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Proposal Topic:

Optimization of Timetables Using Graph Coloring

Area of Focus:

(Part A) Deterministic Algorithm Animation and Algorithm Snippets: NP-Completeness with Graph Drawing

Proposal Background:

To find the optimal solution for NP completeness problems, all possible solutions must be considered in order to narrow down to the best one, but this requires an exhaustive search algorithm to accomplish. Thus, to find an optimal solution for NP, it is desired to find the next best answer: "close to optimal" (approximated) solutions. This, although not the best solution, requires much less time than optimal solutions.

A classic example for NP completeness problems is the timetable optimization which is a schedule of events (like college courses or movies at theaters) to fit in a minimal set of time blocks such that one event cannot simultaneously happen with the other event. So to find an approximation for the close to optimal solution, heuristics are used to accomplish this.

There are many algorithms that can narrow down the close to optimal solution, among them is the graph coloring algorithm.

Algorithm:

The algorithm we will be using is the graph coloring, which we assign colors (assignment of labels) to certain elements of a graph that are under certain constraints such that no two adjacent vertices share the same color.

Data Input:

Dataset with z number of students with x number of courses (some same course but different professors) in y semester. And each student would also be taking several courses.

Expected Output:

The goal of this project is to organize a close to optimal timetable schedule that accommodates the courses the university must provide in a minimal number of time blocks of the y semester without course A overlapping with the time of course B that is same course but taught by different professor in the same semester.

This is also applied to student's study plan, in which their 4 year plan do not have overlapping courses in the semesters.