ABSTRACT

Timetable generation in educational institutions is a complex task involving numerous constraints, such as faculty availability, classroom assignments, subject load, and session continuity. Manual scheduling methods are often inefficient, error-prone, and difficult to scale, especially in multi-department and multi-semester academic environments. The Web-Based Automatic Timetable Scheduler for Colleges addresses this challenge by providing an intelligent, web-based timetable generation system using Genetic Algorithms. Built using Python and the Streamlit framework, the system allows administrators to input essential scheduling parameters including faculty details, subject load, classroom availability, and slot preferences. The core of the application employs a Genetic Algorithm to evolve feasible solutions, guided by a fitness function that prioritizes conflict resolution, slot continuity and balanced faculty workloads. Both hard constraints and soft constraints are incorporated to ensure practical and optimal scheduling. The generated timetables are structured to prevent common scheduling issues such as double allotment for teachers and same subject clashes, also provides scalability to accommodate elective subjects, lab sessions, and multi-semester academic structures. The system outputs user-friendly, downloadable schedules and allows for administrative oversight and adjustments. This, demonstrates the potential of evolutionary computation in solving NP-hard optimization problems of timetable scheduling, offering a scalable, accurate, and efficient solution to a long-standing administrative challenge in academic institutions.