Final Project – Operations Research

Initial Proposal: November 15th 9:10am, 2019
~~**Presentation Due Date: January. 10th 9:10am, 2020**~~
Report Due Date: January 17th 11:59pm, 2020

Project Description

In this project, your team of 6~7 students will find an interesting problem to work on. For example, you may choose a decision problem related to National Taiwan University or the Island of Taiwan. You could decide where on campus to establish a Burger King that would best serve the students, or what is the best way to get from Albert's office in the Civil Engineering Building to Yin-Nan's office in the Civil Engineering Research Building. I consider these types of problem INTERESTING.

Grading

The project will be graded based on the idea of the topic (5%), the abstraction of the real-world problem into a Linear Program, Binary Linear Program, Integer Linear Program, or Mixed Integer Linear Program or other models taught in class (20%), and the validation of the correctness of the model and output (5%). **A preliminary proposal of your work is to be submitted** (10%), and **a formal presentation of 8 minutes is required for each group** (30%), using a presentation method (slideshow, drama, video) you believe that best showcases your work. There will also be a **final report** (30%).

At most 5% extra credits could be granted if one or several additional works is/are included. Possible extra credits are:

- The problem itself is intellectual, interesting, creative, and practical that went beyond Albert's imagination.
- The presentation is superb.
- Validation of the model is done in good extent.
- Other additional works which improve the usefulness and/or correctness of the model.
- Show you have worked hard.

Written Report

The written report is important in this project. If you use part of a model from the Internet, or other sources, you have to acknowledge the work by referencing/citing it clearly in the written report. The report is limited to 20 pages, single-spaced. The page limit does not include the reference list. (You can have 100 pages of reference list, if required.) It is required to include the following 9 parts:

(1) About the problem: Please introduce the problem and elaborate on why your group has chosen it and why it is interesting. This is to show the potential impact of your work.

(2) Literature review for the problem domain in research and practice. In literature reviews, how the research problem, or a similar problem, is addressed should be discussed. Based on the review, you can justify, through similar studies, why you have chosen certain methodology or model to solve your problem. On the other hand, you can also show uniqueness of your work, if based on the literature, no one has attempted to take on your proposing approach.

(3) What are specific objectives for your work? What are your assumptions? What is the main challenge you are trying to overcome in the real-world? What are goals in concrete terms, or even quantitative terms? Minimizing cost? Maximizing profit? How do you define cost or profit? How does this quantitative term relate to your real-world goal?

(4) Modeling processes: You have to introduce the major modeling steps you use in this project. For example, you might have data collection, model formulation, test runs, validation, and so on. What you do in each step, and how are they reasonably achieved? Visualization is strongly encouraged.

(5) The model: The Python *Gurobi* model should be presented and discussed in detail. The purpose of this part is to explain how the model is related to your problem, and how it is developed. Explain how assumptions you've made for your problem translate or effect your model. Explain the objective and constraints. What are specific requirements you have for your problem, and how they are formed into constraints?

(6) Results: You have to discuss the result of your project. Please also talk about how you evaluate the correctness of your model output and the input constants you have used in the model. Why are the results reasonable? Based on common sense? Or how you have looked more in depth to justify the correctness.

(7) Your thought about working on this project. You can talk about what you've learned, or even suggestions.

(8) Extra credits: If you would like to obtain extra credits, please list the additional works you have done.

(9) Work Distribution: please state what part of the project is done by which student. Please also estimate the workload each student has worked. For example Albert work 29.5% of the work, James 40%, Yu-Ting 30.5%, and Steve 0%.

Submission

All teams have to submit the written report by uploading (the report, the Python/Gurobi .py and the output results - all zipped in one file) via CEIBA. The final report zipped into a single .zip file (with the model files) should be submitted through CEIBA, and for administration purposes please upload the zip file for each student. The <u>team name</u> and <u>names of the team members</u> need to be included in the <u>title page</u> of the report. If you have any difficulty submitting the project documents (report and model zipped into one .zip file), please contact Albert. There will be penalties for late submission of 10% per day, up to a maximum of 7 days.