

**INVIGILATOR SYSTEM FOR UMP EXAMINATION PROBLEM BASED ON
FACULTY OF COMPUTER SYSTEM & SOFTWARE ENGINEERING
(FSKPP)**

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ABSTRAK

Masalah utama yang sering dihadapi oleh kolej-kolej atau universiti-universiti di seluruh dunia adalah pengawasan tugas dalam jadual peperiksaan. Ini merupakan masalah yang paling serius dan konflik dalam sesuatu pengawasan tugas dalam jadual peperiksaan. Antara faktor-faktor utama yang terdapat dalam masalah ini adalah saiz bilik peperiksaan, kekangan jarak bilangan hari peperiksaan, struktur dan faktor-faktor ini berbeza diantara satu sama lain. Masalah ini juga berlaku di FSKKP, UMP. Hal ini berlaku kerana timbul perasaan tidak puas hati dengan jadual peperiksaan yang diberi dan jumlah pengawasan diantara pengawas-pengawas yang ditugaskan dalam pengawasan peperiksaan. Selain itu mereka mencadangkan supaya mereka mempunyai jarak kekangan tugas pengawasan seperti sekurang-kurangnya dua atau tiga hari jurang. Mereka lebih gembira sekiranya tugas pengawasan yang diberi adalah kurang. Ini kerana mereka perlu menyediakan atau menanda kertas peperiksaan mereka sendiri. Di sini, kami membantu menyelesaikan permasalahan dalam menjalankan tugas pengawasan semasa peperiksaan di Fakulti Sistem Komputer & Kejuruteraan Perisian (FSKKP), Universiti Malaysia Pahang berdasarkan keperluan yang dikehendaki oleh pihak FSKKP. Akhirnya untuk mencapai matlamat dalam membangunkan satu sistem yang cekap bagi tujuan penyediaan penjadualan pengawasan yang sistematik kaedah heuristik digunakan. Kaedah graf heuristik digunakan dalam jadual pengawasan mereka. Graf heuristik ini digunakan oleh para pengawas yang bertugas kerana ia merupakan salah satu kaedah yang mudah untuk difahami dan mudah untuk digunakan. Untuk membangunkan sistem ini kami menggunakan beberapa perisian dan perkakasan. Antara perisian yang digunakan adalah seperti XAMP, PHP, MYSQL, Adobe Dreamweaver, Apache dan Web Server. Manakala perkakasan yang digunakan pula adalah seperti computer, hard disk, dan pen drive. Selain itu, kami membuat kajian-kajian keatas beberapa buah universiti. Kami juga membuat kajian dan soal selidik terhadap beberapa teknik pengaturcaraan yang digunakan untuk membangunkan sistem ini.

ABSTRACT

The main problem faced by the colleges or universities around the world are monitoring task in the examination schedule. This is the most serious problems and conflicts in a supervisory role in the examination schedule. Among the main factors in this problem is the size of exam rooms, the number of days within the constraints of the examination, the structure and these factors different from one another. This problem also occurs in the FSKKP, UMP. This is because there is a sense of dissatisfaction with the exam schedule is given and the amount of surveillance between overseers assigned to the supervision of the examination. Instead, they suggested that they have the task of monitoring the distance constraints like at least two or three day gap. They would be happy if the given task is less supervision. This is because they have to provide or to mark their own paper. Here, we help solve problems in carrying out surveillance during the examination at the Faculty of Computer Systems and Software Engineering (FSKKP), Universiti Malaysia Pahang, based on the requirements required by the FSKKP. Finally, to achieve the goal of developing an efficient system for the preparation of a systematic surveillance scheduling heuristics used. Methods graph heuristic used in their surveillance schedule. The graph heuristic used by the invigilators because it is one method that is easy to understand and easy to use. To develop this system we use a number of software and hardware. The software used is as XAMP, PHP, MYSQL, Adobe Dreamweaver, and Apache Web Server. The hardware used was as computers, hard disk, and pen drive. In addition, we made studies on several universities. We also made a study and survey of some programming techniques used to develop this system.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

The final examination students of invigilator system at UMP are includes to a few staff to be prepared of invigilator system duties that follows by Academic Management Division. Invigilation's duties of all staff try to spread by the Academic Management Division. Invigilation duties are a set of requirement they have.

Examination in invigilator system is preparing for challenging the task has always been in it. The numerous factors of the invigilator system is getting for the invigilation committee consideration. The invigilator system such as lecturers do marking ensuring for duties assigned and their own subjects do not invigilate for lecturers.

