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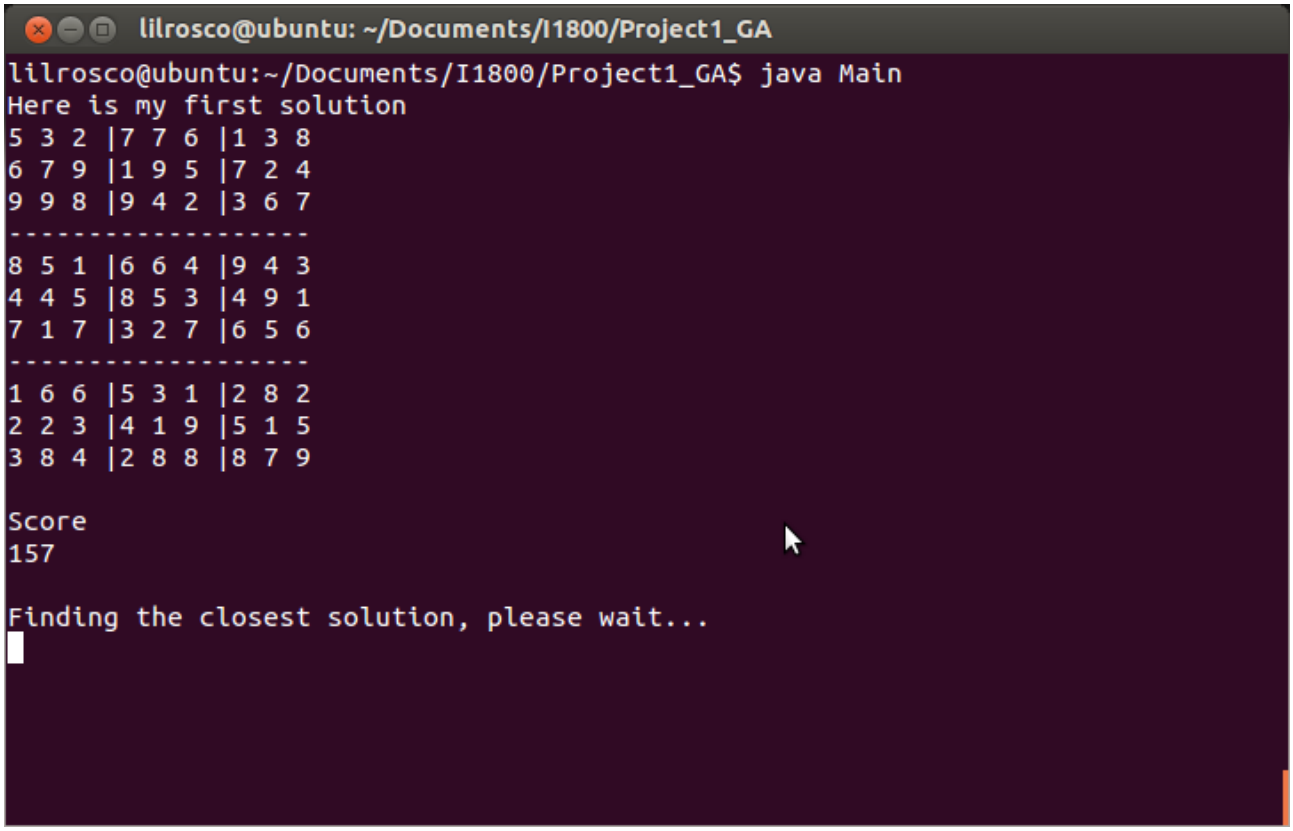
Genetic Algorithm for Sudoku

