Master ADEO 2

Project 5

The traveling salesman's problem

Program in a language of your choice the following three procedures for constructing a solution to the traveling salesman problem:

1. Generation of a random tour
2. Choose a city randomly
   Repeat n-1 times:
      Choose the city not yet visited that is closest to the one where you are and go there
3. Choose a city randomly
   Create n-1 "star" routes each containing 2 cities
   Repeat n-2 times:
      Merge the two routes that save the maximum distance

Give the average length (relative to the best known solution) of the routes provided by these heuristics as well as their execution time, for the following problems of the TSPLIB library:
berlin52, eil101, lin318, pr1002, rl5934, d18512
Graphically represent the routes obtained.

2. Programming of improvement procedures for the traveling salesman problem

Program procedures allowing to find the local optima relative to the 2-opt, 2,5-opt and 3-opt neighborhoods, by adopting the first neighbor solution which improves the current solution.

For the same examples of problems as in point 1, provided that the computation times are reasonable, give the average quality of the solutions obtained by composing each heuristic for the generation of solution with each improvement procedure. In addition, we will try the following compositions:
Savings + 2-opt + 3-opt
Savings + 3-opt + 2-opt
Savings + 3-opt + 2-opt + 3-opt + 2-opt + 3-opt + 2-opt ...

Complete (as far as is reasonable) a table with 15 rows and 12 columns giving the relative quality of each of the methods and their respective calculation time for the 6 examples of problems considered.

Evaluate the empirical complexity of your locations. Indicate in the report the data structures used in your program