Special Assignment

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CS345A: Algorithms-II

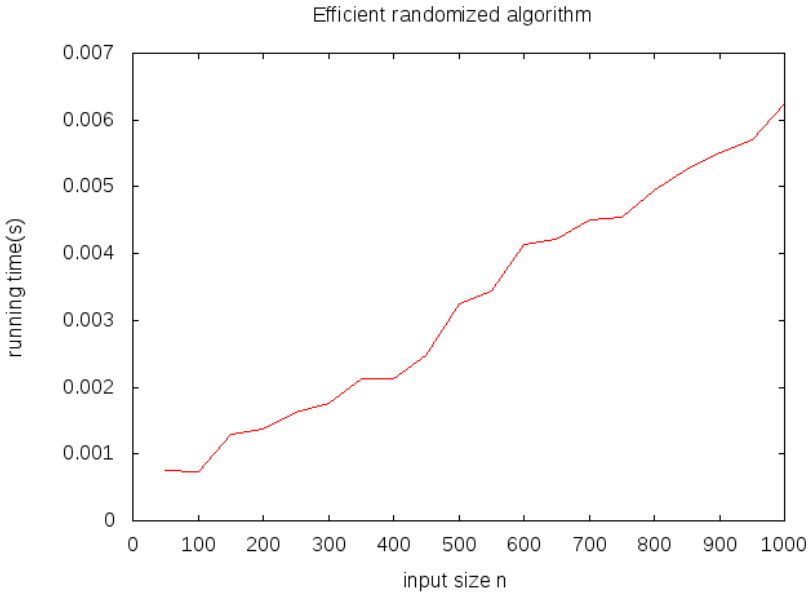
1 Inference

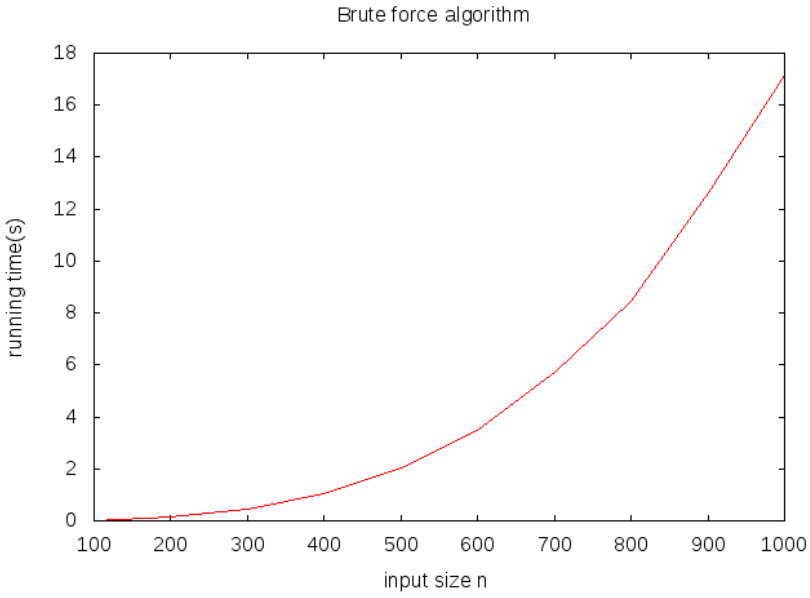
Inferences we can draw from these two graphs are:

- In case of brute force algorithm our graph is smooth because no matter what the inputs are it will run all the permutations and has fixed number of iterations to be $\mathbf{O(n^4)}$. Hence it gives us smoother graph.
- In case of randomized algorithm we get a very rough straight line because it is not fixed how many times it will run ie. number of iterations are not fixed, it depends on the input and since we have used random points to generate these plots hence we are getting a rough plot. However we can use a straight best fit line to represent it.
- Overall Brute force takes $\mathbf{O(n^4)}$ and randomized algorithm takes $\mathbf{O(n)}$.

2 Distribution

- Distribution of the running time of the randomized algorithm is a rough straight line.
- It's Best fit line is $y = 0.00017267894736842 + 5.9641353383459 * 10^{-6}x$
- Deviation: Around 60% of points lie on best fit line and 25% doesn't deviate much, only 15% or less points show significant deviation but still **not** of order $\mathbf{O(n^4)}$ from my graph. But theoretically it is bound to be a $\mathbf{O(n)}$ algorithm.


Efficient randomized algorithm
running time(s)
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
0
100
200
300
400
500
600
700
800
900
1000
input size n


Brute force algorithm
running time(s)
18
16
14
12
10
8
6
4
2
0
100
200
300
400
500
600
700
800
900
1000
input size n