CSOC20010

Introduction to Computational Social Science II

UCD School of Sociology

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Week 1 Assignment: Virus On a Network

Go to NetLogo Web:

http://www.netlogoweb.org/launch

From the "Models Library" at the top, select "Sample Models/Networks/Virus on a Network".

This model demonstrates the spread of a virus through a network. Each time step (tick), each infected node (coloured red) attempts to infect all of its neighbours. Susceptible neighbours (coloured green) will be infected with a probability given by the VIRUS-SPREAD-CHANCE slider.
Resistant nodes (coloured grey) cannot be infected.

Infected nodes are not immediately aware that they are infected. Only every so often (determined by the VIRUS-CHECK-FREQUENCY slider) do the nodes check whether they are infected by a virus. When the virus has been detected, there is a probability that the node is recovered and the virus is removed (determined by the RECOVERY-CHANCE slider).

If a node does recover, there is some probability that it will become resistant to this virus in the future (given by the GAIN-RESISTANCE-CHANCE slider).

When a node becomes resistant, the links between it and its neighbours are darkened, since they are no longer possible vectors for spreading the virus.

1. Load the model and play around with different parameters and see how the number of infected nodes will be affected. Each time you change the parameters, press SETUP and then GO to run the model for the new set of parameters.

2. Use the following values in this part:
   NUMBER-OF-NODES = 150
   AVERAGE-NODE-DEGREE = 6
   INITIAL-OUTBREAK-SIZE = 3
   VIRUS-CHECK-FREQUENCY = 1
   GAIN-RESISTANCE-CHANCE = 0
   Now there are two remaining parameters to change: spread rate (VIRUS-SPREAD-CHANCE) and recovery rate (RECOVERY-CHANCE). Change these two parameters incrementally in the whole range and record the number of infected agents after t = 100 (use at least 10 different values for each parameter, in total 100 combination).

3. Produce a "heat map" to show the number of infected node at t=100 for each combination of VIRUS-SPREAD-CHANCE and RECOVERY-CHANCE.

4. Submit your heat map with 2-3 lines of interpretation in a word or PDF file.