Genetic Programming in Swift for Human-competitive Evolution

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Objectives

1. Implement a genetic programming library in the Swift programming language.
2. Demonstrate the usage of the library by applying it to sample problems.

Genetic Algorithms

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Swift

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Architecture

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Properties

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Self-driving Car

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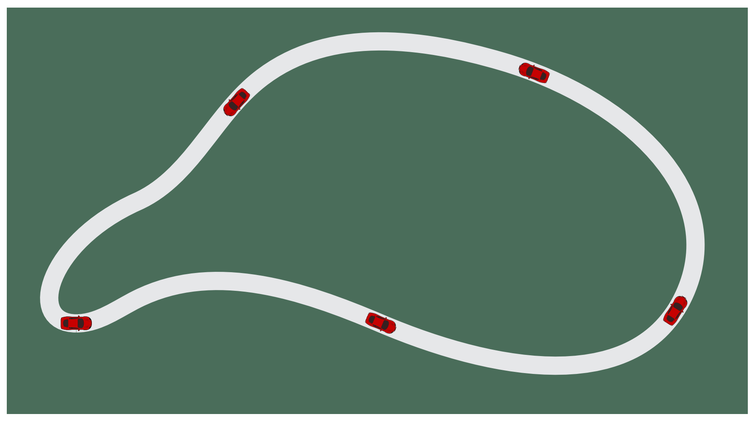
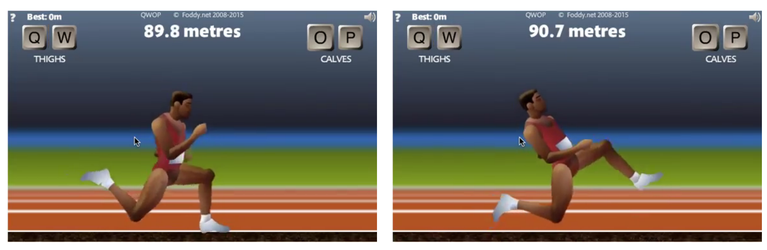


QWOP Player

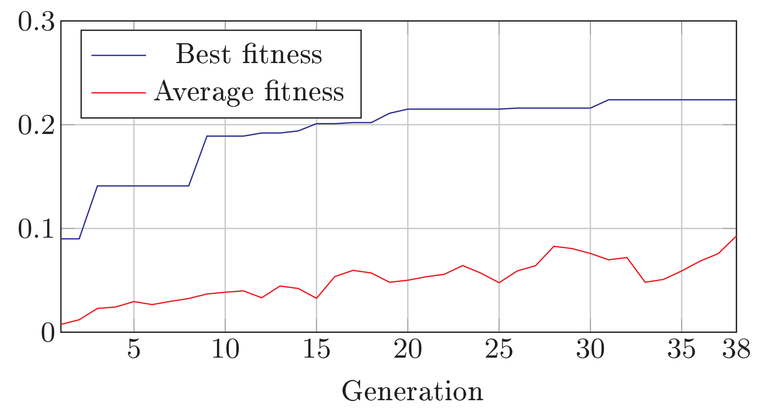
QWOP is a popular online game, in which the player drives an athlete to finish a 100-meter sprint race as fast as possible. QWOP's difficulty is caused by its control scheme, which only allows the player to move the athlete by contracting individual muscle groups within his body. The challenge of the game is in that sense comparable to the problem of evolving bipedal gaits in physical robots.



The presented library was used to evolve an artificial QWOP player and partially replicate human-competitive results achieved by **TODO**. In every generation, 80 game strategies were generated and encoded as simple programs (genotype strings), then evaluated by the fitness function

$$f(d_1, d_2, \ldots, d_n) = \frac{1}{100n} \sum_{i=1}^{n} d_i$$

where $d_1, d_2, \ldots, d_n$ are the distances achieved in n trial 30-second runs. The best strategy after 38 generations was able to complete the race in approximately 152 seconds.



Conclusions

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References

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