1. Title: AI Driven Smart Timetable Generation System

2. Domain: Artificial Intelligence (AI), Optimization Techniques, Educational Automation Systems

3. Application:

The system is designed to automate the timetable creation process in colleges and educational institutions. It helps in assigning subjects, teachers, classrooms, and time slots efficiently while avoiding scheduling conflicts and reducing the manual workload of academic staff.

4. Hardware & Software Required:

Hardware:

- Computer / Laptop
- Minimum 4GB RAM

Software:

- Python Programming Language
- Jupyter Notebook / VS Code
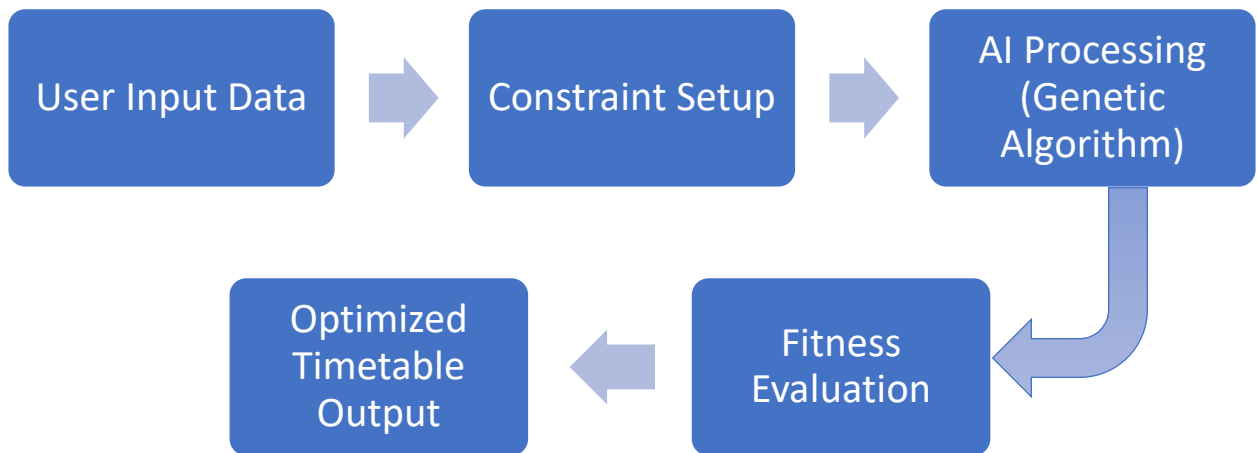- MySQL / Excel for data storage
- HTML/ CSS/ JavaScript

5. Input Required for Project:

- Subject list with weekly hours
- Teacher details and availability
- Classroom and lab information
- Daily time slots
- Teacher workload limits
- Subject type (theory/lab)

6. Objectives of Project:

- To automate timetable generation using AI
- To minimize conflicts between classes and teachers
- To optimize teacher workload distribution
- To utilize classrooms efficiently
- To reduce time and effort in manual scheduling
- To produce flexible and reliable timetables

7. Block Diagram of System:

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User Input Data  →  Constraint Setup  →  AI Processing (Genetic Algorithm)
                                                    ↓
Optimized Timetable Output  ←  Fitness Evaluation
```

8. Expected Algorithm / Processing:

The project uses a Genetic Algorithm to generate optimized timetables. The algorithm starts by creating random timetable solutions and evaluates them based on constraints such as conflict-free scheduling, workload balance, and room availability. Through selection, crossover, and mutation operations, the algorithm continuously improves timetable quality until an optimal solution is achieved.

9. Expected Output from Project:

- Automated clash-free timetable
- Balanced workload for teachers
- Proper utilization of classrooms and labs
- Time-efficient scheduling process
- Printable class-wise and teacher-wise schedules

10. Abstract:

Timetable generation in educational institutions is a complex and time-consuming task when done manually. It often results in scheduling conflicts and inefficient resource usage. This project proposes an AI Driven Smart Timetable Generation System to automate and optimize the scheduling process. By using intelligent algorithms, the system takes academic data as input and generates a conflict-free timetable while balancing teacher workloads and classroom utilization. The proposed system reduces manual effort, improves efficiency, and provides a smart solution for academic scheduling.

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