In the literature review, the problem of the paper examination timetable is discussing and the problem is found. The educational examination of timetabling problem such as the room and timeslot of system exams does not finish here. The exam-timeslot of the room timetable has generated for the institution normally after. For the literature review in this timeslots and rooms from the research found involves assigning exams.

Problem of the invigilator is no datasets are available as due to the fact from the research community based on UMP. It is less attention. No dataset are available is dataset contains in this invigilator for modeled before and discussed.

Invigilator system is significant of capable minimizing in the development. The invigilation schedules have time spent and involvement on the preparation based on committee. In the producer of process an invigilation schedules such as reliability,

ensures consistency and continuity for the future semesters. The Final Examination Unit of the management of UMP has full control over the final examination to be able based in Academic Management Division.

In examination of operation room is the alterations of the number will be greatly reduced the invigilators of final using list. The constraints of optimized for the lecturers preferences with made of the number and controlled of the data. Furthermore, the system is a standalone develops by using the several of software such as XAMP, PHP, MYSQL, Adobe Dreamweaver, Apache and web server.

1.2 Problem Statement

Invigilator system for UMP examination is challenging task due to a number of factors that cannot be avoided. Factors of a number is cannot to be avoided during due the task of challenging. An invigilators are not satisfied with their schedule and they would like a better invigilator system because they feel that the division of duty with them during the time of exams is unfair. The think this work is burden them. Another reason is the number of invigilation's duties between the gaps between is not satisfied.

Invigilator system is the second problems statements of UMP. During the draft preparation for timeslot of the one room or more than are assigned in this problems. The draft of timetabling in manually invigilators is the time to look for invigilators .The invigilators will be a lot of constraints time and room that have to be guarded invigilators out before the last draft.

The invigilators is an assigning to examination rooms for involved the third problems.This problem has received because it less attention than examination timetabling problem. No data sets are available from the research in the literature review.

The maximum number of invigilation duties based on invigilators exceed is the another problem statement in invigilator system. At least two or three day gap should be in scheduling invigilator refer to suggestion from them.

1.3 Objectives

- i. To study the examination problem based in invigilator system for UMP.
- ii. To develop a system based of invigilator system problem on the UMP examination requirement.
- iii. To implement the graph colouring hyper heuristic of method in invigilator system.

1.4 Scope

- i. Investigation of the graph colouring hyper heuristic of method.
- ii. In the academic management division must only one user can control, monitor and initiate the invigilator system such as examination timetable.
- iii. The system is a standalone develops by using the several of software such as XAMP, PHP, MYSQL, Adobe Dreamweaver, Apache and web server.

1.5 Project Significance

From this system will be going to help the Academic Management Division in the part segregation of duties in invigilator system. This result of this system will be given to the invigilator are satisfied. Thus, this can improve the invigilator are happy in their duties.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In this chapter discuss about the literature review. The method of existing system should have in this chapter. Method is get from overview research. Existing system have formula and calculation for solution this problem. Another part, University invigilator system will be introduce of the characteristics and know the specifically about the invigilator system problem in examination or timetabling.

2.2 Definition Scheduling Invigilators

The main problem of invigilator system or timetabling in a set of events. For the example in this problem are date, time, venue, id staff and subjects. At the same time and one or more than of the location is expected for is no person or resources said (Burke and Erben, 2001). Type of system is the objectives to get the total of maximize and to minimize the duration of production for a given set to customer demands.

The process of assigning tasks from a set to resources is the definition scheduling invigilators take from the website (Guru Net, 2005). This concept in many areas for example computing and production processes are important in invigilator system. is an optimization

In the decision making process the allocation of the limited resources will to turn into tasks in a given time. Transportation system, educational timetabling personnel system, sports timetabling are the timetabling of classified. In this process the tasks will be carry out based on the resources are employed, people or object.

2.3 Timetable Invigilator

Timetable invigilator system is main of the problem to assigning exams. Another problem from timetable invigilator system is students have problem of periods and rooms while exam. In the examination and invigilator system have several types of the problem such as soft and hard constrain. The both of constraint schedules will be related with each other.

For example, on examination schedule the periods and rooms will be assigned to several amounts of invigilators. Normally, for invigilate of examinations the academic staff will be choose as candidates. In the examinations, they will be responsible to control, monitor invigilate another want to do. To get the good quality of examinations so an appropriate invigilator timetable must be control all.

