CS 112 Homework #5

Spring 2017
20 Points   Due Monday, April 10

Objective: Bring together what you have learned to make a Zombie Apocalypse model in NetLogo.

You will have plenty of opportunity to use your imagination to make a model that you find interesting. You are not expected to have a player interact with a character, by causing it to move by pressing keys, because NetLogo doesn't handle that kind of user input well. But you can experiment with that if you like. The user can use sliders and buttons to set parameters which change the behavior of the model.

The Basic Model

We will use an epidemiology model. We have:
- A population of humans
  - Some are immunized
  - The rest are not immunized - they are vulnerable
- A population of zombies

Note: Use breeds for your characters: human, immune, zombie

- In your model, characters may have energy, which they lose by moving, or gain somehow such as by winning a confrontation with a zombie.
- The kinds of characters (breeds) can use the "person" shape, but be distinguished by color: a different color for vulnerable humans, immunized humans, and zombies

All these characterizes move around the field

When a vulnerable human comes into contact with a zombie (i.e. occupies the same patch), the human may be converted into a zombie. Here are some possibilities:
1. The human automatically turns into a zombie (i.e. the human hatches a zombie and dies.)
2. The human and zombie "fight", and if the human loses, it becomes a zombie. Maybe:
   a. "Flip a coin" to decide the outcome
   b. Compare energy (if your characters have energy); if the human has the lower energy, it becomes a zombie.

Immunization

You should have a mechanism by which humans gain immunity. It could be by:
- Coming into contact with an immune human

- Acquiring a certain level of energy
- Walking through an "immunity ray".
- Winning a confrontation with a zombie

There should be a mechanism to cause zombies to die

Use sliders to set the initial number of humans, immunes and zombies.

Use a plot to show the current number of humans, immunes and zombies.

Grading

Item	Description	Points
1	Program produces 3 breeds: humans, immune, zombies	3
2	Characters move around the "world"	1
3	When an immune human encounters a zombie (lands on the same patch), the human is not affected.	1
4	Some mechanism for zombies to convert humans into zombies (e.g., encounter)	2
5	Some mechanism to make humans immune	2
6	Some mechanism to cause zombies to die (e.g. loss of energy, lose an encounter with a human or immune)	2
7	Sliders to set the initial numbers of humans, immune, and zombies	3
8	A plot showing the numbers of humans, immune and zombies	3
9	A way for the program to end, e.g., no more humans or zombies	2
10	Enhancement 1	2
11	Enhancement 2	2
Total		**20**

Ideas for the Zombie Apocalypse Assignment

These are ideas we discussed in class to make the project more interestin

Shotguns – be able to shoot the zombies

Directed Motion:

- Humans move away from zombies

- Immunizing Radiation: Humans move toward it

Variants of the zombies, with different behaviors
- e.g. zombie dog moves fast but only in a straight line

Give zombies energy to model decay
- When they run out of energy, they die.
    - This works with the immunization model – when there are no more victims to infect, the source of the virus disappears
- Stop when all zombies are dead

Varied outcome from encounters
- Roll the dice: "heads", the human wins, "tails", the zombie wins
- Base it on energy: the one with the most energy wins (like hit points)
    - Humans gain energy per tick
        - Human spawns human when energy limit reached
        - Both humans reset energy, become vulnerable.

Barriers
- Zombies and humans must navigate around them