Assignment-4

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Problem Statement / Defination :-

a) Write a python program to store roll no of students in array who attended training program in random order. Write a Function For a Search whether perticuler student attended training program or not using linear Search and Sentinel Search.

b) Write a python program to store roll no of students in array who attended training program in sorted order. Write a function for Searching whether perticuler student attended training program or not using Binary Search and Fibonacci Search

Objective:-

- To understand Concept of Searching
- To study different Searching methods
- To Study application of each method.

Outcome -
- To write function for implimenting Searching method
- To use function written for only one application.

S/W and H/W Requirements :-

- Programming language :- Python
- operating system :- 64 bit Fedora
- programming tool :- Jupyter notebook

Theory :-

Linear Search is a method for finding a target value within a list. it sequentially checks each element of the list for the target value until match have been found or all elements have been searched. Linear Search runs in an worst Case time and makes most n Comparisons where n is the length of the list. if each element is equally likly to searched then linear search have an average (n/2) Comparison.

Sentinal search is type of linear search where the n of

Comparison are reduced as Compare to linear Search algorithm.
in this Search last element of array is replaced with the element to be searched and linear searched is perform on the array without checking current index.
The no of Comparison in worst case are (n+2) here.

Binary Search :- Search a sorted array by the repetedly dividing the search interval by in half. Begin with an interval covering of whole array. if the value is less than item in middle it will narrow the interval to half. & repetedly check until the value is found or interval is empty.
time Complexity Olog (n)

Fibonacci Search is a Comparison-based technique that uses Fibonacci nubers to search an element in a sorted array
fibonacci Search divide given array in unequal parts.
Binary Search uses division operator to divide range

Algorithm :-

1 Start
2 int n, choice
3 take input of n no and store in Array
4 read choice and key
5 if (choice == 1)
6 Search S.linearsearch(key)
7 elif(Choice == 2)
8 S.Sentinal Search (key)
9 elif (choice == 3)
10 S. binary Search (key)
11 elif(Choice == 4)
12 S. Fibonaccisearch(key)
13 elif (choice == 0)
14 Go break
15 else:
16 wrong choice.
17 end

* Algorithm for linear Search

1 Take input Array
2 Take key you want to search
3 Set Flag = -1
4 Loop: arr [start] -> arr [end]
, if match found arr [curr.pos^] = x
print "mathch found at x"
Flag = 0
abort.
5 after loop

* Algorithm for Sentinal Search

1 Take input array , key
2 Append the n at the end of array
3 while (arr[i] != key)
4 i++
5 return if i != n
6 el. return i
7 else
8 return -1

* Binary Search

1 Take input array , n, key
2 Start loop while ( left < right)
mid = left + (right - left)/2
• if arr[mid] == x then
return m
• else (if arr[mid] less than x) then
left = m+1
• else
right = mid - 1
3 end loop
4 return -1

| Test Case | Descrip | I/P | O/P | Expected O/P | Result |
|---|---|---|---|---|---|
| 1 | 1. linear<br>2. Sentinel<br>3. Binary<br>4. Fibonacci | [1,2,3,4,5]<br>5<br>5 | present | present | pass |
| 2 | | [1,2,3,4,7,6]<br>8<br>1 | Absent | Absent | pass |

## Time Complexity

linear Search :- O(n)
Sentinel Search :- O(n)
Binary Search :- O(log(n)
Fibonacci Search :- Olog(n)