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Smart Timetable System Using AI and ML

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Abstract- Professional colleges have exclusive aqueducts of courses and every has its particular part of syllabus whichinclude different topics. In those colleges, teachers are teaching one- of-a-kind subjects in different semesters and also outside identical semester academy are dealing with two different topics. Theimportant charge is that the timetableneeded to program in line with the college furnished time places in which timetables are organized in this type of way that facultytimings do not overlap. The time table does now do not overlap with their different schedules and these timetables.

Keywords: Scheduling; Timetable Automation; Artificial Intelligence; Genetic Algorithm

I. Introduction

Time table scheduling has been in human essentials since they allowed of managing time effectively. It's extensively used in schools, institutes and other fields of teaching and working like crash courses, couching centres, training programs etc. It may also manipulate schedule while a teacher isabsent, overdue coming or beforehand going. The maximum and minimal workload for a faculty for an afternoon, week and month could be exact for the effective generation of timetables [1]. By the usage of this software program, users can exercise for leave through imparting go away needed date, cause and also with alternative college (Pillay and Ozcan E., 2019b). In this system we are using Machine learning and AI for optimization of the system. It is suitable to give extra Burden to another person effectively.

II. Literature survey

When it comes to scheduling problems, we can't develop a generic function to solve all scheduling problems. (McCollum et al., 2012a)[4] Main goal in this research is to develop operations that can automate the functions of computing timetable planning systems. The planning of today's timetable was done manually. Less effective and time consuming. There is also less flexibility as the timetable cannot change smoothly. It takes a lot of time to recreate the timetable without conflicts because there are so many things to consider [4].

A. Local Search Procedure

This is a common technique that has been used to create scheduling problems. Taboo search, simulated annealing, and genetic algorithms are local search methods. Genetic algorithms are the most commonly used algorithms. Let's discuss the above method [5].

Use of python libraries like tkinter for GUI. It only used for Semester Wise. It is an application-based software which has access to that particular desktop (Vikram M. Apte,

2021). So, we believe that by making it website we can believe to reach many more colleges.

B. Multiple Context Reasoning

This means understanding the situation specifically, along with how it fits in the overall system [6]. The current situation mayhave features that are similar to situations youhave encountered before, but the underlying forces may be different, so what you did lasttime may not work this time.

Automated Time Table Generation Using Multiple Context Reasoning for University Modules (Jian Xin Xu). It uses Context Reasoning for scheduling. It has less accuracy and optimization compared to the genetic algorithm. So, we believe that geneticalgorithm will solve many optimization problems in scheduling [7].

C. Genetic Algorithm

This algorithm was invented by John Holland. He wrote a book on genetic algorithms entitled Adaptation to Natural and Man-Made Systems. Genetic algorithms are based on evolutionary algorithms. This algorithm uses the principle of natural collection to create and develop the optimal solution as a result. A genetic algorithm is also a heuristic search with natural evolutionary features such as mutation, inheritance, crossover, and selection to generate solutions that optimize a problem toget the right solution. Genetic algorithms areoften used in developing planning systems [8].

When planning a schedule, there may be many solutions that do not violate the constraints. So, using a genetic algorithm gives us a good pool of solutions [8]. Evolutionary features such as mutations and crossovers make this algorithm more efficient and less time consuming to search.

D. Constraint Programming (CP)

The main feature of this method is that it allows you to see constraints explicitly as part of the program. This paves the way for adaptability, a feature we want on our roadmap (Gervás and Miguel).

The Constraint programming is used for scheduling (Prashanta Kumar, 2020). constraint propagation techniques for these problems and related machine scheduling problems are introduced and possible applications of these techniques in connection with lower bound calculations.

III. Methodology

The smart timetable system uses machine learning algorithms. This is a genetic algorithm used to solve complex problems with more variables and possible outcomes orsolutions. Bad solutions are replaced by goodsolutions.

