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Automatic Timetable Generator

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Abstract-Professional colleges have exclusive streams of courses and each has its syllabus which includes numerous topics. In those colleges, colleges are teaching one-of-a-kind subjects in distinct semesters and additionally, inside identical semesters schools are dealing with two extraordinary topics. The important mission is that the timetable table is required to agenda in line with the college furnished time slots in which timetables are organized in this type of way so that faculty timings do not overlap. The time desk does not overlap with their different schedules and these timetables are effectively used by faculty In this painting, we develop the software of a time desk that may robotically produce a time desk following faculty to have time slots This system affords blessings to the college need no longer worry for time clashes; a human does no longer need to carry out permutation and combination and they can concentrate on other sports rather than wasting time through generating Time-Table. This gadget offers an efficient timetable generated in keeping with expert university requirements.

Keywords-Genetic Algorithm, Automated Timetable, soft and hard constraints

I. INTRODUCTION

Although the majority of college organization work has been mechanized, the lecture timetable preparation is still commonly done by hand due to its inherent difficulties. The physical lecture-timetable preparation demands significant time and effort. The manual lecture-timetable scheduling is a limitation fulfillment problem in which we find a result that satisfies the given set of constraints. There have been numerals of approaches made in the earlier period to the difficulty of constructing timetables for colleges and schools. Timetabling problems may be solved by diverse methods inherited from operation studies such as graph coloring, local search measures such as tabu search, simulated annealing, genetic algorithms or backtracking-based constraint fulfillment handling. In our project, timetable problem is formulated as a constraint fulfillment problem and we proposed a realistic timetable algorithm which is capable of taking care of both hard and soft constraints. It is a complete timetable solution for Colleges which help to overcome the challenges in manually constructing the timetable. Trilateration based structure, shedding light on its pivotal role in meeting the evolving demands of individuals seeking advanced yet accessible security measures in an interconnected world.

II. LITERATURE SURVEY

1. Timetabling

It is large and highly constrained, but above all the problem differs greatly for diverse colleges and learning institutions. It is hard to write a universal agenda, fitting for all possible timetable problems. Even though manual creation of timetables is sustained, it is still universal, because of the lack of suitable computer programs. Timetable problems There exist a lot of diverse timetable problems such as:

- University Timetable
- Exam Timetable

- School Timetable
- Sports Timetable
- Worker Timetable Moreover, there exist a lot of problem-solving methods, which typically use the concept of customary optimization algorithms such as genetic algorithms, Backtracking, and Constraint Logic Programming. In recent years two major approaches appear to have been victorious.
- Local Search Procedures

2. The Local Search Procedures

The local search measures such as Simulated Annealing, Tabu Search, and Genetic Algorithms. These methods convey constraints as various cost functions, which are minimized by a Heuristic Search of enhanced solutions in a neighborhood of some opening realistic result

Simulated Annealing (SA)

Simulated annealing is a probabilistic method used for similar to the global optimum of a given function. Purposely, it is a metaheuristic to fairly accurate global optimization in a huge search space No. 978-81-923607-3-7 when the search space is distinct. Simulated annealing is a technique for finding a good result to an optimization dilemma.

3. GA Operators

Chromosome Representation

Genetic material is a set of parameters that describe a planned result to the problem that the genetic algorithm is demanding to answer. The genetic material(chromosome) is often represented as an easy string. The fitness of a chromosome depends upon how well that chromosome solves the problem at hand (Mittal & Hiral Doshi, February 2015).

Initial Population

The first step in the performance of a GA is the production of an initial population. Each member of this population encodes a potential solution to a problem. Each unit is evaluated and assigned a fitness value according to the fitness function. It has been acknowledged that if the initial population to the GA is good, then the algorithm has an enhanced option of finding a good result and if the initial supply of construction blocks is not large enough or good enough, then it would be hard for the algorithm to find a good result (Mittal & HiralDoshi, February 2015).

Selection

This operator selects chromosomes in the population for reproduction. The fitter the chromosome, the more times it is likely to be chosen to reproduce. During each successive production, a portion of the accessible population is selected to select a new generation. Individual solutions are chosen through a fitness-based process, where fitter results are usually more likely to be chosen (Mittal & HiralDoshi, February 2015).

