

Evolution Simulator

Eric Turner
Period 3

October 31, 2006

Abstract

My area of interest is in artificial life, specifically artificial evolution.

1 Purpose and Scope

The purpose of this project is to create an AGENT-based model that simulates the evolution of different organisms within an environment. These organisms will be a basic simulation of real-world organisms, with the need for food, the ability to breed and die, and so on. Their function and lifespan will be based on dozens of genetic characteristics, such as metabolism, eyesight, etc., and these characteristics will be passed on to offspring. There will be a genetic variability that will allow the organism species to evolve, or devolve. The hope is a demonstration of natural selection, and after several generations the collective gene will be more advanced than the original. To give an incentive to evolve, there will be dangers in the environment, such as predator-prey relationship between different species, where both will evolve.

2 Background

Several MASON programs that have resemblance to the idea of social modeling have been looked into, including sugarscape, Mr. Schelling's Neighborhood, etc.

3 Procedure and Methodology

Since I already have a basic program with the final user-interface, the rest of the time will be spent expanding genetic characteristics and artificial intelligence of the organisms, in order to better simulate real-world situations. Once there is an acceptable organism character, then traits and environments will be altered to experiment with an equilibrium scenario, where the predator/prey relationship will have a negative feed-back loop.

4 Testing and Analysis

For debugging, I plan to include debugging output in the simulator itself. For developing an equilibrium, I plan to create graphs of species population, as well as average genetic characteristics and aspects of the environment, in order to alter methodology to stabilize progress, and to compare the output to real-world situations.

5 Expected Results

I expect to see consistent results between different species as those found in real-life situations. I also expect to see different species of Organisms to have clear evolutionary trends in order to improve their situation. For unchecked populations within a bounded environment, the population curve should follow an exponential trend initially, but then flow into an equilibrium state.