

REPORT

CptS 223 Project #2

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A: Problem statement.

Compare the running time of the four different algorithms for the maximum subsequence sum problem. Which are expected to have time complexity of $O(N^3)$, $O(N^2)$, $O(N \log N)$ and $O(N)$, respectively.

B: Experimental setup.

- Specify the machine architecture (CPU, clock speed, RAM) where all the testing was conducted:

Intel Core i5, 4G, 1333MHz

-Mention whether you used Windows or Unix or Mac OS X for your testing.

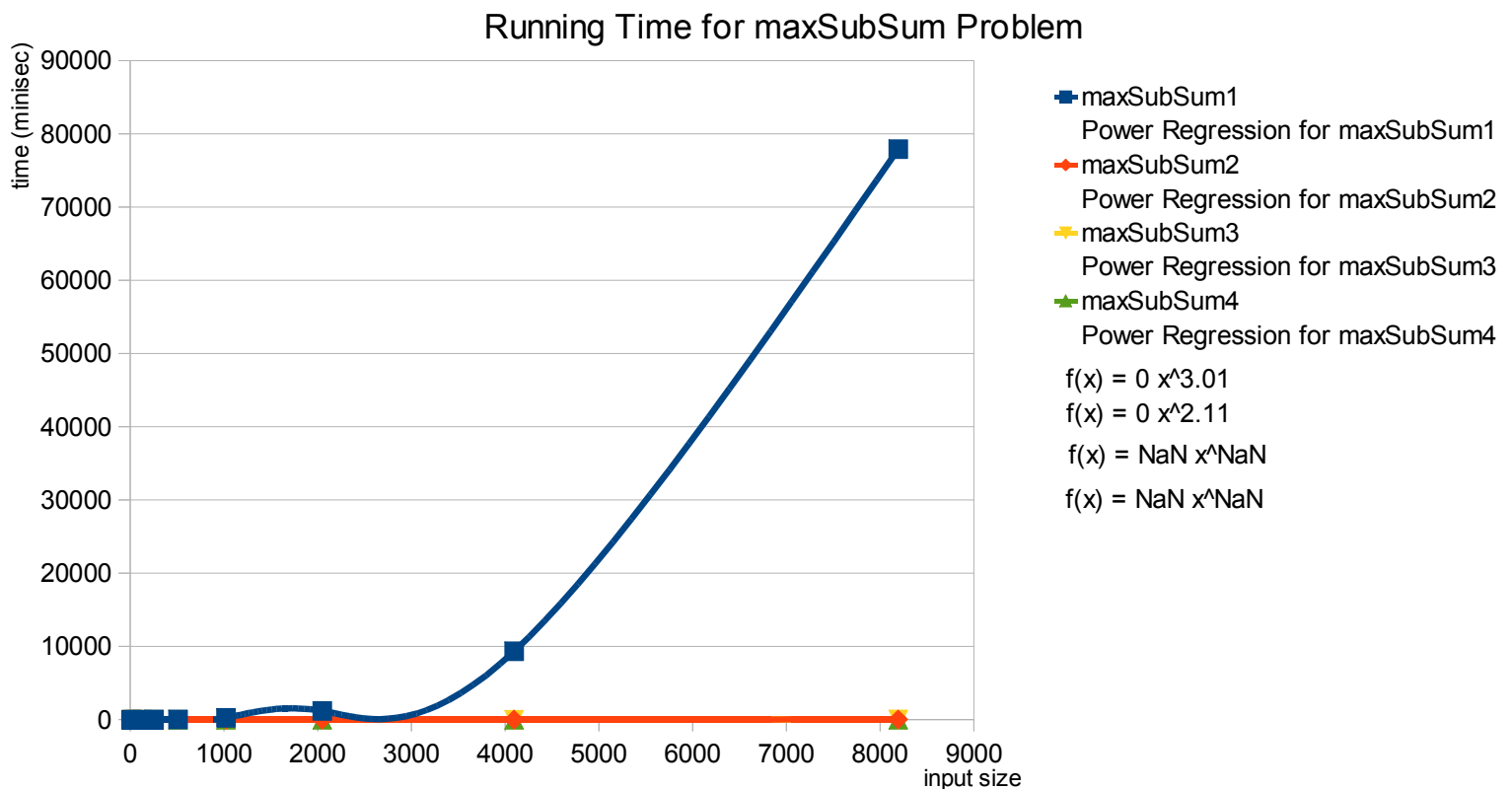
Windows, C-free software

How many experiments were performed and averaged, to determine each point in your plot?

10 times

C: Experimental Results:

1. plot average running time (minisec) against input size (8-8192)



Note: Time is scaled by minisecond because excel goes out of range for time in microsecond.

2. discussion:

maxSubSum1 results fit with function $f(x)=(C x^3)$, which agree with theoretical expectations that it runs in $\Theta(N^3)$ time complexity. Because it contains three nested for loop,

$$T(N) = \sum_{i=0}^{N-1} \sum_{j=i}^{N-1} \sum_{k=i}^j \Theta(1) = \Theta(N^3)$$

maxSubSum2 results fit with function $f(x)=(C x^2)$, which agree with theoretical expectations that it runs in $\Theta(N^2)$ time complexity. Because it contains two nested for loop.

$$T(N) = \sum_{i=0}^{N-1} \sum_{j=i}^{N-1} \Theta(1)$$

$$T(N) = \Theta(N^2)$$

maxSubSum3 results are too small to have expected regression equation. I expect it to fit into $f(x)=(c x^k)$, $1 < k < 2$. Because it follows $T(N) = 2T(N/2) + \Theta(N)$, $T(n)=\Theta(N \log N)$; and $n < n \log n < n^2$

maxSubSum4 results are too small to have expected regression equation. I expect it to fit into $f(x)=(c x^1)$.