

Exams Schedule Generator Using Genetic Algorithm

Deadline: 03 May,2021

Problem

The assignment is to find generic solution that will facilitate generating schedule for university using “Genetic Algorithm”.

- You have to write code from scratch.
- Make sure your notebook is well documented
- You cannot use any built-in library for the implementation of Genetic Algorithm except Pandas and NumPy.
- You can use any kind of crossover discussed in class.
- You can choose any rate of mutation (which can be justifiable)
- You have to roulette wheel selection for selecting potentially useful solutions for recombination (Chromosomes).

The success of solution is estimated on fulfillment of given constraints and criteria. Results of testing the algorithm show that all hard constraints are satisfied, while additional criteria are optimized to a certain extent. You have to submit. ipynb with a one-page report of your implementation .pdf.

Constraints

There are set of constraints that need to be fulfilled.

Hard Constraints

- An exam will be scheduled for each course.
- A student is enrolled in at least 3 courses. A student cannot give more than 1 exam at a time.
- Exam will not be held on weekends.
- Each exam must be held between 9 am and 5 pm
- Each exam must be invigilated by a teacher. A teacher cannot invigilate two exams at the same time.
- A teacher cannot invigilate two exams in a row.

The above-mentioned constraints must be satisfied.

Soft Constraints

- All students and teachers shall be given a break on Friday from 1-2.
- A student shall not give more than 1 exam consecutively.
- If a student is enrolled in a MG course and a CS course, it is preferred that their MG course exam be held before their CS course exam.

- Two hours of break in the week such that at least half the faculty is free in one slot and the rest of the faculty is free in the other slot so the faculty meetings shall be held in parts as they are now.

Input & Output

Input data for each exam are *teachers' names, students', exam duration, courses (course codes)*, and list of *allowed classrooms*.

Output data are classroom and starting time for each exam along with course code and invigilating teacher. Time is determined by day (Monday to Friday) and start hour of the exam.

- Output will be a chromosome which satisfies all hard constraints and soft constraints at least three. (as much as you can)
- You have to display a list of all hard and soft constraints which are fulfilled in the output.
- Don't forget to show fitness values at each iteration.

Evaluation Criteria

The weightage for this assignment will be doubled of normal assignments.

Requirement	Marks
Fulfillment of hard constraint	10*6 = 60
Fulfillment of soft constraint	05*4 = 20
One-page report .pdf	20
.ipynb file containing code in python	50

Submission

- Assignment must be submitted in the google classroom.
- Submission other than google classroom won't not be accepted.
- You are required to submit your notebook and document separately as **Proj01- <18I-XXXX>.ipynb** and **Proj01- <18I-XXXX>.pdf**.
- Your report must include a sample dataset along with its output upon running your program – the harshest dataset that you have tested.
- Your notebook must contain all the datasets that you have tested your code on.