

Modeling the Tragedy of the Commons Using Agent-Based Modeling

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Abstract

The Tragedy of the Commons is an Experimental Economics social scenario wherein a number of autonomous individuals share a pool of resources. Conventional economic wisdom dictates that they should act selfishly, for their own benefit. However, the tragedy of the commons demonstrates that a community of individuals acting in this way will ultimately lead to the downfall of the community as a whole. The agent-based modeling simulations (ABMS) which can be created using the NetLogo software are an ideal means by which to model the Tragedy of the Commons.

Introduction

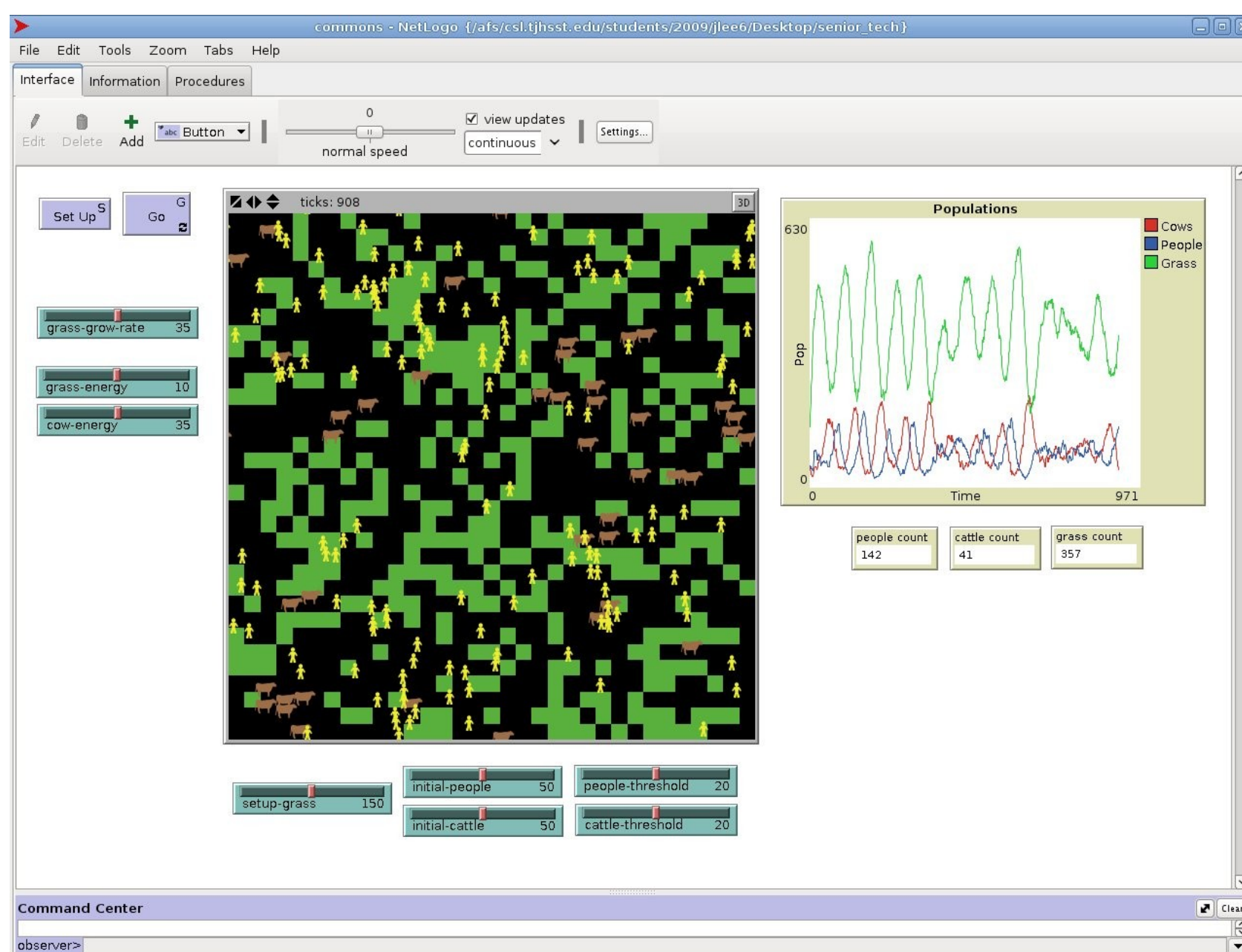
The Tragedy of the Commons is a real world problem which may be observed throughout the world. For example, one way America deals with its pollution is by putting its garbage in designated areas. However, space is a finite resource. When individual groups each contribute to the nation's pollution problem, it mounts into an exponentially larger issue. The Tragedy of the Commons exists in any environment consisting of autonomous individuals, who stand to benefit by taking from a shared resource pool. A practical solution to the Tragedy would have far reaching benefits.

Overview

This model is written using the NetLogo software. NetLogo's agent-based modeling simulations are ideal for this type of project as they allow for groups of autonomous agents and the programming of prescribed behaviors for each type of agents. NetLogo displays graphically and in real time the agents and the environment, and can easily chart aspects of the environment. Thus, the simulation may be easily modified, and observations may be made and conclusions drawn with ease.

Testing and Analysis

If the program incorporates reasonably realistic behavior, certain expected growth patterns should occur. Namely, the exponential growth-fall population cycle already mentioned. Furthermore, the populations should vary directly and inversely with one another. Once the model is advanced enough, different behaviors may be programmed into the people. These modifications may result in some emergent behavior in the people over a long period of time. One particular type of people, behaving differently from others, may emerge as the dominant class (for example, selfish people over altruistic people).



A typical demo of the program