System programming HW4 report

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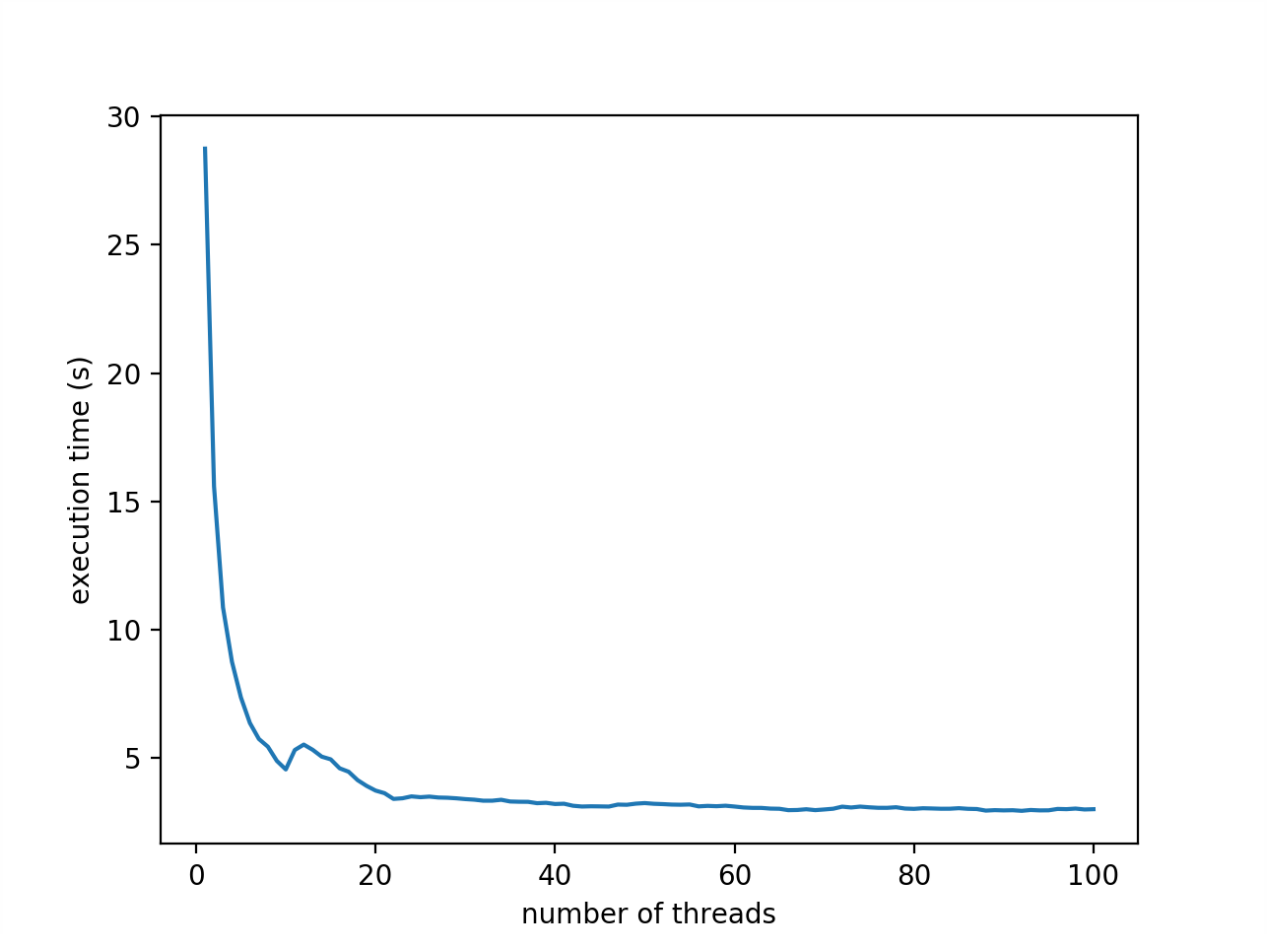
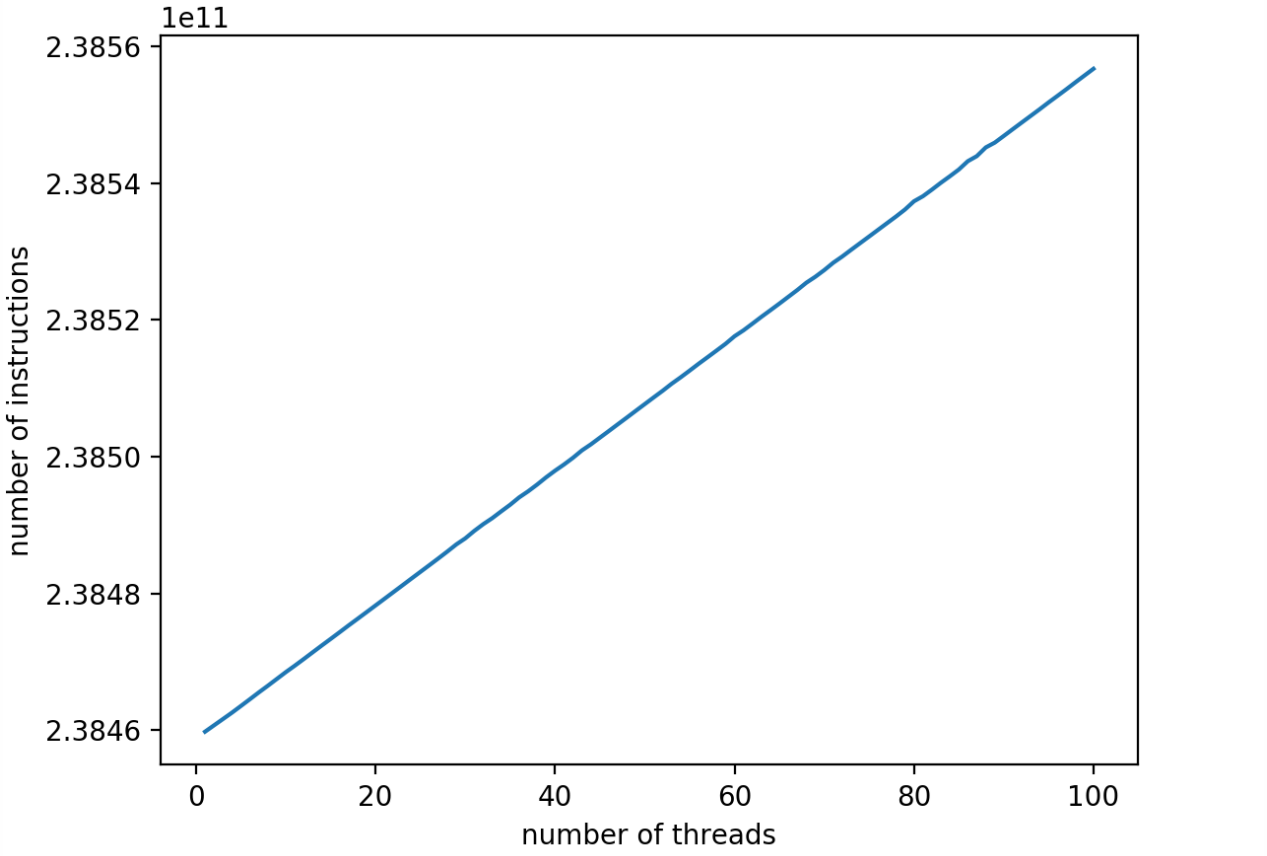
(1) Compare the execution time with different thread number



I tested with 1 to 100 threads, each running 50 training iterations. The result shows that the execution time decreased significantly when increasing the thread number from 1 to 10. However, the execution time didn't improve much when there were more than 20 threads.

(2) Compare the instructions number with different threads numbers



I tested with 1 to 100 threads, each running 50 training iterations. The result shows that the number of instructions increased with the number of threads, and the relation is nearly linear.

(3) Other parallel method.

We can use Strassen algorithm. It's based on divide-and-conquer, and thus is very suitable to accelerate with thread parallel. It works by dividing the matrix into four blocks and compute multiplication with only three blocks, while the fourth blcok is derived from the other three blocks. By solving the running time recurrence relation of the algorithm, we can show it runs in $O(n^{\log_2 7})$, which is theoretically faster than the traditional $O(n^3)$ matrix multiplication.