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

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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 network of students is represented by the yellow line on the graph, while the remaining lines represent the different models used to simulate the spread of the contagion 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 both randomness in the initial infections of students, and an element of randomness in the overall spread of the contagion through the network brought on by differences in the distribution of connections between infected students.

With this in mind however, the modelled spread of the contagion through the school appears to be slowest when viewed through the lens of 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 similar spread of the contagion through the network when compared to the true network of students, however all of the simulations show a faster spread than the reference network of students.