Programming Assignment-1

CS F407 Artificial Intelligence

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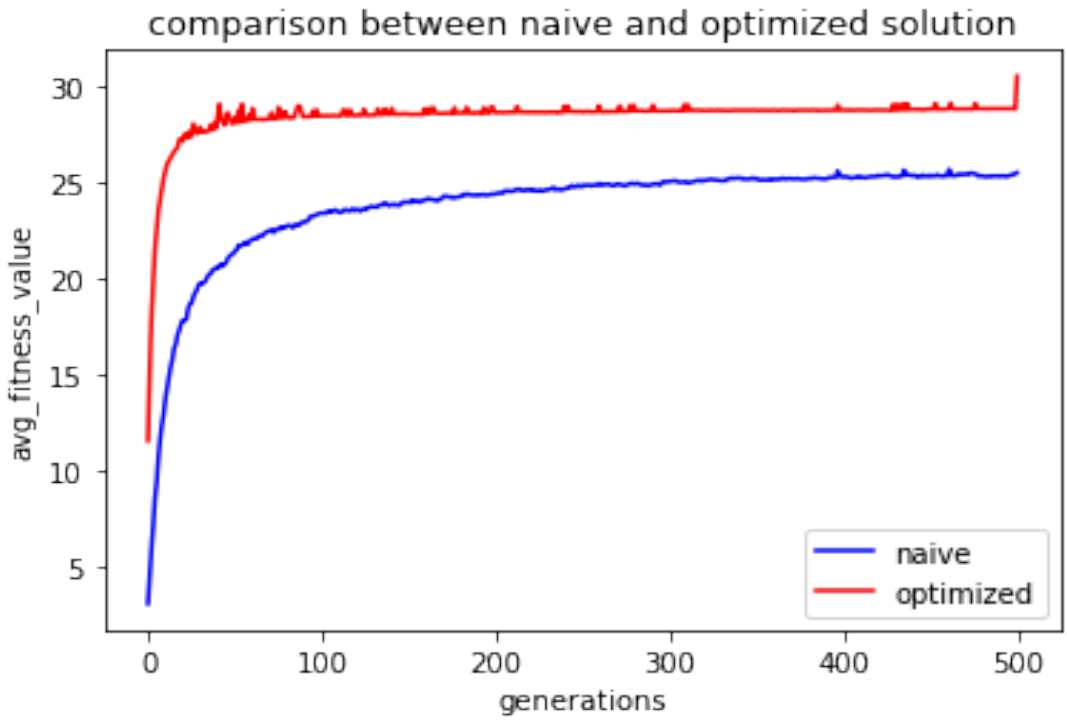
Q1 8 Queens Problem

1. Optimization Methodology
   - The concept used for optimization is similar to restricting the maximum number of consecutive sideways move.
   - Sideways move is defined as same maximum fitness value in the last generation.
   - If the maximum fitness value of a generation is constant for more than x generations than we are forcefully introducing mutation in every member of next generation
2. Optimizations Implemented
   - The population size has been increased from 20 to 70 to get better results in lesser time.
   - In the optimized solution I have limited the generation from having a constant value of maximum fitness found over a certain number of generations by making the probability of mutation to 100%.
   - Moreover in the reproduce function I have made two possible children by selecting a pivot point randomly instead of one and then choosing the one with better fitness.



3. RESULT

- The above graph plots the average maximum fitness per generation for 100 runs of the optimized and naïve genetic algorithm and provides a comparison between the two over 500 generations

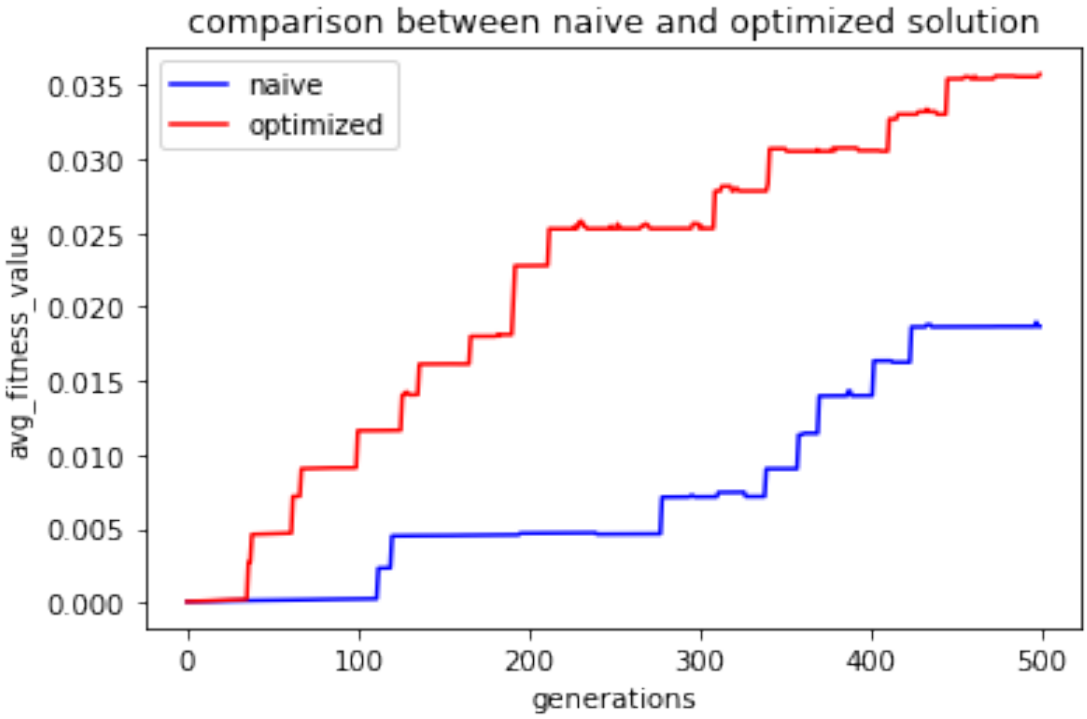
- On average in every Generation the optimized GA produces a better fitness value compared to the naïve GA

Q2. TSP

1. Optimizations Implemented

   - The population size has been increased from 20 to 50 to get better results in lesser time.

   - In the optimized solution I have made an alternate mutation function in which I searched a random city x in such a way that it had no roads to the cities adjacent to it and this city was swapped with the city that had roads to both the adjacent cities in the state and if such a pair is not found than we use the naïve mutate function.



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