Machine learning

Introduction
In this report I will be testing and collecting data when I change the population size in the txt file. I will be seeing how many generations of cars are needed to get around the track depending on the amount of cars that are being spawned.

observation/question
Changing the hyper-parameters of the Car AI program affects how the program runs, what the program runs and what the viewer can see.
How much can the hyperparameters change the program and what are the limits of the hyperparameters?

Research area
In this report I will be testing the impacts that changing the hyperparameters will have on the Ai cars and the track. To do this I will be changing a certain parameter and keeping one the same as a consistent result. In the case of this experiment I will be changing the population and I will be keeping the map the same. I will be testing these changes over as many generations to complete the map.

Hypothesis
I think that increasing the amount of cars will decrease the amount of generations needed because there are more cars for the program to learn and adapt to.

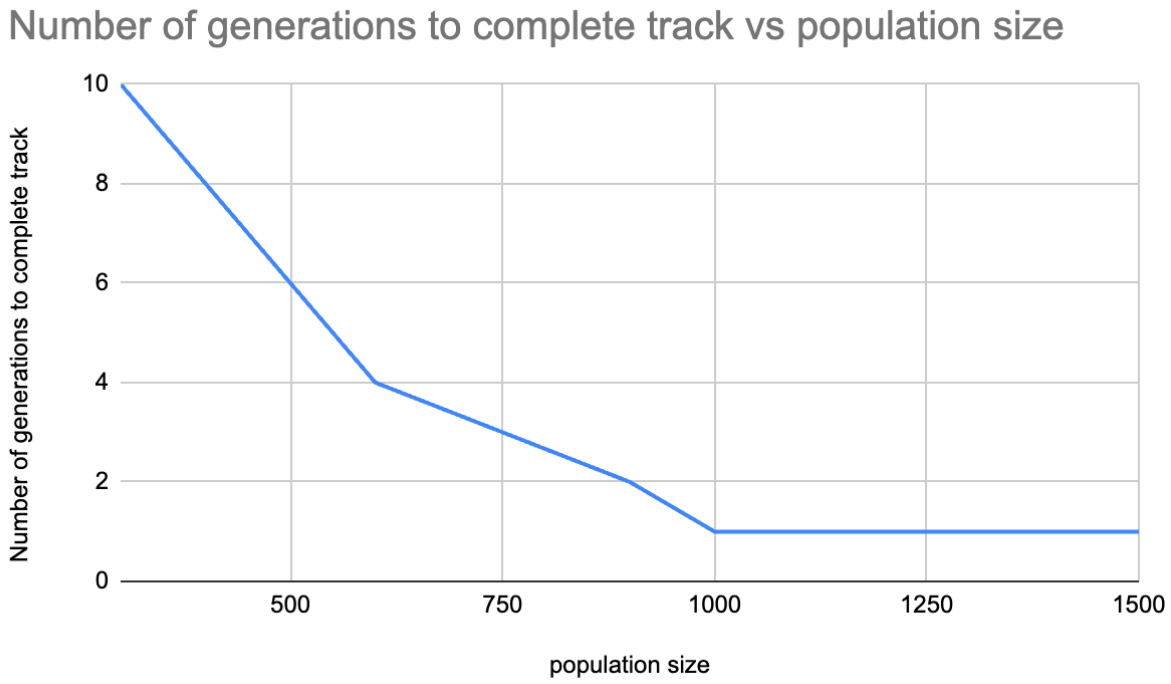
Conducting the experiment
In this experiment I will be changing the population size from the NEAT functions in the txt file I will be recording the results in the tables below. I will be testing how many generations are needed for the car to get around the track.

Experiment 1

In this experiment I will be changing the pop_size and seeing the effect that has on the program	Independent variable	Dependant variable	Controlled variable	Did this change the program?
	Changing the pop_ size	What you observe or measure	The map the car is going around	yes/no
	I changed the pop_size	I observed a change in the amount of cars that were spawning.	I kept the map the same as the other experiments.	Yes

Experiment 1 results

Population size	**Number of generations to complete track**	**Track used during the test**
300	**10**	**2**
400	**8**	**2**
600	**4**	**2**
900	**2**	**2**
1000	**1**	**2**
1200	**1**	**2**
1500	**1**	**2**



Analysing of the data

What I discovered from these experiments where the hyperparameters were changed was that they had a big effect on the program. When changing the population size I found that when I spawned in lots of cars less generations were required for the car to complete the track. I also found that there was a limit to the number of generations needed once I got to spawning 1000 cars. Only 1 generation was needed for the car to complete the track. Any amount of cars over 1000 cars only needed 1 generation.

Conclusion

Overall my hypothesis was correct that “I think that increasing the amount of cars will decrease the amount of generations needed because there are more cars for the program to learn and adapt to.” and these experiments proved that it was true.

What would I do differently next time

Next time to see what the changes are in the program I would test the program with different maps to see what effect the map has on the amount of generations needed. I think that using a harder map would require more generations of the cars to complete the map.

References

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-----> *NEAT overview* (19 September 2015), NEAT overview, accessed 12 September 2023.

-----> *What are neural networks* (8 February 2019), Neural networks, accessed 12 September 2023.

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