Journal of Quality Measurement and Analysis *JQMA* 20(1) 2024, 145-158
e-ISSN: 2600-8602 *http://www.ukm.my/jqma*
https://doi.org/10.17576/jqma.2001.2024.11

FINAL EXAMINATION TIME TABLE SCHEDULING USING INTEGER PROGRAMMING WITH AVERAGE TIME SLOT GAP MINIMIZATION

(Penjadualan Peperiksaan Akhir Menggunakan Pengaturcaraan Integer dengan Purata Pengecilan Jurang Slot Masa)

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ABSTRACT

The exam of scheduling problem is an academically researched type of scheduling challenge in which exams for a given number of courses are assigned to specific time slots subject to certain constraints. The problem arises when there is a conflict or redundant examination in a time slot of the day. In this research, our aim is to maximize the total amount of students' study time to ensure that all students have sufficient time to study during exam weeks. We used an integer programming approach with an average time slot over the examination for this examination scheduling problem. The algorithm is applied to real data from third-year students of Bachelor of Science in Mathematics with Honours at the Department of Mathematics and Statistics, Faculty Science, UPM during semester 2 session 2021/2022. The result shows that integer programming gives an optimal solution for this complexity. With some improvements to the algorithm, there can be solutions that are better than the manually compiled schedule.

Keywords: scheduling; examination timetabling; integer programming; average time slot over the examination; constraints

ABSTRAK

Isu penjadualan peperiksaan adalah satu jenis cabaran jadualan yang diselidiki secara akademik, di mana peperiksaan untuk beberapa kursus ditetapkan kepada masa - masa tertentu dengan tertakluk kepada beberapa kekangan. Masalah ini timbul apabila terdapat konflik atau pengulangan peperiksaan dalam satu slot masa pada hari tersebut. Dalam penyelidikan ini, matlamat kami adalah untuk memaksimumkan jumlah masa belajar pelajar untuk memastikan semua pelajar memperoleh masa yang mencukupi semasa minggu peperiksaan. Kami menggunakan pendekatan pengaturcaraan integer dengan purata slot masa untuk masalah penjadualan peperiksaan ini. Algoritma ini diaplikasikan ke data sebenar dari pelajar tahun ketiga Ijazah Sarjana Muda Sains Matematik dengan Kepujian pada semester 2 sesi 2021/2022. Hasilnya menunjukkan bahawa pengaturcaraan integer memberikan penyelesaian optimum untuk kompleksiti ini. Dengan beberapa penambahbaikan dalam algoritma, terdapat penyelesaian yang lebih baik daripada jadual yang disusun secara manual.

Kata kunci: penjadualan; ujian penjadualan; pengaturcaraan integer; purata waktu slot bagi ujian penjadualan; kekangan

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Received: 5 May 2023
Accepted: 18 August 2023

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