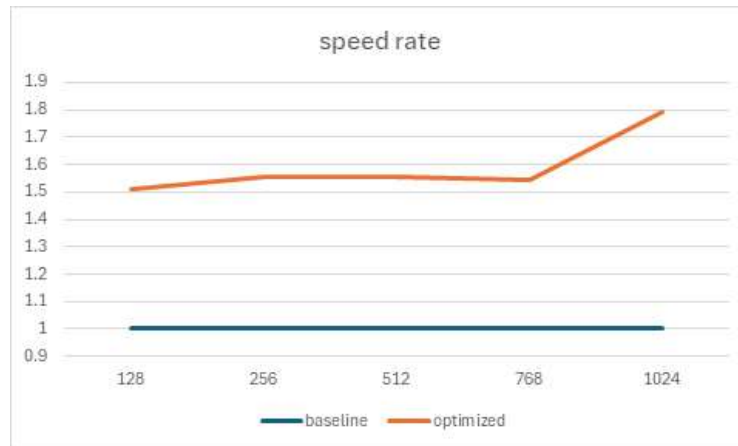


CSE306 assignment 2 report

201911006 강준서

[First Section - Implementation Result]

The graph shows the value of measuring the speed of “filter_optimized” that I implemented. We can see that all bmp files show better speed than “filter_baseline”.



[Second Section - Optimization Approaches]

1. Remove memory allocation/release: In the “filter_baseline” function, “malloc”, “free” were repeatedly used for each pixel. We saw that unnecessary memory allocation/release occurred here. In fact, “malloc”, “free” are relatively slow operations because each of them allocates and releases heap area of memory. On “malloc” calls, the operating system generates significant overhead to find and allocate requested memory blocks. “free” is a function of dynamically releasing allocated memory, which returns memory blocks to the memory management system, causing overhead as well. So I removed them and changed them to save the result directly in the output array.

2. Conditional statement optimization: The conditional statement was changed to a three-term operator for increased readability. It also reduces the amount of code stored in memory because it reduces the amount of code compared to when using if, else if statements. I expected a slight performance improvement.

3. Instead of setting the initialization of the pixel structure to 0 using memset, I replaced it with a value assignment immediately. This was expected to reduce unnecessary operations.

4. Reduce redundant calculations: Two variables, “filter_index” and “pixel_index”, were defined separately in the loop to be calculated in advance. I expected to make the code efficient because this reduces redundant calculations.

(Exception) I modified the range of dx and dy from -1 to 1 in the inner loop to increase the readability of the code. I expected this would prevent me from checking the conditions again, but I found that it didn't really make that much difference in machine language.

Through these processes, I optimized “filter_baseline”, which is a success because it showed a faster speed, an improved speed, as shown in section 1.