



LABORATORY 5 DATA STRUCTURES ALGORITHMS

Group 6

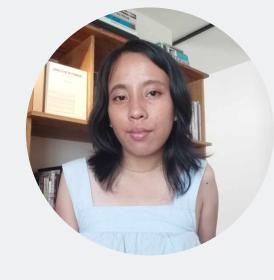




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← → Q Q Search Algorithm Analysis Worksheet

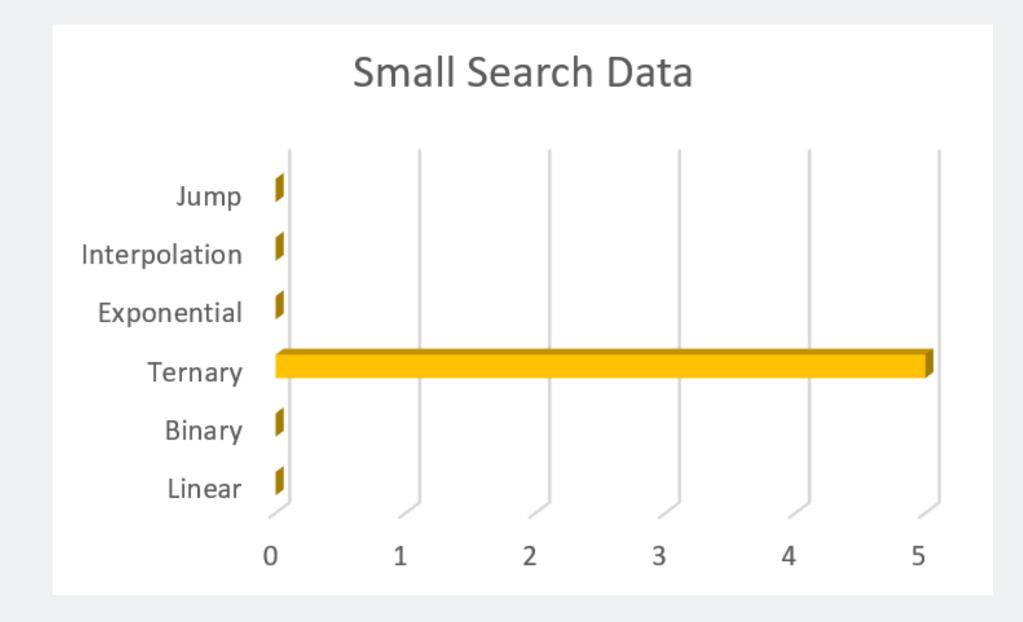
Table:

