**18.11.2024 - DSA PRACTICE**

1. **BUBBLE SORT**

**CODE:**

import java.util.\*;

class BubbleSort {

public void bubbleSort(int[] arr) {

int n = arr.length;

boolean swapped;

for (int i = 0; i < n; i++) {

swapped = false;

for (int j = 0; j < n - i - 1; j++) {

if (arr[j] > arr[j + 1]) {

int temp = arr[j];

arr[j] = arr[j + 1];

arr[j + 1] = temp;

swapped = true;

}

}

if (!swapped) {

break;

}

}

}

public static void main(String[] args) {

Scanner scanner = new Scanner(System.in);

System.out.print("Enter the number of elements: ");

int n = scanner.nextInt();

int[] arr = new int[n];

System.out.println("Enter the elements:");

for (int i = 0; i < n; i++) {

arr[i] = scanner.nextInt();

}

BubbleSort sorter = new BubbleSort();

sorter.bubbleSort(arr);

System.out.println("Sorted array:");

for (int num : arr) {

System.out.print(num + " ");

}

}

}

**Output**:

Enter the number of elements: 5

Enter the elements: 64 34 25 12 22

Sorted array:

12 22 25 34 64

**Time Complexity : O(n\*\*2)**

**Space Complexity : O(1)**

1. **Non Repeating Character**

**CODE:**

import java.util.\*;

class Solution {

public char nonRepeatingChar(String s) {

Map<Character, Integer> charCount = new HashMap<>();

for (char c : s.toCharArray()) {

charCount.put(c, charCount.getOrDefault(c, 0) + 1);

}

for (char c : s.toCharArray()) {

if (charCount.get(c) == 1) {

return c;

}

}

return '$';

}

public static void main(String[] args) {

Scanner scanner = new Scanner(System.in);

System.out.print("Enter a string: ");

String input = scanner.nextLine();

Solution solution = new Solution();

char result = solution.nonRepeatingChar(input);

if (result != '$') {

System.out.println("First non-repeating character: " + result);

} else {

System.out.println("No non-repeating character found.");

}

}

}

**Output**:

Enter a string: programming

First non-repeating character: p

**Time Complexity : O(n)**

**Space Complexity : O(n)**

1. **K largest Elements**

**CODE:**

import java.util.\*;

class Main {

public List<Integer> kLargest(int[] arr, int k) {

PriorityQueue<Integer> maxHeap = new PriorityQueue<>(Collections.reverseOrder());

for (int num : arr) {

maxHeap.add(num);

}

List<Integer> result = new ArrayList<>();

while (k > 0 && !maxHeap.isEmpty()) {

result.add(maxHeap.poll());

k--;

}

return result;

}

public static void main(String[] args) {

Scanner scanner = new Scanner(System.in);

System.out.print("Enter the number of elements: ");

int n = scanner.nextInt();

int[] arr = new int[n];

System.out.println("Enter the elements:");

for (int i = 0; i < n; i++) {

arr[i] = scanner.nextInt();

}

System.out.print("Enter the value of k: ");

int k = scanner.nextInt();

Main solution = new Main();

List<Integer> result = solution.kLargest(arr, k);

System.out.println("The " + k + " largest elements are:");

for (int num : result) {

System.out.print(num + " ");

}

}

}

**Output**:

Enter the number of elements: 4

Enter the elements:

17 393 947 12

Enter the value of k: 3

The 3 largest elements are:

947 393 17

**Time Complexity : O(nlogn + k logn)**

**Space Complexity : O(n)**

1. **Form largest Number:**

**CODE:**

import java.util.\*;

class Solution {

String printLargest(int[] arr) {

int n = arr.length;

String[] strs = new String[n];

for (int i = 0; i < n; i++) {

strs[i] = String.valueOf(arr[i]);

}

Arrays.sort(strs, (a, b) -> (b + a).compareTo(a + b));

if (strs[0].equals("0")) {

return "0";

}

StringBuilder largestNum = new StringBuilder();

for (String str : strs) {

largestNum.append(str);

}

return largestNum.toString();

}

}

public class Main {

public static void main(String[] args) {

Scanner scanner = new Scanner(System.in);

System.out.println("Enter the number of elements:");

int n = scanner.nextInt();

int[] arr = new int[n];

System.out.println("Enter the elements:");

for (int i = 0; i < n; i++) {

arr[i] = scanner.nextInt();

}

Solution solution = new Solution();

String result = solution.printLargest(arr);

System.out.println("The largest number is: " + result);

}

}

**Output**:

Enter the number of elements:

5

Enter the elements:

3 30 34 5 9

The largest number is: 9534330

Time Complexity: O(n logn)

Space Complexity : O(n)

1. **Quick Sort**

CODE:

import java.util.Scanner;

class Solution {

static void quickSort(int arr[], int low, int high) {

if (low < high) {

int pi = partition(arr, low, high);

quickSort(arr, low, pi - 1);

quickSort(arr, pi + 1, high);

}

}

static int partition(int arr[], int low, int high) {

int pivot = arr[high];

int i = (low - 1);

for (int j = low; j < high; j++) {

if (arr[j] <= pivot) {

i++;

int temp = arr[i];

arr[i] = arr[j];

arr[j] = temp;

}

}

int temp = arr[i + 1];

arr[i + 1] = arr[high];

arr[high] = temp;

return i + 1;

}

}

public class Main {

public static void main(String[] args) {

Scanner scanner = new Scanner(System.in);

System.out.println("Enter the number of elements:");

int n = scanner.nextInt();

int[] arr = new int[n];

System.out.println("Enter the elements:");

for (int i = 0; i < n; i++) {

arr[i] = scanner.nextInt();

}

Solution.quickSort(arr, 0, n - 1);

System.out.println("Sorted array:");

for (int num : arr) {

System.out.print(num + " ");

}

}

}

**Output**:

Enter the number of elements:

6

Enter the elements:

10 7 8 9 1 5

Sorted array:

1 5 7 8 9 10

**Time Complexity : O(n log n)**

**Space Complexity : O(log n)**

1. **Edit Distance**

**CODE** :

import java.util.Scanner;

class Main1 {

public int editDistance(String str1, String str2) {

int m = str1.length();

int n = str2.length();

int[][] dp = new int[m+1][n+1];

for (int i = 0; i <= m; i++)

dp[i][0] = i;

for (int j = 0; j <= n; j++)

dp[0][j] = j;

for (int i = 1; i <= m; i++) {

for (int j = 1; j <= n; j++) {

if (str1.charAt(i-1) == str2.charAt(j-1))

dp[i][j] = dp[i-1][j-1];

else

dp[i][j] = Math.min(dp[i-1][j], Math.min(dp[i][j-1], dp[i-1][j-1])) + 1;

}

}

return dp[m][n];

}

}

public class Main {

public static void main(String[] args) {

Scanner scanner = new Scanner(System.in);

System.out.println("Enter first string:");

String str1 = scanner.nextLine();

System.out.println("Enter second string:");

String str2 = scanner.nextLine();

Main1 solution = new Main1();

int result = solution.editDistance(str1, str2);

System.out.println("The minimum edit distance is: " + result);

}

}

**Output**:

Enter first string:

kitten

Enter second string:

Sitting

The minimum edit distance is: 3

**Time Complexity : O(m\*n)**

**Space Complexity : O(m\*n)**