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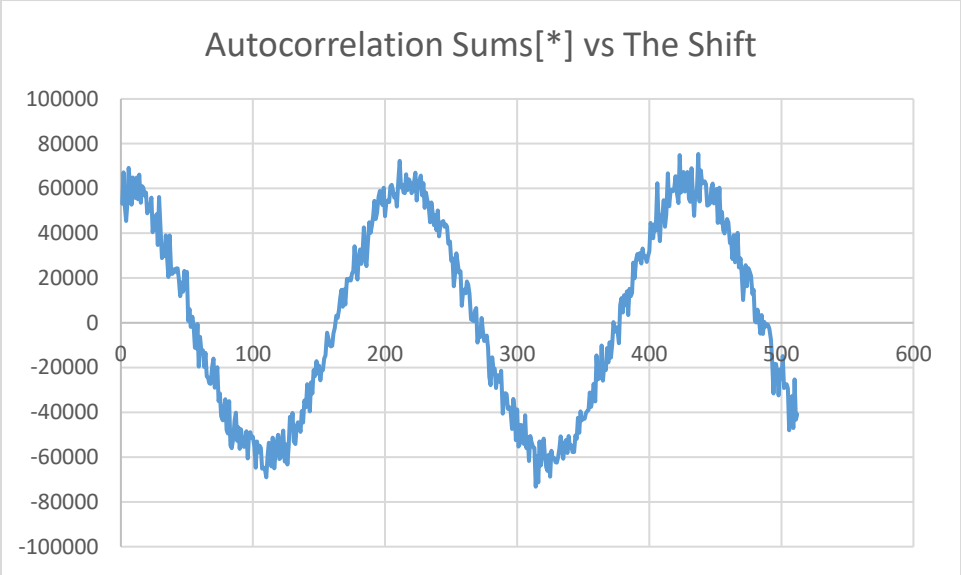
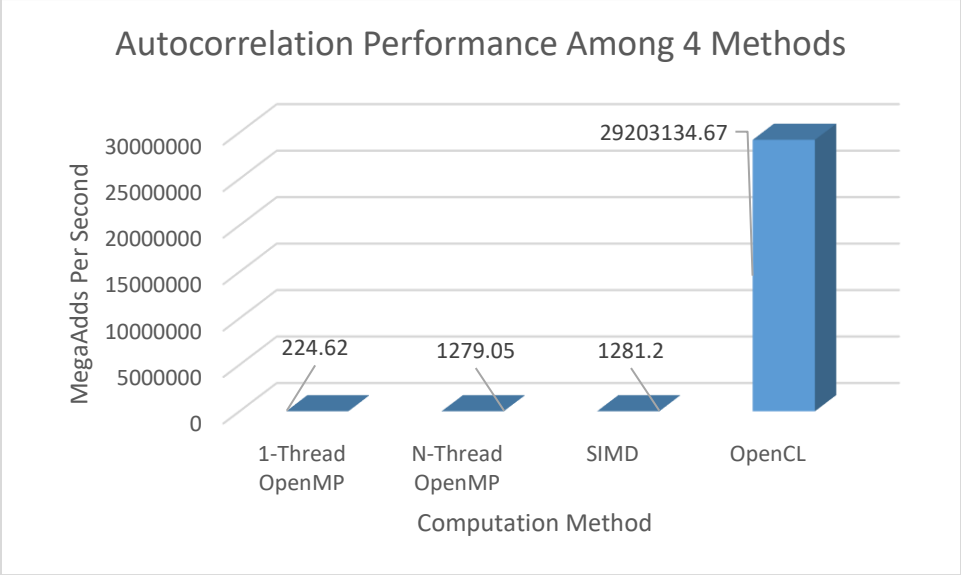
Project 6
AutoCorrelation using OpenMP, CPU SIMD, and GPU OpenCL

1.



2. The period of a sine-wave is the time required for two successive wave crests to pass a fixed point. So in this hidden sine-wave graph the period is approximately 200. At multiples of 200 shift, the wave makes a complete cycle.



3. Looking at the bar chart, there is a clear and obvious winner in performance. The OpenCL method of autocorrelation is the fastest by magnitudes over the other methods. OpenCL is nearly 23,000 times faster than second place SIMD. N-Thread OpenMP is a fraction behind SIMD

in third place and 1-Thread OpenMP is in last place as expected performance wise. The one pattern is the 1-Thread, N-Thread and SIMD being grouped together performance wise.

4. For the 1-Thread vs N-Thread the performance difference is due to parallelizing over N threads which was 8 for this project. SIMD was slightly faster than that due to using assembly code for greater control. OpenCl performed way beyond everything due to the fact the GPU has many times more cores than a CPU that are used for parallelization of computations. This parallelization naturally lends to increased performance for large data sets like the one for this project.