

DAA – Assignment no: 03

Write a Python program to solve a fractional Knapsack problem using a greedy method.

Input:

```
Assignment3.py X
Assignment3.py > ...
1  class Item:
2      def __init__(self, value, weight):
3          self.value = value
4          self.weight = weight
5          self.value_per_weight = value / weight
6
7      def __lt__(self, other):
8          return self.value_per_weight < other.value_per_weight
9
10
11 def fractional_knapsack(items, capacity):
12     """Solves the fractional Knapsack problem using a greedy method.
13
14     Args:
15         items: A list of Item objects.
16         capacity: The capacity of the knapsack.
17
18     Returns:
19         The maximum value that can be placed in the knapsack.
20     """
21
22     items.sort(reverse=True)
23
24     total_value = 0
25     total_weight = 0
26
27     for item in items:
28         if total_weight + item.weight <= capacity:
29             total_value += item.value
30             total_weight += item.weight
31         else:
32             remaining_capacity = capacity - total_weight
33             fraction = remaining_capacity / item.weight
34             total_value += fraction * item.value
35             break
36
```

Assignment3.py X

Assignment3.py > ...

```
37     return total_value
38
39
40 if __name__ == "__main__":
41     # Create a list of Item objects.
42     items = [
43         Item(60, 10),
44         Item(100, 20),
45         Item(120, 30),
46     ]
47
48     # Set the capacity of the knapsack.
49     capacity = 50
50
51     # Solve the fractional Knapsack problem.
52     max_value = fractional_knapsack(items, capacity)
53
54     # Print the maximum value.
55     print("The maximum value that can be placed in the knapsack is:", max_value)
56
```

Output:

```
PS D:\Tanmay Mohadikar\Sem 7 Practicals\DAA\Code file> & D:/Python/python.exe "d:/Tanmay Mohadikar/Sem 7 Practicals/DAA/Code file/Assignment3.py"
The maximum value that can be placed in the knapsack is: 240.0
PS D:\Tanmay Mohadikar\Sem 7 Practicals\DAA\Code file>
```