**CSOC20010 Assignment 2 – Contagion Spread through a network simulated using five different models**

*Samuel Dornan*

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| **Model Name** | **Halfway point** |
| Configuration Model | 93 |
| The Highschool Network | 108 |
| Barabasi-Albert Model | 75 |
| Watts-Strogatz Model | 105 |
| Erdos-Renyi Model | 90 |
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Diagram

Description automatically generated

The above table and graph show the spread of a contagion through a network of Highschool students using a variety of different models; the Configuration Model, the Barabasi-Albert Model, the Watts-Strogatz Model, and the Erdos-Renyi Model. The true degree of the network of students is represented by the yellow line on the graph, while the remaining lines represent the different ways in which the contagion can spread through the network.

Of all of the models used, the contagion appears to spread fastest through the school when viewed through the lens of the Barabasi-Albert Model, which is a preferential attachment model whereby a node will attempt to connect to another node with the highest number of connections, thereby maximizing the chance of the contagion spreading to other nodes. As a result of this preferential attachment, half of the population is infected by the 75th timestep, however the rate of infection decreases sooner as there are fewer nodes with a higher degree of connections.

When viewed through the lens of the Configuration Model, the rate of contagion appears to plateau between 100 and 150 steps, before increasing again between 150 and 200 steps. This may be as a result of randomness in the degree of connections between individual students, as built into the model. (Citation needed)

With this in mind however, the modelled spread of the contagion through the school appears to be slowest when viewed through the true network of students, with half of the population being infected by the 108th timestep.

In conclusion, we can see from the graphs presented that all of the models simulate a fast initial spread of the contagion, followed by a gradual decrease in spread as the number of infected nodes becomes greater than the number of susceptible nodes. As well as this, we can see that all of the modelled networks simulate a faster spread than the true network of students.