Search Algorithms

CSCI 432

January 15, 2026

Name:
Who did you work with today?

Two Algorithms

The following two algorithms takes as input a array L of real numbers and a query q (a real number).

Algorithm 1 Search I

Input: L, a list of real numbers
Output: q, a query element (a real number)
1: $found \leftarrow$ FALSE
2: **for** $i = 1$ to $|L|$ **do**
3:    **if** q=L(i) **then**
4:       $found \leftarrow$ TRUE
5:    **end if**
6: **end for**
7: **return** $found$

Algorithm 2 Search II

Input: L, a list of n real numbers
Output: q, a query element (a real number)
1: $found \leftarrow$ FALSE
2: $left \leftarrow 1$
3: $right \leftarrow n$
4: **while** $left < right$ **do**
5:    $mid \leftarrow \lceil \frac{left+right}{2} \rceil$
6:    **if** L[mid]=q **then**
7:       $found \leftarrow$ TRUE
8:       $left \leftarrow right + 1$
9:    **else if** $L[mid] < q$ **then**
10:       $left \leftarrow mid + 1$
11:    **else**
12:       $right \leftarrow mid - 1$
13:    **end if**
14: **end while**
15: **return** $found$

Discuss the following questions:

1. What do these algorithms do?

2. Are these two pseudo-code examples of the same algorithm? Why or why not?

3. Do the two have the same runtimes?

4. Is one algorithm better than the other?

5. What are the common names of these two algorithms?

Two Linear Search Algorithms

The following algorithm takes as input a array L of real numbers and a query element q (a real number), and returns true if the element q is in the list L and false otherwise.

Algorithm 3 Linear Search II

Input: L, a list of real numbers
Output: q, a query element (a real number)
 1: $found \leftarrow$ FALSE
 2: **for** $i = 1$ to $|L|$ **do**
 3:    **if** q=L(i) **then**
 4:       $found \leftarrow$ TRUE
 5:    **end if**
 6: **end for**
 7: **return** $found$

Algorithm 4 Linear Search II

Input: L, a list of real numbers
Output: q, a query element (a real number)
 1: **for** $i = 1$ to $|L|$ **do**
 2:    **if** q=L(i) **then**
 3:       **return** TRUE
 4:    **end if**
 5: **end for**
 6: **return** FALSE

Discuss the following questions:

1. Are these two pseudo-code examples of the same algorithm? Why or why not?

2. Do the two have the same runtimes?