

EE3980 Algorithms

Homework 5. Trading Stock, II

Due: April 6, 2019

In the last homework, the single-buy-single-sell stock trading problem was transformed into a maximum subarray problem. And, two algorithms were used to solve the problem. Many people have noticed the inefficiency in the brute-force approach, which possesses a time complexity of $\mathcal{O}(n^3)$. Thus, this home is intended to fix the problem. There are two parts in this homework:

1. Please modify Algorithm (3.1.12) to achieve $\mathcal{O}(n^2)$ complexity.

Note that it may need to deviate from using the maximum subarray approach.

2. Please answer the question:

Is there a lower complexity, lower than $\Theta(n \lg n)$, algorithm in solving the single-buy-single-sell stock trading problem?

If yes, please devise an algorithm and implement it as a **C** function.

If no, please give your reasons.

As in Homework 4, please use the Google stock data files to demonstrate the complexities of your algorithms. The number of repetitions in measuring CPU time should be no less than 500. The output of your program should also follow that of homework 4. In addition, please compare the CPU times for all the implemented algorithms for homework 4 and 5.

Notes.

1. One executable and error-free **C** source file should be turned in. This source file should be named as `hw05.c`.
2. A `pdf` file is also needed. This report file should be named as `hw05a.pdf`.
3. Submit your `hw05.c` and `hw05a.pdf` on EE workstations using the following command:

```
$ ~ee3980/bin/submit hw05 hw05.c hw05a.pdf
```

where `hw05` indicates homework 5.

4. Your report should be clearly written such that I can understand it. The writing, including English grammar, is part of the grading criteria.
5. The CPU time per iteration of the second algorithm, if any, may be used to determine part of the grades of this homework.