Assignments List

Course name: Design and Analysis of Algorithms [TE Division B]

Faculty: P.S.R. Patnaik

Mode of submission: Online [Moodle/Google Classroom]

1) For the following problems, find the space and time complexity of your solutions to the problems [CO1]
    a. https://www.hackerrank.com/challenges/equal-stacks/problem
    b. https://www.hackerrank.com/challenges/ctci-recursive-staircase/problem
2) Write a pseudo code based algorithm for prefix array sum problem and find time and space complexity. Choose any two application of the prefix array sum problem implement them in Python. [CO1]
3) Implement Prim's algorithm using union-find algorithm to detect presence of cycle in the graph. [CO3]
4) Implement Kruskal's algorithm using union-find algorithm to detect presence of cycle in the graph. [CO3]
5) Compare Dijsktra, Bellman Ford, and Floyd Warshall algorithms w.r.t to the following; [CO1]
    a. Input and output
    b. Time and space complexity
    c. real world applications
6) W.r.t to assignment 5, if a businessman wants to plan a business trip covering all the cities between a source city and a destination city and if there is a profit or a loss associated with travel between two cities. Suggest an appropriate algorithm to help businessman choose a source and destination city which will give him max profit. Justify your choice with valid arguments and relevant examples. [CO2]
7) With a help of pseudo code and implementation of pseudo code explain how the 0/1 Knapsack problem can be solved in an optimal way. Discuss the space and time complexity o various approaches to solve the 0/1 Knapsack problem. [CO2]
8) You are given with a list of files and a probability of each file being searched by the user. Considering that your search operation has to be an O(log n) operation.
    a. Design an algorithm to store files in such a way so that total cost of search operations on all files is minimal. [CO2]
    b. Implement the algorithm in Python under the same time and space complexity you arrived for the algorithm designed. [CO3]
9) Suggest and algorithm design approach from to solve Sudoku problem. Implement the suggested algorithm in Python. [CO2]
10) Discuss and explain the P vs NP problem. [CO4]