**(S1-21\_DSECLZG519) (Data structures and Algorithms Design)**

**Academic Year 2021-2022**

Design Documentation

**Assignment 2-PS1 – Crypto Currency- Group 385**

**Overview:**

This is a Crypto currency problem, we are trying to maximize profit by selling the crypto based on the inputs given and portfolio.

**Given Problem Statement:**

We need an algorithm to be developed in such a way that we should maximize profit by selling the crypto currency in our portfolio with the maximum sell amount given and Quantity and price of each cryptocurrency we have in the inputps1.

**Objective:**

Main objective is to write a python code algorithm for Crypto currency selling to maximize profit according to the inputs.

**Data Structure:**

For this problem statement we have used List of lists.

List contains data as shown

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Quantity | Price | Profit | Profit/price |

**Design:**

* The maximum amount that need to be sold, total number of crypto currencies that we have and their data is stored in InputPS1.txt.We read it using text file read function.
* We store data in the list of lists for each crypto currency data.
* We store maximum amount and types of crypto currencies into two different variables and return them to main function.
* We are using Knapsack algorithm to solve this problem.
* We are sorting the given data in the decreasing order based on the profit percentage on each crypto currency.
* Then start selling of the crypto currencies to reach maximum amount given in the problem statement.
* Finally saved all the data into a variable and writing the final data into a Outputps1.txt file using write function

**Time Complexity:**

* Complexity of the reading data from inputPS1 file and writing data into outputPS1 file is **O(n)**
* Complexity of the sorting algorithm that we have used in the code is **O(n\*log(n)).**
* Complexity of the Knapsack algorithm we have used is **O(n^2)**

**Total time complexity of the code is O(n^2)**

**Alternate Modelling:**

* This can also be implemented by using dictionaries as we have used list in the in the current algorithm.
* Here we have used knapsack algorithm we can also use Greedy algorithm to maximize the profit by selling the specified amount in the input.
* Reading input ,writing output and Sorting is same in the alternative modelling.

**Input & Output format**

**InputPS1 - (Input)**

Type of Crypto coins: 6

Maximum spend: 1000

C1 / 6 / 50 / 45

C2 / 8 / 60 / 50

C3 / 1 / 400 / 90

C4 / 2 / 100 / 70

C5 / 2 / 15 / 4

C6 / 2 / 200 / 24

**OutputPS1 – (Output)**

Max Profit:815.3333333

Quantity selection Ratio:

C1 :1.0

C2 :1.0

C3 :0.0

C4 :1.0

C5 :0.667

C6 :0.0

Total Quantity of each coin sold:

C1 :6

C2 :8

C3 :0.0

C4 :2

C5 :1.333

C6 :0.0