Monday 8th November 2021

Binary Search

Binary Search

To use a binary search in a list, the list must have already been sorted in ascending order, either numerically (1-9) or alphabetically (A-Z). A binary search uses a “divide and conquer” method to make it more efficient:

1. Find the median (middle item) and compare it with the search term.
2. If the search term is lower, ignore the median and higher items.
3. If the search term is higher, ignore the median and lower items.
4. Find the new median from your new list
5. Repeat until you reach the search term (or don’t find it).

Median Values

The median is the middle item in a list. If there is an odd number of items, then the median is the middle item. However, if there is an even number of items, the median is halfway between the middle two number. As there is no index called 5.5, it is truncated to 5. To find a median, use

***median = (length of list + 1) // 2***

Advantages and Disadvantages

|  |  |
| --- | --- |
| Advantages | Disadvantages |
| Very quick at finding items | *List must be sorted*  *Complex to program and implement* |

Practice Questions

1. What are the main advantages of using a binary search algorithm over a linear search algorithm?

**Binary searches are quicker and more efficient compared to linear searches**

1. Show the process of finding the team ‘Liverpool’ using a binary search:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Step 1 | Arsenal | Chelsea | Liverpool | Man U | Newcastle | Tottenham |
| Step 2 | - | - | Liverpool | - | - | - |