2.4 Scheduling Invigilator

First, invigilator system or timetabling is a problem of assign times to get the events and subjected in process to constraints on the assignments. The institution for individual and unique to creates in the scheduling problem. Second, problem is assign resources and times to attend the meetings as possible to satisfy constraints of far. The timetabling has four categories such as transportation system, personnel scheduling, educational timetabling and sports timetabling. Lastly, the invigilator system has to contain such as hard and soft constraints from one institution to another with very greatly.

The reported of invigilators with system are not satisfied and make good interesting better system invigilation based on a survey of UMP invigilator system (Awang, 2006). Therefore, they suggested that each invigilation duty should have at least a two or three day gap. However, they prefer fewer invigilation duties, considering that they also need to be available or on standby during their own exam paper in progress.

To get the solution an even of invigilation duties and among the staff make requested itself. When the timetable officer is open to any suggestions for improving the

current timetable, motivated for include the suggestion such as an additional constraint in addition to the original constraints.

2.5 Constraint Logic Programming (CLP) to Examination Scheduling

2.5.1 Introduction

Constraint programming mean is to find a first feasible timetable into hybrid of method. Generated random is use at the notation. For the example such as a neighbour. To find the solution the method is accepted and it should be good current. The domain is solving over a particular by replacing unification, for the example real, finite sets and integer such as integer, real, finite sets with constraint.

Constraint satisfaction of techniques with the logic programming for enhancement with preserving nature in logic programming for declarative. The objective from this technique is to solving a certain class of combinatorial such as, timetabling, scheduling, allocation of resource or circuit verification. From constraint programming in scheduling the application of a detailed analysis can be found.

One or several rooms have must given for each of invigilators while examination. In a set obligatory module for each university of degree is composed. The each teacher has the responsibility and preferences regarding time slots and schedule to gathered and recorded in the local database.

A set of student types such as the defined. The model enables to use in the work or any other type of constraints that limit student's available time slots. Some religious constraints imply. On the afternoon or at the night some students have exam. Another day for sets of students is unable to have exams on Saturdays. For each student type, time preferences are recorded using the same scale used for teacher preferences. Capacities, room types, localization, availability, and distances are decided as the model.

A set of modules is composed for each examination. Usually these modules correspond to the same subject given, for example, to different degrees. However, his kind of modeling enables the definition of exams given at the same time, in the same room or set of rooms, including several different modules. This is particular useful for

very small exams, with only a few students that these ways can one room, avoiding the waste of room and human resources. An exam takes place in a given time slot, using a set of rooms and a few of invigilators.

Room is assigned given for each an invigilator. In the same room the several invigilators can supervise. One slot of variable is each for exam into scheduled. For each exam, one or several exam rooms are allocated and for each room, a set of invigilators is defined. The three phased is suggests to approach and get the result such as the types of variables refer to Table 2.1.

Table 2.1 Types of Variables

1	Time Slot Variables $T = \{T_1, T_2, \dots, T_n\}$ where n is the number of examination to be scheduled.
2	Room Variables $R = \{R_{11}, R_{12}, \dots, R_{1M_1}, R_{21}, R_{22}, \dots, R_{2M_2}, \dots, R_{n1}, R_{n2}, \dots, R_{nM_n}\}$ where n is the number of the examination to be scheduled and $M = \{M_1, M_2, \dots, M_n\}$ is the maximum number of rooms for each of the n exams.
3	Invigilator Variables $I = \{I_{11}, I_{12}, \dots, I_{1M_1}, I_{21}, I_{22}, \dots, I_{2M_2}, \dots, I_{n1}, I_{n2}, \dots, I_{nM_n}\}$ where n is the number of exams to be scheduled and $M = \{M_1, M_2, \dots, M_n\}$ is the number of rooms for each of the exams.

2.5.2 Methodology

The model of methodology from existing system is following for the hard constraints and gets the evaluation of criteria such as below.

- (i) C1 One time slot must be only scheduled for each exam.
- (ii) C2 One of examination room at least for each exam.
- (iii) C3 One invigilator at least for each exam.

The model of methodology from existing system is following for the soft constraints and gets the evaluation of criteria such as below.

- (i) S1 A student differences between number of periods and two examinations
- (ii) S2 A student has number of examinations in day is given
- (iii) S3 A student has number of examinations in days for two consecutive

2.5.3 Result

Solved the problem with problem analyses without violating using hard constraints imposed. The examination period used in this case for three weeks. Planning efforts is used for week and lastly manual resolution method is using to get the result.

