Polytechnic University of the Philippines

GROUP 4

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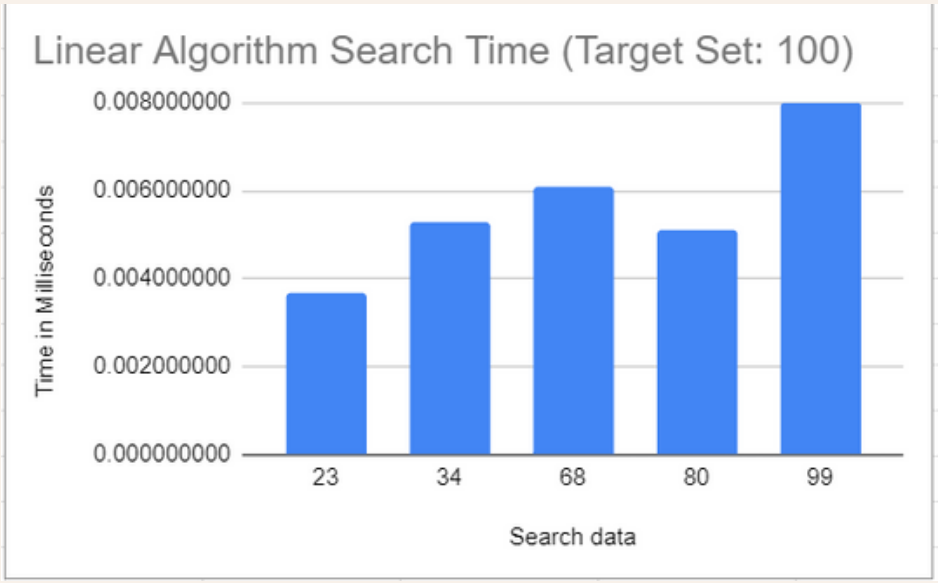