Target Set Search Data S	Search Algorithm Analysis Worksheet							
100 23 0.223000025 0.110999972 0.007900002 0.112999887 0.055000055 0.125000006 34 0.097000011 0.05000017 0.005400005 0.0600002 0.05400047 0.115000003 68 0.12700021 0.08200042 0.01099996 0.07300047 0.075999997 0.16700035 80 0.1460002 0.075999997 0.01099996 0.11800025 0.05000017 0.172 99 0.138999967 0.07800012 0.011600001 0.097999946 0.046000059 0.14600002 1,000 12 0.084999992 0.052999967 0.006400005 0.136999952 0.031000018 0.135000009 34 0.06100028 0.071999966 0.0181 0.06399978 0.064999986 0.104999999 566 0.38600029 0.05599999 0.0172 0.082999977 0.051000025 0.159999981 899 1.02199997 0.078000012 0.007200004 0.107000014 0.053999975 0.178999981 987 1.160999964 0.045999986 0.0115	Jump	Interpolation	Exponential	Ternary	Binary	Linear		
34 0.097000011 0.050000017 0.005400005 0.06000002 0.054000047 0.115000003 68 0.127000021 0.082000042 0.010999996 0.073000047 0.075999997 0.167000035 80 0.14600002 0.075999997 0.010999996 0.118000025 0.050000017 0.172 99 0.138999967 0.078000012 0.011600001 0.097999946 0.046000059 0.14600002 1,000 12 0.084999992 0.052999967 0.006400005 0.136999952 0.031000018 0.135000009 566 0.386000029 0.05599999 0.0172 0.08299977 0.051000025 0.159999981 899 1.02199997 0.078000012 0.007200004 0.107000014 0.053999975 0.178999981 987 1.16099964 0.045999986 0.0115 0.084000058 0.04800002 0.19599998 10,000 100 0.155000016 0.099999961 0.03799998 0.15199993 0.08700008 0.149999978	Time in Milliseconds					Search Data	Target Set	
68 0.12700021 0.08200042 0.010999996 0.073000047 0.075999997 0.16700035 80 0.1460002 0.075999997 0.010999996 0.118000025 0.05000017 0.172 99 0.13899967 0.07800012 0.01160001 0.09799946 0.046000059 0.1460002 1,000 12 0.084999992 0.052999967 0.006400005 0.136999952 0.031000018 0.13500009 34 0.06100028 0.07199966 0.0181 0.063999978 0.064999986 0.104999999 566 0.38600029 0.05599999 0.0172 0.082999977 0.051000025 0.159999981 899 1.021999997 0.078000012 0.007200004 0.107000014 0.053999975 0.178999981 987 1.160999964 0.045999986 0.0115 0.084000058 0.048000002 0.195999964 10,000 100 0.15500016 0.099999961 0.03799998 0.151999993 0.08700008 0.149999978	0.125000006	0.055000055	0.112999987	0.007900002	0.110999972	0.223000025	23	100
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34 0.061000028 0.071999966 0.0181 0.06399978 0.06499986 0.10499999 566 0.386000029 0.05599999 0.0172 0.08299977 0.051000025 0.15999981 899 1.02199997 0.078000012 0.007200004 0.107000014 0.05399975 0.178999981 987 1.16099964 0.045999986 0.0115 0.084000058 0.048000002 0.195999964 10,000 100 0.155000016 0.099999961 0.03799998 0.15199993 0.087000008 0.14999978	0.14600002	0.046000059	0.097999946	0.011600001	0.078000012	0.138999967	99	
34 0.061000028 0.071999966 0.0181 0.06399978 0.06499986 0.104999999 566 0.38600029 0.05599999 0.0172 0.08299997 0.05100025 0.15999981 899 1.02199997 0.078000012 0.007200004 0.107000014 0.05399975 0.178999981 987 1.16099964 0.045999986 0.0115 0.084000058 0.048000002 0.19599964 10,000 100 0.155000016 0.099999961 0.03799998 0.15199993 0.087000008 0.14999978								
566 0.386000029 0.05599999 0.0172 0.08299977 0.051000025 0.15999981 899 1.02199997 0.078000012 0.007200004 0.107000014 0.05399975 0.178999981 987 1.160999964 0.045999986 0.0115 0.084000058 0.048000002 0.195999964 10,000 100 0.155000016 0.099999961 0.037999998 0.151999993 0.087000008 0.149999978	0.135000009	0.031000018	0.136999952	0.006400005	0.052999967	0.084999992	12	1,000
899 1.021999997 0.078000012 0.007200004 0.107000014 0.053999975 0.178999981 987 1.160999964 0.045999986 0.0115 0.084000058 0.048000002 0.195999964 10,000 100 0.155000016 0.099999961 0.037999998 0.151999993 0.087000008 0.149999978	0.104999999	0.064999986	0.063999978	0.0181	0.071999966	0.061000028	34	
987 1.16099964 0.04599986 0.0115 0.084000058 0.048000002 0.19599964 10,000 100 0.155000016 0.09999961 0.03799998 0.15199993 0.087000008 0.149999978	0.159999981	0.051000025	0.082999977	0.0172	0.05599999	0.386000029	566	
10,000 100 0.155000016 0.09999961 0.03799998 0.15199993 0.087000008 0.149999978	0.178999981	0.053999975	0.107000014	0.007200004	0.078000012	1.021999997	899	
	0.195999964	0.048000002	0.084000058	0.0115	0.045999986	1.160999964	987	
	0.149999978	0.087000008	0.151999993	0.037999998	0.099999961	0.155000016	100	10,000
3000 3.646999976 0.06000002 0.011900003 0.228999997 0.097000011 0.367999965	0.367999965	0.097000011	0.228999997	0.011900003	0.06000002	3.646999976	3000	
6000 6.35999997 0.093999988 0.029800001 0.201000003 0.045000052 0.245999981	0.245999981	0.045000052	0.201000003	0.029800001	0.093999988	6.35999997	6000	
7666 8.726000015 0.091000038 0.024600005 0.376000025 0.110999972 0.482999967	0.482999967	0.110999972	0.376000025	0.024600005	0.091000038	8.726000015	7666	
9877 6.51599994 0.041000021 0.013500001 0.332999989 0.08300005 0.54499993	0.54499993	0.08300005	0.332999989	0.013500001	0.041000021	6.515999994	9877	





