# Vision and Perception

**Second Part of the course on Image Processing**

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**List of exercises**

1. Do some warm up exercise, it is not required to report them.
2. Find out if circle and ellipse are separable as filters.
3. Given two images A and B do the Fourier transform of them, show the spectrum then try to reconstruct an image using the phase of A and the magnitude of B.
4. Given an image A use the convolution with the LoG filter to obtain the edges of the image, do the same using the Sobel filter and the Laplacian.
5. Take an image, transform it into a gray image. Lower its resolution, applying also a Gaussian filter so that the intensity value is reduced. Implement the histogram equalization, note that it amounts just to compute the formula (*) reported in slide 7 of Video Histogram and Entropy. Show the intensity values of the probabilities before and after in a table. Compute the entropy of the image, before and after the equalization.
6. Is the Harris corner detection invariant with respect to affine transformations and intensity? Tell in three words when a region of an image should be considered salient.
7. Blend two images. Use skimage.transform and only $pyramid\_expand$ and $pyramid\_reduce$. You can generate the mask interactively. For those who are interested in blending try to do it pseudo automatically, and give criteria.
8. Compute $H(Y|X)$ in bits recalling $p(x|y)p(y) = p(x, y)$