



Homework No. 1

Genetic Algorithm

Prelude

For this assignment, you need to implement the Genetic Algorithm with Python to try to solve the *Travelling salesman problem*. TSP is an NP-Hard problem that asks the following question: Given a set of cities (vertices) and the distances between each pair of cities (weighted edges), what is the shortest possible (weighted) cycle that contains all the cities?

What to do?

Implement the Genetic Algorithm to “solve” the TSP for a given input. After implementing the code, test your code by setting the test case *bayg29*, which contains 29 cities, as the input of your code. What’s the lowest cost your code could find for this test case? What’s the corresponding cycle? Note that the length of the best cycle your code has found must be less than 2000 for this test case.

Prepare a summary of what your code does and what ideas and tricks you’ve used to optimize your code. Did the size of the population or the number of iterations matter? Write interesting facts you’ve learned in this process.

Upload a zip file containing your source code along with the summary.

Extras

Your homework will receive extra points for each of the following parts:

Extra 1. finding an answer with the cost less than 2500 for *gr229*.

Extra 2. finding an answer with the cost less than 10^6 for *pr1002*.

Extra π . finding the best answer among the students for *pr1002*.

Test Cases

- bayg29
- gr229
- pr1002

For more test cases, visit Heidelberg University’s site.