ECE 4310/6310 Introduction to Computer Vision

Lab #1 – Convolution, separable filters, sliding windows

In this project each student must implement three versions of a 7x7 mean filter. The first version should use basic 2D convolution. The second version should use separable filters (1x7 and 7x1). The third version should use separable filters and a sliding window.

Any pixel for which the convolution extends outside the image boundary (sometimes called "edge cases") should be given an output value of zero.

All three versions of the filter should produce the exact same output. This must be verified by comparing the images using "diff" or a similar program and showing the method used and result.

Each version of the filter should be timed, and the typical amount of time reported (for example, the average amount of time over ten runs).

C-code for smoothing a 512 x 512 image is posted at the class website. The program contains code demonstrating a 3x3 mean filter using basic 2D convolution, and how to time a piece of the program. You can use this code to derive a solution to this lab.

You must write a brief report that verifies result similarity between the 3 versions, and summarizes and compares the amounts of time each version of the filter takes.

Submit your C-code and report to Canvas. The submission is due by midnight of the due date.