1. Overview

1.1 Model Purpose

This model is designed to understand & simulate the spread of COVID-19. The spread of virus is highly related with human contact and average recovery time of infected people. Depends on the number of populations, virus blocking grade of mask, human activity level (social distance) and recovery time, the spread of virus can be slow down. Whereas some attributes such as gender, age and race are not relevant to the infection of virus. So, it can be omitted. The main purpose of this model is showing the relationship between spread of virus and those attributes. By changing the value of attributes, the model allows us to implement “what-if” scenario as well. This model also includes a question, “Does the virus blocking grade of mask influence the spread of virus?”.

1.2 Entity

Our model is consisted of human entities, which is divided by three area, “Healthy people”, “Sick People” and “Recovered People”. The humans are located on patches with different color. Green means “Healthy People” and red means “Sick People”.

1.3 State variables and Scales

Since this model mainly focuses on the spread of virus in specific human domain, we need to set the number of people and size of coordinate for patches.

We have three variables in our model and that is similar with SIR model. We have “Healthy people”, “Sick People” and “Recovered People”.

Healthy people = The people who does not infected by COVID-19

Sick People = The people who does infected by COVID-10

Recovered People = The people who recovered after infected by COVID-19

The landscape extents to 24*24 patches, and each human patch is randomly located and moved. At temporal scale, one simulation step (‘tick’) comprises a time period of about a hour.

1.4Process overview and scheduling

The simulation consists of a series of generation infection and recovery cycles as shown in the

Figure 1. Healthy people can be infected when they contact with sick people. And after average recovery time, they can be recovered.

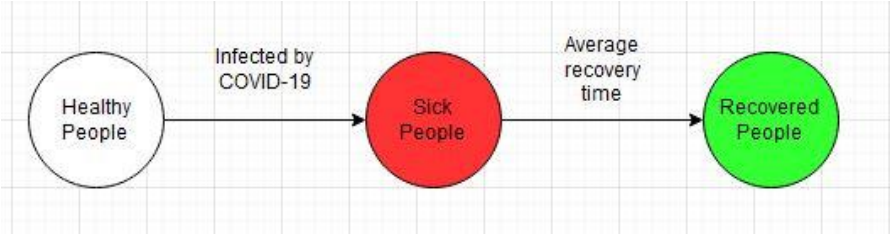

Figure 1 Basic flowchart of the model

2. Design concepts

Observation

The simulation ends when there are no more infected people and when all the infected people are recovered. And the graphs show the rate of infected and recovered people.

Interaction

The interaction is based on the contact of people. There are healthy and infected people. And when they are contacted, the healthy people are infected.

3. Details

3.1 Initialization

The model is initialized based on human and their random position. We can change the number of initial people and recovery & infection chance.

Input Parameters	Experiment Values
Initial people	150
Recovery chance	80
Virus blocking grade	60
Recovery time	30

3.2 Submodels

Since I have a question, “Does the virus blocking grade of mask influence the spread of virus?”, I set a slider to adjust of virus blocking grade of mask. When increase the grade, there almost everyone got infected and when I decrease it, I can see some people never get virus. This means the virus blocking grade of mask can slow down the spread of virus. In conclusion, I can answer my question through my model. The virus blocking grade of mask influences the spread of virus.