Scheduling of Student Courses

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Every year universities have to assign rooms and time slots to courses so that all students can attend their assigned courses. This is a complex problem, with a lot of constraints that must be modeled. In fact, this has been the focus of the latest International Timetabling Competition (ITC) (`https://www.itc2019.org/`. The ITC provides datasets in XML. A detailed description of the competition can be found here: `https://www.itc2019.org/papers/itc2019-patat2018.pdf`

In this project, we will deal with this problem, devising a tool that can find a suitable schedule that meets the hard constraints and minimizes the utility value of unsatisfied soft constraints. The tool should be able to load data from the XML format used in the competition (`https://www.itc2019.org/format`), and output a corresponding course schedule.

We will consider the constraints used in the competition in an incremental way: starting from a smaller sub-set of constraints and gradually including more to our model. Also, some other constraints (e.g. ones that would be relevant in the schedule for Aalborg university) could be considered.

To address this problem, a possible approach is to use constraint optimization tools. For that, there are a number of options that may be used (see `https://en.wikipedia.org/wiki/List_of_optimization_software`). You will select an appropriate tool, model the problem in its input language, and possibly customize the tool to optimize it for your model.

This project lends itself more towards an experimental approach. You will perform an in-depth analysis of what is the performance of your tool under different models. How is the performance affected by the number of students, courses, or rooms? How is the performance affected by each constraint? Is there a combination of constraints that make finding a satisfying assignment really hard? Is there a phase transition in the behavior of your tool?