



Greedy Techniques: Introduction

Let's go over the Greedy Techniques pattern, its real-world applications, and some problems we can solve with it.

We'll cover the following



- Overview
- Examples
- Does my problem match this pattern?
- Real-world problems
- Strategy time!

Overview

An algorithm is a series of steps used to solve a problem. There are multiple types of problem solving algorithms, with greedy algorithms being one of them. **Greedy** is an algorithmic paradigm that builds up a solution piece by piece. This means it chooses the next piece that offers the most obvious and immediate benefit. A greedy algorithm, as the name implies, always makes the choice that seems to be the best at the time. It makes a locally-optimal choice in the hope that it will lead to a globally optimal solution. In other words, greedy algorithms are used to solve optimization problems.

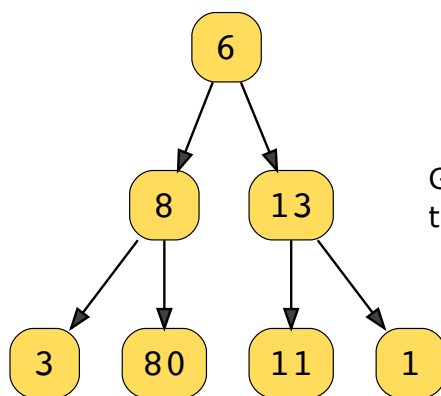
Greedy algorithms work by recursively constructing a solution from the smallest possible constituent parts. A recursion is an approach to problem-solving in which the solution to a particular problem depends on solutions to smaller or equal instances of the same problem. While this technique might seem to result in the best solution, greedy algorithms



have the downside of getting stuck in local optima and generally do not return the global best solution. There are a number of problems that use the greedy technique to find the solution, especially in the networking domain, where this approach is used to solve problems such as the traveling salesman problem and Prim's minimum spanning tree algorithm.

The illustration below shows a simple example that demonstrates the working of a greedy algorithm and also shows how a greedy algorithm doesn't guarantee an optimal solution.

Find the path with the maximum sum of node values



Greedy algorithm will look for nodes with the largest values.

1 of 5



Examples

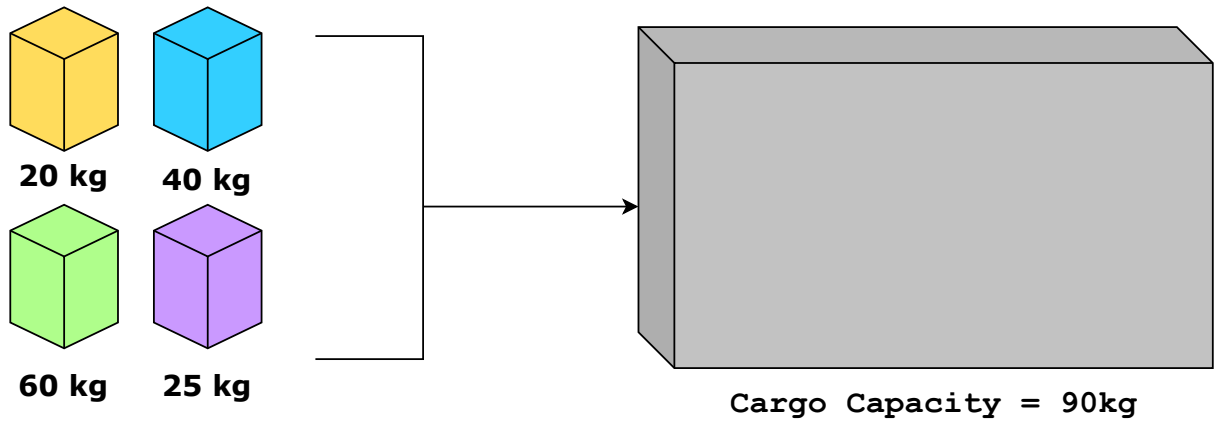
The following examples illustrate some problems that can be solved with this approach:

?

