ECE 6310 Introduction to Computer Vision

Fall 2020

Lab 1 – Convolution, separable filters, sliding windows

Submitted By –

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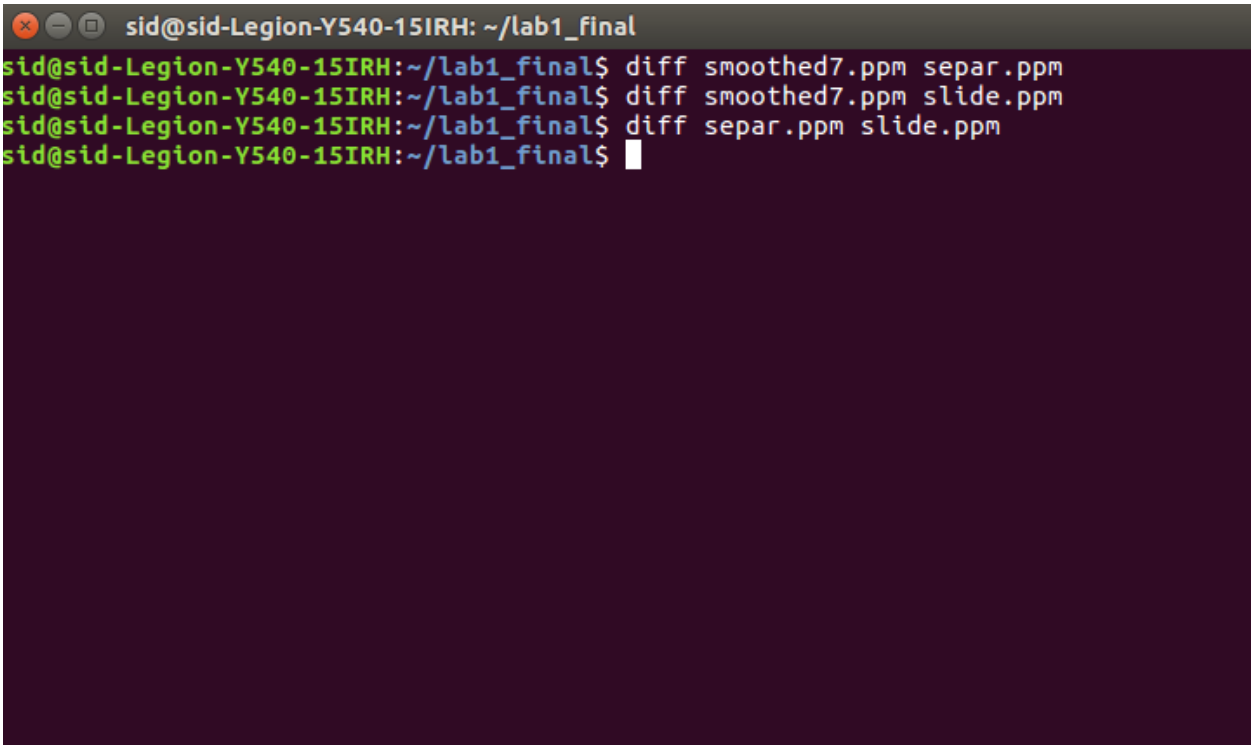
Results Comparison:

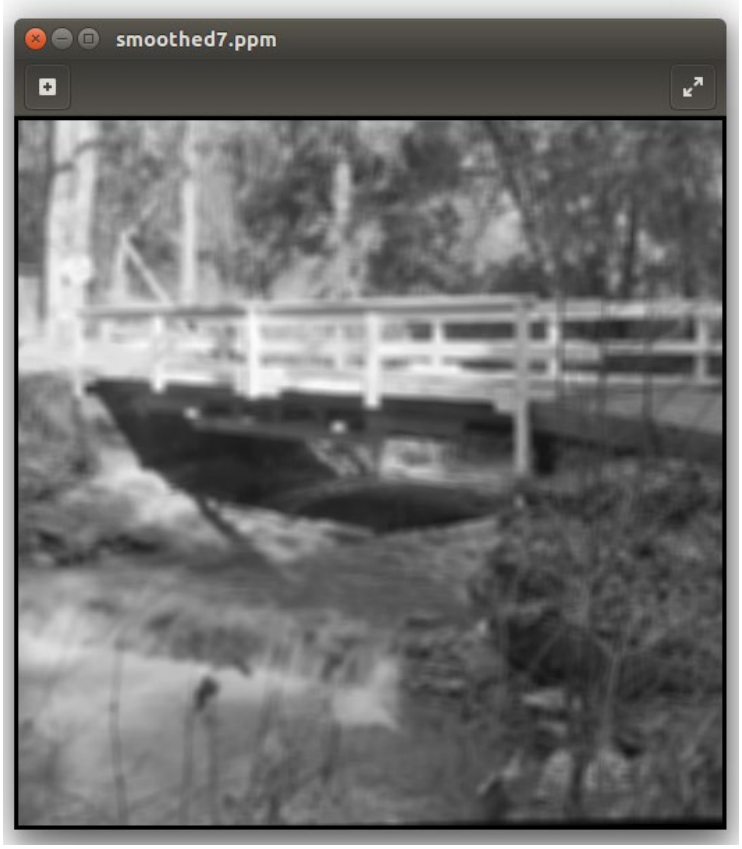
The three codes for this lab are named as follows:

