COS314 Assignment 2 documentation

Shaun Naude (u18014080)

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1 Representation used

When the input puzzle is entered into the program it will be stored in a 9x9 array of integers.

2 Initial population generation

- The population is created by copying the original input puzzle and replacing every missing block with a random digit in range [1,9].
- These random digits are added in such a manner that there can be no duplicate numbers in each 3x3 sub-block of the puzzle.By doing this there can only be duplicate elements in either the rows or columns of the puzzle being created.
- The size of the population created is determined by the GA.txt file supplied in the project directory.

3 Fitness evaluation

- The fitness is evaluated by counting the of **non-duplicate** integers in each row and column of the puzzle.
- Each puzzle within the population will have an integer value associated with it that determines that individual puzzle's fitness.
- Fitness evaluation takes place after each crossOver() and mutate() function.

4 Selection Method

4.1 Fitness Proportionate Selection

Once each puzzle has been given a **fitness score** the top 50% of the population will be randomly paired-up for the crossOver process to begin.

5 Genetic Operators

5.1 CrossOver

5.1.1 Child 1

The first child will be a combination **rows** taken from each parent.This CrossOver will take place in such a manner that there will be no duplicate values in each 3x3 sub-block of the puzzle.

5.1.2 Child 2

The second child will be a combination **columns** taken from each parent.This CrossOver will take place in such a manner that there will be no duplicate values in each 3x3 sub-block of the puzzle.

6 Mutation

- The mutation operation will swap two random integers within each 3x3 sub-block. This type of mutation will maintain the *no duplicate status* of each 3x3 sub-block within the puzzle.
- The mutation operation will take place on every child produced by the CrossOver operation.