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Artificial Life

Professor Kriegman

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Lab 3

Objective:

The objective for each creature in my simulation was the same as the standard diffmpm: move to the right side of the screen fast.

Optimization Method:

I used the evolutionary optimization method. My aim was to do the gradient-based training on each individual as the program already did, then after completing that for each member in the population, the top 50% would move to the next generation and create mutated individuals to fill the remaining population.

Results:

The progression of the creatures is seen in the video, though it is not a very successful evolution. A clip of the CSV file that the program writes all the data to is here:

```
,-0.4217447340488434
5,-0.3804973065853119
,-0.37187811732292175
5,-0.10943111032247543
94,-0.5174955725669861
,-0.18275535106658936
```

The best fitness is approximately -0.52, however none of the creatures moved across the screen, rather would achieve better results by falling further.

Challenges:

This one was a nightmare for me. First, I did not like my results from Lab 2 so I redid that, but even then the options to evolve on were limited and did not result in anything interesting. When trying to

do the evolution, I ran into resource allocation issues, CUDA issues, and probably issues I no longer even remember. I also struggled with attempting to do gradient descent before deciding I do not know enough about taichi to be successful with that.

Future Work:

There are still frequent issues where the fitness is not properly calculated or runs into some error and scraps that individual from the population that need to be fixed.

Additionally, I am unable to run the code autonomously because I had issues trying to remove the visualization and plotting, so I must close each plot for the individuals that visualize for the code to be able to move on. This prevents me from running very long simulations.

Lastly, doing better tracking of data for plotting purposes and confidence in the algorithm will help moving forward.