Yapay Zeka

Solving Maze With Genetic Algorithms

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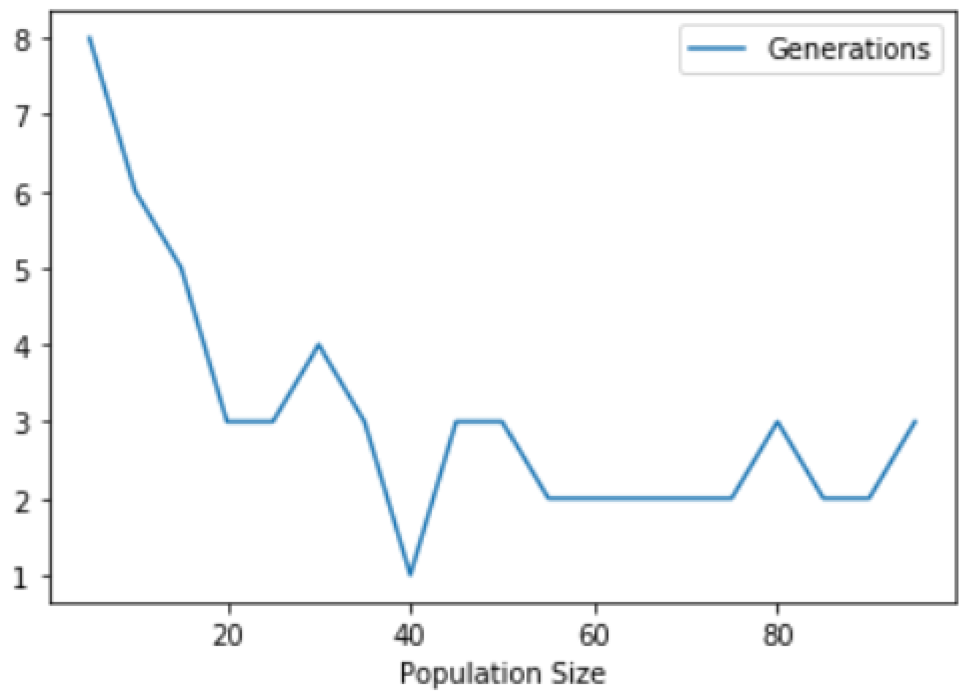
Analysis on Population Size

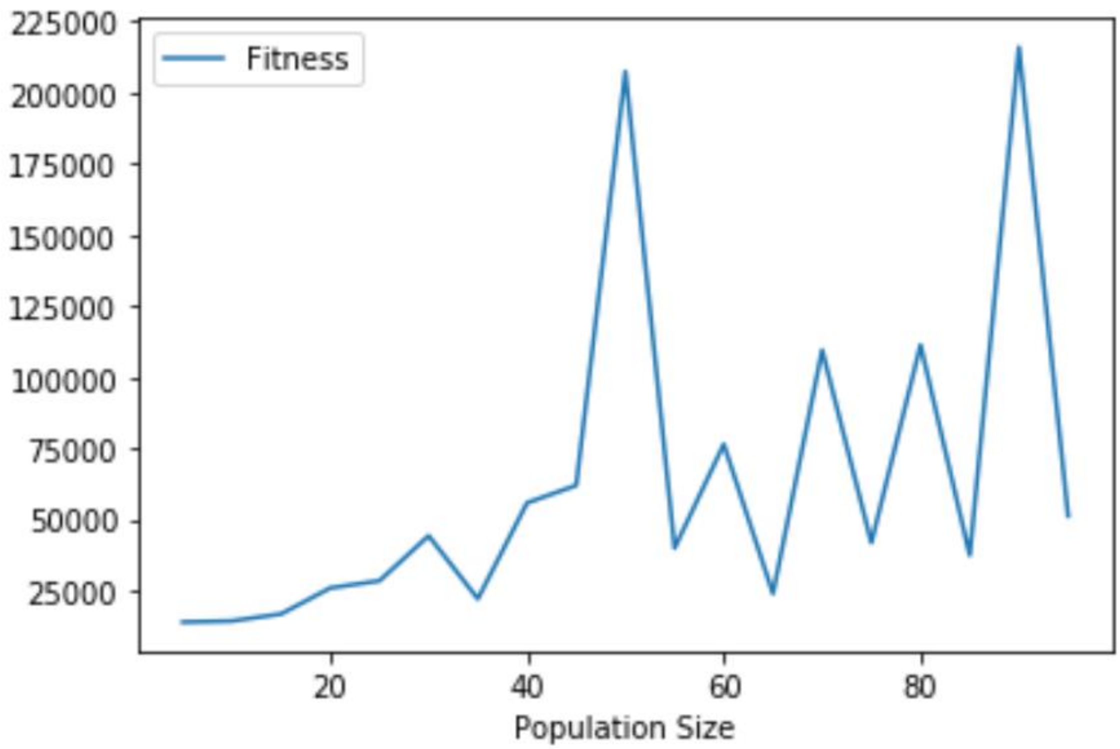
1- Population Size Vs First Generation Reaching to The Goal Position(N=20)



