

# Simulating a Multiple-Predator Multiple-Prey System with Agent-based Modeling

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## Abstract

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

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## 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.

## 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.

## Results

This project should get an 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.

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