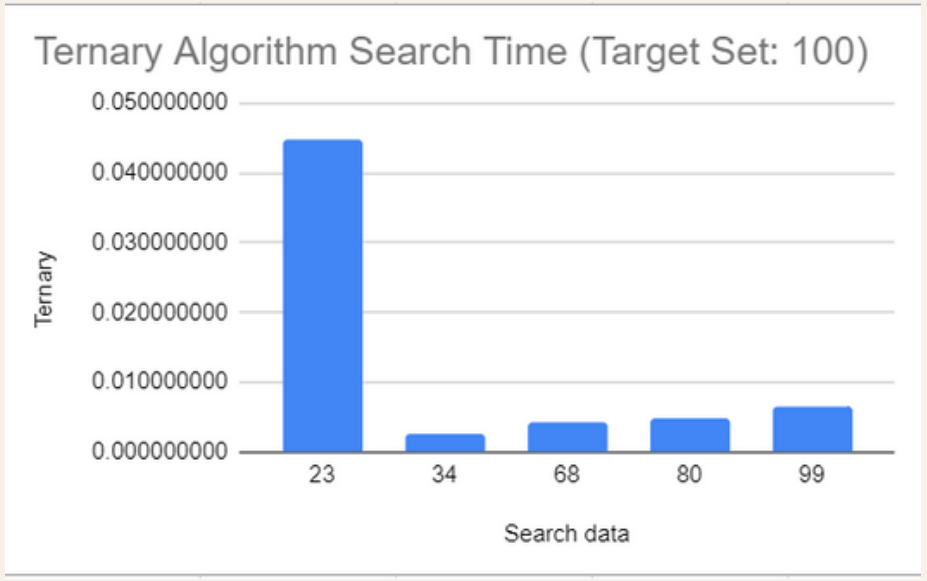
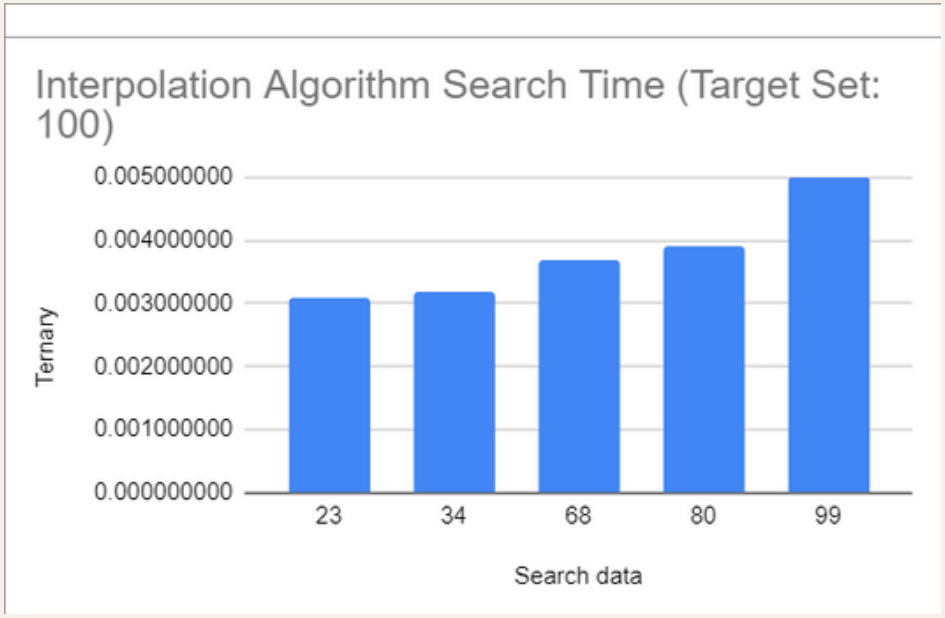
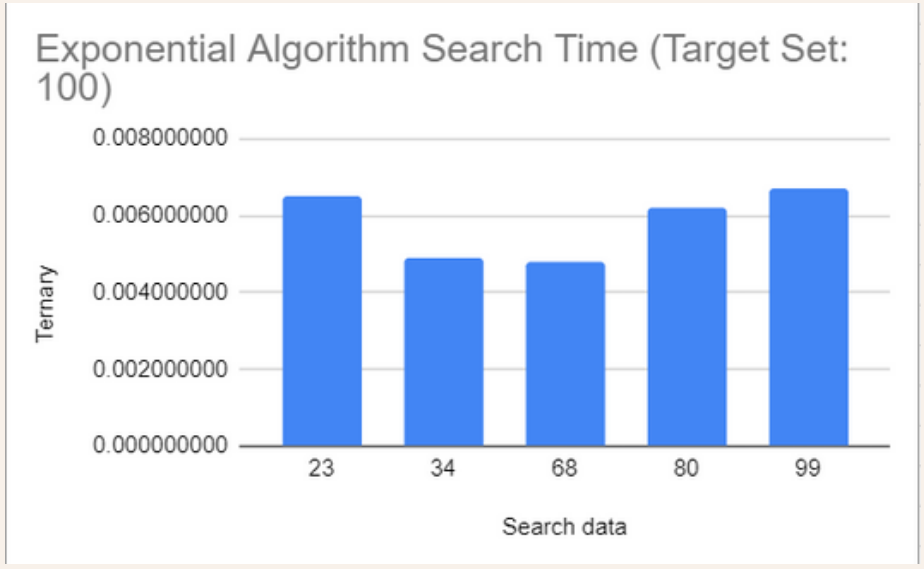
Data Structure and Algorithm

