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Automatic Timetable Generator using Constraints and Optimization

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Abstract: *This project presents a comprehensive solution for automating academic timetable generation using constraint satisfaction and optimization techniques. The system allocates faculty, subjects, classrooms, and time slots efficiently while eliminating scheduling conflicts. It significantly reduces manual effort and improves accuracy and scalability for educational institutions.*

This research presents a comprehensive, automated framework designed to revolutionize the way educational institutions manage academic scheduling. By addressing the inherent inefficiencies of traditional manual methods, the proposed system leverages advanced Constraint Satisfaction Problems (CSP) and various optimization algorithms to create a seamless scheduling environment. The system is engineered to intelligently allocate key resources—including faculty, subjects, classrooms, and time slots—ensuring that every variable is optimized for maximum efficiency. The primary objective is the total elimination of common scheduling conflicts, such as overlapping classes, room double-bookings, and teacher unavailability. By automating these processes, the system not only significantly reduces the manual administrative burden but also provides a level of accuracy and scalability that is unattainable through human effort alone. This solution is designed to grow alongside the institution, accommodating increasing numbers of students and complex course structures without a decrease in performance.

Keywords: Automated Timetable Generation, Constraint Satisfaction Problem (CSP), Hard and Soft Constraints, Backtracking Algorithm, Conflict Detection and Resolution, Scheduling Optimization, Resource Allocation, Academic Scheduling System

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