FAST

Logo

Description automatically generated

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| Subject | Artificial Intelligence |
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| Section | 6C \_ |
| Assignment. | AI-Project |

About:

The project was Scheduling of exams **Exam Scheduler**. We have to implement the logical algorithm from the AI course taught us in class. Different algorithms are for different situations, and we have to find out the best solution regarding the exams to be scheduled. There were some constraints that were followed throughout the project. Which are stated below.

Hard Constraints:

These are the constraints that were important to follow in our solution.

1. An exam will be scheduled for each course.
2. A student is enrolled in at least 3 courses. A student cannot give more than one exam at a time.
3. Exam will not be held on weekends.
4. Each exam must be held between 9 am and 5 pm
5. Each exam must be invigilated by a teacher. A teacher cannot invigilate two exams at the same time.
6. A teacher cannot invigilate two exams in a row.

Soft Constraints:

These are the constraints that were to make solution more towards the best solution. These were not important like optional to follow.

1. All students and teachers shall be given a break on Friday from 1-2.
2. A student shall not give more than 1 exam consecutively.
3. If a student is enrolled in a MG course and a CS course, it is preferred that their MG course exam be held before their CS course exam.
4. Two hours of break in the week such that at least half the faculty is free in one slot and the rest of the faculty is free in the other slot so the faculty

Working:

For this specific problem that was given to us we have used **Simulated Annealing** concept to generate conflict free solution. Every timetable was treated as solution, but it was all about the best solution. Which had a low cost and or less conflict that timetable was produced and shown as a result.

Applying Algorithm:

Simulated Annealing was applied and by the theory it works at number of temperature until the cost becomes zero it comes out from the loop. This concept was applied. We checked the conflicts at each time with our neighboring solutions so that we can apply weightage on each constraint. Hard ones were given larger weightage than the soft ones because they were compulsory to follow. Our structure contains the best solution regarding soft constraints and perfect solution regarding hard constraints.

Terms used:

|  |  |
| --- | --- |
| Identifiers | Meaning |
| list | These were used to store the data of courses and students etc. |
| csv | Csv files were used to read the data from to convert into a meaningful timetable. |
| panda | Panda is used in project library so that we can structure our solution in table form. |
| class | We have implemented our logic using class structure and have put information necessary in the class. |

Test Runs of Program:

We were to find the best possible solution against the number of hard constraints that were given and for that local beam search was used to place the exams in such a way that they won’t be having any clashes of students, courses and teachers in the date sheet. This is done by keeping the clashes number as utility function to support the algorithm while the rest is displayed in code.

Sample Test Outputs#1:

**Initial State:**

Text

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**Output:**

Diagram

Description automatically generated Text

Description automatically generated

Text

Description automatically generated A picture containing background pattern

Description automatically generated

**Date Sheet:**

A picture containing calendar

Description automatically generated

Sample Test Outputs#2:

**Initial State:**

Graphical user interface, application

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**Output:**

Text

Description automatically generated Text

Description automatically generated Text

Description automatically generated

**Date Sheet:**

A picture containing table

Description automatically generated