Graph: Small Data Set

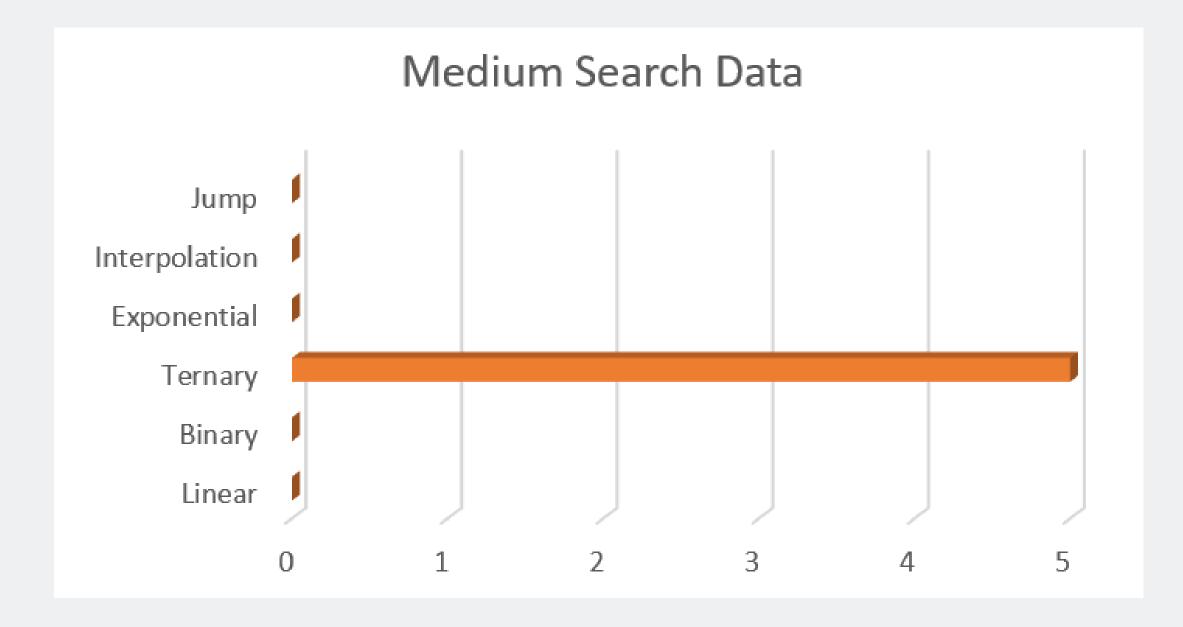


Small Data Set				
Linear	0			
Binary	0			
Ternary	5			
Exponential	0			
Interpolation	0			
Jump	0			





