ECE 6310 – Introduction to Computer Vision – LAB 1 REPORT

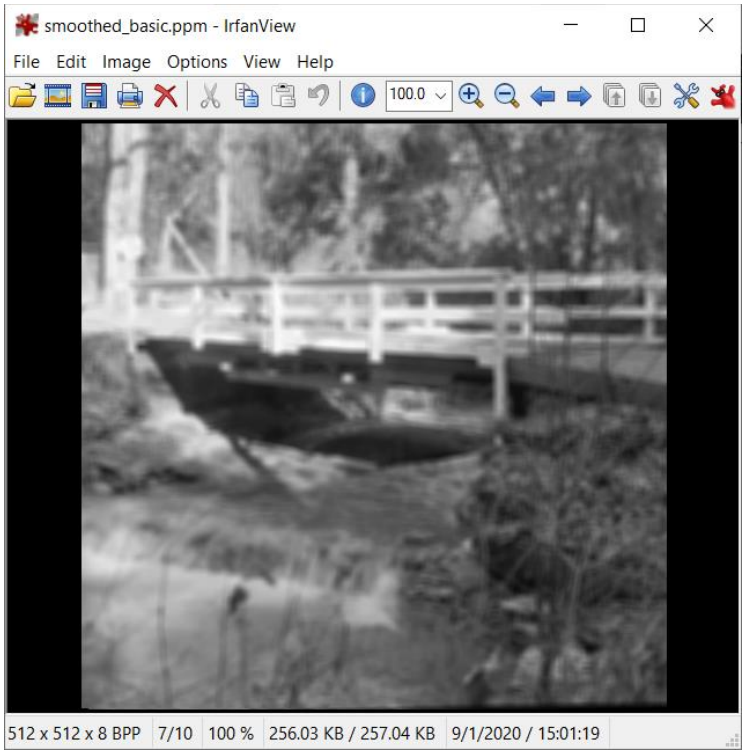
Convolution and Timing

TASKS

- Use 7x7 mean filter, perform regular 2D convolution
- Use 1x7 and 7x1 separable filters to perform two 1D convolutions and obtain the same output
- Use separable filters and sliding window to obtain the same output
- Use diff to compare output images

Basic 2D Convolution

Output Image:



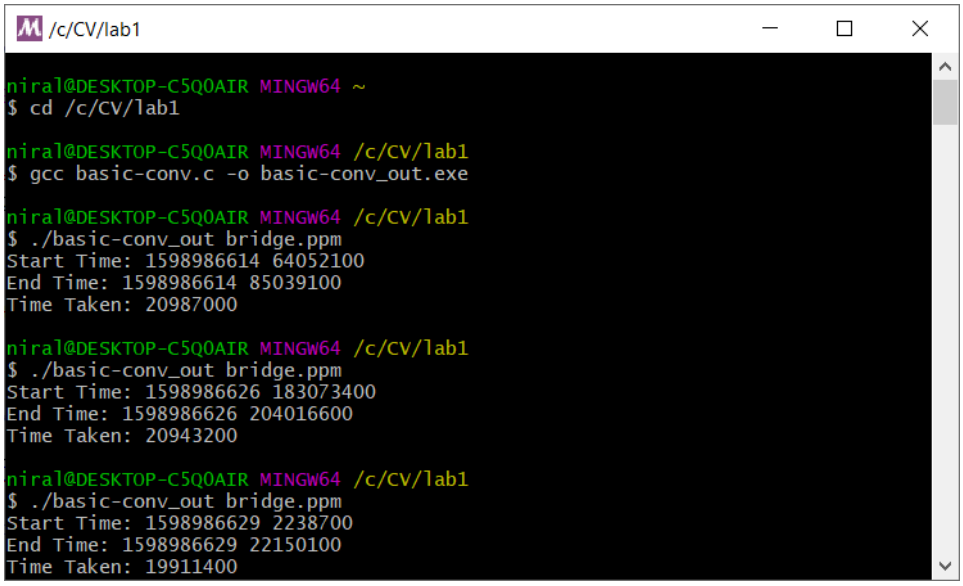
Average Time Taken:

