

## **ITI41222 Evolutionary Computation (Autumn 2023)**

### **Term Assignment**

#### **Part 1: Choose a problem**

You are asked to choose a problem to be solved. It must be a free optimization problem or a constrained optimization problem in class NP or NP-complete.

Submit a report (in 2 pages) that provides (1) a formal definition of the problem, including input(s), model, output(s), and relevant mathematical definitions when applicable, and (2) a brief review on how this problem has been addressed in the literature with an emphasis on recent studies (preferably last 5 years).

**Due:** September 25, 2023 (for report submission)

#### **Part 2: Choose a method**

You will be applying two different algorithms to solve the problem you choose in part 1. The first algorithm must be a genetic algorithm (GA) while you are allowed to decide on your second algorithm. Then, you are asked to choose another algorithm that can be applied to solve your problem.

Submit a report (in max 10 pages) that introduce (1) how you will apply genetic algorithm to solve your problem, including your representation method, cross-over and mutation operators and other parameters, (2) a description of the algorithm you choose, (3) how you will apply the second algorithm to solve your problem.

Present your work in the classroom in 10 slides/10 minutes.

**Due:** October 9, 2023 (for report submission), October 10, 2023 (for presentation).

#### **Part 3: Implement and Test**

Implement two algorithms (GA and the second algorithm in Part 2) using your favorite programming language. You are allowed to use available libraries as long as you understand the implementation and are able to describe if it is asked in the exam. Find or generate a dataset to simulate your problem and test your algorithms on this dataset.

Submit a full report including (1) your report in Part 1, (2) your report in Part 2, (3) your results in Part 3, which should describe your implementations details, dataset, experimental setup and empirical comparison of two algorithms in terms of their running performance, (4) a conclusion which will particularly associate the theoretical time complexity of the algorithms with their experimental performance and interpret all your findings.

**Due:** October 31, 2023 (for report submission)