Crossover

Crossover is a genetic operator used to vary the programming of a chromosome or chromosomes from one creation to the next. It is parallel to reproduction and organic crossover, upon which genetic algorithms are based. Crossover takes more than one parent solution and produces a child solution. There are techniques for collection of the chromosomes. Crossover arbitrarily exchanges the subsequences before and after that locus between two chromosomes to create two children. The crossover operator roughly does as it is natural recombining between two single chromosome organisms (Mittal & Hiral Doshi, February 2015

Mutation

The mutation is used to sustain genetic diversity from one creation of a population of genetic algorithm chromosomes to the next. It is parallel to natural mutation. Alteration(mutation) alters one or more gene values in a chromosome from its initial situation. In mutation, the result may alter totally from the previous result. Hence GA can come to enhanced results by using mutation. Mutation can take place at each bit position in a string with some possibility, usually very small. (Mittal & Hiral Doshi, February 2015).

Fitness Function

The fitness function is described over the genetic representation and procedures the quality of the represented result. The fitness function is forever a problem reliant In particular, in the fields of genetic programming and genetic algorithms, each design result. After each round of testing, the thought is to remove the 'n' worst design solution. Therefore, desires to be awarded a shape of merit, to signify how close it came to meeting the general necessity, and this is generated by applying the fitness function to test, results obtained from that solution (Mittal & Hiral Doshi, February 2015)

Disadvantages of Local Search Procedures are:

- The complexity of taking into relation to hard constraints
- The need to decide their parameters even though they are excellent for optimizing the realistic solution

4. The Constraint Programming (CP)

The major advantage of constraint programming is declaratively a clear-cut statement of the constraints serves as part of the program. This makes the program easy to adjust, which is critical in timetable constraints are handled through a system of const propagation, which minimizes domains of variables, coupled with backtracking search. In modern CP languages, both features do not need to be planned explicitly. The main disadvantages of this approach are:

1.The difficulty with expressing soft constraints

2. The potential problems with enhancing the initial feasible solution. The capability to convey composite constraints in a simple, declarative way is critical for establishing of the colleges and university timetable problem into the program and is critical for their successful tailored delivery approach is able to introduce soft constraints during a search, leading quickly to a "Good" timetable, integration of local search into CP gives the capability to optimize efficiently the timetable.

5. Constraints

There are a variety of constraints to be satis the time to instantiate variables about time slots and classrooms. The constraints can be categorized into Hard and Soft constraints.

6. Hard Constraints

A timetable that breaks a hard constraint is not a feasible solution. Hard constraints comprise Conflicts", HC1. A classroom is not assigned to more than one teacher at the same time. HC2. A teacher cannot teach more than one class at the same time. HC3. Courses for similar year-session students of a department cannot take place at the same time. HC4. The classroom for a course should have enough capacity to take students registered in the course. HC5 .The classroom should be well set of equipment required services for the classes.

7. Soft Constraints

Soft constraints are less significant constraints, and it is typically not possible to avoid breaking at least some of them. Either timetable is functional, which calculates the level to which a timetable has violated its soft constraints. Some soft constmore vital than others, and this is often a special priority value. SC1. The teachers are not assigned to time in the teacher's prohibited time zones.

SC2. Teachers' daily teaching hours should be within the acceptable hours.

SC3. As far as possible, classes are scheduled in the lecturer's preferred time zone.

SC4. A lunch break must be scheduled.

SC5. The practical courses are scheduled in the morning session, and the theory courses are such sessions.

SC6. The lecture hours for a course should be scheduled consecutively.

SC7. As distant as possible, classes should correspond department's exclusive

SC8. The classrooms should be allocated in a manner to reduce the distances between adjacent classes' classrooms

III. SYSTEM DESIGN

The design of a scheme is basically a blueprint or plan for a system. It determines the part structure of the components. The most creative and challenging phase in the life cycle is system design. The word system design describes a final system and the process by which it is developed. This term refers to the technical specifications that will be applied in the implementation. the importance of system design can be stated as “Quality”. The design of the system provides us with representation that can be accessed for quality. Design is the only way where we can accurately translate user requirements into a complete software product or system.

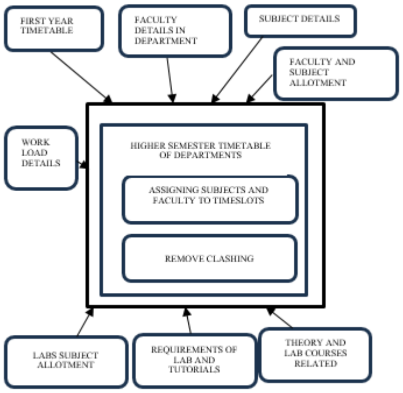
FIRST YEAR TIMETABLE
FACULTY DETAILS IN DEPARTMENT
SUBJECT DETAILS
FACULTY AND SUBJECT ALLOTMENT
WORK LOAD DETAILS
HIGHER SEMESTER TIMETABLE OF DEPARTMENTS
ASSIGNING SUBJECTS AND FACULTY TO TIMESLOTS
REMOVE CLASHING
LABS SUBJECT ALLOTMENT
REQUIREMENTS OF LAB AND TUTORIALS
THEORY AND LAB COURSES RELATED

Fig.1 complete software product or system.

