13.3 *NetLogo* Tutorial 2

Introduction to Computational Science:
Modeling and Simulation for the Sciences, 2nd Edition

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Introduction

NetLogo Tutorial 2 provides the background to understand a *NetLogo* implementation of the model in Module 11.4, "Introducing the Cane Toad – Able Invader," and to use the software to complete various projects in Chapters 11 and 14. Tutorials 1a-c are prerequisites to this tutorial. Tutorial 2 does not develop a particular model but improves your facility with using the *NetLogo* Dictionary and covers some of the commands employed in the implementation of Module 11.4's model. We recommend that you work through the introduction with a copy of *NetLogo*, answering all Quick Review Questions in a separate document.

Resizing World

Type all requested commands in a *NetLogo* file and an answer document. When requested to "look up" a command, consult the *NetLogo* Dictionary.

Quick Review Question 1 Start a new *NetLogo* simulation and save the file. This question involves resizing the world.

a. Add a *setup* button. How do we add a slider? Add a slider, called *SIDE*, that has a minimum value of 10, default value of 16, and maximum value of 30.
b. Look up ***resize-world***. What does it do?
c. Write a *setup* function that clears everything and then resizes the world to go from –*SIDE* to *SIDE* in each direction. To write –*SIDE*, subtract *SIDE* from 0 and place this expression in parentheses, (0 – *SIDE*). Be sure to put a blank on each side of the minus sign. Check your work. On the Interface level, make *SIDE* 10, and click *setup* to view the results.

Random Normal

Quick Review Question 2

a. Look up ***random-normal***, and give what it reports.
b. On the Interface level, in the *observer*> text box at the bottom of the window, type the command to return a random number with mean 0.8 and standard deviation 0.5. Using the up arrow to retrieve the command, execute the command several times until obtaining a negative value.

c. Write a statement at the top of the code to indicate that the patches own an *energy* variable. Check your work. On the Interface level, click *setup* to check your work.

Minimum and Maximum

Quick Review Question 3

a. Look up ***min***. Add a *Reporter* box on the Interface level to report the minimum energy of the patches. Make the *Display Name* be "Minimum Energy." Note the displayed value.
b. Look up ***max***. Add a *Reporter* box on the Interface level to report the maximum energy of the patches. Make the *Display Name* be "Minimum Energy." Note the displayed value.
c. Look up ***list***. On the Interface level, in the *observer>* text box, type the command to return a list with the number 0 and -7.
d. What is returned?
e. In the *observer>* textbox, enter and execute the command to obtain the maximum of 0 and -7. To do so, we must place 0 and -7 in a list.
f. In the *observer>* textbox, enter and execute the command to obtain the minimum of 1 and 4. To do so, we must place 1 and 4 in a list.
g. Suppose we wish to restrict the energy values to be between 0 and 1. First, make sure that the value is non-negative by having another command in *setup* to *ask patches* to update *energy* to be the maximum of 0 and *energy*. Check your work, and click *setup* to observe the *Minimum Energy*.
h. Then, to force energy values to be less than 1, have a third command to update *energy* to be the minimum of 1 and *energy*. Check your work, and click *setup* to observer the *Maximum Energy*.
i. Alternatively, we can consolidate the three assignment statements into one command, as follows:

```
set energy min list 1 max list 0 random-normal 0.3 0.5
```

For clarity, place three sets of parentheses in the command, one around the calculation of the random normal, one around the list for the maximum, and one around the list for the minimum. Check and execute.
j. Look up ***max-one-of***. In the Command Center, write a statement to display a patch that has a maximum *energy* value. Pressing the up arrow, re-execute the command several times, noting the variety of reported patches. Inspect several of these patches to verify that each of these patches has the maximum energy value.
k. Create one turtle.
l. In the Command Center, ask each of the turtles (and there is only one turtle) to show one of its eight neighbors that has a maximum amount of energy. To use the von Neumann neighborhood of four nearest neighbors, we would use ***neighbors4***.

m. To include the patch on which the turtle resides, which is ***patch-here***, with the neighbors, we need to employ a ***patch-set***. Look up this command. Write a command to return a patch set with the patch here and the eight neighbors.
o. In the Command Center, ask each of the turtles (and there is only one turtle) to show one of its eight neighbors or the patch beneath the turtle that has a maximum amount of energy.

Absolute Value

Quick Review Question 4 Look up ***abs***. On the Interface level, after *observer>* at the bottom of the window, type a command to return the absolute value of -6.2.