**1. Understand Search Algorithms**

**Linear Search**

* **Description**: Linear search, also known as sequential search, scans each element in the dataset sequentially until it finds the target element or reaches the end of the dataset.
* **Time Complexity**:
  + **Best-case**: O(1) (if the target element is the first element).
  + **Average-case**: O(n) (where n is the number of elements).
  + **Worst-case**: O(n) (if the target element is the last one or not present).
* **Usage**: Suitable for small or unsorted datasets.

**Binary Search**

* **Description**: Binary search finds an element in a sorted dataset by repeatedly dividing the search interval in half. It compares the target value with the middle element of the interval and eliminates half of the remaining elements from consideration.
* **Time Complexity**:
  + **Best-case**: O(1) (if the target element is in the middle).
  + **Average-case**: O(log n) (where n is the number of elements).
  + **Worst-case**: O(log n) (if the target element is at the extreme end of the search space or not present).
* **Usage**: Suitable for large, sorted datasets.

**4. Analysis**

**Comparison of Time Complexity**

* **Linear Search**:
  + **Best-case**: O(1) when the target is the first element.
  + **Average-case**: O(n) when the target is somewhere in the middle.
  + **Worst-case**: O(n) when the target is the last element or not found.
* **Binary Search**:
  + **Best-case**: O(1) when the target is the middle element.
  + **Average-case**: O(log n) due to halving the search space each iteration.
  + **Worst-case**: O(log n) when the target is at the ends or not found.

**When to Use Each Algorithm**

* **Linear Search**:
  + **Small datasets**: The simplicity of linear search makes it effective for small datasets.
  + **Unsorted datasets**: Linear search does not require sorting and can work with any order of elements.
* **Binary Search**:
  + **Large, sorted datasets**: Binary search is much more efficient for large datasets due to its logarithmic time complexity.
  + **When sorting is feasible**: If the dataset is not already sorted, sorting it before performing binary search can be beneficial if multiple searches are expected.

**Summary**:

* **Linear Search** is straightforward and works with unsorted data but is less efficient for large datasets.
* **Binary Search** is more efficient for large, sorted datasets but requires that the data be sorted beforehand.