Variables: guest\_list, init\_covid, guests, dist\_room, total\_contracted, contracted, healthy

We record the number and names of guests, width of space (in meter), total number of contracted and healthy guests

Main functions:

* Covid\_judge: If a healthy person comes within 1m of the covid\_person, we judge if the person is contracted, and update the result if the person is contracted.
* Reset: reset the variables
* Move: The guest move in a speed with normal distribution, with mean equals to 0 and standard deviation as parameter

Good points:

* Reset the graph (status) for different simulation on time intervals and moving speeds, and thus take advantage of multiple samplings by averaging results.
* Randomly move each guest every second

Purposes: The purpose of this study is to simulate the rate of spread of coronavrius based on population density and time elapsed (seconds) using matplot and numpy libraries in Python.

Simulate states of people in the room after 2000, 4000, 6000 and 8000 seconds, as demonstrated. And under different moving speeds, i.e. each person moving with a normal distribution of mean = 0, standard deviation of 0, 0.2, 0.4, 0.6, 0.8 respectively, as demonstrated in the last graph.

Analysis based on time:

At the initial state, only 5 out of 25 people get contracted, which is 20% of the current population.

After 2000 seconds, 12 out of 25 people get contracted, with an increase of 7 people, where the increasing area mainly stays at the bottom right corner, where the population is more dense.

After 4000 seconds, 17 out of 25 people get contracted, with a spread across the bottom half of the graph.

After 6000 seconds, 21 out of 25 people get contracted, meaning that only 4 people are healthy at this moment.

After 8000 seconds, only 3 people survived.

Analysis based on moving speed: We can see clearly that the greater the moving speed (standard deviation for normal distribution), the greater the number of people contracted in the end.