
sdmay18-04: Physical Character Animation using Machine Learning

Spring Report 4

February 24 - March 9

Team Members

Rob Quinn — *Project lead, Sim lead programmer, client communications*

Joe Sogard — *Web lead, Backend programmer*

Joe Kuczek — *Full stack web, SCRUM master*

Luke Oetken — *Simulation programmer, Machine Learning, Status reporter*

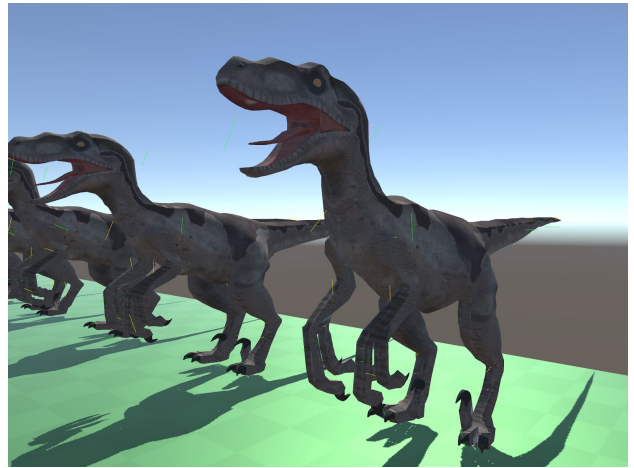
Andrew McKeighan — *Simulation programmer*

Kenneth Black — *Simulation programmer, Machine Learning*

Summary of Progress this Report

This week our team finished designing the new raptor character model to be used in the simulation, and began testing it. The genetic algorithm appears to work well so far on this model, although fitness function tweaks are necessary to ensure the raptors move in a natural looking way.

We also added the ability to spawn multiple instances of characters with the same genome, and take the average score of these characters in the evaluation phase as the score for the genome. This helps smooth out physics inconsistencies that occur from floating point differences on the plane. With this feature in addition to the best k and breeding features from last report period, as well as enhanced fitness functions, we are finding in testing that the models are learning significantly faster than before. Focusing fitness functions on realistic movement is now our priority in order to obtain the best looking character animations.



We continued to enhance the website for optimal ease of use and aesthetics. Testing of both the simulation and the website shows they are in a good place to work on integrating the real simulation data in the database.

Pending Issues

Currently our simulation is designed to primarily reward characters for walking the farthest, and this can cause characters to do very well while moving in a strange and unnatural way. As our project is now focused on creating realistic animation for video games, we need to modify our fitness functions to better train characters to move in ways that look natural.

Plans for Upcoming Reporting Period

For the next report period we plan to work on adding the functionality for the simulation to automatically send data to the website database, and have the website correctly display that data in an understandable way. We also plan to focus on making our fitness functions reward more realistic movement for all of our current animal models. We will continue to consider what additional animal models we would like to add to the simulation, and research how we will convert the simulation models to game animations.

Individual Contributions

Team Member	Contribution	Bi-Weekly Hours	Total Hours
Rob Quinn	Automatic armature generation, raptor model fully rigged, works, and is being tested.	6	58
Joe Sogard	Created more thorough automated testing for php scripts. Researched possibilities of regularly executed tests with notifications for issues.	7	58
Joe Kuczek	Updated website to show all trials by animal, added hover-labeling to specific points on graph. Researched methods for creating synthetic data.	7	49
Luke Oetken	Added averaging for multiple instances of each genome. Integrated fitness function evaluation with breeding. Worked on testing genetic crossover features.	6	62
Andrew McKeighan	Genetic Alg Locomotion Edits to work better with fitness function evaluation. Fixed merge conflicts.	6	46
Kenneth Black	Added limits to muscle values. Researched better mutations for our algorithms.	6	47