Network Simulation

Claire Kelling

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Abstract

For this brief study, I will be examining isomorphic regular networks for 6 and 8 nodes, both with degree 3. I will simulate 10,000 diffusion examples using code from the following website: https://www.r-bloggers.com/going-viral-with-rs-igraph-package/. I will take the average number of time periods until the network is either saturated or no one else is infected. For this simulation, I will use a probability of infection of 1/2. The first node that is infected is chosen at random for each simulation. The source for the isomorphic graphs is the following website: http://www.mathe2.uni-bayreuth.de/markus/reggraphs.html#GIRTH7[1].

6 node graphs, p=0.5

These are the simulations for the 6 node graphs.

Table 1: 6 Node Graph Simulations

Node	Degree	Diameter	Triangles	Cut Set	Average Time	Average Number of Infected Nodes
6	3	2	2	3	4.11811	4.2895
6	3	2	0	3	4.2396	4.3721

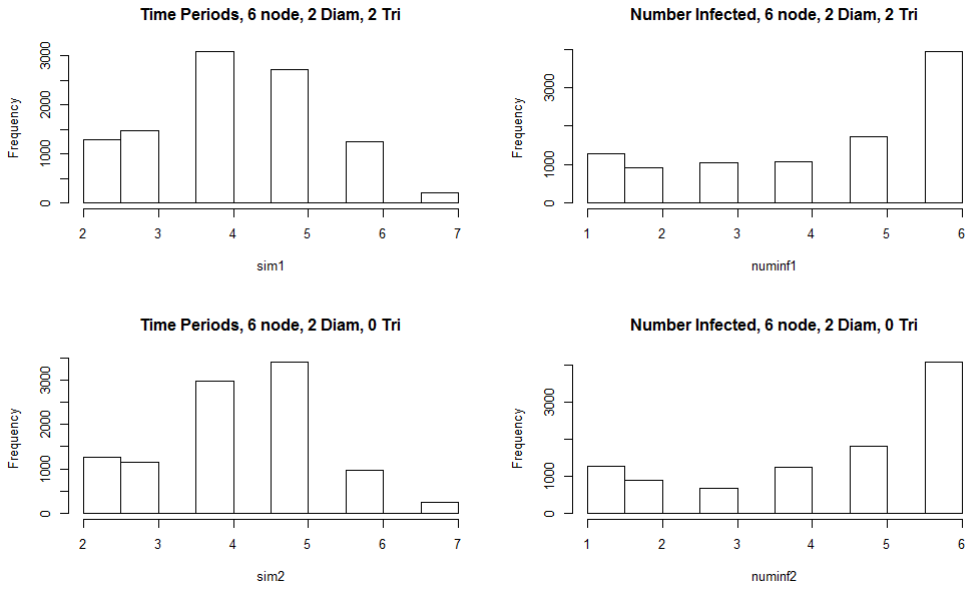

Figure 1: 6 Node Simulation

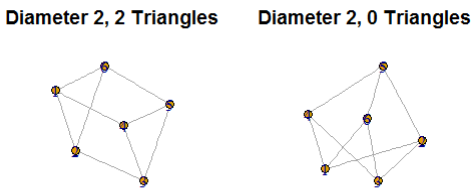

Figure 2: 6 Node Graphs

8 node graphs, p=0.5

These are the simulations for the 8 node graphs.

Table 2: 6 Node Graph Simulations

Node	Degree	Diameter	Triangles	Cut Set	Average Time	Average Number of Infected Nodes
8	3	3	0	3	4.6972	5.1783
8	3	3	2	3	4.6309	5.0678
8	3	3	4	2	4.4859	4.47339
8	3	2	0	3	4.6533	5.1685
8	3	2	1	3	4.6521	5.2452

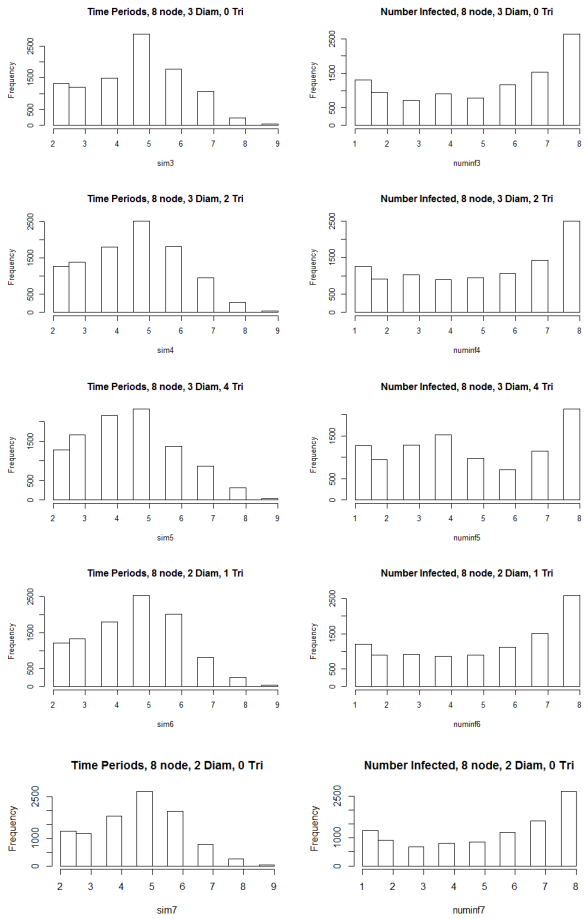

Figure 3: 8 Node Simulation

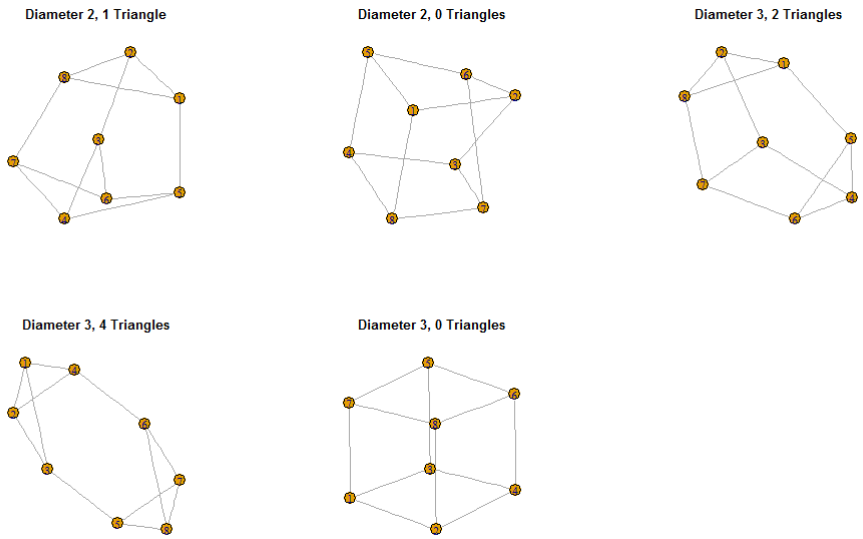

Figure 4: 8 Node Graphs

References

- Fast Generation of Regular Graphs and Construction of Cages. Journal of Graph Theory 30, 137-146, 1999.