

RAJSHAHI UNIVERSITY OF ENGINEERING & TECHNOLOGY



DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Lab Report 5

Course Code: CSE 2202

Course Title: Sessional Based on CSE 2201.

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Problem Statement:

A solution to greedy knapsack problem for finding the optimal subset of input data.

Description:

Knapsack problem is a problem of combinational optimization. Given a set of items, each item to include in a collection so that the total weight is less than or equal to a given limit and the total value is as large as possible. There are two types of knapsack one is 0/1 knapsack and another is fractional knapsack problem. In this experiment we have used fractional knapsack problem. Fractional knapsack problem is mainly solved by greedy approach. The complexity of fractional knapsack problem is $O(n \log n)$.

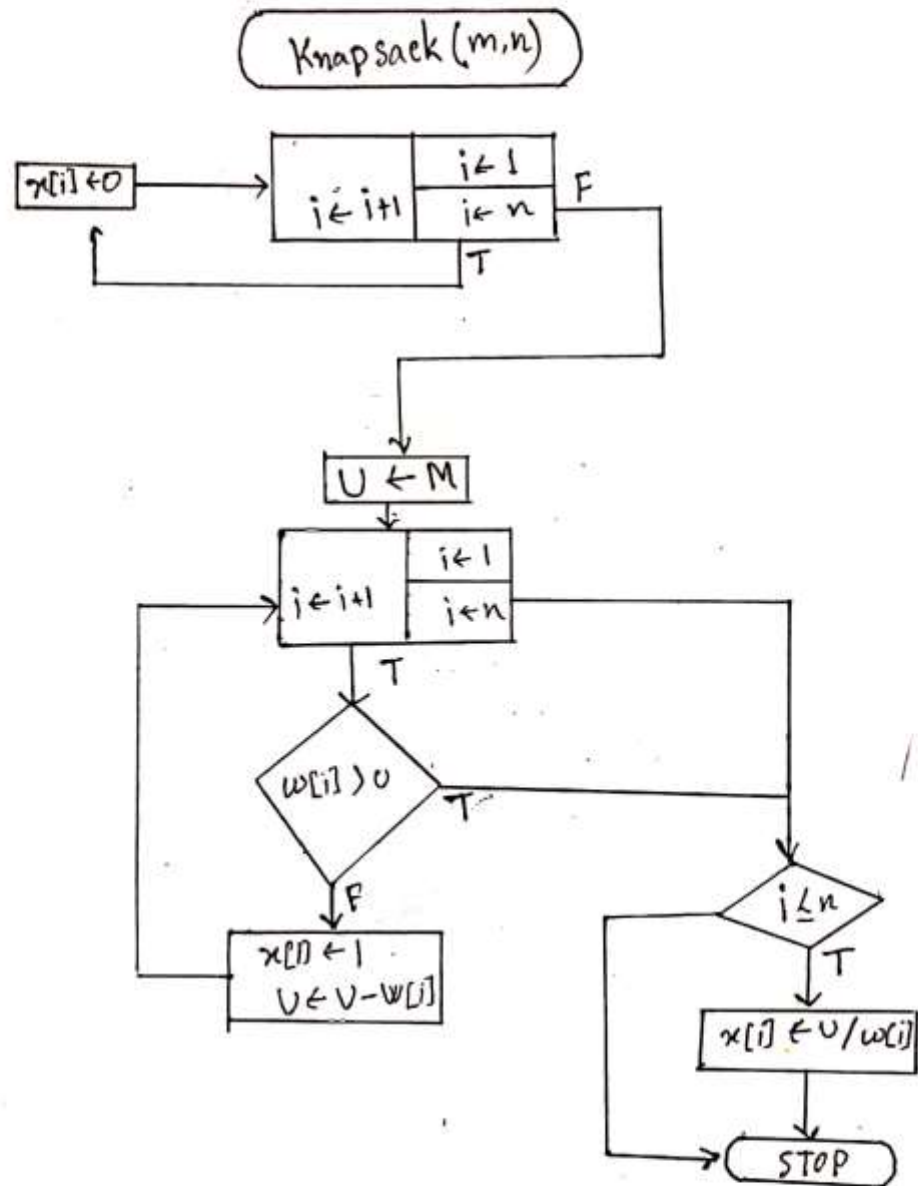
Algorithm:

Knapsack (m, n)

