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CISC 1600

Solar System Colonization Simulation

**Description**

My program simulates space colonization of the solar system between two species—humans and aliens. These species are able to settle in planets and expand their populations. The ultimate goal for each species is to become dominant. Eventually, one species will populate vastly greater than the other, and eliminate the other species. Under the “Controls” title, there are three buttons that allow users to set up the simulation, start it, and to clear it. Under the “Variables” title, there are factors that can be modified to influence the outcome of the model. To the right, there are monitors and a graph displaying human and alien populations.

**Environment**

There are 8 planets and 1 dwarf planet that each species can settle on: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Neptune, and Pluto. The sizes of each planet and their circular orbits that mimic their path around the sun are scaled down from their real-life measurements. It is possible to modify which planet aliens and humans can originate from by choosing a planet from the dropdown variables. It is also possible to speed up or slow down the simulation by using the time-scale slider variable.

**Agents & Interactivity**

The planets hold settlement variables for both humans and aliens. If a species reaches 95% in settlements in that specific planet, a spaceship of that species will be hatched. The spaceship will subtract and carry a certain percentage of the settlements of that species from that planet and bring it to another planet. What planet the spaceship will go to is determined through an order of priorities. The first priority is to find the closest planet with a majority of their own species and the least of the other species. The second is to go to any planet with their own species, and the third is to go to any planet. Once a spaceship reaches its target planet, it will populate it.

**Population Control**

Each population in a planet follows the continuous growth/decay formula where A is the expected population, P is the initial population, *e* is Euler’s number, *r* is the rate of growth, and *t* is the time. The rate is affected by the intelligence variable that can be manipulated through a slider. Both species can grow, but once the capacity of a planet is reached where the total of both populations on a planet equals a hundred percent, the larger population will be reduced by the smaller population to simulate combat and fighting over resources.

**Improvements**

To further improve this model, I could include events between spaceships of different species such as fighting. I could also have multiple planets of the same species coordinate strategic plans instead of their current random behavior. In addition to the intelligence variable, I could add other variables that impact population growth such as food production and environmental conditions.

**Conclusions**

There were multiple findings that occurred when manipulating variables. For example, the starting planet variable offered each species an advantage or disadvantage. When humans started on Earth, they were closer to other planets. This allowed for the quicker colonization of surrounding planets compared to when aliens started on Pluto. Another finding was when the settlement-in-voyages variables were at the minimum, stalemates occasionally occurred. This is because small amounts of settlements that were being sent to enemy planets could not compete and were quickly eliminated.

This model is not just about human or alien colonization in the solar system. It can also be used and modified to compare the population dynamics between any two species within any environment.