Lesson 5: Implement a genetic algorithm using ParadisEO

1 Example

The archive `paradiseo_practices_0208.tgz` installed on your computer contains a genetic algorithm implemented using ParadisEO-EO (see `gen_algo` in the **build/lesson5** directory).

To run it, please go in **build/lesson5** and start the program `gen_algo` by giving one of the TSP instances located in **tsp/benchs**.

When entering `./gen_algo ../../tsp/benchs/berlin52.tsp`, you should end up with the following outputs:

```
>> Loading [../tsp/benchs/berlin52.tsp]
[From] -26461 52 39 12 29 44 2 26 13 40 7 35 14 28 25 41 6 51 10 50 45 19 0 38 15
33 42 21 18 32 37 9 5 20 34 43 16 30 1 23 22 4 27 36 4946 47 48 11 17 8 31 24 3
STOP in eoGenContinue:  Reached maximum number of generations [1000/1000]
[To] -13068 52 45 24 28 22 19 21 30 17 31 36 46 25 13 12 26 27 51 10 14 37 23 4 15 49
20 2 8 42 50 11 47 39 38 35 34 44 18 40 9 7 32 3 5 33 16 41 6 1 29 0 48 43
```

The printed-out results show for the initial best solution and the final one :
-the length of the route
-the number of cities
-the route itself (notice that the city index starts from 0).

2 Study the genetic algorithm dedicated components

Study the `gen_algo.cpp` file located in the **lesson5** directory using :

- the ParadisEO-EO API documentation available at :

  http://eodev.sourceforge.net/eo/doc/html/index.html

- the source files located in the **tsp/src/** directory

3 Customize the GA

Make a backup (copy) of the cpp file `gen_algo.cpp`. You can now modify the original `gen_algo.cpp` and use the existing makefiles to compile it.
Edit and modify the `gen_algo.cpp` file :

- Try to tune a few parameters of the GA (selection criteria, stopping criteria ...).
- Then, try to change the initialization of the population by applying one of the local searches on each individual.

To compile `gen_algo.cpp`,you should use the command `make` from **build/lesson5**.

Finally, test your modifications on several TSP instances (`berlin52`, `eil101` ...) and compare the results you get.