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A University Forest Fire: Examining the Spread of the Coronavirus through College Social Networks Using a Modified Forest Fire Probabilistic Model

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RAECHEL GRIFFIN (Mathematics)

A University Forest Fire: Examining the Spread of the Coronavirus Through College Social Networks Using a Modified Forest Fire Probabilistic Model

Sponsor: Michael Barrus (Mathematics and Applied Mathematical Sciences)

The coronavirus has proven to be a powerful and deadly force, wreaking havoc across the globe. Gaining information regarding the spread of the virus and how human prevention measures can abate the spread has become crucial in keeping communities safe. Mathematical modeling has long been a way to predict epidemics using typical models like SIR. Unfortunately, due to the lack of knowledge and data on how exactly the Coronavirus behaves, models like these may not depict the whole picture. In this paper, the transmission of the virus is modeled based on graph theory and its applications to social network analysis. Using a modified forest fire algorithm, a probabilistic model is developed to depict who in a social network may be infected with COVID-19 and if they would spread the virus to other nodes in their community based on scientific data and behavior of the pod. Furthermore, using degree centrality as a measure of 'importance' for people in the network, the model compares the spread of the virus originally to the spread given the most influential node is deleted. This model in particular focuses on the college communities in Rhode Island and behaviors associated with this demographic.