AC52050 – PROGRAMMING LANGUAGES FOR DATA SCIENCE

ZOMBIE APOCALYPLSE

(The assessment is written using R programming language)

This code was generated to check how an infection spreads when an infected person comes in contact with a non-infected person. Some of the factors which are used here include the number of zombies (for this code, there is only one infected person initially), the chance of the zombie disease spreading, and immunity of a non-infected person.

The report is divided into 4 sections, explained below:

Creating the population:

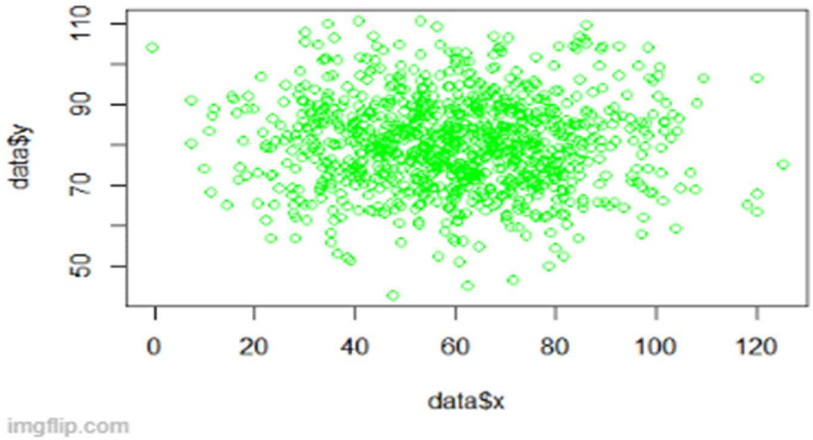
For setting the population value, it can be done using *pop_val*, which can be changed according to the number of people required. Then, for generating the latitude and longitude values of each person, we can use the function *rnorm*, which will create normally distributed values. We will call these x and y, and the size of the required number is specified using the *pop_val* variable. Also, these values are rounded off to 1 digit, using the function round.

Variable *state* has 2 values: normal and Infefcted. Initially all people are assigned the status as normal. */mm_prob_val* contains the possible probability of immunity of a person, and *immunity* contains the randomly generated probability values from *imm_prob_val*, whose size is also limit to the *pop_val* count.

Now all these are consolidated to a data frame called *data.*

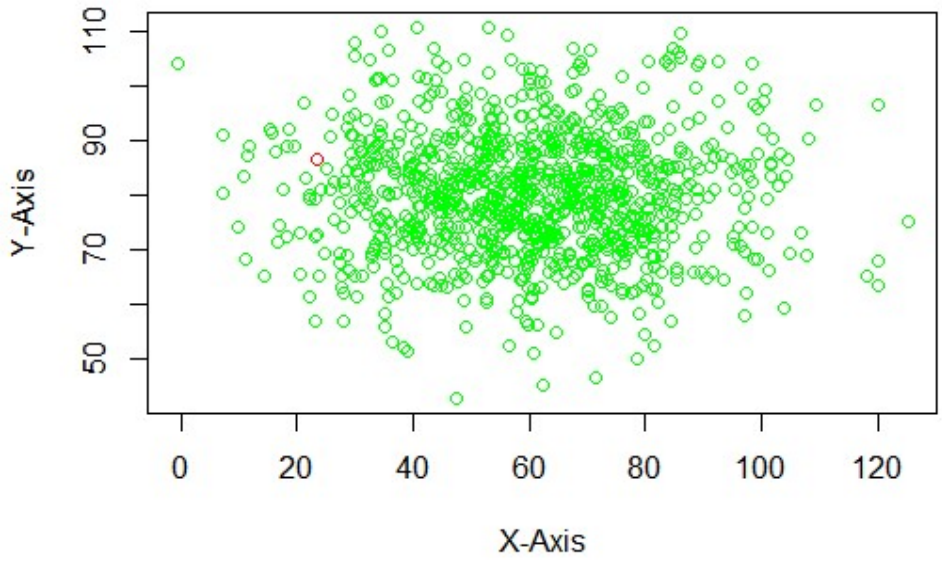
People Movement:

