REPORT NETLOGO: PROJECT WOLF-SHEEP-GRASS-WATER MODEL

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UFLA

LCC1013-2021/1-10A-G010 INTRODUCTION TO AGENT-BASED MODELS

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Project Link: https://github.com/DaviHorner/Netlogo-Project

Abstract

This model explores the stability of predator-prey-water ecosystems. Such a system is called unstable if it tends to result in extinction for one or more species involved. In contrast, a system is stable if it tends to maintain itself over time, despite fluctuations in population sizes.

INTRODUCTION

This model was created using the predation model Wolf-Sheep-Grass provided by the NetLogo, the idea for this project was trying to begin to recreate the reintroduction of wolves on the yellowstone park, and show that is necessary predators and prey to protect the waters in nature. On the part of information in the archive “Projeto Final.nlogo” there are more in depth information about the code.

DESIGN THE MODEL

From the two types of design that exist in agent based modelling, that are phenomena-based and exploratory-based. My project will be a phenomena-based model. And because I will be adding to the model provided by NetLogo I will be working with a top-down approach.

1. What part of your phenomenon would you like to build a model of?

I will try to create a more realistic predation model than the one provided by NetLogo where I will add water and their relations with the environment to show the necessity of predators on reserves to help maintain the environment sustainable and healthy.

2. What are the principal types of agents involved in this phenomenon?

Sheep	Wolves

3. What properties do these agents have?

Sheep:	Wolves
Energy	Energy

4. What actions or behaviors can these agents take? How do these agents interact with each other or with the environment?

Sheep:	Wolves:
Breed	Breed
Eat Grass	Eat Sheep
Move at random	Move at random

5. In what kind of environment do these agents operate? Are there environmental agents? (Environment)

Grass:	Dirt	Water:
Grow after a countdown if near water	After a countdown there are a chance to transform in water because of ‘rain’	If around 6 or more Dirt the water will dry.

6. If you had to define the phenomenon as discrete time steps, what events would occur in each time step, and in what order?

Tick 0: Creation of the ‘world’

Tick 20: Followed by a quick degradation of the environment and number of wolves and sheep.

Tick 20-...: Hopefully the number of grass, sheep, wolves and water will remain stable after the grass starts to only exist around the water..

7. What do you hope to observe from this model?

I hope to see patches of grass around a group of water, at the same time there are a constant number of sheep and wolves without going extinct. And maybe creation of new patches of water and grass around the world.

Analyze the Model

Result 1: Without Water

On this variation of the model, the model is doomed to fail because there is no water to grow more grass.

Result 2: With Water

With this variation using the default values it reaches stability at around 120 ticks. And it manages to keep a healthy amount of sheep and wolves for an indeterminate amount of time

Conclusion

This simulation after the changes became much more realistic despite not following grazing or predation equations, or having a realistic raining season, but this simulation is an important step in trying to create a more realistic model to try to predict how predators and prey interact with the environment and how their interactions manages to work the land and what steps are necessary to create a more sustainable environment, because even though loving herbivores and not wanting to see their deaths, the cycle of life on nature demands the introduction of predators to have a healthy and sustainable environment. Next steps for this project could be trying to create a new type of patch for degraded land where it makes it more difficult to grow grass or absorb water; we can also try to modify the model so the sheep will flock and keep near grass at the same time that the wolves will flock themselves and keep away from sheeps until time to hunt them; create more intelligent interactions between wolves and sheep; or try to make the rain more realistic and several other things.