Here we can clearly see that up until some threshold, as the population size increase it takes less generations to reach to the destination.

After the threshold(here 40), we see that increase of population size does not seem to have any bad or good effects on the result.

2- Population Size Vs Closeness to The Goal in The First 10 Generations(N=20)

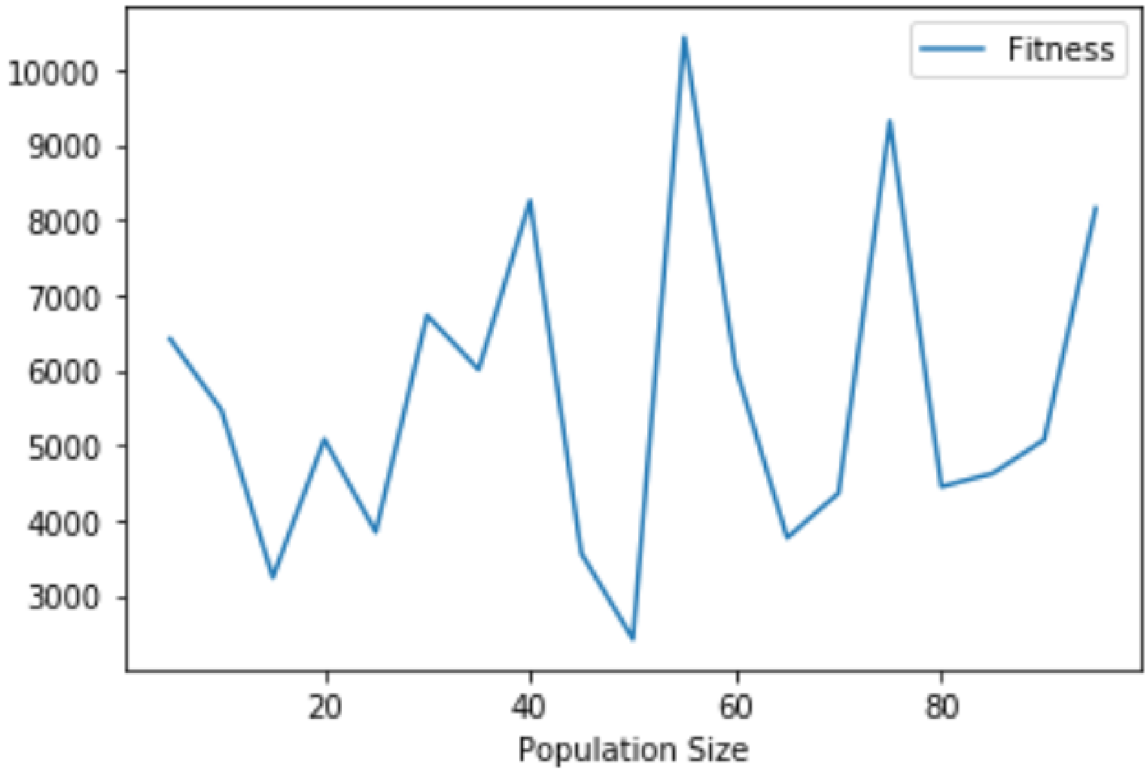


The sudden peaks shows us the fact the we got real close or probably reached to the destination.(Since maze size is low)

Here wee see that, as the size of the population increase, we get closer and closer to the goal position in the first 10 generations.

This shows us the fact that as we generate more and more population per generation, we get better and better results with the cost of higher runtime of course.