In a deep back track the lack of the time are not changed to due and perform of the allocations. A small random is performed to generated the problems in other experiments. For the conclude strategies one and three are the best in examination timetabling problems. Space of allocation is very constrained and strategy two is very good to get the solution.

Concerning non modular of universities groups for students such as a similar degree programs for constraints for rooms and invigilators with tight in strategy four is good for get the solution problems. Do not perform well is the other strategies for invigilator variables are instantiate in examination timetabling problems.

2.6 Graph Colouring Constructive Hyper – Heuristic (GCCHH) for the Examination Timetabling Problem

2.6.1 Introduction

Graph heuristics was developed of research during the early days on timetabling problems. Examination timetabling problems get the solution with use graph heuristics. The graph heuristics been chosen because the quality has produced good and most widely applied (Burke et al. 2005, 2007, Kendall and Hussein 2005, Armani et al, 2005). The heuristics used such as below.

Table 2.2 Heuristic hybridizations to order exams with produce use the four sorted lists

Largest Degree First (LD): In decreasing exams are ordered, all other exams by the number.
Saturation Degree First (SD): In ascending exams are ordered, timeslots remaining by the number.
Largest Colored Degree First (LCD): Non increasing exams are ordered based on LD, but scheduled exams already to considering the number.
Largest Enrolment First (LE): In decreasing are ordered by enrolled the number of students.

2.6.2 Methodology

In Table 2.3 Heuristic Hybridizations used in exams to produce four sorted lists to get the solution

Table 2.3 Strategies of heuristic hybridization

h_i	Heuristic hybridizations
h_1	In this heuristic hybridization ($LD+LE+SD+LCD$), the exams to be scheduled are arranged in a non-increasing order of the number of conflicts they have with other exams (LD); those with equal LD evaluations are then arranged in a non increasing order of the number of student enrolments (LE), then in a non decreasing order of the number of available timeslots (SD) and, finally, in a non-increasing order of the number of conflicts the exam has with those already scheduled (LCD).
h_2	Similar to h_1 , this heuristic hybridization ($SD+LCD+LD+LE$) arranges the exams to be scheduled by using SD , LCD , LD and LE hierarchically.
h_3	Same as the above, with a different hierarchy of heuristics ($LCD+SD+LD+LE$).
h_4	Same as the above, with a different hierarchy of heuristics ($LE+LD+SD+LCD$).

Note: h_1, h_2, h_3, h_4 are the name of Heuristic hybridization

2.6.3 Result

In figure 2. 3 the heuristic hybridization are presents the formula from h_1 until h_4 . The heuristic hybridization strategies of h_1 is using this formula $LD+LE+SD+LCD$ for find the constructs a list of exams by ordered. For heuristic hybridization strategies of h_2, h_3, h_4 is similar the other of three lists in the exams are constructed by h_1 . Based on the first ranking in criteria this step is defined static lists or dynamic. The two dynamic lists such as h_2 and h_3 , with the number of conflicts with those exams already assigned and two static lists h_1 and h_4 or with the number of remaining in the timeslots using the order exams dynamically.

2.7 Hybrid Evolutionary Algorithm for Timetabling Problem

2.7.1 Introduction

The domain of feasible timetables is described searches in the evolutionary of algorithm. The requirement for specific rooms to be scheduled has been temporarily waved for the purposes of experimentation and is replaced by the rule that no more than a set number of students may be scheduled to any particular period. Generate conflict-free graphs is used in random algorithm to get the initial of population. Population member is decided such as below.

- (i) An exam is generating a random ordering.
- (ii) Ordering in the turn according for each exam.
- (iii) First period is finding in the exam for the placed without conflict and a set maximum number of students does not go above.
- (iv) The period is place in the exam

A random of feasible exam timetables is the large populations to run with quickly using the algorithm. Minimum length, it will not produce of timetables. Containing unused or little did not use of periods, nor will it produce extremely long drawn out of the timetables. Solution of this problem is reasonably constrained. For example the limited of time and space available.