Graph: Medium Data Set

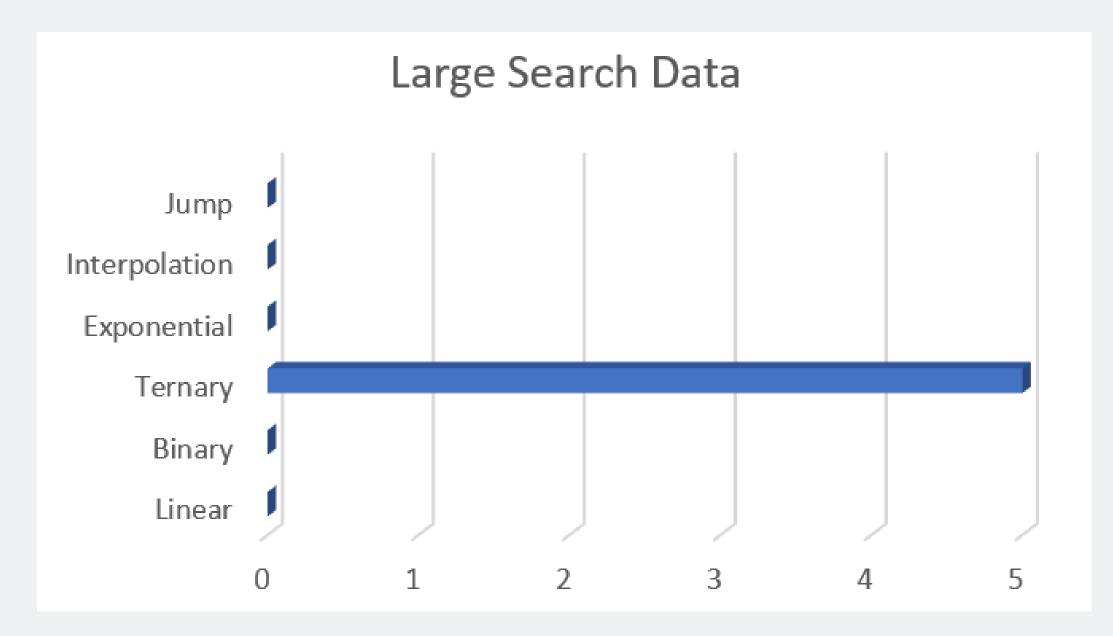


Medium Data Set				
Linear	0			
Binary	0			
Ternary	5			
Exponential	0			
Interpolation	0			
Jump	0			



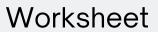


Graph: Large Data Set



Large Data Set				
Linear	0			
Binary	0			
Ternary	5			
Exponential	0			
Interpolation	0			
Jump	0			