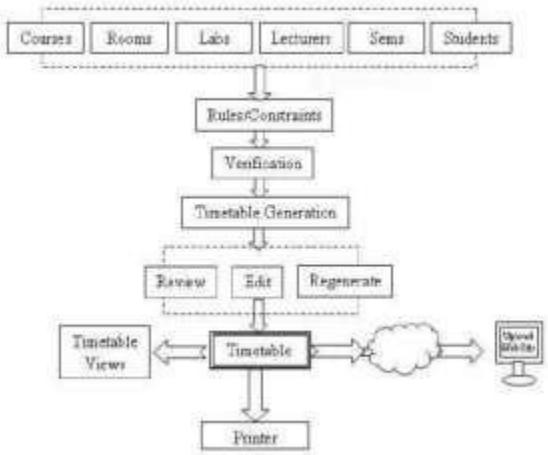

Fig. 1: Proposed System

To make a timetable system generic that is efficient by the use of Django. It will focus on optimization of resources using ML. It also shows the view of timetable as we want by using Database (SQL).

IV. Mathematical Model

Groups: refer to a set of students. For every group of students, a course set has been deter-mined. A student in a specific group can attend the courses that are available in the course set for that group of students. Due to this, the class for the course that is under the same set cannot be scheduled at the same time. Resources: refer to type of lecture rooms. There are 4 types of resources {r1,r2,r3,r4}that match the types of lecture rooms {type1,type2,type3,type4}.

Sets

S Set of class meetings, {m1,m2, ...mn} The set of class meeting is divided into 3 parts. S1is the first- and second-class meetings for the M1, M2, and M3 programs. S2is the first-class meeting for the M4 and M5 programs, while S2 is the second class meeting for both of the programs. This is done to separate the first- and second-class meeting for the M1-M3 programs and to assign the first and second class meeting for M4 and M5 programs in the same day.

D Set of days, {d1,d2, ..., d5}

T Set of timeslots, {t1,t2, ..., tl}

I Set of lecturers, {I1,I2, ..., Im}

SIi Set of class meetings conducted by lecturer

Ii G Set of student groups, {g1,g2, ..., gp}

R Set of resources, {r1,r2,r3,r4}

Srk Set of class meetings that require resource type rk, (rk∈R)

P Set of class meetings in pairs (mj,mk) which cannot be scheduled at the same day

Hi Set of class meeting that takes approximately I hours (i=2) Parameters

hmj duration of one class meeting mj

wrk maximum capacity (hours) the resource rk per day,(rk∈R)

erk maximum capacity (number) resource

rk per hour, (rk∈R) pgi maximum total hours of daily class a group of student gi can attend, (gi∈G)

sIi maximum total hours of daily class a lecturer Ii can teach,(Ii∈I)

V. Proposed System

Our project will help to optimize the timetable and will override any time period. It is efficient. Intend to display the Timetable as per the faculty is been allotted for the respective subject in according to the user. Mainly it has the feature of holiday management and it reloads subjects periods if someone is absent. This system uses Python Libraries and also Machine learning for optimization.

A. Diagrams

Below diagram shows the data flow i.e.in which manner will the data flow in our system.

