrast-stretching was used for clarity. Was is the cause for the 'little squares' effect? (Hint: Read the slides on image compression)

## 2. Erosion and Dilation

- Create two morphological filter functions that operate on binary images: *Erosion* and *Dilation*. Use a 3x3 *kernel* as shown in Figure 2.
- Apply these function to image *Imagem\_AP5\_2*, which is the results of the segmentation of image *Imagem\_AP5\_1*, degraded by salt and pepper noise.
- [Optional] Make your functions more flexible, by allowing them to receive an additional parameter with the operating *kernel*.



c) Erosion

 1
 1
 1

 1
 1
 1

 1
 1
 1



Figure 2