Algorithm Analysis and Design-I Lab Assignment (CSE 2631)

B.Tech 3 Semester
Section 23412C3 and 23412A1

Department of Computer Science and Engineering
ITER, SOA University

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Overview

Textbook

Problem Solving in Data Structures and Algorithms Using Java by Hemant Jain

Lab Assignment 1

1. Write a JAVA program to find sum of n numbers.
2. Write a JAVA program to find maximum and minimum elements in an array.
3. Write a JAVA program to rotate an array by k positions.

Lab 2: Abstract data type (Array)- iterative implementation

Perfprm the following programs in JAVA using iterative approach

1. Write a JAVA program to find the largest sum contiguous subarray. (Given input array A=[3,4,-5,-7,2,5], output is 7). Do in O(n) time complexity.
2. Write a JAVA program to find smallest possible missing number. (Example, Input array A=[1,4,63,2,34], output=3)
3. Write a JAVA program to convert array to maximum minimum array (Input: 1 2 3 4 5, Output: 5 1 4 2 3). Do for both sorted and unsorted array.
4. Write a JAVA program to find factorial of a number.
5. Write a JAVA program to generate n^{th} fibonacci number.

Lab Assignment 3: Abstract data type (Array) – recursive implementation

1. Write a JAVA program to find the sum of n numbers. (Assume numbers are any arbitrary integers)
2. Write a JAVA program to find maximum and minimum elements in an array.
3. Write a JAVA program to find factorial of a number.
4. Write a JAVA program to generate n^{th} fibonacci number.
5. Write a JAVA program to computing n^{th} power of a number.
6. Write a JAVA program to find the smallest positive missing number.
7. Write a JAVA program to find the GCD of two numbers.
8. Write a JAVA program to convert a decimal number (base 10) to hexadecimal equivalent number (base 16)

Lab Assignment 4: Sorting Algorithms

1. Write a JAVA program to sort an array using insertion sort.
2. Write a JAVA program to sort an array using selection sort.
3. Write a JAVA program to sort an array using bubble sort.

Lab Assignment 5: Sorting Based Problems

1. Write a JAVA program to perform reduction operation in an array. Display the array after each possible reduction. Also, count the number of possible reductions.
2. Write a JAVA program to merge two sorted arrays.
3. Write a JAVA program to find if reversing a subarray makes the array sorted or not.

Lab Assignment 6: Searching Algorithms

1. Write a JAVA program to implement linear search without recursion.
2. Write a JAVA program to implement linear search using recursion.
3. Write a JAVA program to implement binary search without recursion.
4. Write a JAVA program to implement binary search using recursion.

Lab Assignment 7:Searching Based Problems

1. Write a JAVA program to find the first repeated elements in an array.
2. Write a JAVA program to print duplicates in a list.
3. Write a JAVA program to find the missing number in an array.
4. Write a JAVA program to find the element pair with minimum/maximum difference in an array.
5. Write a JAVA program to find the element which appears maximum number of times in an array.

Lab Assignment 8: Linked List

- Write a JAVA program to implement the following operations for linked list:
  - Create
  - Insertion (start, end and at any position k)
  - Deletion (start, end and at any position k)
  - Traversal
  - Reversal

Lab Assignment 9: Stack

- Write a JAVA program to implement the following operations for stack using array:
  - Create
  - Push (check for overflow)
  - Pop (check for underflow)
  - Peek
  - Display
- Write a JAVA program to implement the following operations for stack using linked list:
  - Create
  - Push
  - Pop
  - Peek
  - Display

Lab Assignment 10: Queue

- Write a JAVA program to implement the following operations for queue using array:
  - Create
  - Enqueue (check for overflow)
  - Dequeue (check for underflow)
  - Display
- Write a JAVA program to implement the following operations for queue using linked list:
  - Create
  - Enqueue
  - Dequeue
  - Display