COMP304: Artificial Intelligence: Assignment Two
Due Date: 15 October 2018

Write a program using a Genetic Algorithm to solve the task assignment problem below:

The Task Assignment Problem

In a task assignment problem, each task must be performed by one person. The input to the problem is a table that shows how well each person (A to M in the example below) performs each task (1 to 10 in the example below). The solution to the problem is the person-task assignment that produces the best score.

	1	2	3	4	5	6	7	8	9	10
A	34	31	20	27	24	24	18	33	35	19
B	14	14	22	34	26	19	22	29	22	19
C	22	16	21	27	35	25	30	22	23	23
D	17	21	24	16	31	22	20	27	26	17
E	17	29	22	31	18	19	26	24	25	14
F	26	29	37	34	37	20	21	25	27	27
G	30	28	37	28	29	23	19	33	30	21
H	28	21	30	24	35	20	24	24	32	24
I	19	18	19	28	28	27	26	32	23	22
J	30	22	29	19	30	29	29	21	20	18
K	29	25	35	29	27	18	30	28	19	23
L	15	19	19	33	22	24	25	31	33	21
M	27	32	27	29	29	21	19	25	20	27

Your program should input the task values as shown above from a file. The first two lines of the file will contain the number of persons (i.e. the number of rows) followed by the number of tasks (i.e. the number of columns). Your program should cater for up to 20 persons and up to 20 tasks. Your programs should output the optimal task assignment and the total score.

Specifications

1. Design and implement the program (using a genetic algorithm) as specified above.
2. Sample input is given in a text file (input.txt).
3. Write a report detailing the following:
   (a) Describe a chromosome in the initial population and the population size used.
   (b) Define the fitness function you used.
   (c) Describe the selection method used.
   (d) Describe the mutation operator and the mutation rate used.
   (e) Describe the crossover operator and the crossover rate used.
   (f) Describe the termination criterion.

Notes:

- Use either Java or C++ to implement the program.
- Submit both the source code and you must submit executable programs that run without the IDE being installed on the user's system.
  - Java programs: Submit a jar file or the class files that will run. Ensure that the jar/class files can be run on a machine with only the JDK installed (i.e. without the IDE that you have used to create the program).
  - C++ programs: Ensure that you compile the program to run on machines that do not have C++.
- The interface can be text-based or graphical.
- Programs that do not run will be allocated a mark of zero.

Submission

- The assignment **must** be submitted on or before 15 October 2018.
- You must use the Course website to submit. Click on **Assignments** in the Activities block (top left). Then click on **Assignment Two**. You will be taken to a page which allows you to upload a file. You can re-upload a file but this will overwrite any file that was previously uploaded.
- Please be warned against plagiarism. This is an individual assignment and group work is **not** permitted. The school has access to software to check for plagiarism. Cases of suspected plagiarism will be submitted to the University proctor.