EXAM SCHEDULING – GENETIC ALGORITHM

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INITIAL POPULATION

An initial time table was generated using random values for courses, staff and students. The time table was spread on 2 weeks span. Here distribution was very un-even with too many conflicts, which was passed to GA algorithm for further processing.

CHROMOSOMES

Each chromosome was extracted from the time table given, in the form of:
[Day-Time, Course Number, Teacher Assigned]

MUTATION METHOD

In Mutation function, we took the given timetable, generated its chromosomes, then mutated those chromosomes on the basis of teachers assigned and course numbers, these parameters or bits were flipped randomly throughout, then returned these mutated chromosomes back to GA for further processing.

CROSSOVER METHOD

In Crossover function, we took the given timetable, generated its chromosomes, then applied crossovers to randomly selected chromosomes, the parameters or bits i.e. (teachers assigned and course number) were interchanged randomly throughout, then returned these cross overed chromosomes back to GA for further processing.

DETERMINING FITNESS VALUE

The Fitness value was calculated on the basis of how well the constraints are catered. More weightage was given to the HARD CONSTRAINTS and less to SOFT CONSTRAINTS, the result was algorithm being more skewed towards hard ones and trying to cater them was the priority.

SELECTION METHOD

The Roulette Wheel selection method was applied, in which the fittest individual has more probability of being selected, in our case the fitness value is reversed therefore the lowest fitness value is more powerful and hence has more chance of being selected, and sent to GA for further processing.

OUTPUT SAMPELS / RESULTS

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+--------------------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
|      Day-Time      | C-301 | C-302 | C-303 | C-304 | C-305 | C-306 | C-307 | C-308 | C-309 | C-310 |
+--------------------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
| Mon  9:00-12:00 AM | CS219 | SS113 | CS302 | CS118 | SS118 | CS217 | MG220 | CS328 |   -   | AI2011|
| Mon  1:00-4:00 PM  | SS111 | CS307 | CS220 | MT224 |   -   | CS218 | CY2012|   -   |   -   |   -   |
| Tue  9:00-12:00 AM |   -   |   -   | CS211 |   -   |   -   |   -   | SS152 |   -   |   -   |   -   |
| Tue  1:00-4:00 PM  |   -   | EE229 |   -   |   -   |   -   |   -   |   -   | MG223 |   -   |   -   |
| Wed  9:00-12:00 AM |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |
| Wed  1:00-4:00 PM  | MT205 |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |
| Thur 9:00-12:00 AM |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |
| Thur 1:00-4:00 PM  |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |
| Fri  9:00-12:00 AM |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   | DS3011|
| Fri  2:00-5:00 PM  |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |
| Mon  9:00-12:00 AM | SE110 |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |
| Mon  1:00-4:00 PM  |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |
| Tue  9:00-12:00 AM |   -   |   -   |   -   |   -   |   -   |   -   |   -   | EE227 |   -   |   -   |
| Tue  1:00-4:00 PM  |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |
| Wed  9:00-12:00 AM |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |
| Wed  1:00-4:00 PM  |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |
| Thur 9:00-12:00 AM |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |
| Thur 1:00-4:00 PM  |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |
| Fri  9:00-12:00 AM |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |
| Fri  2:00-5:00 PM  |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -   |
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TimeTable Generated from Initial Population

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Fitness Value for Initial Population:  21165 (W/ Hard constaints =  18911  W/ Soft contraints =  2254 )
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Initial Fitness Value: Very HIGH!

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+--------------------+-------+-------+-------+-------+-------+-------+-------+--------+-------+--------+
|      Day-Time      | C-301 | C-302 | C-303 | C-304 | C-305 | C-306 | C-307 | C-308  | C-309 | C-310  |
+--------------------+-------+-------+-------+-------+-------+-------+-------+--------+-------+--------+
| Mon  9:00-12:00 AM | MT205 |   -   |   -   |   -   |   -   |   -   |   -   |   -    | CS219 |   -    |
| Mon  1:00-4:00 PM  |   -   |   -   | CS118 |   -   |   -   |   -   |   -   |   -    |   -   |   -    |
| Tue  9:00-12:00 AM |   -   |   -   |   -   |   -   |   -   |   -   | SS152 |   -    |   -   |   -    |
| Tue  1:00-4:00 PM  |   -   |   -   |   -   | SS118 |   -   |   -   |   -   | MG223  |   -   |   -    |
| Wed  9:00-12:00 AM |   -   |   -   | CS302 |   -   |   -   |   -   |   -   |   -    |   -   |   -    |
| Wed  1:00-4:00 PM  | EE227 |   -   |   -   |   -   |   -   |   -   |   -   |   -    |   -   |   -    |
| Thur 9:00-12:00 AM |   -   |   -   |   -   |   -   |   -   |   -   |   -   | CS218  |   -   |   -    |
| Thur 1:00-4:00 PM  |   -   |   -   |   -   |   -   |   -   |   -   | MG220 |   -    |   -   |   -    |
| Fri  9:00-12:00 AM |   -   |   -   |   -   |   -   |   -   | SS113 |   -   |   -    |   -   |   -    |
| Fri  2:00-5:00 PM  | CS118 |   -   |   -   |   -   |   -   |   -   |   -   |   -    |   -   |   -    |
| Mon  9:00-12:00 AM | CS217 |   -   |   -   |   -   |   -   |   -   |   -   |   -    |   -   |   -    |
| Mon  1:00-4:00 PM  |   -   | MT205 |   -   |   -   |   -   |   -   |   -   |   -    |   -   |   -    |
| Tue  9:00-12:00 AM |   -   |   -   |   -   |   -   |   -   |   -   |   -   | AI2011 |   -   |   -    |
| Tue  1:00-4:00 PM  |   -   |   -   |   -   |   -   |   -   |   -   | SS118 |   -    |   -   |   -    |
| Wed  9:00-12:00 AM |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -    |   -   | CY2012 |
| Wed  1:00-4:00 PM  |   -   |   -   |   -   |   -   |   -   |   -   |   -   |   -    | SE110 |   -    |
| Thur 9:00-12:00 AM |   -   |   -   |   -   | CS220 |   -   | CS302 |   -   |   -    |   -   |   -    |
| Thur 1:00-4:00 PM  |   -   |   -   | CS307 |   -   |   -   |   -   |   -   |   -    |   -   |   -    |
| Fri  9:00-12:00 AM |   -   | EE227 |   -   |   -   |   -   |   -   |   -   |   -    |   -   |   -    |
| Fri  2:00-5:00 PM  |   -   |   -   |   -   |   -   |   -   |   -   | CS118 |   -    |   -   |   -    |
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TimeTable Generated from Final Population

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Fitness Value for Final Population:  967 (W/ Hard constaints =  100  W/ Soft contraints =  867 )
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Final Fitness Value: Very LOW!