The Greedy Method & Dynamic Programming

# The Greedy Method

The greedy method is a method for algorithm design. More specifically its used to design algorithms which take in a set of inputs and output a subset of these inputs. This could be for example a shortest path algorithm where it takes a set of nodes and connections and outputs a set of nodes as the path.

## Optimal vs Feasible solution

When a greedy algorithm gives a solution such as a path between two nodes, this solution can either be optimal or feasible. If the solution is optimal it is the “best” solution to the problem, a feasible solution is any valid solution. Such as a path finding algorithms, Dijkstra’s algorithm will find the optimal solution, but A\* path finding could only find a feasible solution.

This shows an important trade off, sometimes calculating the optimal solution takes a lot of processing time, and a much faster algorithm could find a feasible solution that is near optimal.

## Example

The travelling salesman problem is a famous problem. The problem is given a set of points find the optimal route between every point that minimizes distance. This is very important in the delivery business as algorithms are required to calculate the route of delivery drivers. Using a basic method of trying every route and recording the fastest would find the optimal route but has a complexity of O(n!). So in the real world this algorithm isn’t practical as it would take far too long to calculate a route. Instead companies use an algorithm to approximately calculate the shortest route.