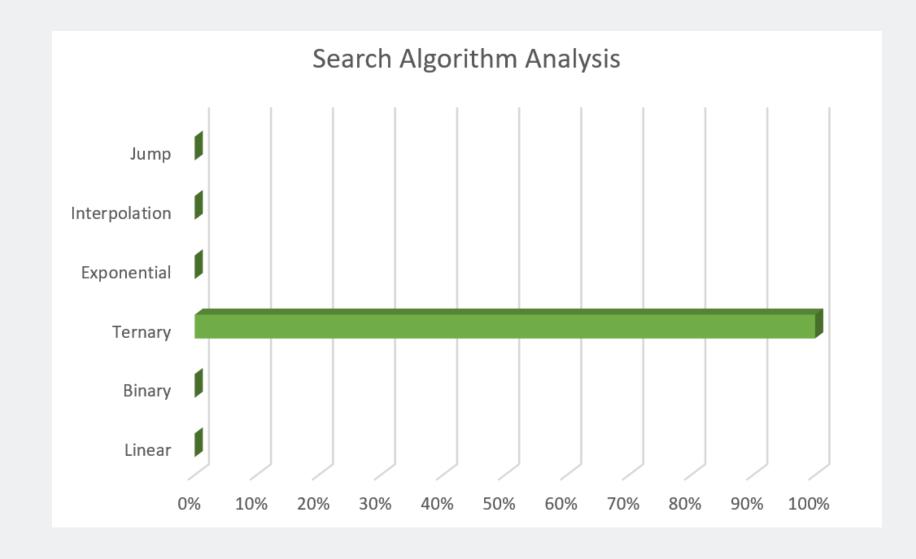


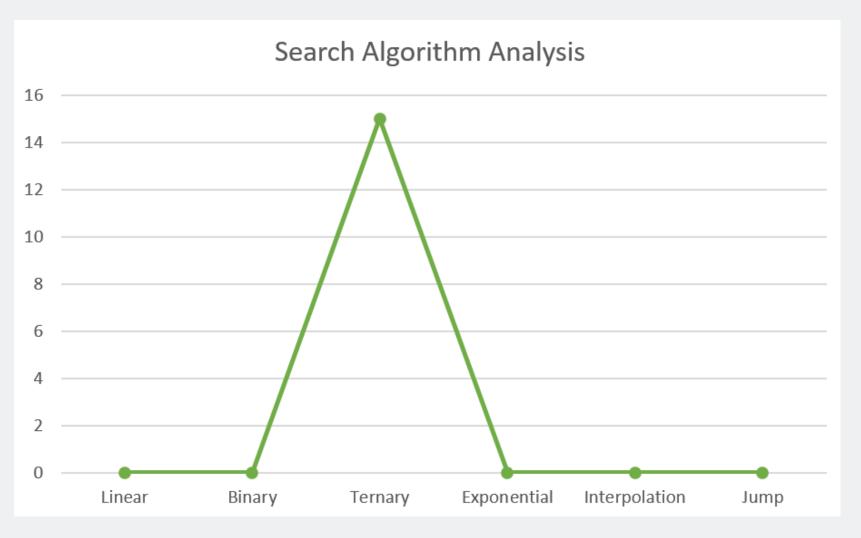




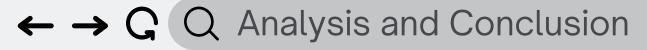


Graph: Search Algorithm











The results of the lab activity, as depicted in the search algorithm analysis worksheet table, highlight that the ternary search algorithm performed best overall. This conclusion is drawn from its consistently fast execution times across various data sets. Specifically, it demonstrated remarkable efficiency, averaging 0.009380000 milliseconds in the small data set, 0.012080002 milliseconds in the medium data set, and 0.023560002 milliseconds in the large data set. The overall performance, averaging 0.015006668 milliseconds, indicates its effectiveness in swiftly locating the target across different data sets. Additionally, the perfect score of 15/15 for all 15 targets in each of the three data sets underscores the algorithm's superb performance.





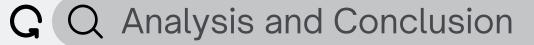


b. Did any search algorithms perform better on specific data sets?

Across all data set sizes (small, medium, large), the ternary search algorithm consistently outperformed other search algorithms. This means that, all throughout the execution of the lab activity, no alternative search algorithm exhibited superior performance compared to the ternary search algorithm. This highlights the algorithm's speed in finding the target and suggests its suitability for a wide range of data sets.





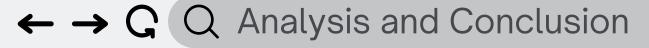




c. How did the size of the data set affect the performance of the search algorithms?

A noteworthy observation from the lab activity results is the correlation between data set size and search algorithm execution time. The larger the data set, the longer it took for the search algorithm to locate the target or the desired integer. This finding aligns with the general expectation that searching through larger data sets inherently requires more computational effort and time. It emphasizes the importance of selecting an efficient search algorithm, such as the ternary search algorithm, especially when dealing with substantial amounts of data to ensure optimal performance and responsiveness in finding the target.







In conclusion, the comprehensive analysis of various search algorithms in the lab activity has revealed valuable insights into their performance across different data set sizes. Among the algorithms tested, the ternary search algorithm performed best overall. Furthermore, the comparison across all data set sizes highlights the superiority of the ternary search algorithm over the other search algorithm. No other search algorithm surpassed its performance in any of the scenarios tested. Moreover, another important observation from the study is the direct relationship between data set size and search algorithm execution time. As expected, larger data sets necessitate longer search times. This emphasizes the importance of selecting a search algorithm that can efficiently handle increased computational demands. In practical terms, these findings suggest that the ternary search algorithm is a reliable and efficient choice for searching target integers across a wide range of data set sizes. Its consistent and exceptional performance makes it a recommended option for scenarios where quick and accurate target retrieval is essential. The insights gained from this lab activity contribute to a better understanding of search algorithm behavior and inform decision-making when implementing such algorithms in real-world applications.





Thank You!