Assignment 2: *Schedule making by using evolutionary algorithms*

11753 - Computational Intelligence. Master in Intelligent Systems. Academic Year 22/23

The goal of this assignment is to implement an evolutionary algorithm for schedule making in a high school. The algorithm will have as input the following information:

- A number of classes (groups of students). No student is in two classes.
- For each class, a total number of weekly hours and a list of courses. Each course will have a set number of weekly hours and an assigned professor. *Keep in mind that a professor can teach courses in several different classes and several courses to the same class.*
- For each professor, their time availability will be available, it may be that they are not available at certain time slots of the week.
- The weekly time slots available to teach the courses.

The output of the algorithm will be the weekly schedule for each class. We will assume that the high school establishes a fixed classroom for each class so that the algorithm does not have to assign classrooms.

a) State which are the soft and hard constraints of your algorithm and justify them.

b) Explain clearly what is the representation of an schedule, which are the parameters of the algorithm and its fitness function. Justify your choice.

c) Create several inputs with different degrees of difficulty and analyze the obtained results. You can use as input lists of courses and their weekly hours several real high school courses.

d) Propose some modification to the algorithm and analyze the obtained results. This modification can be a new mutation or recombination operator, a new selection strategy for the individuals of the new generation, etc.

You can implement the algorithms in the language you consider most appropriate. The algorithms must be accompanied by:

1. All source files.
2. Each implemented function must be briefly explained in the report.

Logistics: Groups of 2 or 3 people. Delivery date: December 9th, 2022.