



**Special Edition**

NCASIT 2023, 29<sup>th</sup> April 2023

Department of Computer Engineering,

St. Vincent Pallotti College of Engineering & Technology, Nagpur,

**Automatic Timetable Generator**

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*Abstract*— The manual system of preparing timetables in colleges with a large number of students is very time consuming and usually ends up with various classes clashing either in the same room or with the same teachers having more than one class at a time. These are just due to common human errors which are very difficult to prevent in processes such as these. To overcome all these problems this paper proposes to make an automated system. The Automatic Timetable Generator system will take various inputs like details of faculty, students, and subjects, and depending upon these inputs it will generate a possible timetable, making optimal utilization of all resources in a way that will best suit the specified constraints. An Automatic Timetable Generator system is an automated system that generates time table according to the data given by the user.

Keywords-component; Timetable, Constraints, Timeslots

I. INTRODUCTION

It's important for humans to schedule their work efficiently. Without a proper timetable, the daily routine gets messy. Proper goal setting gets difficult. In Educational institutes, it is important to have a proper timetable scheduled. Every semester there is a limited time and every subject needs a different amount of time to complete. Therefore, it is important to schedule an efficient timetable so that the right amount of time is allotted to the subjects. A person responsible for this task manually may have to do lots of permutations and combinations to reach a perfect timetable. This may result in the consumption of a lot of time and energy. Also, this perfectly scheduled timetable may have to be changed at any time for many reasons there can be a change in the number of teachers, the number of public holidays may increase, and many more. There is no certainty for this timetable to be perfect for the whole semester. Now if this happens too many times, generating a timetable every time may not be possible and may develop lots of confusion in daily routine. Therefore, a Timetable Generating System is very essential in educational institutes. All the complex permutations and combinations will be performed by the system very efficiently. The person responsible for generating a timetable will not have to worry about time clashes. The application will provide an easy and less complicated interface making it easy for the user to make use of it. The user will have to provide inputs like teacher name, subject name, Workload, labs, and duration of the course. The application will have a database to store all the inputs by the user. This data will be analyzed by the algorithm and we will get a timetable and a workload sheet of a faculty.



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II. LITERATURE SURVEY

[1] “Shengxiang Yang, Member, IEEE, and Sadaf Naseem Jat” proposed that The university course timetabling problem (UCTP) is a combinatorial optimization problem, in which a set of events has to be scheduled into time slots and located into suitable rooms. The design, of course, timetables for academic institutions is a very difficult task because it is an NP-hard problem. This paper investigates genetic algorithms (GAs) with a guided search strategy and local search (LS) techniques for the UCTP. The guided search strategy which is used here to create offspring into the population based on a data structure that stores information extracted from good individuals of previous generations. The LS techniques use their exploitive search ability to improve the search efficiency of the proposed GAs and the quality of individuals. The proposed gas is tested on two sets of benchmark problems in comparison with a set of state-of-the-art methods from the literature. The experimental results show that the proposed GAs can produce promising results for the UCTP

[2] Antariksha Bhaduri in their article proposed that Scheduling is one of the important tasks encountered in real-life situations. Various scheduling problems are present, like personnel scheduling, production scheduling, education timetable scheduling, etc. Educational timetable scheduling is a difficult task because of the many constraints that are needed to be satisfied to get a feasible solution. Education timetable scheduling problem is known to be NP Hard. Hence, evolutionary techniques have been used to solve the timetable scheduling problem. Methodologies like Genetic Algorithms (GAs), Evolutionary Algorithms (EAs), etc. have been used with mixed success. In this paper, we have reviewed the problem of educational timetable scheduling and solved it with Genetic Algorithm. We have further solved the problem with a mimetic hybrid algorithm, Genetic Artificial Immune Network (GAIN), and compared the result with that obtained from GA. Results show that GAIN can reach the optimal feasible solution faster than that GA.

[3] “Dipti Srinivasan, Tian Hou Seow, and Jian Xin Xu” proposed that finding a feasible lecture/tutorial timetable in a large university department is a challenging problem faced continually in educational establishments. This paper presents an evolutionary algorithm (EA) based approach to solve a heavily constrained university timetabling problem. The approach uses a problem-specific chromosome representation. Heuristics and context-based reasoning have been used for obtaining feasible timetables in a reasonable computing time. An intelligent adaptive mutation scheme has been employed for speeding up convergence. But this system is difficult to implement since it considers the entire university problem and evolutionary algorithm.

[4] Mei Rui, right now, study and subsequently the rundown of the overall issues, a scientific model for the course timetable framework is proposed. At an identical time, utilizing the example acknowledgment innovation in AI, focusing on this numerical model a substitution college course timetable framework configuration program is proposed and figured out. This program not exclusively can well explain the deficiencies of the predominant course timetable framework, but on the other hand, is basic and simple to work with, and has solid flexibility.

III. ARCHITECTURE

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Fig 1: Block Diagram

Figure 1 represents the Timetable Generator. Consists of an input module and required Timetable and the Total workload assign to the faculty as the output.

**A. Input Data**

Input Data can be described as different inputs that are fed to the application by the user.

They are:

1. Faculty Management: It will contain data related to faculty like id, name, and subject taught by him/her.
2. Year Management: It will contain data related to the year like how many total sections are there in that particular year.
3. Subject Management: It will contain data related to the subject and the time required to complete the subject.
4. Slot Management: there are two types ie. Normal slot for department faculty and a special slot for other department faculty.

**B. Constraints**

Constraints are of 3 types:

1. Validity violation constraints: These are some constraints that need to be followed:

- No teacher can be allotted two lectures at the same time.
- Two different lectures cannot be allotted in the same class at the same time.
- Fixed Time slots.

2. Hard Constraints: These are some constraints that cannot be ignored:

- The subject should not be allotted a first lecture twice or thrice a week
- Classrooms or labs cannot be double booked.

3. Soft Constraints: These are some constraints that are not compulsory. More the number of these constraints are followed, the timetable generated can be said a perfect timetable

- No continuous lecture for the teacher in the class.
- A teacher should not have consecutive lectures

**C. Result**

- Faculty Management

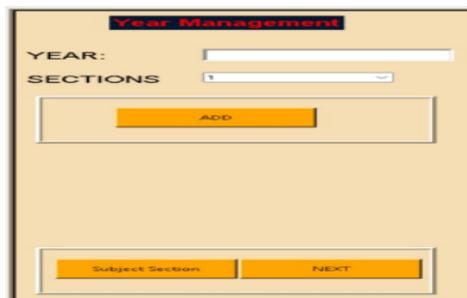
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The screenshot shows a web form titled "Faculty Management". It contains two input fields: "FIRST NAME:" and "LAST NAME:". Below these fields is a yellow "ADD" button. At the bottom of the form, there is a yellow bar with the text "Year Section".

Fig 2 : Faculty Management

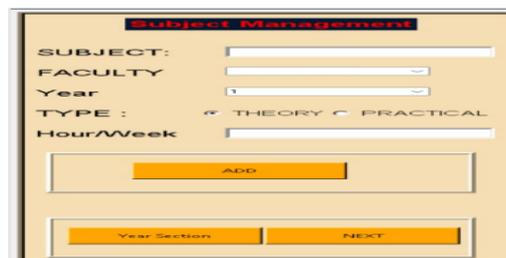
- Year Management



The screenshot shows a web form titled "Year Management". It contains two input fields: "YEAR:" and "SECTIONS". Below these fields is a yellow "ADD" button. At the bottom of the form, there is a yellow bar with the text "Subject Section" and "NEXT".

Fig 3 : Year Management

- Subject & Slot Management



The screenshot shows a web form titled "Subject Management". It contains four input fields: "SUBJECT:", "FACULTY", "Year", and "Hour/Week". There is also a "TYPE:" field with radio buttons for "THEORY" and "PRACTICAL". Below these fields is a yellow "ADD" button. At the bottom of the form, there is a yellow bar with the text "Year Section" and "NEXT".

Fig 4 : Subject Management



The screenshot shows a web form titled "Slot Management". It contains two input fields: "DAY:" and "TIME:". Below these fields is a yellow "ADD" button.

Fig 5 : Slot Management

#### 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 a spreadsheet manually possibly leading to constraints problems that are



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difficult to determine when time table 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 of need. The project reduces time consumption and the pain of framing the timetable manually.

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