

PEMODELAN PENJADUALAN WAKTU KURSUS UNIVERSITI MENGUNAKAN KAEDAH PENGATURCARAAN GOL (Modelling of University Timetabling using Goal Programming Technique)

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ABSTRAK

Kajian ini dijalankan untuk membina sebuah model penjadualan waktu kursus universiti yang cekap berdasarkan pemodelanan matematik yang dibangunkan bagi menghasilkan jadual waktu kursus universiti yang optimal dan bebas konflik. Kajian ini dijalankan di Jabatan Sains Pengkomputeran dan Teori, Universiti Islam Antarabangsa Malaysia (UIAM) dengan melibatkan pengumpulan kursus-kursus wajib ke slot masa dan bilik-bilik kuliah. Pendekatan pengaturcaraan gol digunakan untuk membina model tersebut dan diselesaikan menggunakan perisian LINGO 12. Hasil akhir kajian ini menunjukkan model penjadualan waktu kursus yang dicadangkan ini mampu memenuhi kehendak dan kekangan yang telah ditetapkan serta mencapai matlamat untuk mengumpukkan kursus Tahun 4 ke slot masa pagi. Beberapa penambahbaikan turut dilakukan terhadap jadual waktu kursus yang telah sedia ada.

Kata kunci: pemodelan; penjadualan; pengaturcaraan gol

ABSTRACT

This study was conducted to build a university course timetabling model based on a mathematical model that has been developed to produce an optimal university course timetable. The study was done at the Department of Computational and Theoretical Sciences, International Islamic University Malaysia (IIUM) involving the allotment of all courses to their particular time slots and lecture rooms. In this study, the goal programming approach is used to build the model. Then, the model is solved by using LINGO 12 software. The result of this study shows that the proposed university course timetabling model had met all the requirements and constraints. Besides, the objective to allocate all Year 4 courses in morning sessions are successfully achieved. Apart from that, some improvements were also done to the current course schedule.

Keywords: modelling; timetabling; goal programming

Rujukan

- Akkoyunlu E. 1973. A linear algorithm for computing the optimum university timetable. *The Computer Journal* **16**(4): 347-350.
- Algethami H. & Laesanklang W. 2021. A mathematical model for course timetabling problem with faculty-course assignment constraints. *IEEE Access* **9**: 111666-111682.
- Aziz N.L.A. & Aizam N.A.H. 2018. A brief review on the features of university course timetabling problem. *Proceedings of the 3rd International Conference on Applied Science and Technology (ICAST'18)*, hlm. 020001-020007.
- Badri M.A. 1996. A two-stage multiobjective scheduling model for faculty-course-time assignments. *European Journal of Operational Research* **94**: 16-28.
- Badri M.A., Davis D.L. & Hollingsworth J. 1998. A multi-objective course scheduling model: Combining faculty preferences for courses and times. *Computer Operational Research* **25**(4): 303-316.
- Borgers M. 2018. What is the Best Time for Studying?. <https://www.improvestudyhabits.com/what-is-the-best-time-for-studying/> (19 September 2022).
- Burke E.K., Petrovic S. & Qu R. 2006. Case-based heuristic selection for timetabling problems. *Journal of Scheduling* **9**(2): 115-132.

- Causmaecker P.D., Demeester P. & Berghe G.V. 2009. A decomposed metaheuristic approach for a real-world university timetabling problem. *European Journal of Operational Research* **195**: 307-318.
- Chen M.C., Sze S.N., Goh S.L., Sabar N.R. & Kendall G. 2021. A survey of university course timetabling problem: perspectives, trends and opportunities. *IEEE Access* **9**: 106515-106529.
- Daskalaki S., Birbas T. & Houses E. 2004. An integer programming formulation for a case study in university timetabling. *European Journal of Operational Research* **153**: 117-135.
- Datta D., Deb K. & Fonseca C.M. 2006. Solving class timetabling problem of IIT Kanpur using Multi-objective Evolutionary Algorithm. <http://wenku.baidu.com/view/ee727c6b7e21af45b307a83d.html> (8 Mac 2022).
- Dewan Bahasa dan Pustaka. 2017. Pusat rujukan persuratan melayu. <https://prpm.dbp.gov.my/> (18 Ogos 2022).
- Gotlieb C.C. 1962. The construction of class-teacher timetables. *IFIP Congress*, hlm. 73-77.
- Jamili A., Hamid M., Gharoun H. & Khoshnoudi R. 2018. Developing a comprehensive and multi-objective mathematical model for university course timetabling problem: a real case study. *Proceedings of the International Conference on Industrial Engineering and Operations Management*, hlm. 2018-2119.
- Martinez N.M.A., Pardon C.M. & Torres P.A.A. 2021. University course timetabling problem with professor assignment. *Mathematical Problems in Engineering* **2021**:1-9.
- MirHassani S.A. 2006. A computational approach to enhancing course timetabling with integer programming. *Applied Mathematics and Computation* **175**: 814-822.
- Mokhtari M., Srashk M.V., Asadpour M., Saeidi N. & Boyer O. 2021. Developing a model for the university course timetabling problem: A case study. *Complexity* **2021**: 1-12.
- Nakasuwan J., Srithip P. & Komolavanij S. 1999. Class scheduling optimization. *Thammasat Int. J. Sc. Tech* **4**(2): 88-98.
- Nguyen K., Nguyen P. & Trans N. 2012. A hybrid algorithm of Harmony Search and Bees Algorithm for a University Course Timetabling Problem. *IJCSI International Journal of Computer Science* **9**(1).
- Nonis S.A. & Hudson G.I. 2010. Performance of college students: Impact of study time and study habits. *Journal of Education for Business* **85**(4): 229-238.
- Rappos E., Thiemard E., Robert S. & Heche J.F. 2022. A mixed-integer programming approach for solving university course timetabling problems. *Journal of Scheduling* **25**: 391-404.
- Renau M.A., Fernandez A.D., Valls M.R.B., Maldonado A.S. & Urdiales D.M. 2019. The effect of sleep quality on academic performance is mediated by Internet use time: DADOS study. *Jornal de Pediatria* **95**(4): 410-418.
- Schimmelpfeng K. & Helber S. 2007. Application of a real-world university-course timetabling model solved by integer programming. *OR Spectrum* **29**(4): 783-803.
- Tamiz M., Jones D. & Romero C. 1998. Goal programming for decision making: An overview of the current state-of-the-art. *European Journal of Operational Research* **111**(3): 569-581.
- Wren A. 1996. Scheduling, timetabling and rostering -A special relationship?. *International Conference on the Practice and Theory of Automated Timetabling*, hlm. 46-75.

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