3- Population Size Vs Closeness to The Goal in The First 10 Generations(N=100)

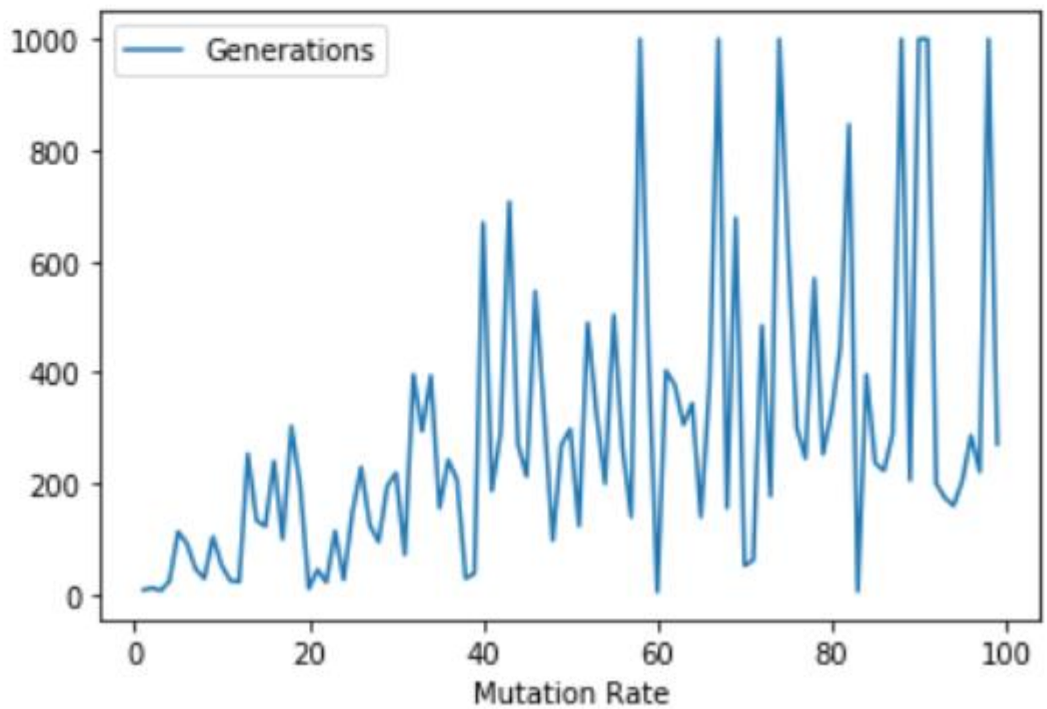


After the last plot on the population size, with this same kind of plot but with larger maze we get somewhat unexpected results.

Here we can not exactly say that as the population size increase we get closer to the destination in the first 10 generation but rather we can say that we have a tendency to more and more closer.

Analysis on Mutation Rate

1- Mutation Rate Vs First Generations That Reaches to Goal Position(N=20)

