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GA 1 Summary

Mutation Rate

When mutation rates are low, the population tends to converge closer to the solution but still have room to explore and change. When they are too high, they seem to slow progress and converging toward the solution slows down. When in the middle it seems to be a balance between the two where it doesn’t converge quickly but it explores the population enough to try different paths.

Crossover Rate

Slower crossover rates tend to slow the population progress down significantly since these parents are identical to their children. In contrast, high populations tend to reach convergence quickly if they have a good offspring but its leaving chance for error. If there is a bad gene that starts to spread, you could see progress regress back to previous generations for example: A population with a Max of 19 fitness, but then the next 3 generations may go 19,18,18 thus making the crossover inefficient. A moderate crossover rate is best for this because it will eliminate the risk of having regression but without reducing the efficiency of the algorithm.

Selection Method

The roulette wheel was easier to implement, and it keeps the population diverse, though this diversity typically led to more generations being generated compared to the tournament style. The tournament style selection would reduce the diversity of the population if two similar parents were selected though since they were randomly selected. Since at the beginning of populations the average populations tend to be around 10 fitness, if two around 10 are selected at the beginning it could lead to longer selection processes if mutation rates and crossover rates are not at efficient numbers.

Parameters

The parameters that yielded the best results were picking a tournament style selection, a crossover rate of around 40-60% inclusive and a mutation rate of 0.02-0.00 inclusive. The parameters would yield generations that converged in than 10 calculations with my best population being 9.