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I’d like to tell you about COVID-ADAPT, a computer model I made to simulate the spread of COVID-19 within a facility, and the impact of mitigation actions to prevent this spread. The purpose of the model is to help businesses and public entities, such as schools and universities, keep open, reopen and grow safely based on science.

COVID-ADAPT was developed in C++, with visualizations done in R. The current version is a functional prototype, but it is not yet realistic, efficient or easy to use. You can see technical details in the Github page of the model.

I will demonstrate the workings of the model based on the visualization of a typical simulation run. What you will see is not a cartoon, but the actual results of the model. The model simulates an indoor facility divided into a grid of locations, here 5 by 5 locations, where people can move around. Infectious people (see triangle in upper left corner) contaminate a location with viral particles, with different shades of red indicating the level of contamination. Susceptible people (see the square in the lower right corner) move around and can get exposed by viral particles in a contaminated location. Exposed people (see circle) become infectious after about 5 days, and start to also contaminate different locations. Infectious people (the triangles) recover after about 10 days (see how they turn into pluses) and no longer contaminate their locations. Viral particles slowly decrease in cells without infectious people, and eventually the virus is cleared.

For now, people move randomly in the model, but we will add directional movement of different types of people (e.g. employees or customers). We will also add masks, which will increase the number of viral particles needed for susceptible people to get exposed, and reduce the viral contamination from infectious people. Vaccination status will also be added with similar effects. We will add barriers and walls that people will have to go around, and a way to easily import a map with such details. We will also added diffusion of viral particles and the effect of cleaning, air filtration and airflow.

Let me know if you find this software potentially useful! COVID-ADAPT is licensed under the Creative Commons license CC BY-NC-SA, which means that you can freely reuse, distribute or modify this model, as long as you credit me in your process. But please don’t try to sell it or any modifications of it, as those inherit this license.

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