Final Report

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CS/ECE/ISyE 524 — Introduction to Optimization — Summer 2024

University Course Timetabling Problem

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1. Introduction

Timetabling problems involve scheduling events into timeslots while adhering to numerous constraints. These problems are crucial in various fields, including airport slot scheduling, sports scheduling, logistics scheduling, and university timetabling.

In this project, we address the University Course Timetabling Problem (UCTP), specifically the allocation of instructors to courses within fixed timeslots over a single week. The objective is to ensure that each class receives the necessary courses while minimizing conflicts and maximizing the satisfaction of preferences.

The data for this problem is synthetically generated, representing the teachers' requirements and available timeslots. Our assumptions include fixed timeslots per weekday and specific constraints such as instructor availability and required timeslots for certain courses.

2. Conclusion

Work Done So Far:

- Problem Definition and Data Generation: We defined the problem scope and generated synthetic data for two classes, nine instructors, and seven different courses.
- Mathematical Model Development: We developed a mathematical model using Integer Programming (IP) to represent the constraints and objectives of the problem.

- Implementation: The model was implemented in Julia, and the constraints and objectives were set up. The optimization process was run, and initial results were generated.

Remaining Work:

- Documentation and Final Report: Completing the documentation and preparing the final report for submission.

Time Estimates:

- Documentation and Final Report: 1 week

3. Issues/Concerns

Major Issues:

- Handling Multiple Courses by the Same Instructor: The current model treats instructor-course pairs as separate entities, leading to potential scheduling conflicts not being identified.

Solutions and Mitigation:

- Enhanced Model Constraints: Implement additional constraints to manage instructors teaching multiple courses.