Time comparison for different search algorithms (size:100)

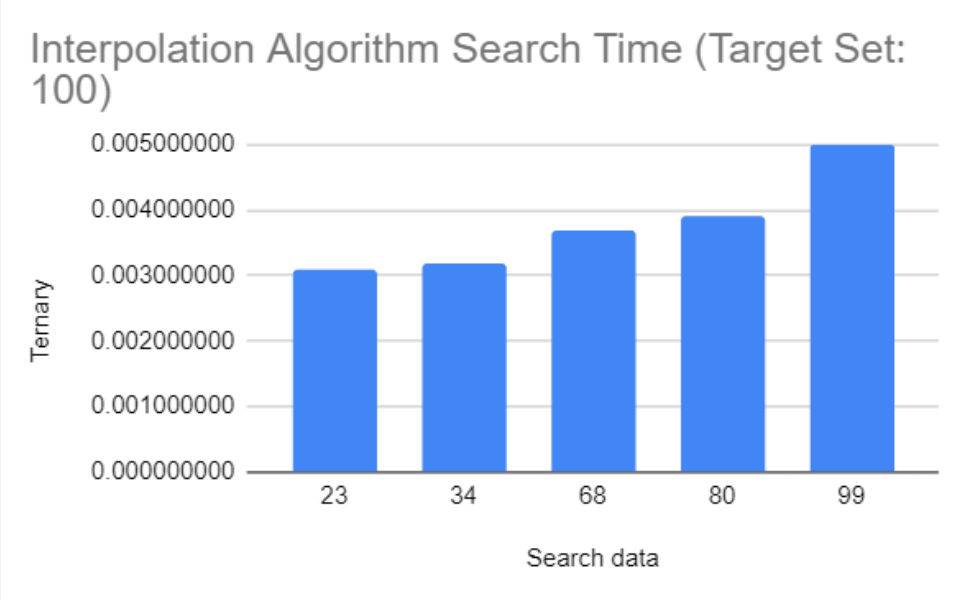


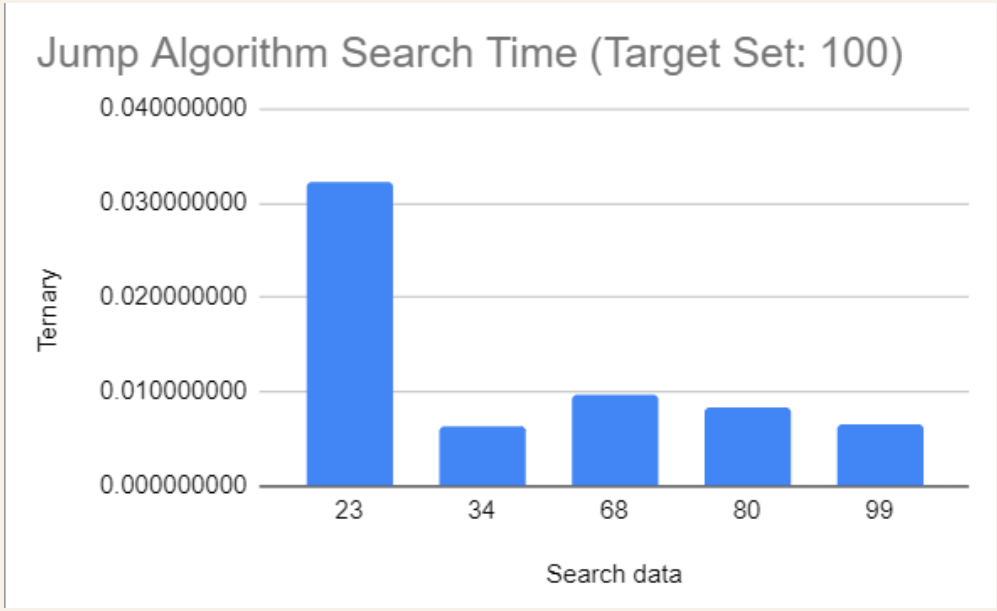