Here, we change a person's position randomly. This uses a nested for loop: The first one is for the number of times this movement should happen for the whole population, and the second loop goes through the data frame, *data's* individual person and randomly generates a value between -1 to 1, and rounded off to first digit. These random values are then added to the x and y values of each person. Since the movement was done multiple times, the difference in position can be seen, as shown below:



Randomly infected person:

Using the sample function, which generates a random number with the *pop_val* as the upper limit, the *state* of that random index is changed to infected, which means that this person has been infected. The plot function will show the infected person in the population as red marked, using an if conditional statement in the *col* parameter of plot function. It can be seen



below:

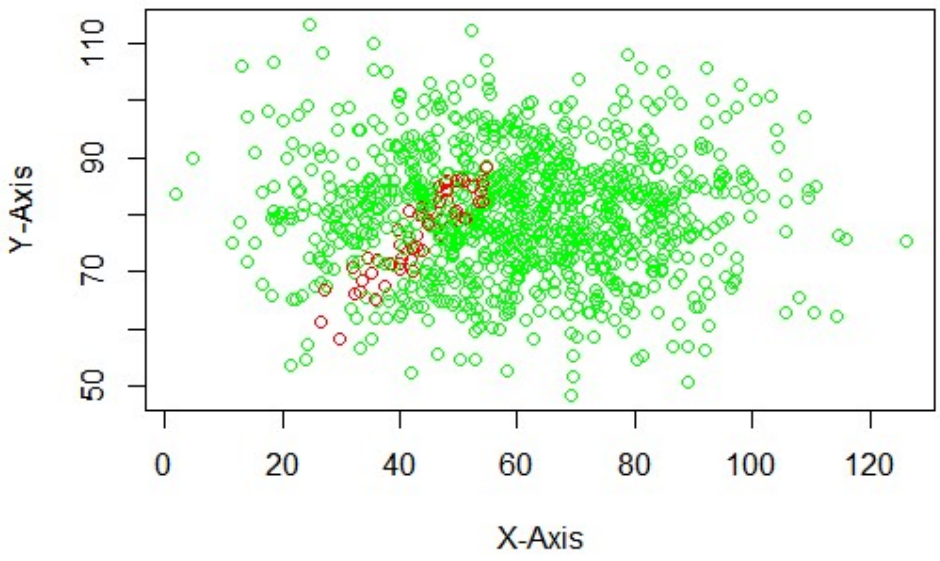
The Infection Spread:

The infected person's data is saved to a variable called *zombie*, which is extracted from the data frame using condition in the *subset* function. We then initialize few temporary variables, as we have a nested for loop here as well. Each loop as got print function to determine as for what is happening in the loop, and it was also used for code accuracy, as it was a bit hard to track what each loop was performing.

The first for loop is a loop to change the infected person's location by generating random values between -5 to 5, which is set as the movement of the infected person, and can be changed as well. These randomly generated values then get added to the x and y values of *zombie* variable, making the infected person move around the population.

The second loop, which goes through all the rows of *data* takes the *zombie* location and then tries to find if the person is nearby or not. From top, it first checks if the *state* of the person is *infected* or *normal.* If the person is in infected state, then it just skips that person and moves along till it finds a normal person. Once a non-infected person is found, the difference in distance between them is calculated.

The difference is then checked as separate loops, first it checks for difference between *x* values and then for *y*. If any one of them is not satisfied, it means that the infected person is far away from that normal person. If both are satisfied, then we move to check the immunity. In here, the if-else loop is defined such that if the immunity of that person is more than 50%, then a close encounter to the infected person will not get him /her infected as well, and if it is less than 50%, then that peson's state will be changed to *Infected*. After each time it goes through the entire population, it plots the graph to show how it is spreading. Plot below shows a spread after some movement from the infected person in a population:-


Y-Axis
110
90
70
50
0
20
40
60
80
100
120
X-Axis