Without design we risk building an unstable software system this system might fail if we make small changes are mode. It may be difficult for the testing process or could be one whose quality cannot be tested. So this software design is a very important phase in the development of software applications

1. The Design Contains the Following Things

- The First-year timetable contains the timetable of the first year based on that we will create higher semester timetables.
- Faculty details in the department tell the details of respective faculty in the department.
- A workload detail tells that the higher and lower workload that faculty has is based on their designation. That is for professor has less work than the assistant professor.
- Subject details as subject name, and subject code.
- Faculty and subject allotment table consists of which subject respective faculty is allotted based on timeslots.
- Theory and lab courses related details contain the details of each subject that is handled by respective faculty

2. The Workflow for Timetable Generation Works in the Following Manner

- Admin will modify all the details of the student, faculty, and subjects.
- Admin will generate the timetable by providing the input as subject, faculty, type, etc.
- Admin will update the timetable a
- The timetable without any clashes and satisfying all the constraints will be generated.
- Appropriate lab or class will also be allotted for the session.
- Students and faculty will get the updated timetable message
- Student and faculty can log in to their account using their login.
- The timetable can be viewed by the student as per the details provided.

IV. PROBLEMS IDENTIFIED

The main difficulty that we are facing during timetabling can be represented by the constraint satisfaction problem with a loose of parameters and many different constraints and the constraints can be replicated in the format in which they can be managed by the scheduling algorithm in an organized manner. The Timetable generation included a difficult process of assigning each subject to Faculty manually and we scheduled the Timetable in a way so that there should be no clashes occur for Faculty. But this process will take a great use of time and also uses too much paperwork which is cost-effective and manual It is done by using the Automated Timetable generator which has the involvement of the decision tree algorithm and Linear Regression. This Algorithm involves the process of Chromosome Representation to Create the Timetable. The admin will enter each of the Fields as a count of subjects, classroom labs, enter, students. The admin role is to assign each of the subjects to their respective Faculty and assign them classrooms and also the students whom they Should teach. After scheduling the Admin will go through to verification check so that no Fields are missed. the Admin encounters any Clash or mistake that had gone unnoticed by the admin earlier, the admin has the option to regenerate or edit option and After successful reviews of the Timetable is uploaded on the college website for the staff and students to view

V. PROPOSED SYSTEM

The proposed system “Automatic Timetable Generator” is designed to be more efficient than the actual manual system. It invokes all base tasks that are now carried out manually. The final system should be able to generate timetables in a completely automated way which will save a lot of time and effort of an institute administration. Ease of use for the user of the system so that he/she can make an automatic timetable. It focuses on the optimization of resources i.e. teachers, labs elective subjects, etc. This system provides a facility for everyone to view the timetable and it generates multiple useful views from the created timetable. Most colleges have several different courses and each course has a ‘n’ number of subjects.

1. Now there are limited faculties, and each faculty might be teaching more than one subject.
2. So now the timetable needed to schedule the entire faculty at provided time slots in such a way that their timings do not overlap.
3. We use a customized algorithm for this purpose.

Advantages of Proposed System:

- Easier slot assigning.
- Less time consumption.
- NO slot clashes.

VI. CONCLUSION

The Automatic Timetable Generator is a web-based system. Its basic function is to generate the timetable according to the data filled. This application will simplify the process of timetable generation smoothly which may otherwise need to be done using spread sheet manually possibly leading to constraints problems that are difficult to determine when a timetable is generated manually. The project is developed in such a way that no slot clashes occur providing features to tailor the timetable as of wish. Separate timetables for the individual class are generated automatically by this system. Various slot combinations can be acquired so that another timetable is generated as needed. The project reduces time consumption and the pain of framing the timetable manually.

It is a complicated task to handle many Faculty's and allocate subjects for them at a time. So our proposed system will help to overcome this disadvantage. Thus we can produce a timetable for any number of courses and multiple semesters. This system will help to create dynamic pages so that for implementing such a system we can make use of the different tools that are widely applicable and free to use also.

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