Simulating a Multiple-Predator Multiple-Prey System with Agent-Based Modeling Computer Systems Lab 2009-2010

Neelesh Shrivastava

October 29, 2009

1 Abstract

This project aims to use an agent-based system to model a multiple-predator multiple-prey system, and then find an equation to asceratin the number of predatorsand prey at any point in time.

2 Introduction/Goal

Problem Statement and Purpose The purpose for this project is to use the agent-based system to find an equation to calculate the population of all the different species at any point in time, in a manner similar to the Lotka-Volterra equations, which are for a simpler single-predator single-prey system.

3 Background

Understanding of different ways to model population and a cursory understanding of the Lotka-Volterra equations is essential to understand population modeling in general The Lotka-Volterra equations are a set of differential equations governing how population behaves when the two interact with

each other. It assumes simple exponential growth/decay for each group, the predator and the prey, and adds a factor to decrease, for the prey, or increase, for the predator, the populations based on interactions between the two populations.

4 Procedure

Mainly Python will be used to implement the simulation and collect the data using TKinter for a graphical model. After this is complete, equation modeling will begin. This project has 4,hopefully becoming n in the future, different species that interact with each other. Currently, the ability for them to eat each other is glitched.

5 Results

This project should get a equation at least as complicated as the Lotka-Volterra equations. These can be used to easily calculate the numbers of a set of populations at any point in time, given starting values and a few parameters regarding interaction between the species, e.g. who eats who and how often this occurs.