COMP 5560 Fall 2022 Assignment 2a

Will Humphlett (wah0028)

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1. Random Search

In this assignment, a random search through the space of state evaluation functions is performed in order to create a Pac-Man controller. The experiment is comprised of 30 runs of 2000 evaluations, where for each the best fitness encountered is recorded. The run with the global best fitness is depicted (Figure 1) by showing the plot of evaluations v. fitness. Overall, the highest fitness recorded was 175.

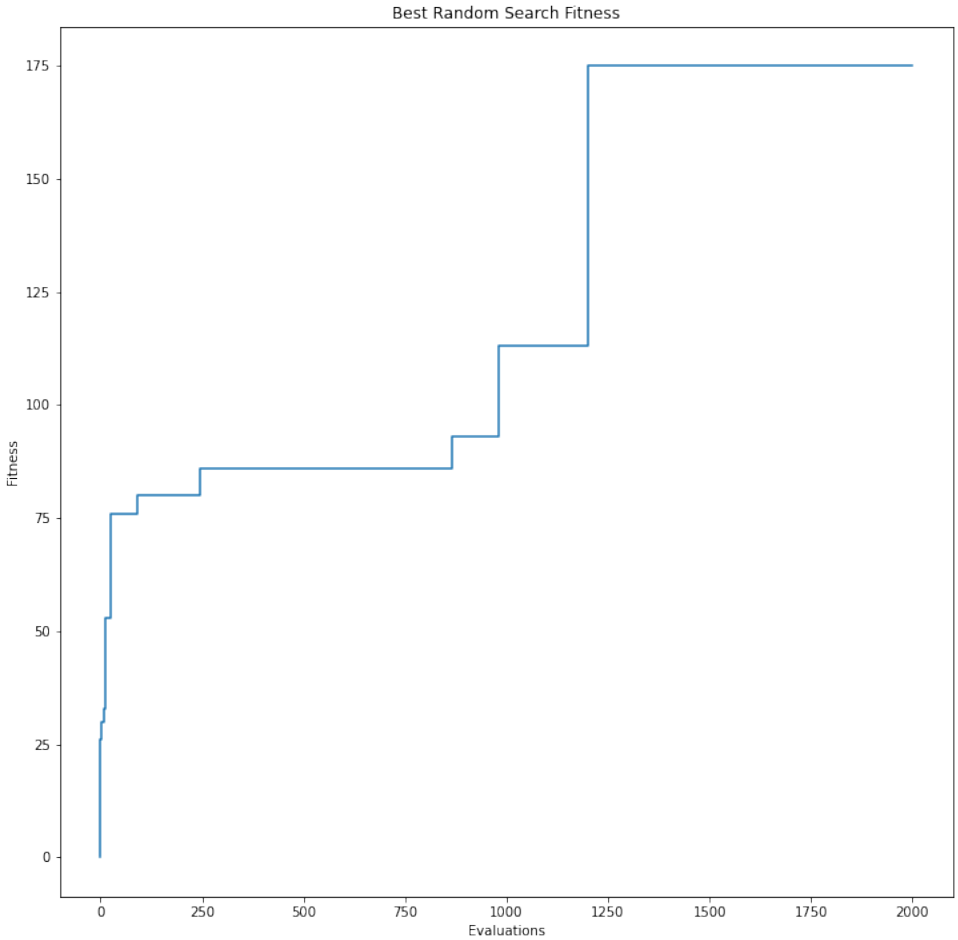

Figure 1: Stairstep Plot of the Best Run

Summary statistics of all 30 runs (recorded in data/green2a/results.txt) are given in the table below.

random	
Mean	119
Standard Error	3.77742
Median	113
Mode	113
Standard Deviation	20.68983
Sample Variance	428.06897
Minimum	93
Maximum	175
Count	30

Table 1: Random Search Summary Stats

2. Most Fit Solution

The state evaluation function with the best fitness (parse tree in solutions/green2a.txt) was found to have a fitness of 175. As a convenience, below is the function written mathematically.

$$V(s') = \frac{G - P}{P * F} * (RAND(G, P) + (F - F)) \tag{1}$$

Watching the playback of this solution (game log recorded in worldFiles/green2a.txt) shows a Pac-Man controller that paths to the pills reasonably well. For the first half of the game, it does this while occasionally getting stuck in non-movement cycles. However, for the bulk of the middle portion, the controller stays nearly motionless and would've died if not for luck on the part of the random ghost controllers. After this, the controller again paths to the rest of the pills and finishes the game with 779 steps remaining.