Documentation of Optimization Tool Instruction

This documentation aims to introduce the optimization tool built on Python and Gurobi. Before using the optimization tool, please make sure you are prepared with knowledge of Python, Python Console, and Gurobi, and make sure your platform is installed with Python, Gurobi, and Python library of Gurobipy.

**How to use the tool**

This optimization tool is well sealed and can be easily run on Python Console. Please start Python Console and use the following command to start the optimization tool and process:

python optimize.py input.xslx output.csv

We must specify three files to start the optimization tool:

optimize.py is the optimization tool sealed in Python codes. This optimization tool contains a main program for initiation of Python Console above and the core optimizing function of optimize(). The function takes two inputs: inputFile and outputFile. inputFile corresponds to input.xslx and specify the location of the input Excel file. outputFile corresponds to output.csv and specify the name and the location of optimized result table to be outputted.

If the function needs to be imported to other Python or Jupyter Notebook files, you can directly import the function from optimize.py:

from optimize.py import optimize

**Input and Output**

Input.xlsx is the input file containing all needed data of course credits, classroom capacity, and course preferences. The Excel table must contain two sheet named "Courses" and "Classroom":

* "Courses" sheet must contain the following columns:
  + course: the course name
  + section: the section of the course
  + units: the units of course must specify how many slots are needed in integer
  + seats\_offered: the number of students the course estimates to take in integer
  + A,B,C: the preferences of courses in {1,2,3,4}. A, B, C corresponds to:
  1. Whether courses are after 10 am and before 6 pm
  2. Whether the courses prefer Monday and Wednesday
  3. Whether the courses prefer Tuesday and Thursday
* "Classrooms" sheet must contain the following columns:
  + Room: the name of classroom
  + Size: the available seats of the classroom in integer

output.csv is the output file containing the final schedules of courses for time slots and available classrooms. It contains four columns:

* course: the name and the section of the course which occupies the time slot
* classroom: the name of the classroom to be used
* slot: the period for the course to be used, ranging from 8am to 8pm
* weekday: the weekday of the time slot, ranging from Monday to Friday