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CS 3612 – Intelligent Systems

CSP: Time Tabling Assignment

Problem

There is a list of subjects, a set of possible time slots for each subject and a set of rooms. Some subjects are compulsory while some are optional.

The following are the constraints to satisfy.

1. A given subject can be assigned only to one of the possible time slots given for that subject.
2. Two compulsory subjects cannot be in the same time slot (optional subjects may).
3. Two subjects cannot be assigned to the same room if they are assigned to the same time slot.

Assign each subject time slot and a room.

Assumption: No compulsory and optional subject can be assigned to the same timeslot.

Solution

Used backtracking search algorithm to solve the **control satisfaction problem**. Modeled the problem as follows.

- **Initial state:**

List of subjects with non-assigned values (None) for timeslot and room.

- **States maintained while solving:**
  - assigned – List for updating the assignments. Initial state at the beginning.
  - assigned_rooms – Map data structure with timeslot as the key and already assigned rooms for the timeslot. (Means already taken by another subject if a room exists for the timeslot when checking.)
  - d – List index to track the assignments in the assigned list.

- **Successor function:**

Iterate through the possible timeslots given for a subject. Try by assigning each possible timeslot with first room given and check whether it succeeds by recursively calling the backtracking search function with updated states.

If it fails to assign to any of the timeslots,

If it is a compulsory subject: No solution.

Else: Try with the next room available for that time slot.

- **Goal Test:**

Check whether the all the entries in initial state is updated with possible values. (`d` will be at the end of `assigned` list.)