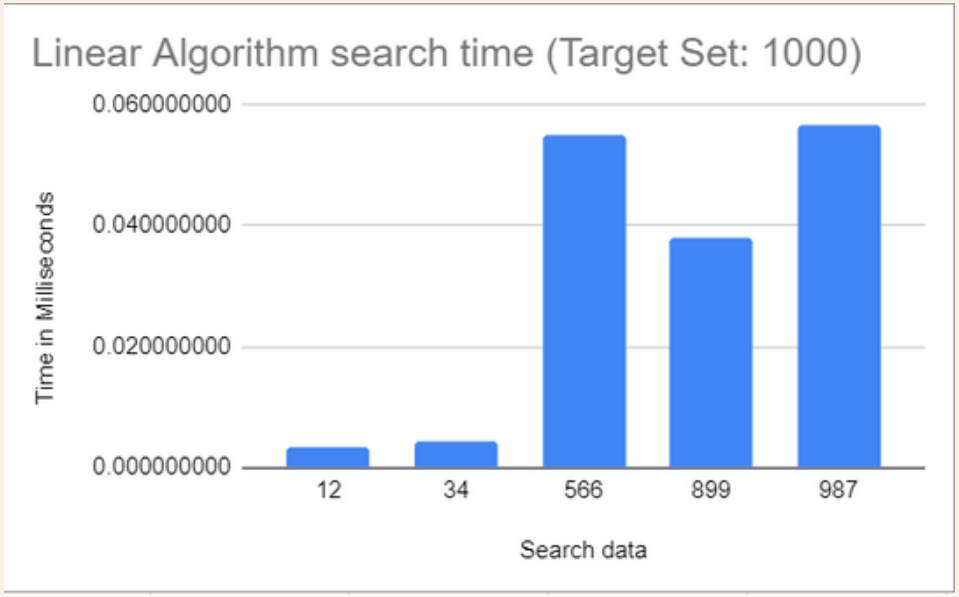


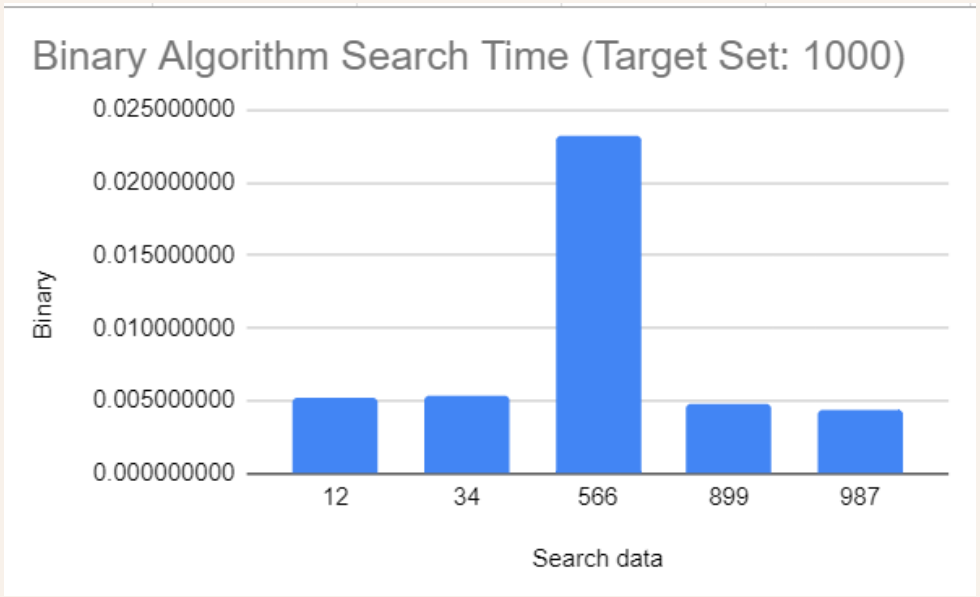
Time comparison for different search algorithms (size:100)

