

Course Project: CS 401 Artificial Intelligence

Deadline: 30th December 2018

Groups formation: Groups with maximum of three members are allowed. You can select members from other sections.

Timetable Scheduling Problem

For a certain university with T teachers, C classes and R classrooms, it is required to schedule teacher-class-room triplets within a time limit of P time slots producing a feasible schedule of one week.

3 hrs classes are required every week (min – 3 classes of one hour; max – 2 classes of 1.5 hrs).

The input parameters are mentioned in the input file provided to test your algorithm.

Constraints for this problem may be hard (must be satisfied) or soft (should be satisfied as far as possible).

Hard Constraints:

1. A teacher cannot teach more than one class at a time.
2. Classroom cannot be shared by two or more classes at a time.
3. No classes should be scheduled at the time of Friday prayer (prayer break 1-2).

Soft Constraints:

1. No consecutive classes for any teacher.
2. Different teacher requires some free days within their scheduled classes (Days mentioned at the end of the input file).
3. Make availability of free days for a particular batch_section in the timetable.

A feasible schedule is one that satisfies all the hard constraints, and minimizes the weighted sum of costs (penalties) associated with the soft constraints.

Propose a solution for the above problem by using ANY TECHNIQUE of your choice we have studied in AI. You can test your solution on the test cases provided as “*Test Case 1.csv*” and “*Test Case 2.csv*”. Instructions regarding the input file format are given in the “*Description.xlsx*” file.

Evaluation: We shall be using an unseen test file for evaluation.

Output:

1. A *complete* and *clear* timetable of a week is generated and stored in file (human readable).
2. Your program must output following table along with the time table mentioned in point no 1.

		Test File
Constraint	<i>Number</i>	<i>Unresolved</i>
<i>Hard</i>	<i>1</i>	
	<i>2</i>	
	<i>3</i>	
<i>Soft</i>	<i>1</i>	
	<i>2</i>	
	<i>3</i>	

Documentation:

In the documentation write down

3. Motivation of choosing the algorithm (3-6 lines) you have implemented to solve the problem.
4. Representation of the solution: After extracted the useful information from the problem description above, how you mapped the statements into a solution. A mathematical representation of your solution is required and no need of long essays.
5. Write down the fitness evaluation criteria.

Bonus marks (10 marks):

A list of soft constraints that you will handle in your solution is defined in the section. Propose additional soft constraints (inspired from the real world timetable scheduling problem) and propose how your algorithm handles those soft constraints. Properly write down these constraints in your documentation and list down the results in the above table (number of unresolved soft constraint in test case 01 and 02).