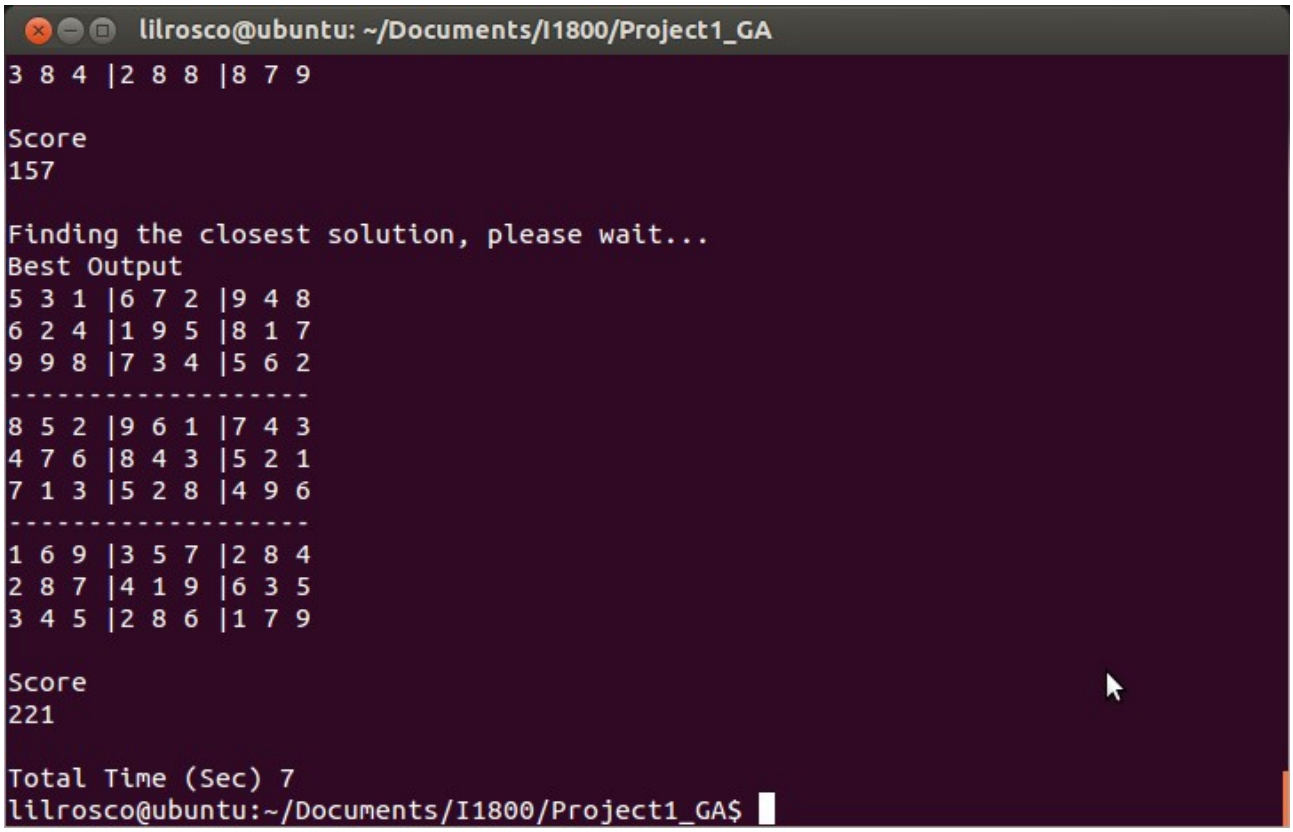
For our implementation of GA for sudoku, we decided to treat a board as a chromosome string. The perfect genetics would be that of a board that has no duplicates in its rows, columns, and sub-squares. The initial population consisted of boards that originally had perfect columns. These perfect columns were generated by observing the remaining valid numbers that could be inserted for the given board in each column. To determine whether a board/string was fit or ideal we opted to calculate the score of each board by rows, columns, squares. For example, if our program noticed that a number in a row was not duplicated then the row score would increase by one. Same treatment was applied for the other two factors of the board. These scores would rather be meaningless if it did not play a crucial role for our selection function.

Our selection function accepted at most the top 100 boards (elitist) to mate and create the next generation. Since each board in the previous generation was scored and sorted accordingly, we felt that if we continued allowing the best to mate then we should keep getting the desired genetics or survival of the fittest. For the crossover of two sudoku boards for their off-springs, a random column index as well as a random row index was selected and everything outside of those indexes were swapped for the children. For our mutation of a board we would swap two numbers in a column. We opted to have every off spring to have a mutation when created with the intention of making each offspring a bit more unique from their parents. After running our program for 30,000 generations with the best fitness of 243, the best fitness we were able to achieve from our strategy was 232. This is most likely due to our selection method ruling out the possible mating of inferior boards with elite boards thus converging the fitness score to the typically score of an elite board. Overall since this algorithm was intended to get the program running with the intent of seeing moderate results we were intrigued. Perhaps if we decided on a better selection method we could have seen results closer to the ideal board.

Screen Shots



Showing one of the sudoku boards from the population and its initial best score.



Showing the best board and its score after 30,000 generations.