# Project 2 – Genetic Search Write Up

* **Your initialization and repopulation strategy**

Given the nature of the problem, and the performance of the algorithm, I chose a simple random initialization strategy. Some thought was put towards using a depth first search algorithm to generate the initial path and build variants from there, but ultimately, it was not deemed necessary.

For repopulation, the top 2.5% of the population was reserved, and parents were then randomly selected from the previous generation to produce new children.

* **Your selection strategy**

The selection strategy selects two unique parents at random from the top 50% of the population. This strategy can be diverted with an optional parameter and a purely random selection strategy can be executed.

* **Your crossover strategy**

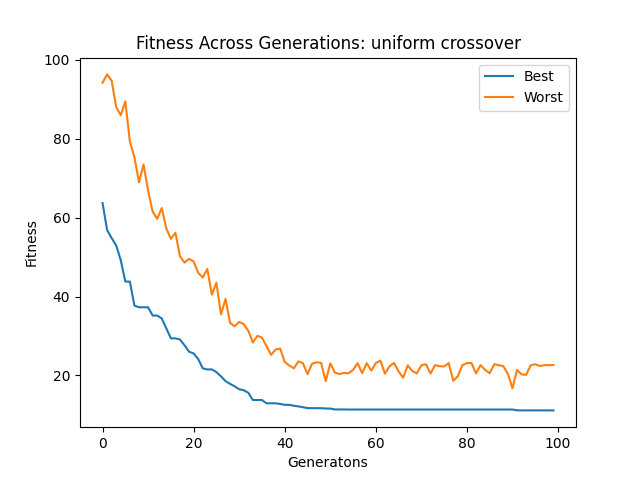
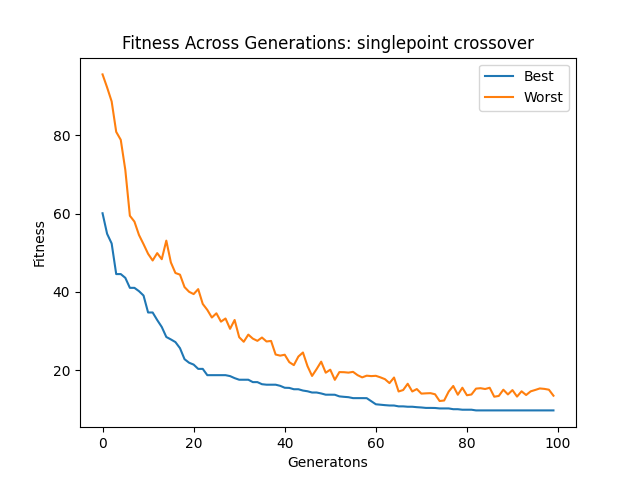
In an effort to evaluate the effectiveness of the algorithm, a total of three selection strategies were performed and documented. Images of each can be found at the end of this document. It is clear from the graphs of each strategy, the uniform crossover and multipoint strategies outperformed single point by a substantial margin. Ultimately however, all approaches resulted in a similar curve, converged at around the same number of generations, and reached a similar best fitness score. Interestingly, although single point resulted in the worst best case, it consistently had the best worst case fitness score, indicating that it might in fact be a superior fit for situations in which a high performance floor is more important than a high performance ceiling.

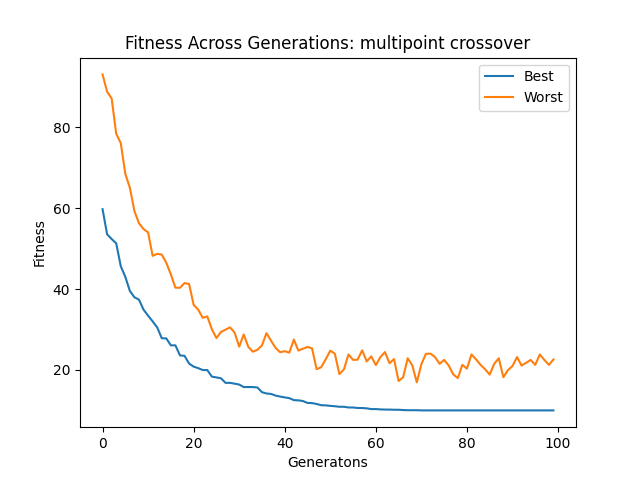
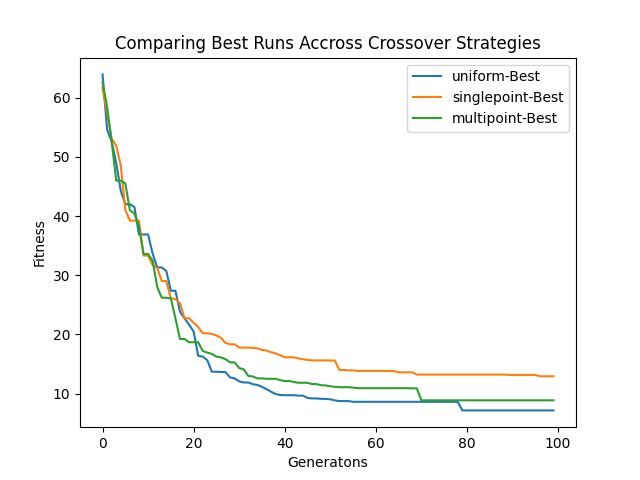
* **Your mutation strategy**

In accordance with the specifications, a random point swap mutation occurs at the mutation rate when producing new children.

All code and generated figures are available [here](https://github.com/dkStephanos/AI_Projects/tree/main/Project%202).

# Figures



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