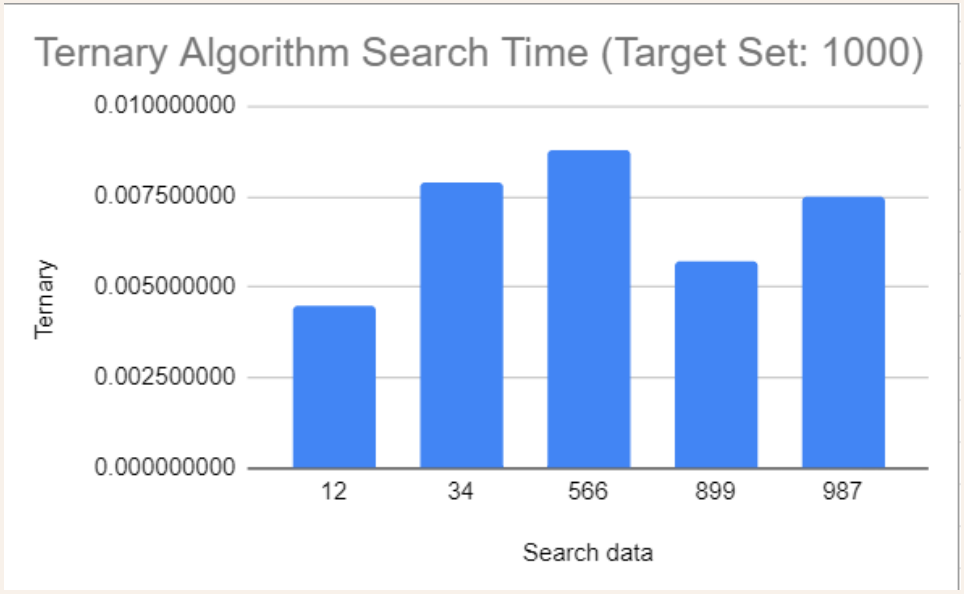


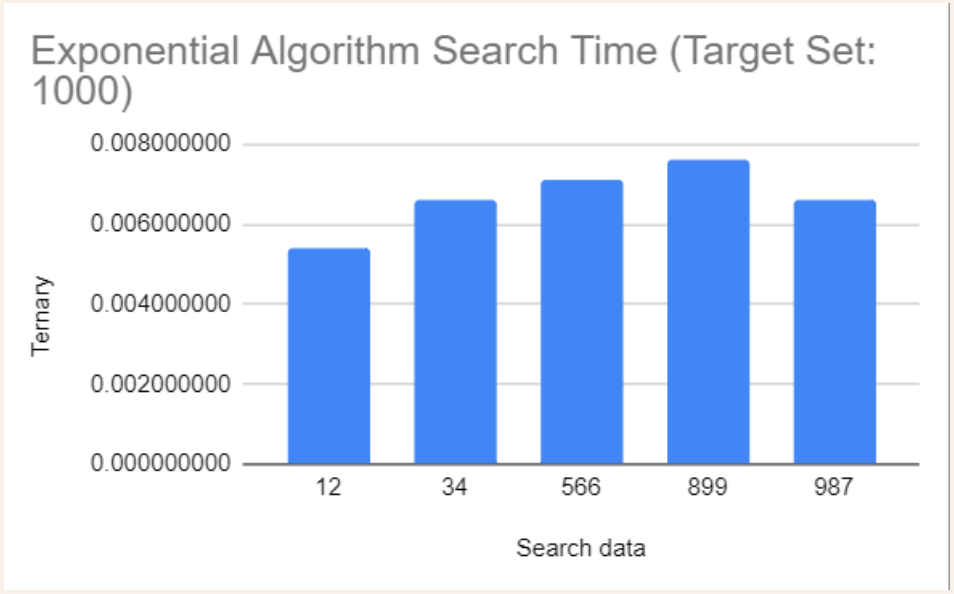


Time comparison for different search algorithms (size:1000)

