

A NON-HOMOGENEOUS APPROACH TO SIMULATING THE SPREAD OF DISEASE IN A PANDEMIC OUTBREAK

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ABSTRACT

In the event of a pandemic outbreak, emergency management units must coordinate an effective mitigation strategy to stop the disease spread using limited resources. In order to develop a successful response, it is necessary to have an accurate model of how the disease will spread. Previously presented models largely rely on homogeneous mixing models, which treat every member of the population as having identical infection risk. Intuitively, such an assumption is unrealistic. Certain demographic groups (e.g., healthcare workers, children and the elderly), have higher infection risks. Additionally, behavioral patterns such as use of public transportation impact infection risks. Using contact networks to represent the level of contact between population members and census data to approximate geographic location and travel patterns, we simulate the progression of a droplet-spread disease through the Greater Toronto Area. The results are periodically displayed on area maps using GIS software for visualization and planning purposes.