

CS 575 -- Spring Quarter 2017

Project #7B

Autocorrelation using CPU OpenMP, CPU SIMD, and GPU OpenCL

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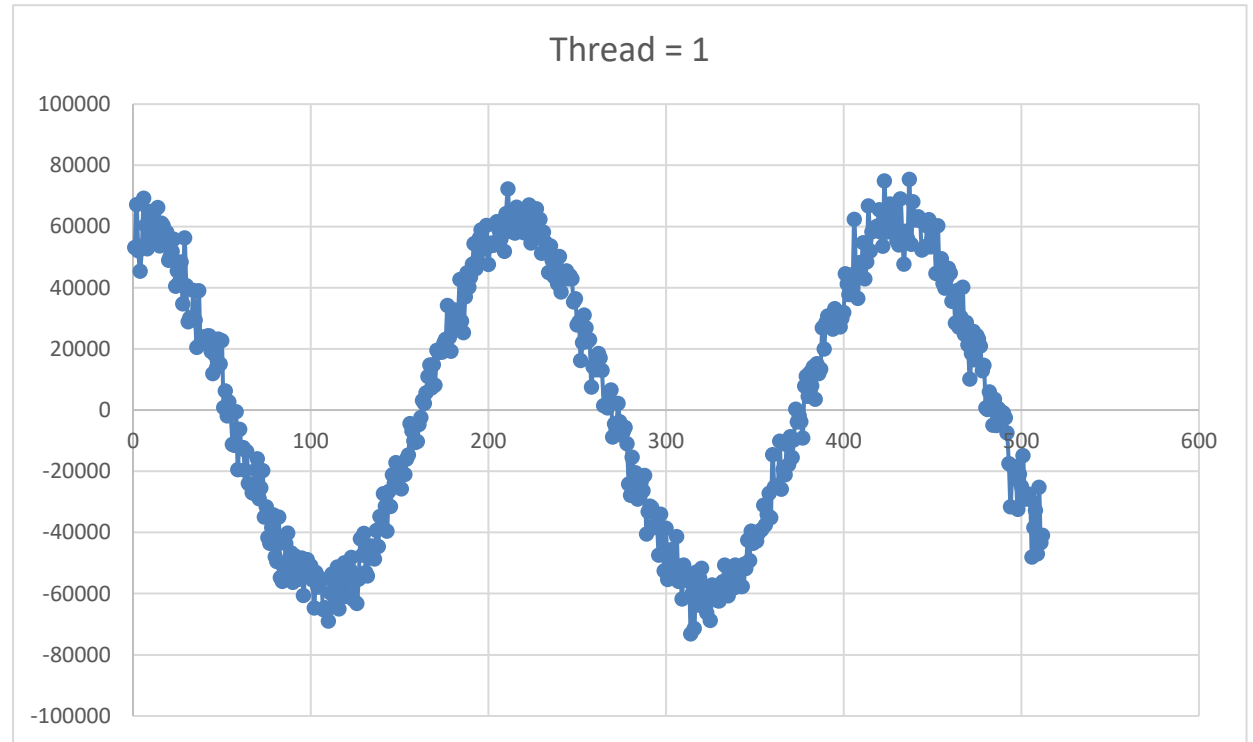
Xiao Tan

I. Runtime environment

In this project, I ran my program on OSU's server `rabbit.engr.oregonstate.edu`. Then I got the following results, and graph.

II. Results and graph

Sums [1]...Sums[512]:



The data I got all the same in sums[1]...sums[512] in OpenMP, SIMD, and OpenCL.
Dataset in *graph.xlsx*.

In the graph, we can see the period is about 200, and the maximum point is about 75416.203125 in 437, so each top point is around 75416.203125.

III. Performance

For OpenMP:

I tried thread 1, 2, 4, 8

The performances are (MegaMults/Sec):

	1	2	4	8
Performance	223.5	445.12	884.17	1207.64

For SIMD:

Its performance is 1703.65 MegaMults/Sec.

And OpenCL: 1960.086 MegaMults/Sec

As we can see, OpenCL have the best performance, then is SIMD, OpenMP did worst, especially thread = 1. OpenCL a little bit faster than SIMD, however, they are faster a lot than OpenMP, and OpenMP performance increased by threads numbers a little.

OpenMP vs SIMD worse due to OpenMP use C++ operation to do sum, but SIMD is use assembly language, it has to be faster. Then SIMD vs OpenCL, because OpenCL run its code in GPU, OpenMP and SIMD are run in CPU, GPU have much more ALU, and tasks can do parallel as much as possible. So GPU have the fastest performance.