Data Structures & Algorithms Fall 2019 Lab # 3

LAB 03: Searching Algorithms

CS211 – Data Structures and Algorithms

Usman Institute of Technology

Fall 2019

 **How to submit:**

o Create an account on <http://www.turnitin.com/>as a Student (if you don’t have already) o Use following information at time of sign-up **CS Section A**

* Class ID: 22664649
* Enrollment Key: DSFALL19CSA

**CS Section B**

* Class ID: 22664651
* Enrollment Key: DSFALL19CSB

1. Write a Function **LinearSearch** that takes two arguments List and value. The function should search the value in the list and returns the location of the value.

For Example: if data = [1,2,3,4,5,6] then LinearSearch(data, 4) should return 3

**def** **LinearSearch**(List, Value):

// your code goes here

1. Write a Function **BinarySearch** that takes two arguments List and value and returns the location of the value in the given list.

**def** **BinarySearch**(List, Value):

// your code goes here

1. Create a class **List** and write functions in Python whose parameters and return value are given below. The List class must have an empty list to store the data.
   1. Write a function **InsertAtFirst** which takes a parameter value and inserts at the start of the list.
   2. Write a function **InsertAtEnd** which takes a parameter *value* and inserts at the end of the list.
   3. Write a function **DeleteFromFirst** which remove the first element from the list and returns the value
   4. Write a function **DeleteFromEnd** which remove the last element from the list and returns the value
   5. Write a function **LinearSeach** which takes a parameter value and returns the location of the value in the list. The function must run in O(n).

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* 1. Write a function **BinarySearch** which takes a parameter value and returns the location of the value in the list. The function must run in O(lgn).
  2. Write a function **IsSorted** whichreturns True if the data containing in the list is sorted, otherwise returns False.
  3. Write a function **Search** which takes a parameter value and returns the location of the value in the list. The function should use Binary Search if the data is sorted, otherwise it can use Linear Search.

**Bonus Task:**

Compare the two search algorithms (Linear and Binary) and write a function **ExecutionTime** to find out the execution time for each algorithm.