Abstract

We use an activity simulator (ActivitySim) to model dynamic human activities and movement for simulating disease spread within the United States. Contacts are formed when people undertake various activities such as work, home, school, shopping, and social recreation; thus, accurately representing the movement and mixing patterns is crucial for predicting disease spread. Studies have shown that people change their behavior, and consequently their activities, in response to a deadly disease. However, most existing agent-based models assume static activity patterns and do not take into account changes in human behavior.

In ActivitySim, each person is assigned a schedule according to an objective function based on his or her demographic characteristics, which balances the utility of an activity (i.e., how preferable it is) against the priority of the activity (i.e., how important it is). We performed a sensitivity analysis of the utility, priority, and objective functions. In particular, we explore how varying the parameters affects regularity using approximate entropy. The results are useful in providing insights into human activity modeling and their impact on disease spread.