Simulation of the Spread of a Virus Using Agent Based Modeling

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Abstract

My goal is to make an agent based modeling simulation that shows the spread of a cold through a school. It will start with an amount of infected students and healthy students received as inputs and will show how much the virus spreads or possibly recedes over time. The program will answer the question as to how quickly and fully different types of sicknesses will be able to spread through the population of a school once introduced. This will show how likely it is for a disease to be spread by a set amount of sick people coming to school with the sickness. This will show if the danger of infecting others is actually a valid excuse not to come to school or if you should come to school unless you actually don't feel like you will be able to do work.

Background

I have been researching different examples of agent based modeling using MASON through the MASON website and the book Growing Artificial Societies which specifically discusses the Sugarscape model. A model similar to mine is part of the demo models for MASON which describes the spread of a virus through a workplace. In this example the agents become immune to the virus once they become healthy, they stay sick for a set amount of time, and move to work and come back home without moving to other places. They are infected through close contact with sick agents just like in my program and this program only has one type of disease unlike mine will when finished. I will attempt to make my model more realistic in most of these areas by using actual data.

Procedures

I will have to test each of the variable inputs of my program to make sure that it can deal with the number of infected people being negative for example. I could also possibly check the results that my model comes up with against real data from studies to see if the final product gives accurate information.

The program will also have a display showing the locations of all of the agents and their status (healthy or sick). It will display all of the other necessary variables (number of sick agents, number healthy agents, total infections, etc.) in text.

Expected Results

My program will answer the question as to how quickly and fully different types of sicknesses will be able to spread through the population of a school once introduced.

This will show how likely it is for a disease to be spread by a set amount of sick people coming to school with the sickness. This will show if the danger of infecting others is actually a valid excuse not to come to school or if you should come to school unless you actually don't feel like you will be able to do work.

I expect my program to show how many people are infected with a virus after any amount of time given an input of how many people there are and how many are infected at the start. It will display the number of infected people and the period that the agents are in at the moment in the display window plus possibly some other information such as the ratio of infected to healthy people, the total number of people that have been infected (including those that have gotten healthy after being infected), and other similar results.

When finished the program will display values for the number of agents are sick, healthy, total agents, total infections, and total recoveries. It will also have a display showing the locations of all of the agents and their status (healthy or sick). Eventually it will be able to have different diseases which have different recovery times and infection rates. I will use research data for all of the stats relating to the different diseases such as the recovery time and the infection rates based on real values for different diseases.

If I finish all of this early I could move on to possibly exploring different methods of contracting the diseases. At the moment viruses are all passed through close contact with a sick agent, but I could add diseases passed through contact with where a sick person had recently touched such as a doorknob or a keyboard.