Integer Non-Linear Programming Technique to Solve Examination Timetable Scheduling

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Scheduling a Timetable is a major administrative activity for many academic institutions. One of such activities is university timetabling, which can be divided into two main categories: class timetabling and examination timetabling. Examination timetabling can be defined as scheduling of a set of examinations of particular courses in a degree programme to a certain number of time slots subject to a set of constraints which may be either hard or soft. This study concentrates on examination timetabling which must be prepared in each semester of an academic year. In past few years, researchers have used different optimization techniques such as simulated annealing, genetic algorithm and integer programming approach to solve problems of this nature. Most commonly used method is 0 - 1 integer linear programming technique. In particular, formulation of a timetable is extremely difficult because of the diversity of the constraints that must be taken into account. When constructing the mathematical model of the timetabling problem, hard constraints have to be met and at the same time effort is made to satisfy as many soft constraints as possible. Therefore, in this study the main purpose is to formulate a mathematical model to determine which examination of a course unit is scheduled on which day, time slot and room while avoiding conflicts and minimizing the inconvenience for students and supervisors. Proposed model is formulated as an integer non-linear programming technique and to test the model, it is applied to prepare the examination timetable of the first year second semester students in the Faculty of Applied Sciences, Rajarata University of Sri Lanka. The optimization model is solved using LINGO optimization software package. This research highlights the importance of a constraint satisfaction problem and concludes how examination timetables can be efficiently and accurately scheduled using the integer non-linear programming approach.

Keywords: Optimization, Programming, Timetabling