Digital Image Processing & Pattern Recognition
UPEC - Optics, Image, Vision and Multimedia

1. Image distance

1.1 Use the example given in *bwdist* function to compare the 2-D distance transforms for each of the supported distance methods.

1.2 Construct the distance transform for the image '*leaf*' for each of distance methods. What about the robustness to noise using '*leafnoisy'* image?

2. Arithmetic operations

2.1. Implement a simple code to find the differences between two images. See the operator – between images, without any loop. Use it with images '*original'* and '*original2'*. Comments with the visual inspection... How then to count these five "errors"? It is not necessary to precisely do it, just assume the eventual problems and how to implement it.

2.2. Make now the difference between '*chroOp'* and '*chroL'*. According to you, what kind of information is in that way highlighted? Try to mask the original image *'chro'* with these results in color in order to highlight particular parts of objects directly. The image '*result'* is the good one… *cat* function can be used if necessary to create 3 planes image from one with only 1.

3. Convolution

Define a signal f and convolve it with itself to get g. Repeat this procedure three times and plot your results.
Now, define a Gaussian convolution kernel (look at function *fspecial*) and convolve an image with the defined convolution kernel (look at function *conv2*). Test what you will obtain if you convolve the image with itself. Justify your observations.

4. Dirac Delta Exercises

1) $\int_{-\infty}^{+\infty} \delta(x) f(x) dx$

2) $\int_{-\infty}^{+\infty} \delta(g(x)) f(x) dx$

3) $\int_{-\infty}^{+\infty} \delta(ax - bx^2) f(x) dx$

4) $\int_{-\infty}^{+\infty} \delta(x^3 - x) e^{-x} dx$