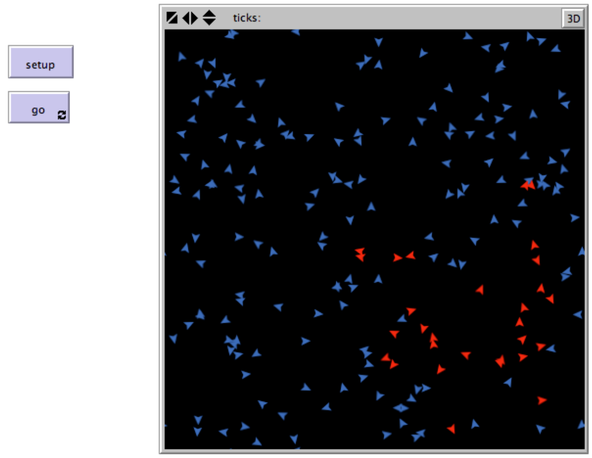
Lab 4: NetLogo Experiments with Epidemic models



There are two NetLogo Video Lab lectures this week:

1) Modeling Epidemics in NetLogo part 1
2) Modeling Epidemics in NetLogo part 2

Assignment part 1:
The " Modeling Epidemics in NetLogo part 1" video fully develops the code you will be reproducing, running and using in your first experiment. Try to recreate the program from the basic specification rather than copying code directly from the video. Peek only when necessary. Subsequently, you will also be adding instrumentation in the form of a global variable, ticks counter, and plot in the "Modeling Epidemics in NetLogo part 2" video.

After you get the Basic Contagion or "Spread the Red" model with instrumentation running, you are to design and run experiments that empirically address the following questions:

1) In a Basic Contagion model, did changing the turn radius in the wiggle procedure impact the spread of the epidemic? How and to what extent? How did you quantify the impact of changing the maximum turn angle variable?
2) Did changing the step distance in the wiggle procedure impact the spread of the epidemic? How and to what extent? How did you quantify the impact of changing the step size variable?

In the Info window, describe in detail the experiments you ran to answer these questions. Prior to online submission, save your model with the filename Epi1.firstname.lastname.nlogo

Assignment part 2:

Alter your "Spread the Red" model to reflect the spread of a known disease that spreads through direct contact. Research the transmission rate of common microbes. For example, the transmission rate of chicken pox is estimated to be 90% meaning that for each contact you have with an infected person, your chance of contracting the disease is 90%.

Relabel the "What to try" section as "What I tried" and answer the following:

1. Describe how you might implement this probabilistic transmission of infection in your model? (Hint: after a collision with a sick person, you can use a simulated toss of a die to see if you were infected, rather than automatically getting infected.)
2. Implement this probabilistic transmission of disease and compare the outcomes of running this model with the previous model in which contract resulted in transmission 100% of the time. Prior to online submission, save your model with the filename Epi2.firstname.lastname.nlogo then upload your model.

Extra credit: Implement recovery from the illness after a period of time and discuss how you implemented it.

Grading Rubric [20 points total]:

[2 points]: Attached two files in Blackboard Learn with the file names:

1) **Epi1.***firstname.lastname***.nlogo**
2) **Epi2.***firstname.lastname***.nlogo**

Note: DO NOT copy and paste your source code into Blackboard Learn. You must ***attach*** the NetLogo source file.

*****After attaching, you MUST CLICK SUBMIT *****

[2 points]: The "info" section of each of your programs includes your name, the date and a description of what the program does.

[6 points]: For the Epi1 code, design and run experiments that attempt to answer the two questions described above. Describe your design, list the experiments you ran, report your results and state your conclusion. All this reporting must be included within the "info" tab of the **Epi1.***firstname.lastname***.nlogo** file you submit into Blackboard Learn.

Note: The points you earn for this section are NOT based at all on your conclusion. Rather, they are based on the on the following criteria:

a) Is your experimental design well-conceived? This includes number of experiments run and ranges of values tested.
b) Is your reporting clear, well organized and easy to read?

[4 points]: Your version of **`Epi1.`***firstname.lastname***`.nlogo`** includes sliders that independently control the random range of turn left and turn right, and the step size; and instrumentation to show the populations of healthy vs. sick agents.

[8 points]: Within the "info" tab of your Epi2 program, report the microbe, the design and results of experiments you conducted with the goal of answering the following questions:

a) What assumptions are being made in your model of the spread of a real-life disease?
b) Compare the outcomes of running this Epi2 model with the Epi1 model in which contract resulted in transmission 100% of the time. Did a reduction in transmission rate result in a much longer period of time before all agents became infected? If so, how much longer?