Artificial Intelligence (CS F407)

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8-Queen Problem:

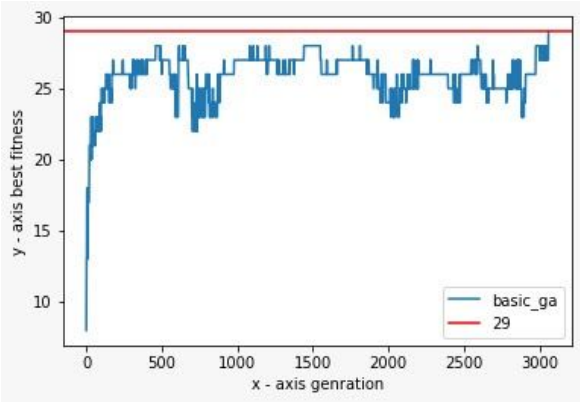

Figure1: Basic GA for 8-Queen problem

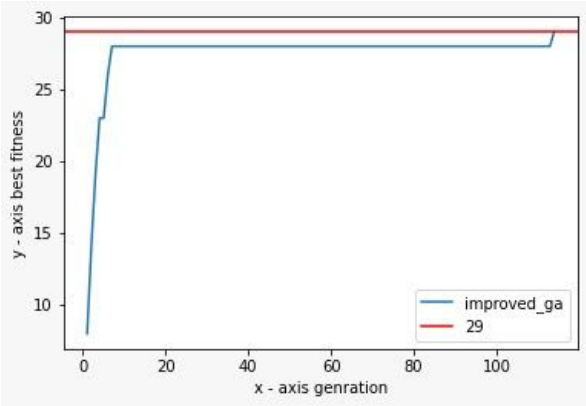

Figure2: Optimized GA for 8-Queen problem

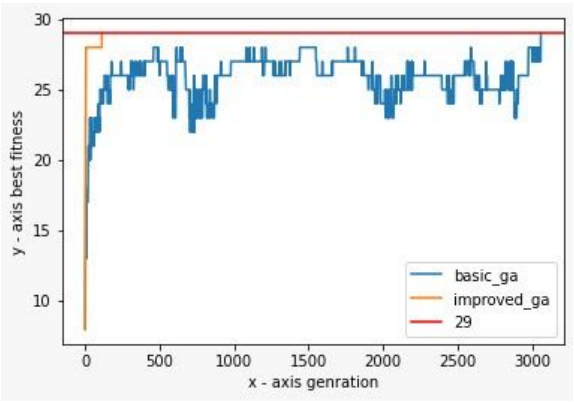

Figure3: Basic GA + Optimized GA in 8-Queen problem

Fitness Function Used -

Fitness function = 1 + number of pairs of queens not in attacking position.

Optimization used in 8 Queen Problem :

1)Mutate function(mutate_8q) -

In mutate we are changing one state to get to a neighbour randomly while in improved GA we are going to a state which is best neighbour and if is the current is best in all neighbour then we will randomly chose any state which was in case of basic GA.

2)Mutate Probability Increase -

Mutate Probability is the probability which is a threshold for mutation step . And when mutation probability is low , the number of children entered in mutation was very low while if more solutions enter the mutation step then we will get more variation rather than just rolling around one state so we will not spend much time on one step we will change it fast.
Mutate Probability from 0.05 to 0.5.

3)Reproduce function(reproduce_8q) -

In basic GA we are choosing the random two parents to reproduce the child from the population while in case of improved GA we are choosing the parents with largest fitness as one parent and randomly the second parent to reproduce the child.

Travelling Salesman Problem (TSP):

Infite is treated as "100" as all others distances are less than 1 and all the distance are computes in 1000KM so all solutions unit is 1000KM

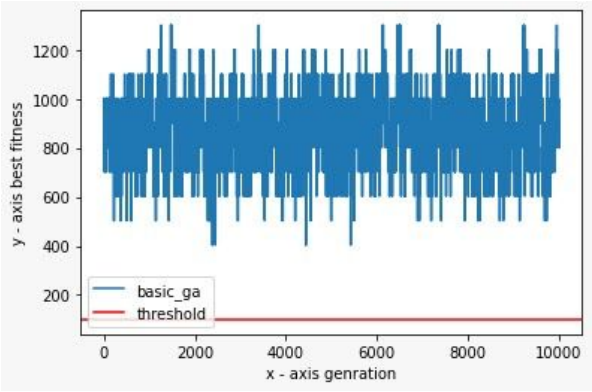

Figure1: Basic GA for TSP problem

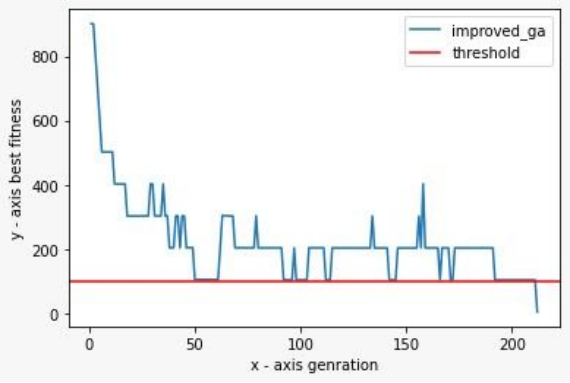

Figure2: OptimizedGA for TSP problem

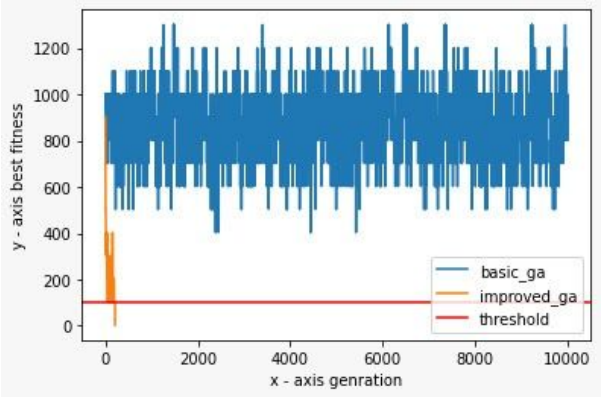

Figure3: Basic GA + Optimized GA in TSP problem

Fitness Function Used -

Fitness function = Total cost of round trip (treating infinite as 100).

Optimization used in TSP Problem :

1)Mutate Probability Increase -

Mutate Probability is the probability which is a threshold for mutation step . And when mutation probability is low , the number of children entered in mutation was very low while if more solutions enter the mutation step then we will get more variation rather than just rolling around one state so we will not spend much time on one step we will change it fast.
Mutate Probability from 0.05 to 0.5.

2)Reproduce function(reproduce_tsp) -

In basic GA we are choosing the random two parents to reproduce the child from the population while in case of improved GA we are choosing the parents with largest fitness as one parent and randomly the second parent to reproduce the child.