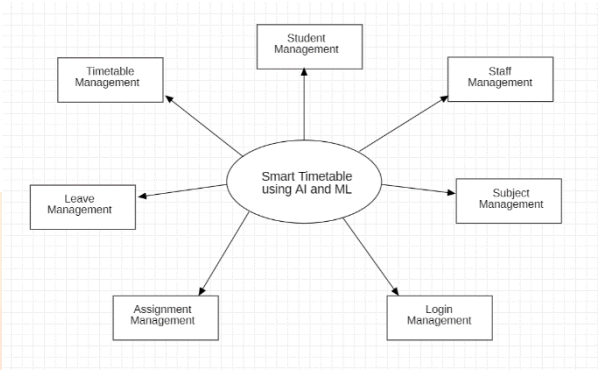

Fig.2: DFD Level 0

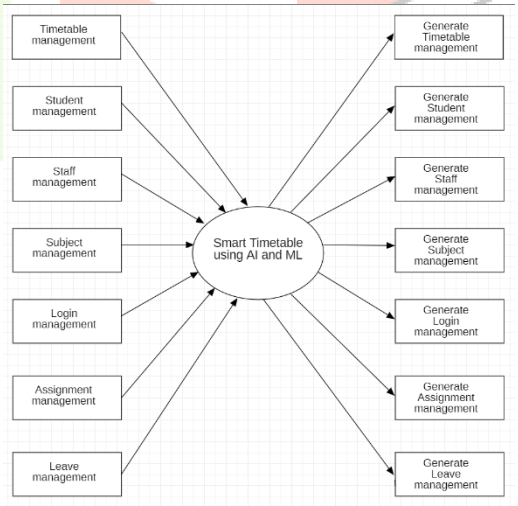

Fig.3: DFD Level 1

B. Results of our project

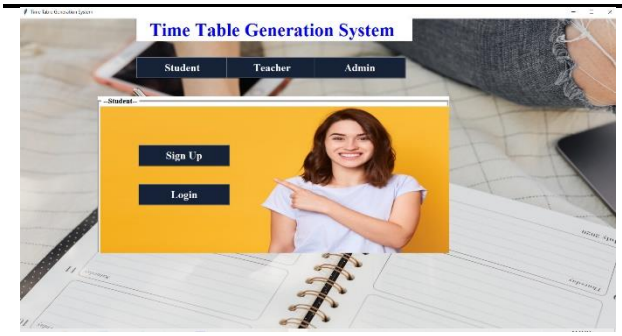

Fig.4: Sign Up Page

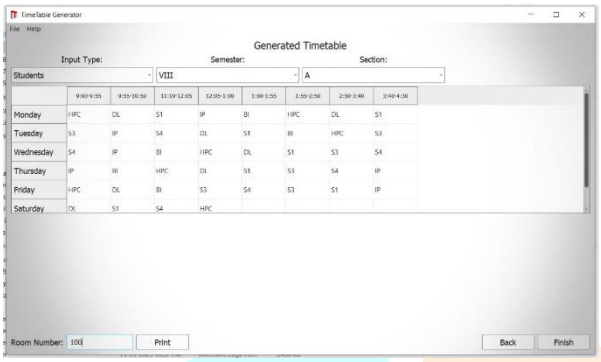

Fig.5: Generated Timetable

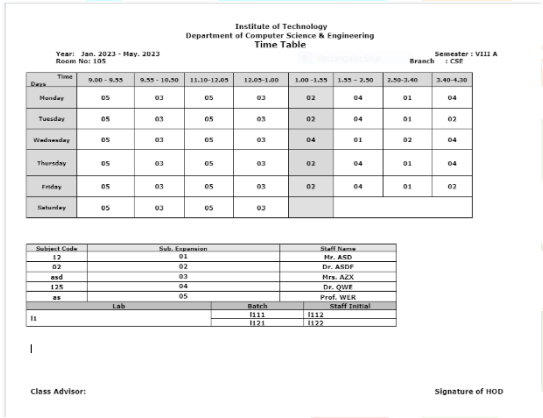

Fig.6: Final Printable timetable

VI. CONCLUSION

The intention of the algorithm to induce a timetable schedule automatically is satisfied. The algorithm incorporates a number of ways, aimed to make better the effectiveness of the search operation. It also, avoids clashes between the availability of teachers. The simplicity of the system and the introduction of configurable algorithmic goals and powers have reduced the need for so many constraints as solutions are created dynamically. This allows users to easily use the application and experiment until they find the best solution for their scenario. The large number of combinations we test to find an accurate rating for our application proved far from a possibility. However, we can conclude that the system was able to generate results from the models provided. Despite their imperfections, these models remain valid and acceptable given the number of limitations placed on the system.

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