

## SchedulEdge: An Automated College Timetable Generator

### Abstract:

Efficient timetable generation is essential for academic institutions to optimize resource allocation, minimize scheduling conflicts, and streamline administrative tasks. This project introduces SchedulEdge, an Automated College Timetable Generator that leverages Genetic Algorithms (GA) and Constraint Satisfaction Problems (CSP) to create well-structured and conflict-free schedules. Built using Python, the system integrates Google OR-Tools and DEAP for evolutionary algorithms, Scikit-Learn for data processing, and SQLite/PostgreSQL for efficient data management. A user-friendly Streamlit interface enables seamless interaction, while FastAPI (optional) provides backend API support, and Docker enhances deployment flexibility. The system features automated conflict resolution to detect and resolve scheduling clashes in real time, preventing overlapping schedules, and intuitive visualizations that offer a clear overview of schedules, allowing administrators to track changes and make modifications easily. Designed for scalability, it accommodates institutions of different sizes, making it a versatile academic scheduling tool. By minimizing human errors and reducing manual effort, SchedulEdge enhances operational efficiency, ensuring a fair, optimized, and reliable timetable generation process.

**Keywords:** Timetable Scheduling, Automated Scheduling, Genetic Algorithm (GA), Constraint Satisfaction Problem (CSP), Optimization

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