

Analysis Time Complexity of Power Set Generating Algorithm

Objective:

This report is based on the analysis the time complexity of power set generating algorithm specially known as all subset of a set. Mathematically, for a set, it's power set will be exponent of 2 as there is always two choice to take an element in it's subset or not. So, the algorithm will be also exponential and our objective will be to determine it's complexity in Big-Oh sense.

Machine Configuration:

Windows edition	: Windows 10 Pro
Processor	: Inter® Core™ i5-7200U CPU @ 2.50GHz
Installed memory (RAM):	8.00 GB (7.88 GB usable)
System Type	: 64-bit operation System, x64-based processor

Power Set Algorithm and Analysis:

For a set S , power set is denoted by $P(S)$ and if the cardinality of the power set is n then total power set or all subset of the set will be 2^n in number.

So, for generation the power set, here the algorithms that was used take 2^n iteration to iterate all the possible value and checking and printing taken n iteration for every possible value. So, in Big-Oh sense it's complexity will be $O(n * 2^n)$

As, it is an algorithm with exponential complexity, so it's runtime grows faster(exponentially) with the cardinality of the set.

Time Complexity: $O(n * 2^n)$ to generate all subset.

Time for Generating Power Set:

Input Size (Cardinality of Set)	Time taken (nanosecond)
5	0
8	0
11	6383
14	199460
17	69328000
20	601929000
23	8162158000
26	27407653000

Graphical Representation:



