

Automatic Time table Generator using Genetic Algorithm

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Abstract— The very essential part for an education system to run, is a schedule. In this project we generate a schedule/timetable as per requirements needed for the particular department with the available staff details and subject details. This project process is achieved using genetic algorithm where all the given constraints satisfied to generate an appropriate schedule/timetable as this process is the main to run an education system evenly.

Keywords— Time Table, Students, Lectures, Schedule.

1. INTRODUCTION

The time table here is to generate with respect to teacher and student constraints, the time constraints is per hours for each individual period for a day, where there is no time clashing for each individual period both in time and teachers for each day and no clashes for one individual teacher in both classes i.e., for two section (A and B) with respect to institute the department under example: Information Science and Engineering the section are (ISE1 and ISE2) no clashes for each teacher in a day, This Project would help the institutes and colleges to generate the time table with the help of the system than the human work hours to write a time table. The idea of using the time table generator is to reduce the efforts of the management in generating the time tables.

The generating of timetable is difficult with all constraints satisfied with problem facing in the institute with no long gap for free hours and no continuous hours for more than 7 hours a day in a institute, this is the problem solved for only one department in an institution and solving this for all department is the challenging problem faced to generate a time table with all possible constraints, this is the time table generated using the genetic algorithm so it is not possible to solve all the given constraints but it can solve almost the main constraints i.e. no clashes between the two teacher with the same time period. The chromosomes used here is to encode the instructions on how to build a

time table. Thus this time table is generated using the genetic algorithm.

2. LITERATURE SURVEY

The idea of generating a timetable for education system was to reduce the work of teachers or lectures while preparing the schedule which was to be followed the complete semester or the complete annual year. To overcome this problem we are working on this project which help to generate a timetable for any educational system. [4] This problem can be overcome with many systems but the use of the genetic algorithm makes the problem definition in an optimized way which help the problems solves much easier and faster. [5] The process is done when the values are given and output is generated using this process which helps our project much easier to implement with reference to this paper [6].

3. PURPOSE OF WORK

Generating a feasible lecture/tutorial timetable in a large university department is a challenging problem faced continuously in educational institutions. The problem faced to generate a time table with no clashes in teacher for the two classes in a same time slot, the student can't have the two different subject or course in same period of time and the teacher cannot have two hours or more than two hours for a same class teaching, and satisfying the all the days as full for 7 hours a day and Saturday that is weekend as half day for 4 hours a day in respective day.

There are two constraints such,

They are:

1. Soft Constraints.
2. Hard Constraints.

The Soft Constraints: - The area of lower priority that will not impact the feature of time table roughly and will not lose its efficiency and the feasibility and its priority in generating a feasible time table

From Students Perspective :- No more than 2 hours Continuously free periods for a day in a time table , This is said to be soft constraints because it is not affecting the time table feasibility or not producing a worst time table for a institute.

From Teacher Perspective: - The teacher cannot take more than 2 hours continuously.

From Institute Perspective: - The each classes should not have less than four hours in a day.

The Hard Constraints: - The area of higher priority that will impact the feature of time table roughly and will not generate a feasible time table for the institute and will not satisfy the give problem.

From Students Perspective :- No clashes with same teacher for two different classes in same time slot, This is said to be hard constraints because it is affecting the time table feasibility or producing a worst time table for a institute which cannot be used .

From Teacher Perspective: - The teacher cannot take the same lessons for the two different classes in same time slot.

From Institute Perspective: - The classes should not have more than 50 students in class.

4. METHODOLOGY

4.1 ALGORITHM:-

Genetic Algorithm, as the word suggest genetic means the study of genes and genetic with respect to biology, but with respect to the computer operation and programming, the evolution of the most basic input to the desired outcomes. The following shows the flow-chat of the Genetic Algorithm.

The first step in the algorithm is the initialize the constraints that is (number of teaching hour in a week, maximum number of classes in a week) which is the initial constraint (initial population), selection is the process of random generation the output that varies from generation (G0 to G n where n is the number of generated outputs. Cross over is the process of combining the two or three generated output to make a more efficient output. This process involves the combining of weak outputs to make a strong output. Mutation is the process of making the output more accurate by adding the required constraint.