21254990 nsec

Measurements:

20987000	21942300
20943200	19986100
19911400	26927100
19985600	20951700
19972100	20943400

Sample:



Separable Filters

Output Image:

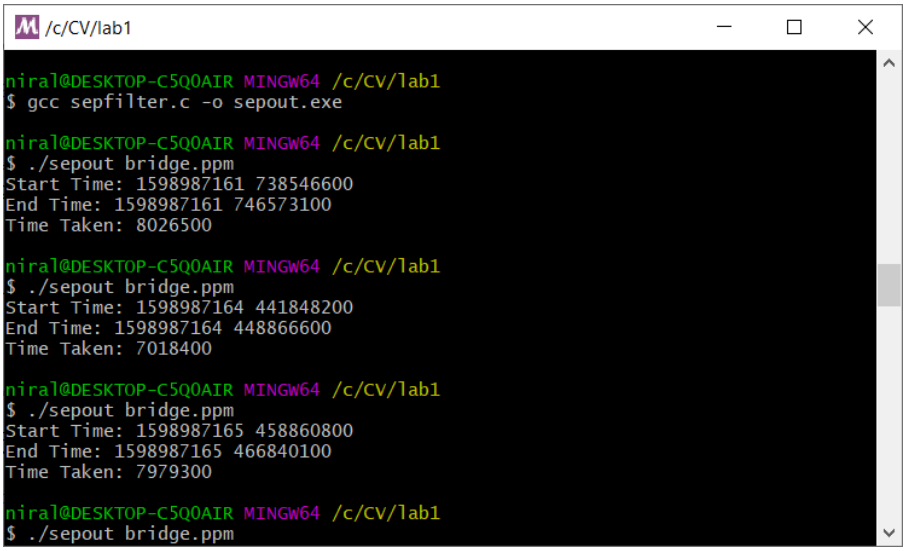
Average Time Taken:

8102110 nsec

Measurements:

8026500	8023400
7018400	9009100
7979300	6981500
8990500	8012800
8003600	8976000

Sample:



Separable Filters with Sliding Window:

Output Image:

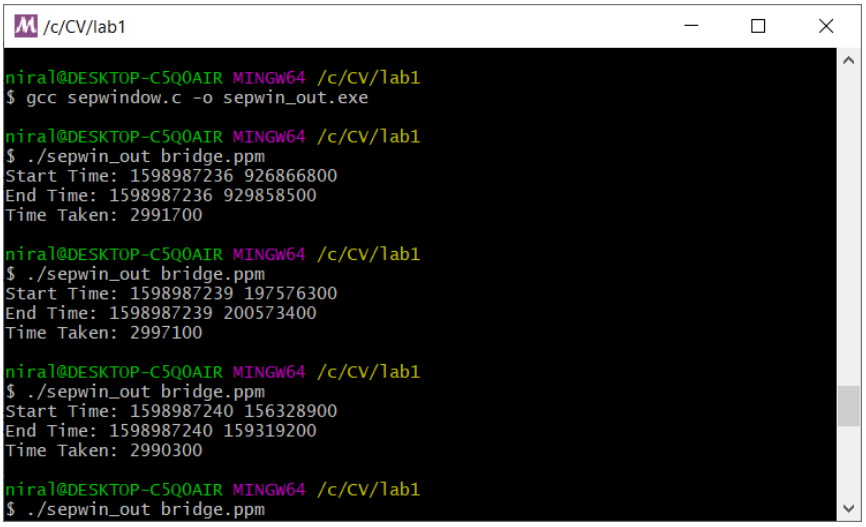
Average Time Taken:

2998780 nsec

Measurements:

2991700	3003100
2997100	2991800
2990300	4035700
3037500	2957400
2025300	2957900

Sample:

