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CMPLXSYS 530

Assignment 1

Chapter 4, Problem 7: **Wolf\_sheep\_3rd.nlogo**

I’m finding it difficult to get the model to stabilize. Using the default setting but now having two predators makes it so that one of the predators dies off. If I up the amount of energy a predator gets from killing another agent, then I can achieve some stabilization for a little longer, however, its almost always the case that one of my predators dies off. I largely attribute this to my method for modeling which predator wins. The winner is decided by who has more energy. So the dominant predator will just keep amassing energy until it reproduces.

Chapter 4, Problem 22: **Wolf\_sheep\_grass\_distribution.nlogo**

Patches grow in different formations/patterns. I found a nice equilibrium when using a re-growth of 0.1. My function for grass-regrowth is to take the average sum of neighboring grass-amounts multiplied by the regrowth-rate and added to the original grass-amount for that patch. This doesn’t affect the behavior of the sheep since the sheep just wiggle. The growth of the grass and wolves are strongly linked together.

Chapter 4, Problem 18: **Disease\_model.nlogo**

The authors of this scientific paper are very vague (i.e. what are agents specifically? What environment are they in?). I took the liberty in choosing to model this problem using sheep as my agents (similar to wolf-sheep model). For this model, there are 2 agents, healthy sheep and sick sheep. I replaced the wiggle to orient the sheep in a random direction.

Assumptions:

-Sick sheep lose energy a lot quicker than healthy sheep

-Agents eat grass to gain energy

-Grass grows uniformly in the world

-No other animals are in this world

-Disease can only be transferred via contact

-Disease sheep eat grass but don’t gain energy

-Disease sheep use 5x as much energy to move as healthy

Experiment Parameters:

500 healthy, 10 disease, movement-cost=1.0, grass-regrowth=0.3, energy-from-grass=2.0

Conclusion: Initially, there is a large spike in disease contraction even if only a small amount of diseased sheep are initially spawned. However, the disease population then tapers since diseased sheep die more quickly and cannot get energy from eating grass. Usually a few healthy sheep survive and then repopulate since all diseased sheep have died off.