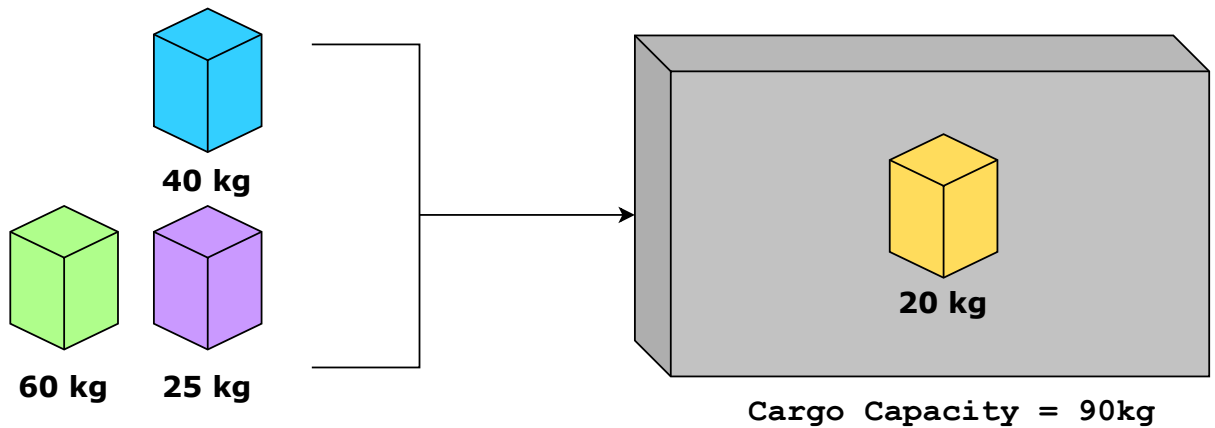
Tt

☾

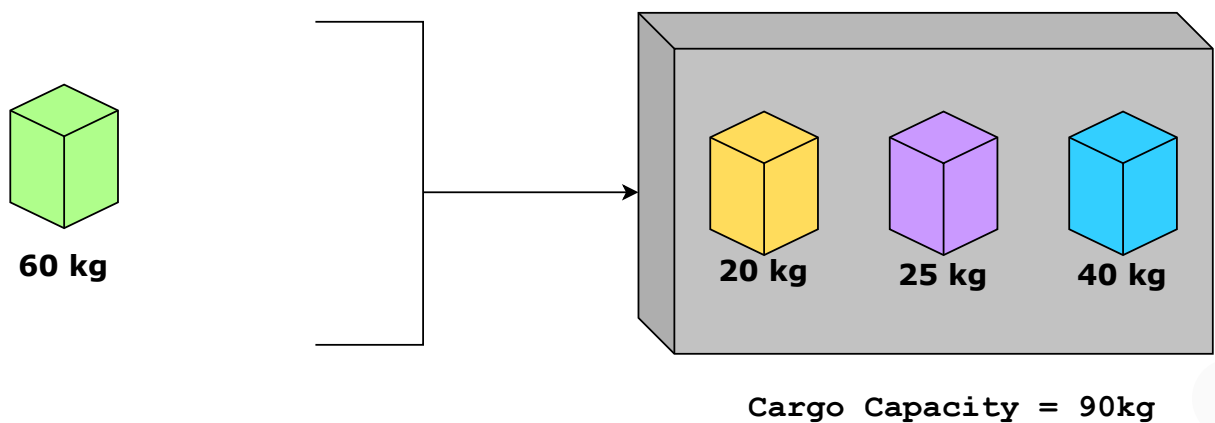
Loading maximum containers in a cargo



To fill cargo with maximum containers, we will start loading cargos with the lowest weight. Hence, container with 20kg is loaded first.



Using greedy approach, three cargos are loaded at a time.



?

Tr

1 of 2

Does my problem match this pattern?

- Yes, if selecting a series of local optima allows us to construct or identify the globally optimum solution.
- No, if any of these conditions is fulfilled:
 - Our analysis shows that making local greedy choices lead us to a sub-optimal solution.
 - The problem has no local optima.
 - It isn't an optimization problem.

Real-world problems

Many problems in the real world use the greedy techniques pattern. Let's look at some examples.

- **CPU Scheduling algorithms:** Many algorithms which use the greedy approach help in CPU scheduling.
- **LAN Networks:** In a large LAN with many switches, finding a minimum spanning tree is important to ensure that only a minimum number of packets will be transmitted across the network.
- **Social Networking Websites:** These applications recommend a list of people that a user may know through the Dijkstra algorithm. The



Strategy time!

Match the problems that can be solved using the greedy techniques pattern.

Note: Select a problem in the left-hand column by clicking it, and then click one of the two options in the right-hand column.



Match The Answer

ⓘ Select an option from the left-hand side

Find the shortest period of time to schedule a set of jobs on a set of machines

Greedy Techniques

Find the number of palindromic substrings contained in a given string

Some other pattern

Find the shortest path between two intersections on a road map

Find the most cost-effective way to lay an optical fiber cable in a neighborhood, such that all the houses get connected

Reset

Show Solution

Submit

?

← Back

Next →

Tt

⌂

 Mark as
Completed

?

Tt



