MATH0462 - Discrete Optimization
Project

Room allocation for the courses of the university

The University of Liège teaches in rooms that are spread over the whole city. This may lead to students having to travel a long distance during the day in order to follow a course that possibly takes place in another part of the city. In this project, we want to explore the opportunity to centralize the allocation of rooms for courses in order to minimize the distance traveled by the students during the day.

We plan the room allocation day by day. For each day, the problem is to find one room for each course organized on that day in such a way that

- two courses organized in the same room cannot have a nonempty intersection of their schedule
- any course must be organized in a room with a sufficient number of seats (with some flexibility in order to avoid an infeasible schedule)
- the distance traveled by the students is minimized.

For each day, there is a csv file entitled EventsNN.csv (with NN the day number) with the list of events that have to be organized on that day, associated to their start time, end time and course code. The code course is just there for information purpose but must not be used as an identifier. For each day, there is also a file studentsNN.json which is a json file with a dictionary indicating the list of students for each event. There is also a csv file with list of rooms available to schedule the courses. This list also includes the capacity of each room and the building in which they are located. Finally there is an excel file indicating the distance in minutes between each pair of buildings of the university. It is assumed that the distance within the same building is 0, whereas the distance between buildings with the same letter is 3 minutes.

Questions

1. Write a MIP model that finds a room allocation satisfying the constraints and minimizing the distance traveled by the students
2. Write a heuristic that solves the same problem.

Instructions

All projects will be done by groups of 2. You must write a very short report (3 pages maximum) including a human-friendly short version of your models and your heuristics. Everything (code+report) should be sent by e-mail to `q.louveaux@uliege.be`. The deadline for submitting your project is May

15. The presentation of the project should be done on Wednesday May 17. No formal presentation is needed but you should possibly be able to discuss the various tests that you have performed.