Hub Location Network Optimization

Patrick Meyer, Mehrdad Mohammadi
IMT Atlantique

1 Metaheuristic algorithm

In this section, you are expected to develop a meta-heuristic algorithm for solving large-size instances of the problem. We recommend that you develop a genetic algorithm (GA) for this problem.

NOTE : Different parts of your algorithm must be explained in detail in your final presentation.

Step 1 : Solution Representation

Before starting to develop the GA, you should design your solution representation. Be careful that the performance of your algorithm highly depends on the solution representation. Try to develop a representation that genetic operators can be easily performed on it without creating infeasible solutions.

> **RECOMMENDATION** : You may search and read about the ***Prufer sequence***. This sequence is a way to represent a tree graph as a sequence of numbers. You may also use other innovative solution representations.

Step 2 : Crossover operator

Depending on your solution representation, consider at least one crossover operator in your GA that never lead to infeasible solutions. Such crossover operator helps to avoid reparing or eliminating infeasible solutions during the algorithm. Explain well your operators.

Step 3 : Mutation operator

Depending on your solution representation, consider at least one mutation operator in your GA that never lead to infeasible solutions. Such mutation operator helps to avoid reparing or eliminating infeasible solutions during the algorithm. Explain well your operators.

Step 4 : Selection operator

In order to perform crossover and mutation operators on the solutions, you should develop a selection mechanism. Please explain well your selection operator.

Step 5 : Termination criteria

Since the GA is an iterative algorithm, it requires to stop after certain ieterations. Accordingly, define a termination criterion for your algorithm. You may define several termination criteria and your algorithm stops whenever one criterion is satisfied.