

ASSIGNMENT 6: FOURIER DESCRIPTION

(2022)

For this assignment you must write a short report in any word processor of your choice (MSWord, Latex,) where you explain your methods and show your results. All input and output images must be shown (preferably so that they can be compared on the same page). PLEASE print you images fairly large. The SunLearn grading system has no magnification option, and small images make it difficult to assess your work.

Add the code in an Appendix.

- 1 Take the image `canadaflag.jpg` as well as each of the images `mapleleaf???.jpg` and binarize them suitably (i.e. convert to monochrome and threshold).

The stems of the leaves will prove to be a nuisance in the rest of the application. Find an automatic way to get rid of them (i.e. to clip them). Then obtain the edge of the leaf. You may use the code `TraceEdge.m` that is supplied. Then write a program that will equi-distribute N points on the boundary of the leaf. (MATLAB has a function `interp1`, that may be handy in this regard.) If one wants to do Fourier description on the boundary, $N = 128$ is a suitable number of points.

Next, apply Fourier description to each of the leaves and compare each with the symbolic leaf on the flag. You must therefore come up with a quantifier that says how close each leaf is to the symbolic leaf, regardless of position in the frame, size, or orientation. Choose your own number of modes to retain. Also devise your own way to rescale to the size of the symbolic leaf.

Then use some value derived from these operations and sort the 10 leaves in the order 'best fit first', and present your results suitably.
