A Smart Time Table Generator

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A B S T R A C T

The manual system of preparing time table in colleges with a large number of students is very time consuming and usually ends up with various classes clashing and also some faculty usually takes the previous year's timetable and modify it but still it is a tedious job to incorporate changes. To overcome all these problems, we propose to make a system which works automatically. This project introduces a practical timetabling approach capable of taking care of both hard and soft constraints required especially for preparing time table in colleges with a large number of students and limited resources like classrooms or labs. The automated time table scheduling provides easier ways for teachers and student to view their timetable once they are finalized over the application, having individual login id and passwords. This paper also presents various algorithm like an evolutionary algorithm (EA) and genetic algorithm-based approach to solving a heavily constrained university timetabling problem which has been used in other projects also. The program can simply be extended to suit the requirements of other kinds of institutions also.

Keywords: Timetable, Genetic Algorithm, Evolutionary Algorithm, Constraints.

1. Introduction

Timetabling relates all activities with regards to making a timetable automatically. Wren in 1996 defines timetabling as the allocation, the collection of databases, subject to constraints, of given resources to objects being placed in space time. A timetable must meet a number of requirements and then it should satisfy the desires of all people as well as possible.

At universities, there are many different courses, so there is no conflict free timetable available for every student within that given time. Therefore, the faculty tries to find the timetable with the least conflicts. The timetable for an institutional department is made manually, i.e., without any orderly automation. This turns out to be hectic and energy repelling as the computation and algorithmic calculation of denominating and allocating each and every class, lab and workload have to be done by the prowess of human accuracy only.

Thus, the solution could be handed out with the help of algorithmic management of the timetable lectures with the support of priority and randomizing techniques. Even though most college administrative work has been computerized, lecture timetable scheduling is still mostly done manually due to its inherent difficulties. Timetable Scheduler targets to develop software for college in order to handle the "Timetable Formation" for the staff.

This work resolves the problem by permitting the lectures to see their assigned subject and timetable. This software helps to handle the particulars of the timetable of staff. Anybody with a little computer knowledge can approach and deal with the software with ease; hence it can be termed user friendly. Hence it offers security to the users by offering perfect login.

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2. Existing System

The manual timetable scheduling demands lots of time and efforts along with lots of paperwork. It is widely used in schools, colleges and other fields of teaching. In early days, time table scheduling was done manually with a single person or some group involved in the task of scheduling it with their hands, which take a lot of effort and time.

While scheduling, even the smallest constraints can take a lot of time and the amount of data to deal with increases. Other cases that can cause a problem is when the number of Faculties (Teaching Staff) is less, resulting in a rescheduling of time table or they need to fill on empty seats urgently. In such cases Automated time table, scheduling can be a very convenient method for managing it in computers with algorithms also proving to be eco-friendly for no paperwork.

3. Literature View

Finding a feasible lecture timetable in a large university department is a challenging problem faced by the institution continually in educational establishments. This paper presents an evolutionary algorithm (EA) based approach to solving the problem constrained university timetabling problem. The approach uses a problem- specific chromosome representation and the EA method. Heuristics and context-based reasoning have been used for obtaining feasible timetables in reasonable computing time and it will be accurate one.

In the paper David Abramson and J. Abela Evolutionary techniques have been used to solve the time table scheduling problem automatically. Methodologies like Genetic Algorithms (GAs), Evolutionary Algorithms (EAs) and CSP etc. have been used with mixed success. We have further solved the problem with a mimetic hybrid algorithm, genetic artificial immune network (GAIN) and compare the result with that obtained from GA and then it will display. In this paper, we have reviewed the problem of educational time table scheduling and solving it with a genetic algorithm and genetic algorithm is the easiest one.

4. Proposed System

The proposed system will be able to generate time tables in a completely automated way which will save a lot of time and effort of an institute administration.

User defined constraints handling. Ease of use for the user of the system so that he/she can make an automatic time table. Focus on optimization of resources i.e., teachers, labs, and rooms etc. Provide a facility for everyone to view timetable. Generate multiple useful views from the time table.