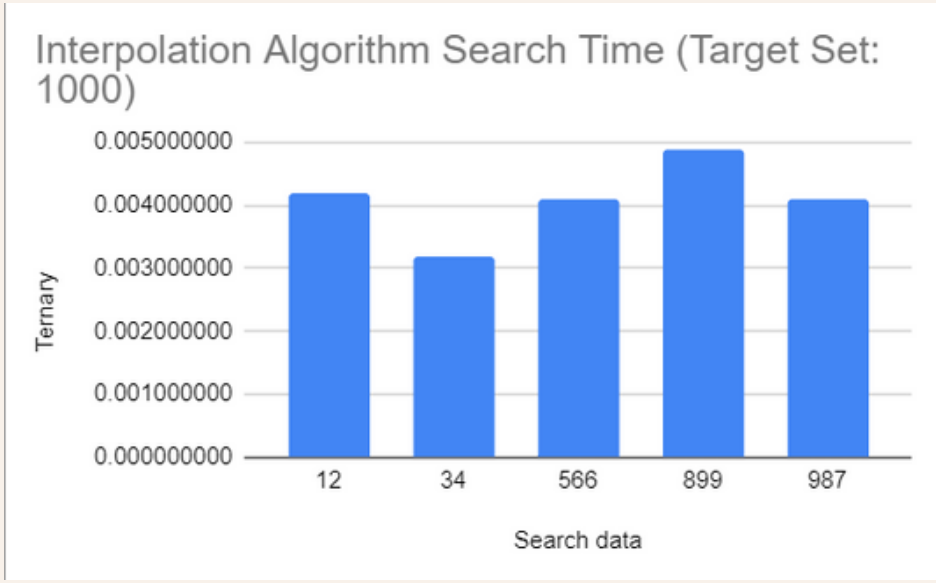


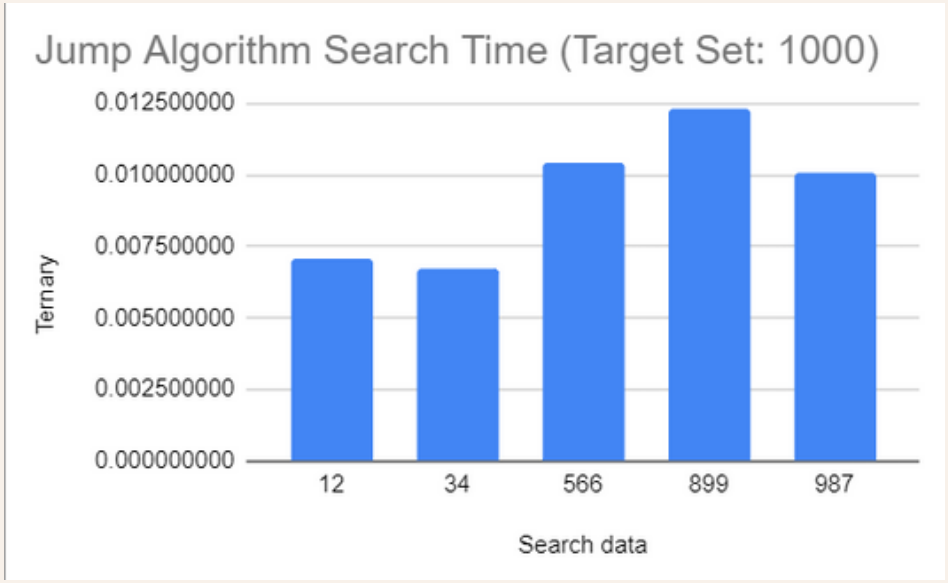




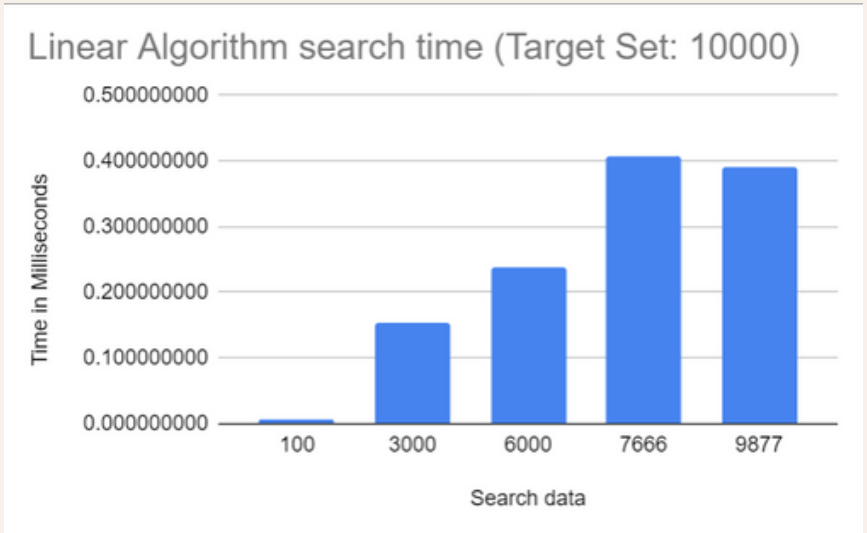


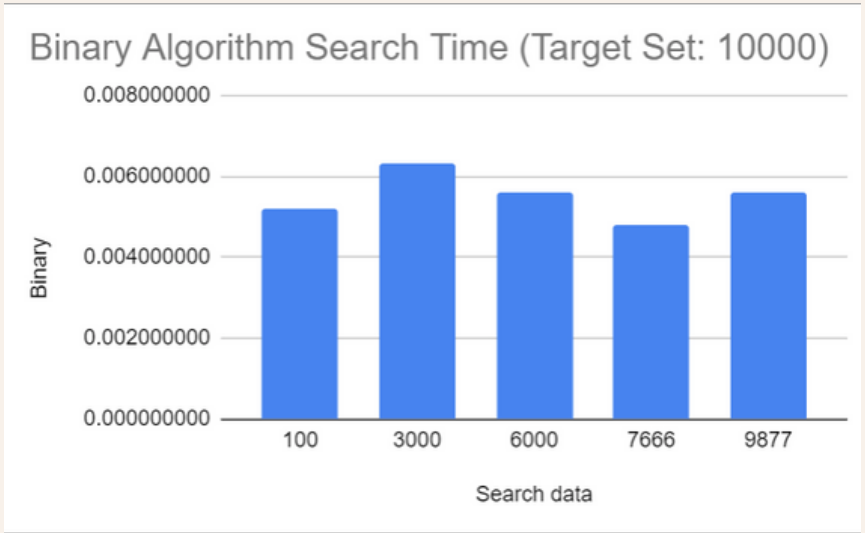
Time comparison for different search algorithms (size:1000)

