University of Melbourne - School of Mathematics and Statistics

Optimisation for Industry - 2024

Group Project

Overview: Businesses such as bakeries, restaurants, travel agencies, supermarkets, grocers, colleges, hotels, etc. often have realistic (and still easy to model/solve) optimisation problems. As OR/MS consultants, you are commissioned to evaluate an activity of a business of your choice and propose improvements that could be made to this activity. You are expected to understand the problem and propose an OR approach.

Submissions: Via canvas. One submission per group. Each submission should contain a pdf document and a companion Jupyter notebook with the implementations.

Deadlines (strict):

- Proposal: Friday of Week 6, 5 pm.

- Final report and Jupyter Notebook: Friday of Week 12, 5 pm.

Proposal: The goal of the proposal is to present a summary of the problem to be tackled. The idea is that the Lecturer will be able to guide the groups on the feasibility of solving/approaching the problem in the timeframe available. The proposal should use a maximum of one page and should explain the context in which the problem occurs, the data available and, mostly, what is the set of decisions to be made (e.g.: we want to find a rostering for workers at the ECR Library; we want to find the best locations for a new bike-sharing parking; etc.). **The proposal is due by the end of week 6**.

Presentation: Groups will present their work in 10 minutes during the last week of the subject.

Report: A typical report should contain the following sections:

1. Introduction: Motivate the problem. Present any relevant associated literature. Explain the goals of the project and which analysis you wish to make.

2. Problem definition: Formally define the problem. Which kind of simplifications are made? Which kind of problem variants do you wish to tackle?

3. Data: Present the data you are using. How was it collected/generated?

4. Model formulation and solution strategy: Present your model(s). Present your solution strategy: black box solver, iterative generation of constraints, decomposition method...

5. Model implementation and solution

   (Jupyter): Implement your model for the scenarios you have available. If a single scenario (instance) is available, present modifications or what-if analys that can be made.

   (PDF): List your main results. In this section, tables of results, figures, etc. are expected.

6. Conclusions and recommendations: Present a summary of analysis and conclusions to your stakeholders.

The report should be as brief as possible, but still present the most interesting developments and conclusions. Your report should not have more than 7500 words.

Examples of past projects:

- Vehicle routing and scheduling: A case study of Lao Chu Ham Company.
- Utilizing Social Media to increase Awareness and Customer Traffic
- Long-term planning for wind capacity expansion targets
- Melbourne Tourist Day Plan
- Optimising operations in a Baking Company
- Optimisation of Costs and Output in the Process of Frozen Orange Juice Concentrate Production
- Optimisation of Australia Post Operations in the Area Around the Parkville campus
- Staff roistering at ERC library
- Assignment of students to rooms in a College