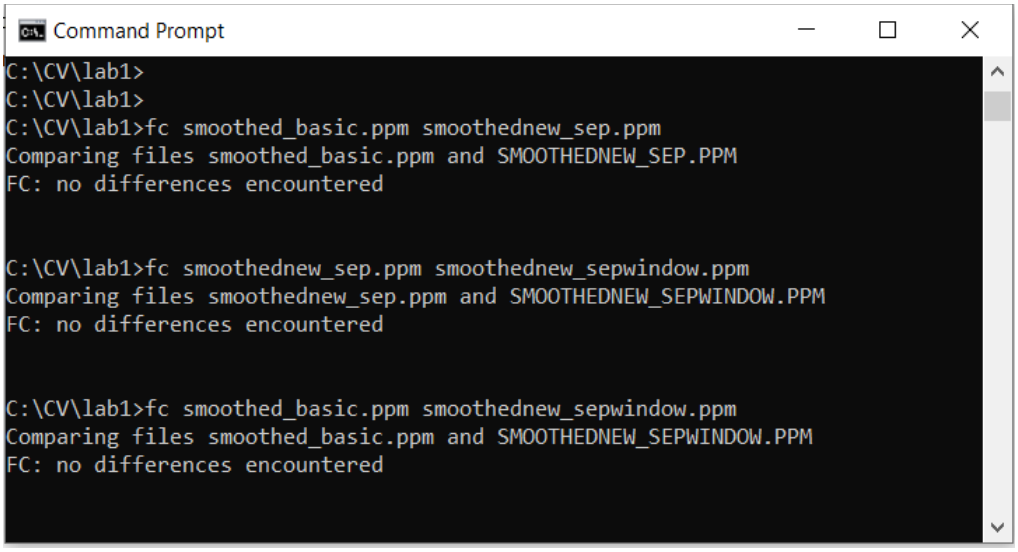


Comparing the Average Time Taken:

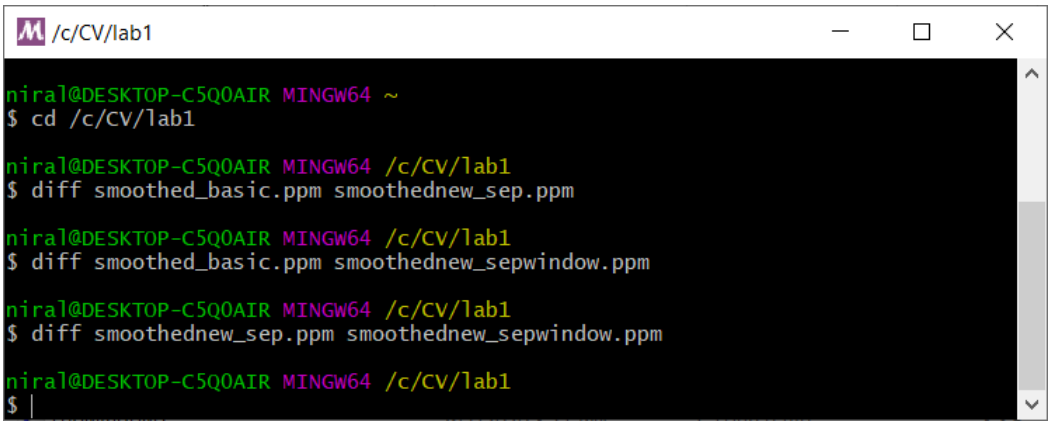
Basic 2D Convolution	21254990 nsec	takes most amount of time
Separable Filters	8102110 nsec	takes lesser time
Separable Filters with Sliding Window	2998780 nsec	takes the least amount of time

Comparing the Output Images

Using fc command on the cmd:



Using the diff command on msys2 Shell:



Difficulties Encountered and Fixes

1. Indexing – Not indexing properly in the separable filters with sliding window produced a very noisy image with little resemblance to the original image. Fixed by switching the outer for loop and inner for loop while convolving vertically.
2. Rounding – Occurred because of difference in division. One was directly divided by 49 while the other was divided by 7 twice. Fixed by storing the entire sum in an int array and producing the smoothed image by directly dividing joint sum by 49.