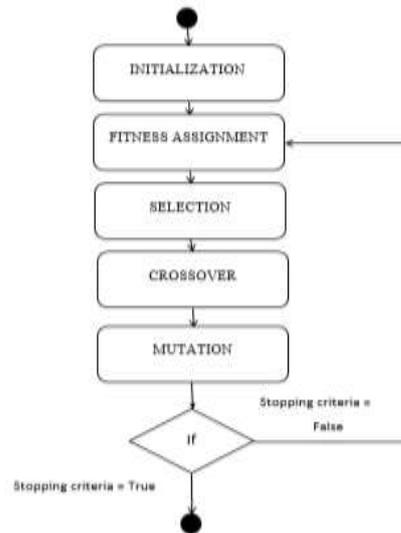


Fig 1. Flow of algorithm

That is add are own desired output to the already established output Ex: If the generated output from the cross over is have a few null values, the mutation process helps to fill these null values. This is compared with the desired output constraint to see if the generated output is same as the desired output, if the desired output and generated output is different the whole process starts again from the selection process till the desired output is obtained.

5. IMPLEMENTATION

A genetic algorithm is a search heuristic that is inspired by Charles Darwin’s theory of natural evolution. This algorithm reflects the process of natural selection where the fittest individuals are selected for reproduction in order to produce offspring of the next generation.

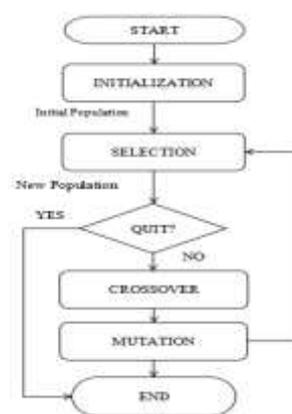


Fig 2. Process of work

Step 1: Initialization:

First step in this project is to identify the input parameters, initialize them and send those parameters to the algorithm to generate time table.

Step 2: Fitness assignment

- In this second step the input values of all the parameters are assigned to zero.
- Then it generates random timetables for the given parameters.

Step 3: Selection

- If 10 timetables are generated then all 10 timetables are selected with respect to every teacher.

Step 4: Cross over

- All the related timetables get paired up and mix together to get appropriate timetable without any clashes.

Step 5: Mutation

- Then we get the updated timetable without any clashes among the subject and teachers.
- If any clash among the teachers towards the subject is given then it goes back to fitness assignment and initialises the values to zero and restart the process.

TimeTable for: MONDAY

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> Generation # 136
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Period#	dept	Subject(Name)	time(id)
1	MATH	15HAT4L---(M4)-->(Prakash Sir)	9:00 AM-10:00 AM
2	ISE	15CS44---(HP)-->(Veeresh Sir)	10:00 AM-11:00 AM
3	ISE	15CS45---(SE)-->(Dr Prakash Sir)	11:00 AM -12:00 AM
4	MATH	15CS46---(AdvM2)-->(Sheeba Ma'am)	12:00 NOON -1:00 PM
5	ISE	15CS46---(DC)-->(Kavitha Ma'am)	1:00 PM-2:00 PM
6	ISE	15CS42---(DOC)-->(Saritha Ma'am)	2:00 PM-3:00 PM
7	ISE	15CS43---(DAA)-->(Anuthabalan Ma'am)	3:00 PM-4:00 PM

Fig 3. Output of Project

Subject consists of the subject code (a code that is given for various subject that are to be thought in the institution) along with the subject name and the teacher in charge for that particular class.

The given output would consists of the time table for an academic year, where they would be no clashes of the same teacher among the classes, the necessary constraint of number of classes while be followed in the generated time table.

The condition of minimum and maximum number of classes for a particular subject is satisfied. We get an accuracy of 80%.

Table I: Parameters To Generate Time Table

Classes	Attributes
Schedule	Daytime
Course	Subject, Subject Code
Instructor	Name, Department, Subject taken
Room	Number, Capacity
Department	ID, Name, Subject

6. RESULTS

Based on the constrained given in the time of initialization a feasible time table would be generated, the output will be like the following:-

A time Table for a particular classes, which include the name of the subject, teacher in charge of the subject, which department they belong to, time the session begins and when the session ends, and also the number of periods.

7. CONCLUSIONS

As discussed, the intention of the algorithm to generate a time-table schedule automatically is satisfied. Using the all constraints satisfying the algorithm. Also the timetables generated are much more accurate, than the ones created manually. The project reduces time consumption and therefore the pain in framing the timetable manually. The coding was done using python programming language to optimize the code the least. And working with no extra databases to change the values the alteration of values can be done in the code which makes the generation much easier. Finally conclude the time table is generated automatically.

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