Outcomes depend on

A.   Interface for input the system will be having an easy to use and interactive interface to enter all the inputs like the teacher name, the data for the rooms and data for the labs and the data for the subject.
B.   Database Capabilities the system will have a well-designed database to store all the information which will be entered in as the input. A separate database is used to maintaining basic information, subjects, teachers, batches, the timing of the period and their associations and other details Database for holding generated timetable and for storing required timetables.

5. Methodology

The methodology used in this application enables us to approach Evolutionary Algorithms like a genetic algorithm. Evolutionary Algorithms are a class of direct, probabilistic search and optimization algorithms gleaned from the model of organic evolution. A Genetic Algorithm (GA) is a type of Evolutionary Algorithms. Genetic Algorithm differs from other search techniques.

GAs optimizes the trade off between exploring new points in the search space and exploring the information discovered thus far. GAs is randomized algorithms; in that they use operators whose results are governed by probability. The results for such operations are based on the value of a random number using probability. This means GAs use probabilistic transition rules, not deterministic rules and it gives accurate one. GA was combined with a heuristic specific greedy algorithm to take advantage of the global search of feasible solutions and specific technical efficiency in local solution optimization. This approach resulted in considerably smaller execution times.
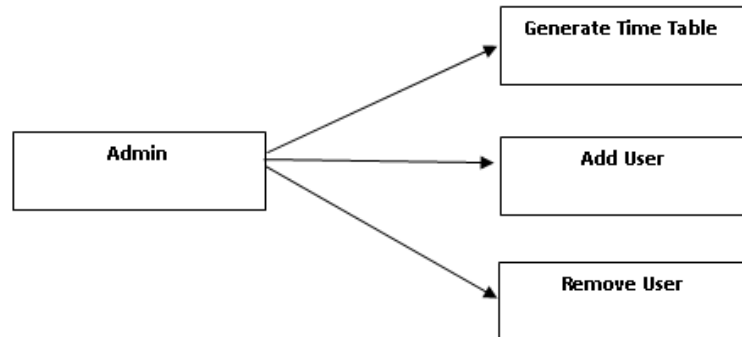
6. System Model

Fig 1. System model

Department Tabling Program

The four main factors in course of automatic timetabling are teachers, courses, timeslots, and classrooms together with other teaching facilities in the same department. The combination of these four factors is defined as the particle position method and each particle represents a solution group. First, we set the four parameters of the PSO method that are a number of iterations, learning factors (cognitive and social) and inertia weight factor. We take the best values for a different number of iterations for 10, 20 …, 240, 250, different values of learning factors and different values of inertia weights. For which value of these parameters, the best value is maximum then that value is given an optimal solution. We set these parameters and use a dataset from the database in our algorithm.

1. The faculty member gives the preferences of subjects and labs that they want to teach.
2. The system assigns load to faculty based on the designation.
3. The system sorted the preference of each faculty member on the basis of his or her weight.
4. Particle Swarm optimization allocates the subjects and software labs to faculty and calculates the objective function.

7. Conclusion

Our approach of developing automated timetable system is successful in solving colleges ″lecture- course timetabling problem. We have also shown how we can fit our timetabling system as Rich Desktop Application. The graphical user interface (Windows Form Application) used in this application provides an easy way in understanding how an application works and also makes ease in providing the input.

This application is provided with necessary details of faculty and subjects which are stored in the database (SQL SERVER) and then by making use of the available data it generates the lecture-course timetable with minimum time when compared to the manual generation of timetable and involves in satisfying all the constraints No overlapping of time slots for any subject. There should be a minimum gap of one hour for respective faculty per subject no repetition of time slots per faculty. This system will help to create dynamic pages so that for implementing such a system we can make use of the different tools are widely applicable and free to use also.

8. Future Work

In our proposed system there is no need for Faculty to worry about their period details and maximum workload. But it is difficult for selecting a faculty as a substitute it allows to view the timetable of that faculty to ensure that the faculty is free at that particular period. So we can further extend our project for the substitute and it will be added to the database of teachers and it will be allocated the classes or practical sessions of the previous faculty member on leave. The principal can also view the final results of the timetable distribution. It is a comprehensive timetable management solution for departments which help to overcome the challenges in current and previous systems.

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