COMP125

Assignment 3

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Assignment 3

This assignment deals with an optimisation problem

Finding a selection of items with maximal value under some constraints, i.e. all the items must fit in the bag

We try first a strategy that is to pick at any time the item with largest value that can fit in the bag

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For instance take a bag carrying 60 and a list of 4 items:

Item 0: value = 22 and weight 28
Item 1: value = 11 and weight 3
Item 2: value = 35 and weight 45
Item 3: value = 17 and weight 26

Assignment 3

For instance take a bag carrying 60 and a list of 4 items:

Item 0: value = 22 and weight 28
Item 1: value = 11 and weight 3
Item 2: value = 35 and weight 45
Item 3: value = 17 and weight 26

We take Item 2 first. It has maximal value and 35<=60. Then we would like to pick item 0 but it does not fit in the bag. Same thing with item 3. So we end up with item 1.

Total value = 46 and weight = 48.

The selection is **`false true true false`**

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If the list of items is sorted according to the value of the items in decreasing order

Then the problem is quite easy to solve

But if we sort the items, then we lose the order…

It is possible to solve the problem without sorting

It is also possible to use indirect sorting

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Unfortunately, this strategy does not always perform well, i.e. return an optimal selection

Again consider the example of a bag carrying 60 and the list of 4 items:

Item 0: value = 22 and weight 28
Item 1: value = 11 and weight 3
Item 2: value = 35 and weight 45
Item 3: value = 17 and weight 26

It is actually possible to pick all the items except item 2 for a total value of 50 and a total weight of 57

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How do we find an optimal selection?

Go through all the possible ways to pick items in the list

You may adapt the method **`permuteRec`** discussed in the lectures to suit your need