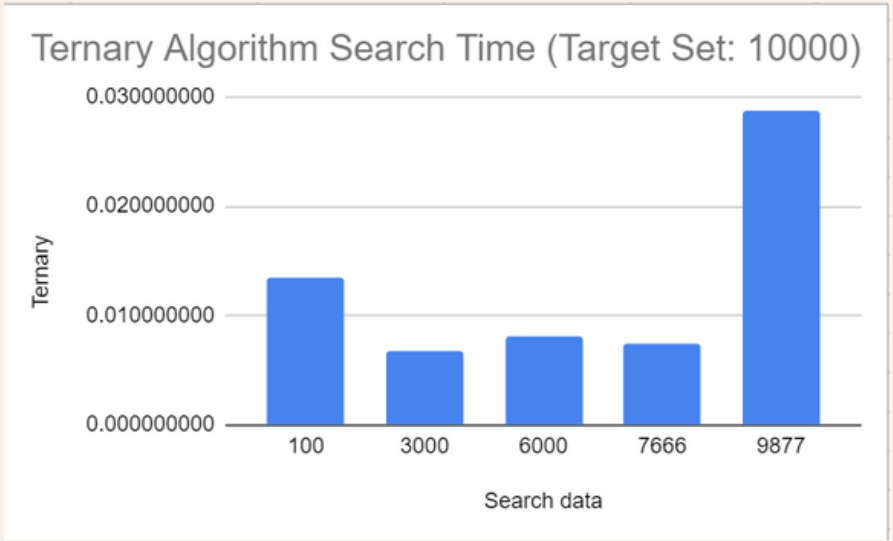


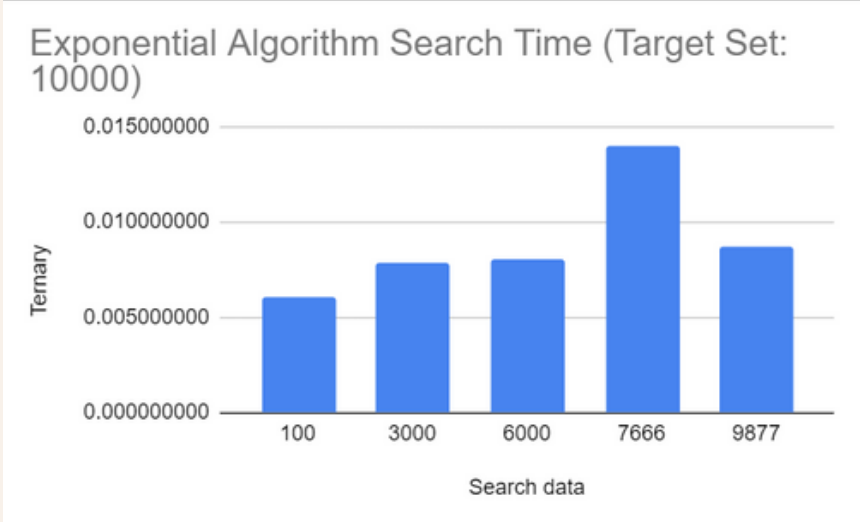


Time comparison for different search algorithms (size:10000)