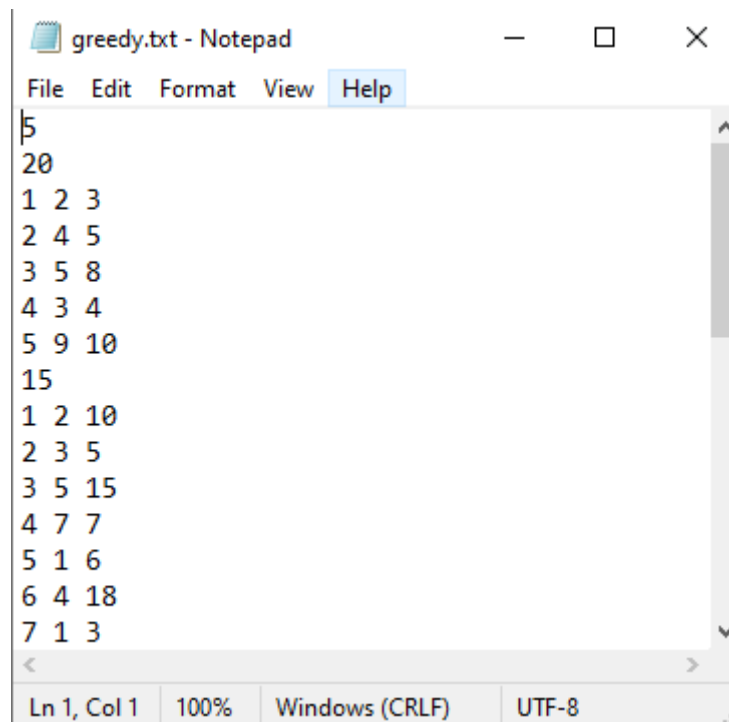
1. for $i \rightarrow 0$ to n
2. do $x[i] \rightarrow 0$
3. $V \rightarrow m$
4. for $i \rightarrow 1$ to n do
5. if $(w[i] > V)$ then break;
6. $x[i] \leftarrow 1.0$; $V \leftarrow V - w[i]$;
7. if $(i \leq n)$ then $x[i] \leftarrow V/w[i]$.

Here m is knapsack size, $p[1:n]$ and $w[1:n]$ contains the profits and weight respectively. $x[1:n]$ contains solution.

Flowchart:

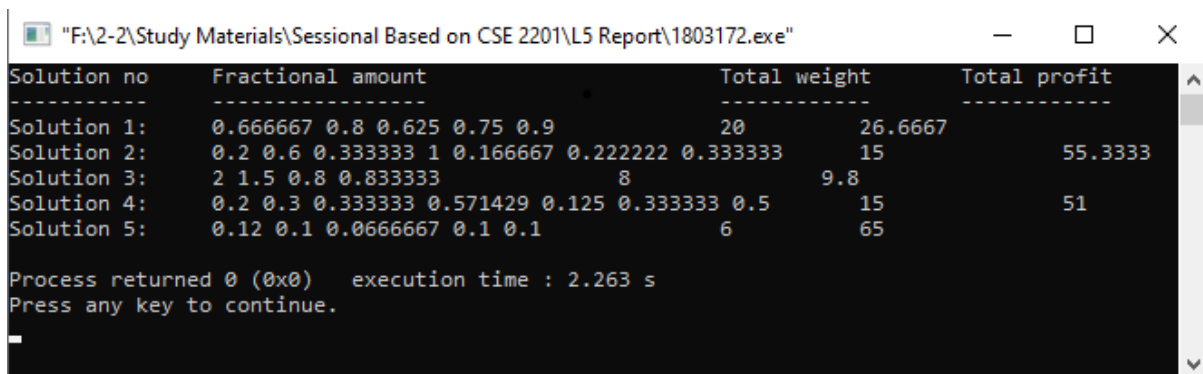


Input:



```
5
20
1 2 3
2 4 5
3 5 8
4 3 4
5 9 10
15
1 2 10
2 3 5
3 5 15
4 7 7
5 1 6
6 4 18
7 1 3
```

Output:



```
"F:\2-2\Study Materials\Sessional Based on CSE 2201\L5 Report\1803172.exe"
Solution no      Fractional amount      Total weight      Total profit
-----
Solution 1:      0.666667 0.8 0.625 0.75 0.9      20      26.6667
Solution 2:      0.2 0.6 0.333333 1 0.166667 0.222222 0.333333      15      55.3333
Solution 3:      2 1.5 0.8 0.833333      8      9.8
Solution 4:      0.2 0.3 0.333333 0.571429 0.125 0.333333 0.5      15      51
Solution 5:      0.12 0.1 0.0666667 0.1 0.1      6      65

Process returned 0 (0x0)   execution time : 2.263 s
Press any key to continue.
```

Conclusion:

In this experiment, we solved the fractional knapsack problem with greedy approach where we have taken the items using their per unit profit.