CSE 204

Data Structures & Algorithms

Run time of the power set algorithm against the number of elements in the set

Submitted By

Soham Khisa

S201705120

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Objective:

The objective of the assignment was to understand the power set algorithm and to get a practical idea about the runtime of it. Plotting the observed runtime against input size of a character array would give insight into the efficiency of the algorithm.

Used Platforms:
CodeBlocks IDE was used to run the code in C++14. The data about runtime was plotted using Microsoft Excel.

Procedure:

The program would take an input of from the user of the size of a character array (Set). Then it would generate the elements of the set and would measure the time it took to generate the elements. After that it would show the set and jump into the power set algorithm. It would generate the power set of the produced set earlier and print it on the console window. Then record the time that took to run the power set algorithm function.

Time Complexity Analysis:

Here we have a loop in the first line and inside it we have another loop in the second line. For every time the outer loop runs the inner loop runs for n number of times. So, the complexity of the inner loop is $O(n)$ and since the outer loop runs for 2^n number of times, the overall complexity of the power set algorithm is $n*O(n) = O(n^2)$.

Machine Configuration:
Processor: Inter(R) Core(TM) i5 – 7200U @ 2.50 GHz 2.71 GHz
Installed memory (RAM): 8.00 GB (7.89 GB usable)
System type: 64-Bit Operating System, x64-based processor

Graph:

number of elements	Running time (second)
5	0.006
7	0.08
10	0.769
13	6.452
15	13.049
17	58.637
18	117.395
19	240.233
20	384.7

Number of elements vs Running time (second)