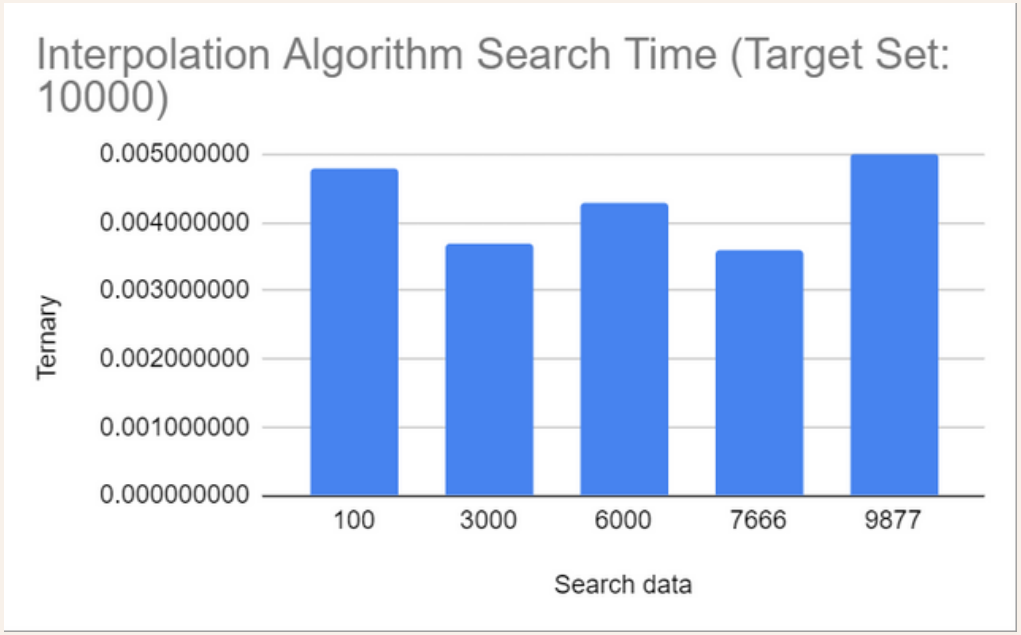


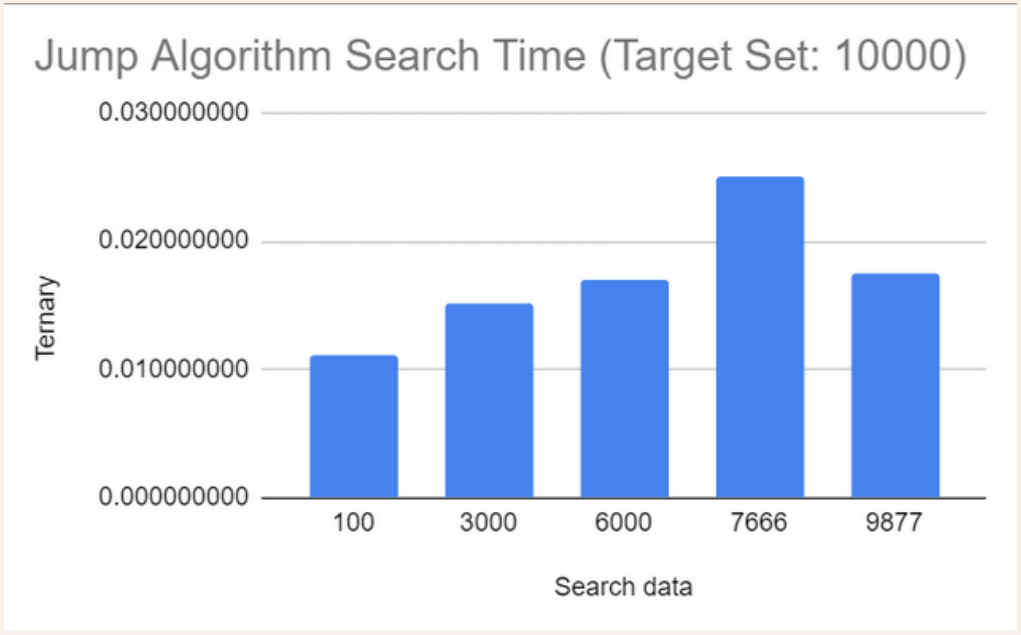






Time comparison for different search algorithms (size:10000)





A. Which search algorithm performed the best overall?

According to the provided spreadsheet, the interpolation search algorithm stands out as the best-performing search algorithm in terms of the fastest search times. The average time for each test size for the interpolation search algorithm is smaller than all of the others.

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

No, however, the linear search algorithm exhibits poor efficiency and speed as the number of elements in the array increases. This observation proves the space complexity of O(1) and time complexity of O(n) (where n is the number of elements) of the linear search algorithm.

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

The performance of various search algorithms was evaluated across three data sets, revealing discernible trends in execution times relative to the data set size.

Linear Search Algorithm - demonstrated an increase in execution time as data sets expanded.

Binary Search Algorithm – maintained a relatively low and stable efficiency.

Ternary Search Algorithm – exhibited a similar trend to linear search, experiencing an escalation in execution time with larger data sets.

Exponential Search Algorithm – showed mixed performance, with fluctuations in execution times across different data sets.

Interpolation Search Algorithm – consistently outperformed its counterparts, demonstrating notably low and stable execution times across all data sets.

Jump Search Algorithm – akin to linear and ternary searches, displayed an increase in execution time with larger data sets.

Average time of all search algorithms – as the data set size increases, most of the search algorithms have increased data retrieval.

D. Write a brief conclusion summarizing your findings

In summary, the interpolation search algorithm consistently outperforms other search algorithms, exhibiting superior efficiency across all datasets. With an average retrieval time of approximately 0.0041 milliseconds, it distinguishes itself as the optimal choice.

Regarding the impact of data set size, linear and ternary search algorithms experience increased execution times with larger datasets, while the binary search algorithm maintains stability. The exponential search algorithm shows mixed performance. In contrast, the interpolation search algorithm consistently delivers low and stable execution times irrespective of data set size. The jump search algorithm, akin to linear and ternary searches, displays increased execution times with larger datasets. The information obtained during data gathering confirms that the results of the tests proved the respective time and space complexities of the search algorithms.