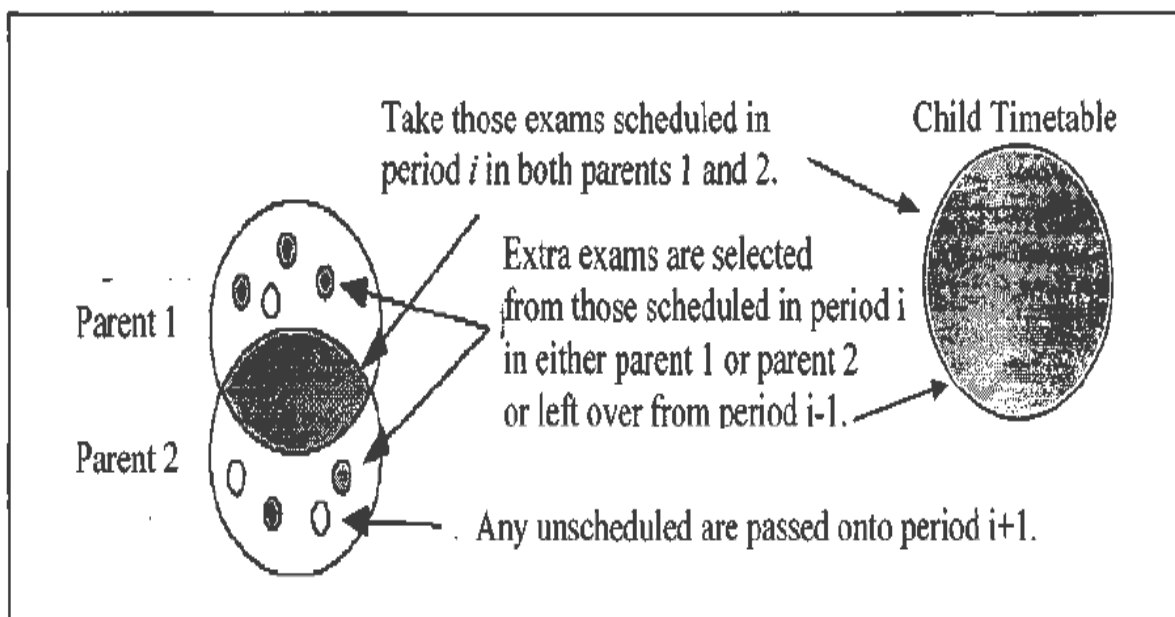


Figure 2.1 Heuristic Hybrid of Crossover Operator

Figure 2.1 shows how the A Heuristic Hybrid Crossover Operator which indicates the crossover operator works for period. For an example, the operator starts by looking at the first period. It takes exams scheduled in that period including both parents and then uses an algorithm to select other exams so that none clash with those already scheduled and the limit on the number of spaces is not violated. Once this is completed, the crossover looks at period two and so on until all exams are placed.

- (i) Random - In random exams are choose by selected. The standard uniform crossover is the closest.
- (ii) Largest Degree (big) -Exams are choose by selected according into the number for the exams while they conflict with it.

2.7.2 Methodology

Heuristic Hybrid using the algorithm for solve the problem. The step by step is show such as in figure 2.2 is show below.

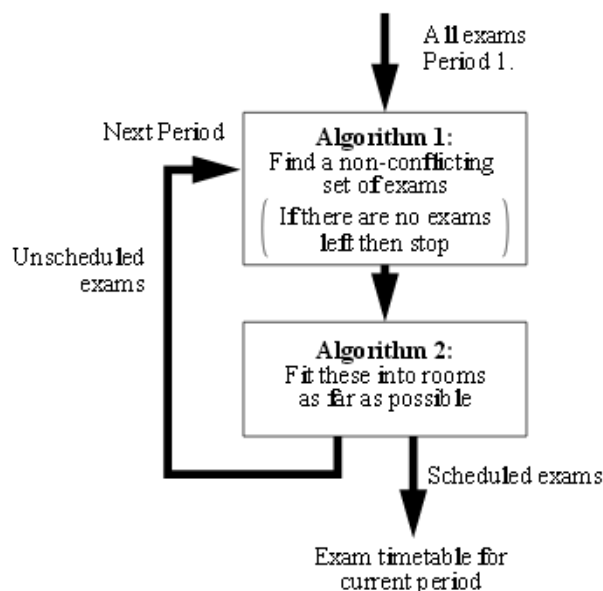


Figure 2.2 Algorithm of Heuristic Timetabling

2.7.3 Result

A timetable is remains to ensure of feasible after its action is the mean similar to crossover in the mutation operator. At random the shift and exam cannot take to another period. In the scheduled have cause a conflict between of one's already and the moved exam. The crossover of the algorithm will be choose and is done by adding exams of mutation in combination for the search into to the current until a later period if cannot be too considered.

Any timetabling is the related factors of the evaluation function for instance of clearly using the selection and fitness calculation. For marking the purposes to the larger of exams appeared earlier and hoped it would be possible include that of the function. The conflicts of the number between exams and timetable in adjacent periods. Based on these two particular common requirements for this purpose.