

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

Implementation

```
def fractional_knapsack(value, weight, capacity):
    # index = [0, 1, 2, ..., n - 1] for n items

    index = list(range(len(value)))
    # contains ratios of values to weight
    ratio = [v/w for v, w in zip(value, weight)]
    # index is sorted according to value-to-weight ratio in decreasing order
    index.sort(key=lambda i: ratio[i], reverse=True)

    max_value = 0

    fractions = [0]*len(value)
    for i in index:
        if weight[i] <= capacity:
            fractions[i] = 1
            max_value += value[i]
            capacity -= weight[i]
        else:
            fractions[i] = capacity/weight[i]
            max_value += value[i]*capacity/weight[i]
            break

    return max_value, fractions

n = int(input('Enter number of items: '))
value = input('Enter the values of the {} item(s) in order: '.format(n)).split()
value = [int(v) for v in value]
```

```
weight = input('Enter the positive weights of the {} item(s) in order:'.format(n)).split()
weight = [int(w) for w in weight]
capacity = int(input('Enter maximum weight: '))
max_value, fractions = fractional_knapsack(value, weight, capacity)
print('The maximum value of items that can be carried:', max_value)
print('The fractions in which the items should be taken:', fractions)
```

Output

Enter number of items: 3

Enter the values of the 3 item(s) in order: 24 15 25

Enter the positive weights of the 3 item(s) in order: 15 10 18 Enter maximumweight: 20

The maximum value of items that can be carried: 31.5

The fractions in which the items should be taken: [1, 0.5, 0]