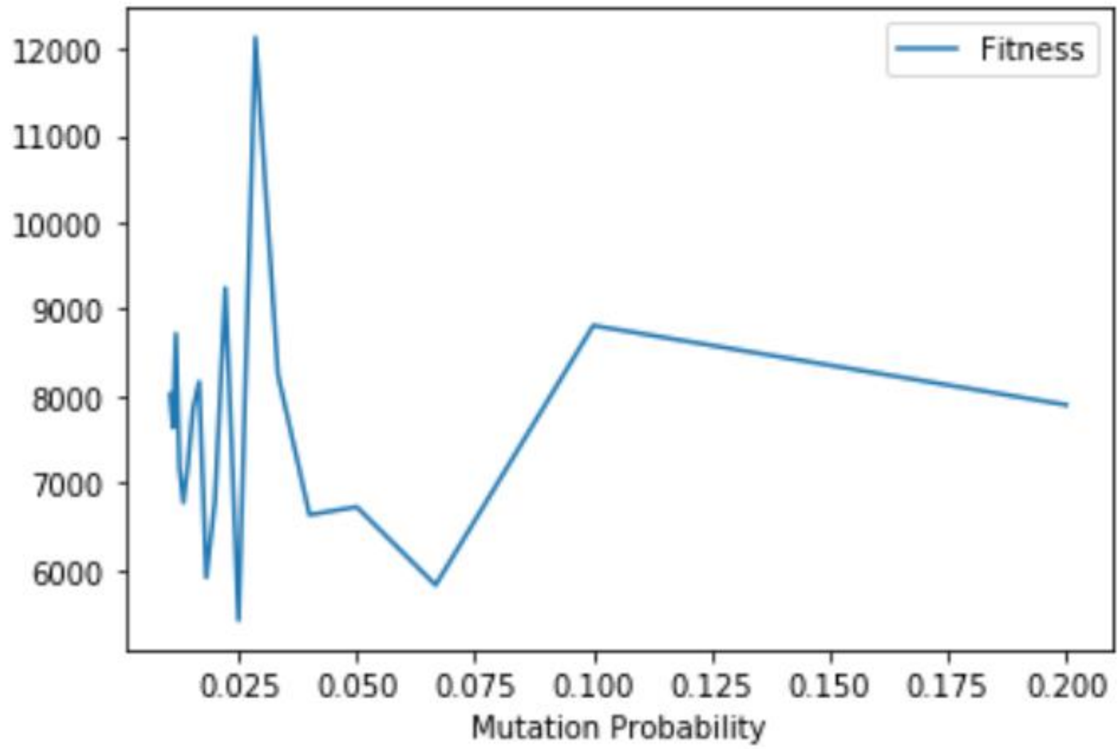


Here the mutation rate goes denominator as 1/mutationRate.

As we can see, as the mutation rate decrease(1/mutation_rate increase), it takes more generations to reach to the goal position.

This shows us the fact that low mutation rates results in bad quality of generations.

2- Mutation Rate Vs Closeness to The Goal in The First 10 Generations(N=100)

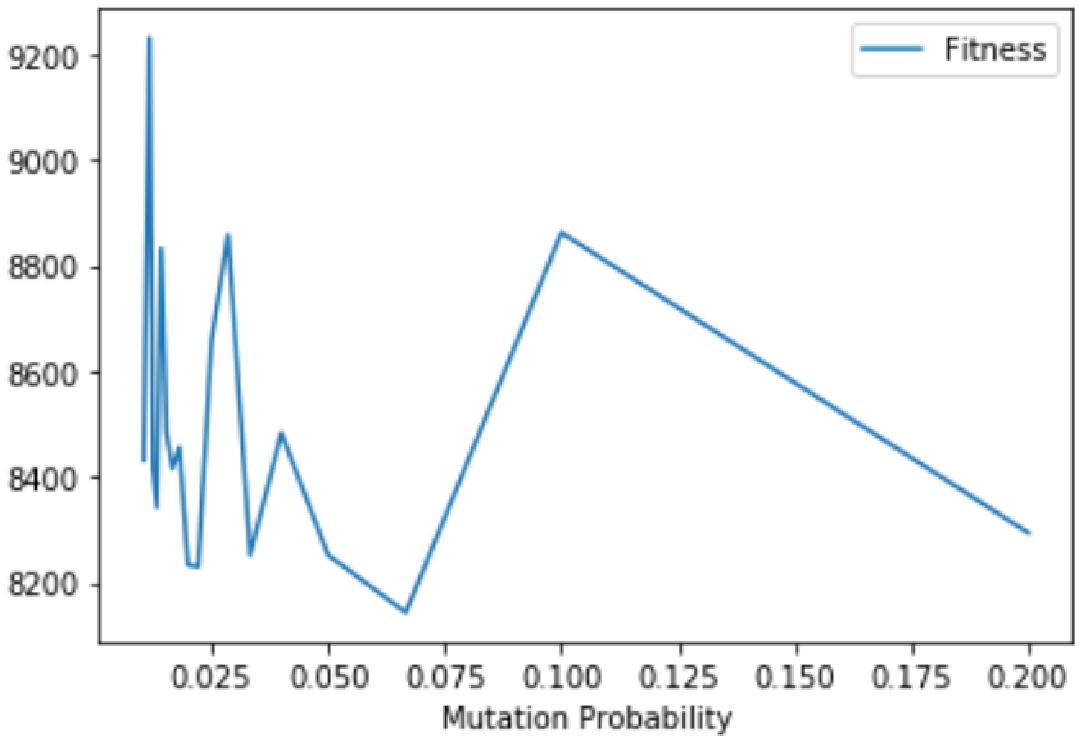


Here we can see that when the mutation probability increase from 0 to 0.025, we see positive sharp changes of the fitness of the generations.

But interestingly, as the mutation rate keep increasing, the quality of first 10 generations get worse.

All in all, we can probably estimate that there exists a lower and upper bounds on the mutation probabilities that gives best results on the populations.

3- Mutation Rate Vs Closeness to The Goal in The First 10 Generations(N=20)



Here again, we see similar results to the last ones.

With this plot, we can say that as the mutation probability increase, closeness to the goal position makes a curve like a sin() function.