

This model simplifies cooperation between individuals using Watts-Strogatz, Erdos-Renyi, Barabasi-Albert, and lattice-style networks where vertices represent individuals. At each time step, the individuals are able to interact with one another and decide whether or not to “cooperate” using a random number generator. If an individual’s neighbor decides to cooperate with them, their probability of cooperating in the future increases. If their neighbor does not, their probability decreases. From this simulation, it was found that in some cases, the population moves towards total cooperation, and in other cases it falls into complete defection after a number of time steps. This project dives into the differences between individuals who cooperate with others every time (cooperators) versus individuals who relentlessly decline to cooperate (defectors). This includes an analysis of the clustering coefficients, closeness centrality values, degrees, average cooperation probability of neighbors, and betweenness centrality values for the neighbors of all cooperators and defectors. From these measures, it has been determined that the average cooperation probability of the neighbors of each cooperator and defector is significantly different, while the closeness centrality values and degrees of their neighbors are not.