

Optimizing School Schedule Generation: A Mathematical Modeling Approach

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Scheduling classes and teachers is a challenging problem for schools. With growing student enrollment, there is a need for efficient scheduling practices that meet the school's constraints and requirements. This paper presents a mathematical optimization model for generating optimal schedules using linear and nonlinear programming techniques. The model is implemented using the Pyomo library and solved using optimization solvers such as Gurobi, CPLEX, or HIGHS. The objective of the project is to automate the scheduling process, reducing the time and effort required to generate schedules and minimizing the risk of errors. The results of the optimization model are discussed, highlighting the potential benefits of the proposed solution. This project makes a valuable contribution to the field of scheduling and optimization and serves as a useful reference for schools and researchers.

Introduction

The modern education system is undergoing significant changes with the advent of digitalization. Schools are implementing electronic journals, schedules, books, and holding remote parent meetings, while also

creating unified accounting systems to evaluate schools efficiency. However, this digitization also presents new opportunities for students, as they are now able to customize their educational programs and choose subjects and activities that interest them the most through a flexible schedule.

The challenge in creating a school schedule lies in the fact that with each student having a unique program, limited resources such as teachers and classrooms must be used efficiently to meet their educational needs and schedules. The school schedule must also take into account the teacher's working hours, classroom capacity, and preferences for conducting classes, as well as the students' interests and needs.

Thus, the issue of composing a school schedule has become highly relevant in our present time, as schools strive to balance the benefits of digitization with the practicalities of managing limited resources. This research paper aims to explore this issue in depth, and provide possible solutions to help schools create an optimized and efficient schedule that meets the needs of both teachers and students.

!!! Add info about LP formulation

!!! Add info about solvers

1 Problem formulation

2 Baseline approach