1. Initial Population Size

We took the initial population size randomly 10 but it can be changed according to in either direction.

2. Population Structure

Our population is basically a 3d list containing many chromosomes (2d list) in it. Each chromosome further consists of several individuals (1d list). The structure of individuals is described below. Each index in the chromosome represents a gene of that individual

Course Code	Course Name	Date	Day	Time	Invigilator	Room	Range of serial number of students in that room

3. Mutation

In this part of the algorithm, we performed ***random mutation*** which means that we altered the genes of the chromosomes by selecting the data randomly. Let's suppose we are mutating the gene holding the data of the schedule of the PF exam, we will mutate it by selecting some other day, date, time and room randomly in the hope that the new solution would give us better fitness.

4. Crossover

In this part of the algorithm, we generate two offspring from the provided parent chromosomes by merging some part of both the parent chromosomes. These parent chromosomes are selected based on the fitness value through roulette wheel selection procedure.

The crossover process consists of two steps.

In the first step we selected a split point **n** randomly in the range of 0 to no of individuals in a chromosome and then we will generate the offsprings in following way;

- Individuals # 0 to n of 1st offspring = Individuals # 0 to n of 1st parent

- Individuals # n+1 to end of 1st offspring = Individuals # n+1 to end of 2nd parent
- Individuals # 0 to n of 2nd offspring = Individuals # 0 to n of 2nd parent
- Individuals # n+1 to end of 2nd offspring = Individuals # n+1 to end of 1st parent

In the 2nd part, we replaced the genes at index 2, 3, 4 of individual i of 1st chromosome with genes at index 2, 3, 4 of individual j of 2nd chromosome where i is 0 and j is no of individuals in a chromosome - 1. This will be repeated exactly in the same way for 2nd offspring too

5. Roulette Wheel Selection

In this part of the algorithm, we use this technique to select the parent chromosomes from our population based on their fitness values. The idea behind this technique is that the chromosome with the best fitness value will have maximum chances of getting selected as the parent chromosomes.

6. Algorithm

a. Initial Population Created
b. Selection of parent chromosomes through roulette wheel
c. Crossover of parent chromosomes to produce offspring
d. Mutation of offspring
e. If fitness of offspring is better or equal, then replace the parents with offspring
f. Check fitness of the best chromosome, if 0, it means we have fulfilled all hard and soft constraints. If not 0, go to step 2

7. Dataset

We have tested our code on 4 data sets. All the data sets are placed inside the folder of **dataset**.