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/eil101.tsp]
[From] -3176 101 5 72 27 77 20 82 23 14 91 17 60 50 43 99 18 34 69
76 22 38 25 88 36 40 7 55 74 42 67 53 11 62 61 92 58 93 19 70 33 32
86 48 47 4 97 73 95 79 85 66 65 24 13 89 8 26 96 56 28 39 80 37 49
78 12 1 98 46 31 57 10 30 90 71 75 81 16 45 29 41 100 51 21 52 59 15
64 44 94 54 9 6 3 0 87 63 2 84 83 35 68 STOP in eoGenContinue:
Reached maximum number of generations [1000/1000]
[To] -1564 101 60
17 81 59 5 94 43 42 14 40 13 15 82 45 46 35 51 26 100 74 38 24 22 21
54 23 66 86 99 44 87 64 34 57 25 32 75 80 29 79 67 53 3 1 58 95 97
90 85 37 83 16 92 91 36 41 96 93 52 56 12 33 77 70 30 88 39 20 72 71
31 62 89 61 49 2 8 18 6 10 9 0 68 78 28 27 76 11 73 55 50 65 19 69
48 63 47 7 4 98 84
```

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.