Report

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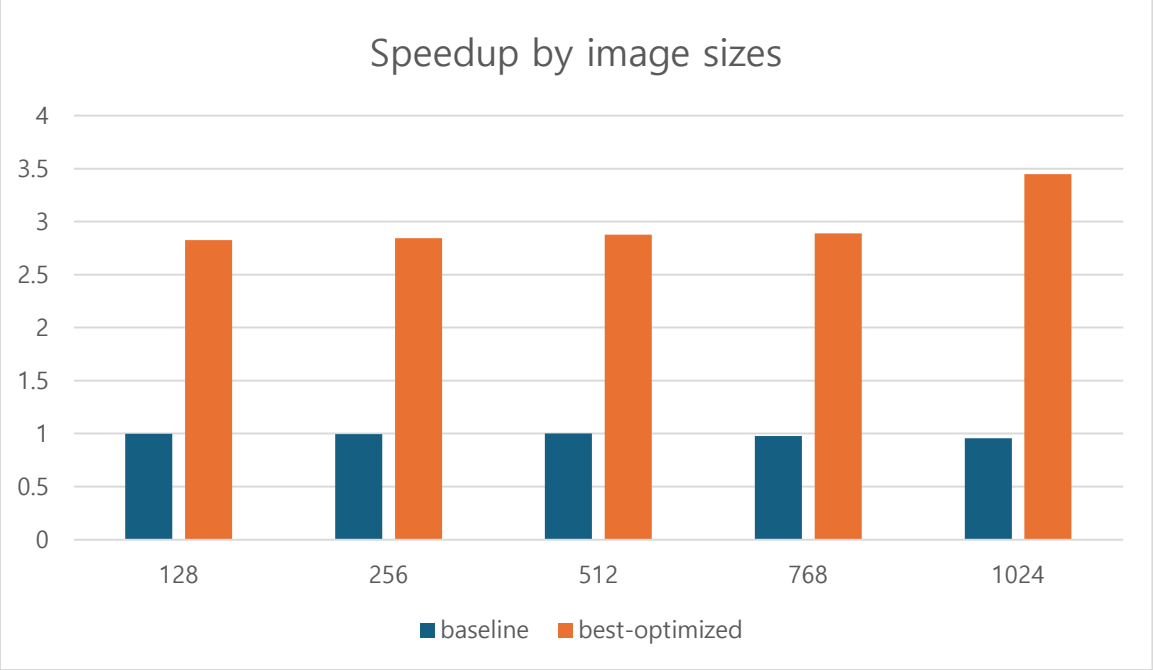
First section

- Implementation results: the speedup of my best implementation for various image sizes as compared to the provided baseline.

Size	128	256	512	768	1024
Baseline	0.996776	0.993721	1.001871	0.977197	0.954298
Best-optimized	2.825209	2.841978	2.875413	2.888804	3.446711



Second section

- my optimization high-level strategy with evaluated results. (speedup achieved by each strategy also failed, figures and/or graphs).

1. baseline

Size	128	256	512	768	1024
Speedup	0.996776	0.993721	1.001871	0.977197	0.954298

2. incorporation of the convolution() function into the filter_optimized() function

Size	128	256	512	768	1024
Speedup	0.998629	0.996014	1.156352	1.240800	0.991507

3. +no malloc

Size	128	256	512	768	1024
Speedup	1.174424	1.146037	1.148350	1.155570	1.215841

4. + share common subexpressions

Size	128	256	512	768	1024
Speedup	1.403390	1.386440	1.385557	1.368145	1.379964

5. + eliminate unused headers

Size	128	256	512	768	1024
Speedup	1.423614	1.363531	1.374093	1.401059	1.386712

6. + cache friendly

Size	128	256	512	768	1024
Speedup	1.422218	1.436224	1.431014	1.442279	1.610900

7. + loop unrolling

Size	128	256	512	768	1024
Speedup	1.979207	2.025286	2.058316	2.023080	2.262312

8. + array index to pointer

Size	128	256	512	768	1024
Speedup	2.438818	2.484210	2.511487	2.523500	2.714429

9. + moving code out of loop

Size	128	256	512	768	1024
Speedup	2.599292	2.479771	2.517962	2.522717	2.847526

10. + casting

Size	128	256	512	768	1024
Speedup	2.616811	2.780027	2.682350	2.636082	3.193843

11. + extra unrolling (final)

Size	128	256	512	768	1024
Speedup	2.825209	2.841978	2.875413	2.888804	3.446711

1. It is literally baseline.
2. The two functions were integrated into one, and overlapping variables were summarized.
3. The process of allocating memory was removed.
4. The common part was declared as a new variable.
5. The unused header was removed.
6. The loop of x and y was swapped.
7. Unrolling was performed according to the values of dx, dy. (11 too)
8. The array was replaced with a pointer.
9. Variables such as yWide were taken out of the loop.
10. Changed double to float.