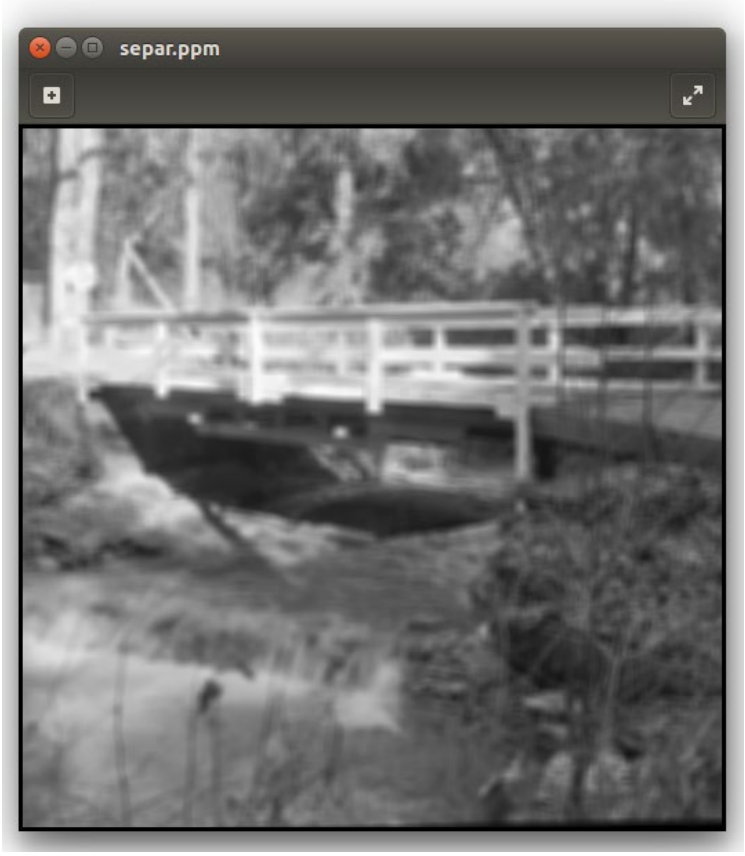
- Basic 2D convolution, 7x7 mean filter – **smooth7.c**
- Separable filter – **separ.c**
- Separable filter and sliding window – **slide.c**

The three images generated from the above three codes are similar and was verified using ‘diff’ function as shown in image below.



It can also be verified by looking at the three images generated by the three codes.


smoothed7.ppm


separ.ppm

Time Comparison:

All three versions/codes ran ten times each and an average of their timings were taken. It was observed that the second code is faster than the first code because it has a time complexity of second version is $O(n^3)$ in contrast to the first code's time complexity of $O(n^4)$. It is because instead of four nested for loops that are running in first code, we are running three nested for loops in second code.

However, the third code is the fastest of all the three versions. Although it has three nested for loops as compared to second code, the for loop that controls the kernel on image runs only once for each row and column.

The resulting times for each version are shown in the table below.

	smoothed7.ppm		separ.ppm		slider.ppm
	26682606		11530607		7215127
	26828924		11110830		6997778
	26975659		11909786		6212752
	26643946		11287701		5849289
	26862905		11673013		7552574
	26044660		12034200		7361785
	25687842		11618454		4960763
	25761133		11260828		5331554
	26119816		11309588		6987533
	26139314		11605247		7188952
Average Time (nanosecond)	**26374680.5**		**11534025.4**		**6565810.7**