Seminar 12 Complex problems

Problem solving methods



Objectives

Using Python to solve complex problems

- Develop abstract data types
- Develop layered applications
- · Implement greedy algorithms



Requirements

Consider a knapsack problem: we have a list of objects, each with a value (v) and a weight (w). The objective is to place objects in a knapsack of capacity W such that the total value of objects is maximum and the total weight does not exceed W.

maximize
$$\sum_{i=1}^n v_i x_i$$
 subject to $\sum_{i=1}^n w_i x_i \leq W$ and $x_i \in \{0,1\}.$

Develop a greedy algorithm for the 0-1 knapsack problem. The solution should include:

- A class to model the problem backpack (capacity, items)
- A class to model the solution selected items
- A class to model the algorithm