

Solution 1

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1 // Copyright © 2020 AlgoExpert, LLC. All rights reserved.
2
3 package main
4
5 func KnapsackProblem(items [][]int, capacity int) []interface{} {
6     values := make([][]int, len(items)+1)
7     for i := range values {
8         values[i] = make([]int, capacity+1)
9     }
10    for i := 1; i < len(items)+1; i++ {
11        currentValue := items[i-1][0]
12        currentWeight := items[i-1][1]
13        for c := 0; c < capacity+1; c++ {
14            if currentWeight > c {
15                values[i][c] = values[i-1][c]
16            } else {
17                values[i][c] = max(values[i-1][c], values[i-1][c-currentWeight]+currentValue)
18            }
19        }
20    }
21
22    value := values[len(items)][capacity]
23    sequence := getKnapsackItems(values, items)
24    return []interface{}{value, sequence}
25 }
26
27 func getKnapsackItems(values [][]int, items [][]int) []int {
28     sequence := []int{}
29     i, c := len(values)-1, len(values[0])-1
30     for i > 0 {
31         if values[i][c] == values[i-1][c] {
32             i--
33         } else {
34             sequence = append(sequence, i-1)
35             c -= items[i-1][1]
36             i--
37         }
38         if c == 0 {
39             break
40         }
41     }
42     reverse(sequence)
43     return sequence
44 }
45
46 func reverse(numbers []int) {
47     for i, j := 0, len(numbers)-1; i < j; i, j = i+1, j-1 {
48         numbers[i], numbers[j] = numbers[j], numbers[i]
49     }
50 }
51
52 func max(arg int, rest ...int) int {
53     curr := arg
54     for _, num := range rest {
55         if curr < num {
56             curr = num
57         }
58     }
59     return curr
60 }
61
```