UCS415 Design and Analysis of Algorithms

Lab Assignment 2

Write a program to solve the following problems using Greedy approach:

- Given the Input: start[] = {1, 3, 0, 5, 8, 5}, finish[] = {2, 4, 6, 7, 9, 9}; using Activity selection. Select the maximum number of activities that can be performed by a single person, assuming that a person can only work on a single activity at a time.
- We are given two arrays that represent the arrival and departure times of trains, the task is to find the minimum number of platforms required so that no train waits.

  Input: arr[] = {9:00, 9:40, 9:50, 11:00, 15:00, 18:00}, dep[] = {9:10, 12:00, 11:20, 11:30, 19:00, 20:00}

  Output: 3
- Given an array of jobs where every job has a deadline and associated profit if the job is finished before the deadline.

JobID	Deadline	Profit
a	4	20
b	1	10
c	1	40
d	1	30

  Maximize the total profit if only one job can be scheduled at a time.

- Given the weights and profits of N items, in the form of {profit, weight},
  Input: arr[] = {{60, 10}, {100, 20}, {120, 30}}, put these items in a knapsack of capacity W= 50 to get the maximum total profit in the knapsack. Use Fractional Knapsack, and break items for maximizing the total value of the knapsack.
- Huffman Coding is a lossless data compression algorithm. The algorithm assigns variable-length codes to input characters, with shorter codes assigned to more frequent characters. Write a program to implement Huffman Coding. Given a string as input, your task is to:

  1. Build a Huffman Tree for the characters in the string.
  2. Generate the corresponding Huffman Codes for each character.
  3. Encode the string using the generated Huffman Codes.
  4. Decode the encoded string back to its original form.

Additional Questions:

- https://www.interviewbit.com/problems/majority-element/
- https://www.interviewbit.com/problems/distribute-candy/
- https://www.hackerearth.com/practice/algorithms/greedy/basics-of-greedy- algorithms/tutorial/ [Solve the problem available at the end]
- https://www.codechef.com/problems/SUBSEG2
- https://www.codechef.com/problems/FGFS/
- https://www.hackerrank.com/challenges/board-cutting/problem