Network Dynamics and Simulation	Computer Science Department
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Workshop on CINET – August 11, 2015

CINET/EDISON   Exercise – I

Purpose: To perform a contagion dynamics analysis with EDISON.

Overview of the Exercise: You will specify a network and a dynamics model, along with properties for the dynamics model, and seed nodes. The analysis is a simulation. It will consist of 20 individual runs, where the difference between runs are the vertices that are specified as *seed* nodes. The seed nodes are the vertices from which the contagion starts.

Procedure: To begin with, please do the following.

(a) Go to the login page: `http://edisondev.vbi.vt.edu:8080/Edison-2.0/edison.jsp#login`.

(b) Log into EDISON with your user name and password.

We will specify all the steps now.

1. Click on the "New Experiment" button on the left of the screen.

2. Fill out the data in the empty fields in the *Experiment Information* screen. For "Title" input your name. For "Category" enter "social." For "Description" enter "deterministic threshold model." For "Number of runs" enter "20." For "Number of steps/Run" enter "100." For "Is random seed defined" select "No."

3. Click the "Next" button at the bottom of the screen.

4. On the *Select Graph* screen, click on the drop-down list and select "netscience." This is the net science network and the screen will show information about it. This is the network on which the dynamics will be run for the simulation.

5. Click the "Next" button at the bottom of the screen.

6. On the *Select Model* screen, click on the drop-down list and select the first model: "progressive 2-state model." A description of the model appears and at the bottom, the input parameters for the model are summarized. This is the behavior model that will control how the contagion spreads on the network.

(over)

7. Click the "Next" button at the bottom of the screen.

8. On the *Nodes and Edges Properties* screen we are going to specify the behavior model parameters for the nodes of the graph. There are several input fields. For "Set name" enter "allNodes." For "Description" enter "All nodes are selected." For "Query type" click "node." For the "Enter query" field, type "select nodes from netscience." This query returns all nodes of the graph netscience. Click the "Validate" button to validate the entered query. The system should tell you that the query is valid. Click the "Execute" button. A box will now appear toward the lower third of the screen. We have selected all nodes. Now we are going to assign properties to them. In the upper box, enter "0." In the lower box, enter "0." The first entry means that all nodes have initial state of 0. The second box means all of the states of the nodes can change (in this case, to 1). Now click on "integer_node_traits." The first two boxes are filled with "11" and "1." Please leave these values as is; these specify the model number. The third box is empty. In this box, enter "1." This value means that the threshold is 1. Click the "Save Set" button. You should see that the blue number is 100%. That is, all nodes have been assigned values.

9. Click the "Next" button at the bottom of the screen.

10. On the *Seeds* screen we are going to specify the nodes that are seeded in state 1. The dynamics is going to cause the state 1 to be spread to the other nodes of the network that are in state 0. There are several input fields. For "Set name" enter "oneNode." For "Description" enter "One seed node for each run." For the "Enter query" field, type "select sample(20,1,fixed) nodes from netscience." This query returns 20 sets, with each set having one node; these nodes will be the seed nodes. Click the "Validate" button to validate the entered query. The system should tell you that the query is valid. Click the "Execute" button. A box will now appear toward the lower third of the screen. Now we are going to assign properties to the selected nodes. In the upper box, enter "1." In the lower box, enter "0." The first entry means that all *selected* nodes have initial state of 1. The second box means all of the states of the nodes can change. Click the "Save Set" button. You should see that the blue number is 100%. That is, all nodes have been assigned values.

11. Click the "Save" button at the bottom of the screen. This saves all inputs for the analysis, and you will be transferred back to the *All Analyses* screen. You should see your analysis on the top of the screen. The analysis name is your name that you entered toward the beginning of this exercise.

12. Just to the right of the analysis name, there are about 4 icons. One is a circle with a right arrow in it. Moving your cursor over it, you see that this is how you submit your analysis. Click that icon. You should now see, in green, near the upper right, the message: "experiment started successfully." You can see the status of the analysis move from "New," to "Submitted," to "Running," to "Complete."

Note: We currently do not have post-processing functional for this code, but you will see the plots displayed during the workshop. You can logout of the system by clicking the "Logout" button.