User Manual

Predator and Prey Simulation
Brooks Burt, Connor Vucovich, Liam Stott

Introduction:

This program is a simulation for the populations of animals, one being a predator and one being the prey, all of which are within a confined environment. The prey can eat food, and will reproduce and create another prey once the animal has eaten. Likewise, the predator is very similar except it eats the prey and ignores the food, and will reproduce and create a new predator once it has eaten. The program has a user-friendly interface that allows the user to set the amount of predators and prey at the beginning of the simulation and then press start to see the visual representation of the interactions between these animals play out on the GUI.

This program is meant to be used as a simulation that a person could use to study the different populations of animals and food as well as the interactions between the animals. The simulation has potential in studying the balances within an ecosystem as well as how to manage the different sizes of populations in order to maintain the greatest longevity in the populations of the animals.

A general person would be interested in this not only for the visual aspect that allows the user to see the actual interactions between the animals, in which they will see how the prey and food disappear once they are eaten. Anyone would also be interested in the scientific aspect of the simulation and how fragile the balance of populations is between the predator and prey. When someone runs the simulation, they will quickly realize that they have to be careful about the initial numbers of populations in order for the populations not to become out of control, and the program soon becomes like a game where you run it over and over again in order to see the outcomes as well as get the results you desire from the simulation.

Background and Motivation:

When doing research for a final project, our team decided that a simulation of some sort was really interesting and we wanted to explore the possibilities of creating one of our own. The complexity and intricacy of the natural world fascinated us, but we also realized that the real world is so vast and hard to keep track of, that a simplified version of the simulation of

interactions between different types of animals and their food sources would be a valuable tool in order for a person to better understand the different dynamics in play within the natural world.

When we were looking at if anything had been done like this before, we saw a variety of different examples that we could take inspiration from. There were population simulations that were more concerned with the evolution of the species and thus the main concept of the simulation was the reproduction of the animal. We chose to go a different route and instead of looking at the evolution of the animals, we would focus our simulation on the number of animals within the population,

When creating user stories, we had to create stories based off of what we wanted the ultimate functionality of our program to be. Our first user story is of a University Professor that wants to use the visual aspect of our program to demonstrate to her students the effects of natural selection on the population of an animal. Thus having a visual interface where users can see the interactions between animals is important for our simulation. Our second user story is about an average person who is just scrolling through the internet for simulations and wants easy and interesting programs to run. This is why having an interface that was simple and easy to use for anyone was important for our project. Our next user story is from a graphical designer who is looking for simulations that are visually appealing so that she can use it as inspiration for her own work. This is why we have to create a simulation with graphics that are accurate so that people with experience in graphical design would be impressed with the end result. Our last user story is about a Biologist who wants to be able to use our simulation to simulate the interactions between species over a long period of time, in a very short timespan. He also wants to be able to manipulate various factors about the environment of the simulation. This is why we had to add in the features that allow the user to set the population of both the predator and prey at the very beginning of the simulation and thus someone like a biologist would be able to study these effects.
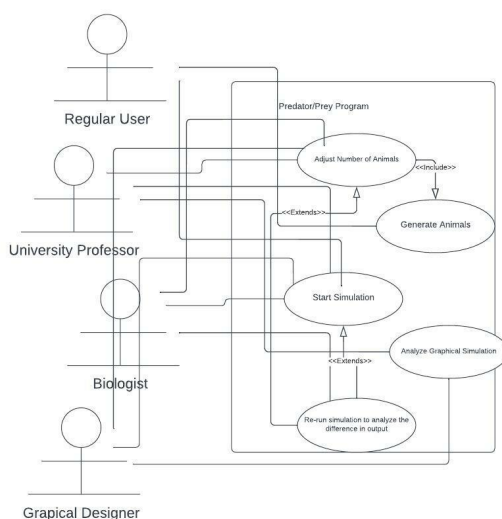
Instructions:

When you first open the program, there are various slider bars that the user will see on the GUI. The one slider bar is dedicated to adjusting the number of prey that the simulation starts with. The other slider bar is dedicated to initializing the number of predators that will be present in the simulation. Once the user has decided how many predators and how much prey will be created, there is a "Generate" button that will then generate those amount of animals and store them in the backend of the program. Once the user then clicks on "Start", the user will see the visual interaction of the animals on the right side of the program, with prey being represented as smaller black dots, the predators as slightly larger red dots, and the food as tiny green blocks. Once the simulation is complete, the graphics on the right side will stop and the user can click the close window button in order to permanently end the program.
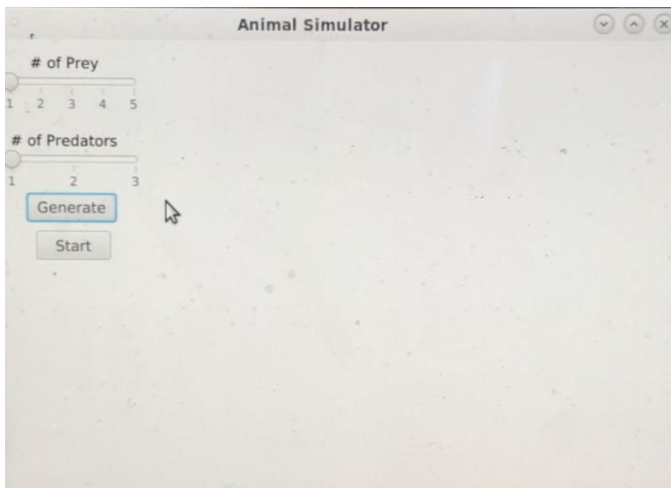

Figure 2: The GUI of the simulation before it has started and while the user is still making their selections
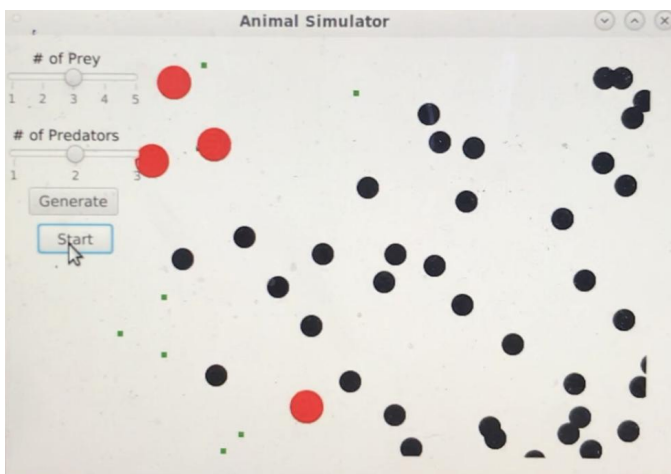

Figure 3: The GUI of the simulation once the selections have been made and the user has pressed "Start"