Proposal:

Introduction: Almost all education institutes have problem concerning with scheduling, especially university. Many things must be considered in order to arrange schedule. One of them is availability of lecturers. Not all lecturers are available at any time. Some of them are just available in some time. Therefore, when schedule is arranged, this thing must be considered. The other things are number of classes and courses offered. Number of classes and courses in university timetable are many. Room availability is other thing, budgeting and many others.

Problem Statement: Timetable scheduling is one of the biggest problems in educational institutions. The final timetable that is selected also contains many flaws, which causes frustration amongst the students and teachers. A lot of time of students and teachers are wasted because of incorrect scheduling.

Up till now many methods and algorithm has been used but still the problem remains. Most popular algorithm these days is Genetic Algorithm. The problem lies in Variable Based model which is Constraint Satisfaction Problem (CSP); we can also say that it is a variable assigned complex problem.

Input Output Behavior of the System: The input (X) will contain Student ID and on output we will get a scheduled timetable which won't contain any clashes regarding timetable.

Scope of the Project: Using this Genetic Algorithm we can benefit in such a way that it will not contain any clashes like 2 classes won't be scheduled in a room, a student won't have 2 classes on a same time and teachers will not be scheduled in 2 classes on same time. Before this algorithm there were a lot of flaws in timetable and above-mentioned clashes were very common that causes a lot of fuss.

Evaluation Metric of Success: Genetic Algorithms are powerful general-purpose optimization tools which model the principles of evolution. They are often capable of finding globally optimal solutions even in the most complex of search spaces. They operate on a population of coded solutions which are selected according to their quality then used as the basis for a new generation of solutions found by combining (crossover) or altering (mutating) current individuals.

The major steps involved are the generation of a population of solutions, finding the objective function and fitness function and the application of genetic operators. An important characteristic of genetic algorithm is the coding of variables that describes the problem. The most common coding method is to transform the variables to a binary string or vector. This initial population formulation process is critical. This step is also recognized as encoding process.

Baseline and Oracle: For this project the minimum aim is to resolve all the clashes and give a completely scheduled timetable that would be free of flaws. The maximum aim for this project is to implement all the soft constraints as well keeping in view the availability of teachers and students. Our aim would be to minimize this gap so that our user would also be satisfies with this scheduled algorithm.

Challenges: A timetable is essentially a schedule which must suit several constraints. Constraints are almost universally employed by people dealing with timetabling problems. Constraints in turn are almost universally broken into two categories: soft and hard constraints. Hard constraints are constraints of which in any working timetable there will be no breaches. For example, a lecturer cannot be in two places at once. Soft constraints are constraints which may be broken but of which breaches must be minimized. For example, classes should be booked close to the home department of that class. In addition to constraints there are several exceptions which must be taken into consideration when constructing an Automated Timetabling system.

Related Work:

https://andreweast.net/wp-content/uploads/2019/06/Timetable-Scheduling-via-Genetic-Algorithm-Andrew-Reid-East.pdf

https://www.researchgate.net/publication/221927228_Solving_Timetable_Problem_by_Genetic_Algorithm_and_Heuristic_Search_Case_Study_Universitas_Pelita_Harapan_Timetable