Study of the Evolution of Organism Combination 2006-2007

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Abstract

Simple single celled organisms face evolutionary pressures in a similar manner to multi-cellular organisms. In order for multi-cellular life to evolve the combination of cells to form a multi-cellular organisms must be advantagous to the individual cells. The objective of this study is to create a simple fluid environment and populate it with rudamentary predator and photosynthetic organisms.
Keywords: Multiagent, Simulated Evolution

1 Introduction

Algae is one of the simplest multicellular life forms that exists in nature. The photosynthetic agents in this simulation are designed to be similar to a single independant Algae cell and will hopefully evolve into a basic Algae like grouping.

2 Background

One of the most controversial and most studied areas of science to day is evolution. One side is attempting to disprove it and the other side seeks

for it to be recognized as the well verified theory that it is. One of the ways to gather evidence in this debate is through the use of simulations like this one. I am seeking to model the evolution of single cell organisms into basic multicellular ones with a single cell type and a self maintaining and regenerating structure.

3 Defining an Organism Abstractly

The abstract definition of an organism is simply a numerical summary through variables and equations of the characteristics of that organism. For example the color of an organism is modeled through an equation representing the frequencies of light that it reflects and the amounts of these reflections. There are a large number of other variables that represent things such as organelles in a cell which themselves may be bacteria that entered the cell and then mutated. The difficult part of this is determining the correct level of detail to attempt to represent that strikes a balance between simplicity and accuracy.

3.1 Defining the World Abstractly

The world that the creatures inhabit must be very simple out of nesessity because it is the simgle most resource intensive object. The world is defined by the variables shown below.

```
World::World(int sx, int sy, int sz, int l, bool b, int il, int ip, int miC, int m
{
int SizeX = sx;
int SizeY = sy;
int SizeZ = sz;
int lignt = l;
bool loop = b;
int initPhoto = il;
int initPred = ip;
int minCurrentSpeed = miC;
int maxCurrentSpeed = maC;
double opacity = opc;
```

```
int[][][] environment = int[SizeX][SizeY][SizeY];
...
```

The SizeX, SizeY, and SizeZ variables define the size of the environment. The light variable defines the base light levels and the opacity defines how much of this light is lost with each level. The Current speed variables define the variations in the water current speeds and the init**** vaiables define the initial populations of creatures.

4 Results and Discussion

So far there isn't any meaningfull output since I will need to write a short program to sift through the outputs and graph them or otherwise display them.

Bibs attached