Simulating a Multiple-Predator Multiple-Prey System with Agent-Based Modeling
TJHSST Senior Research Project Proposal
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1 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.

2 Background

Understanding of different ways to model population and a cursory understanding of the Lotka-Volterra equations existed prior to the beginning of the project. Projects involving trying to study population models, especially those involving multiple-predators and multiple-prey, were examined.

3 Procedure

Mainly Python will be used to implement the simulation and collect the data. Then, equation modeling will begin.

4 Scope

This project will have 4 different species that will interact by eating each other. This data will be tabulated into a text file which can then be analyzed to find the equation for growth. This can later be generalized for more species.

5 Expected Results

This project should get a equation at least approximately 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.