Spread of infection

In order to test the spread of infection. This project is an experiment when an infected student enter a seminar in a square-form hall 10 x 10 m, where there are 50 healthy students hanging around and interact with each other. He/she is the last student. The bar closed and no body leaves the hall and no new person arrives. The student performs random walks, changing positions every 5 minutes. If the infected student comes closer than 0.5 m to others, they have probability of 0.8 to get infected.

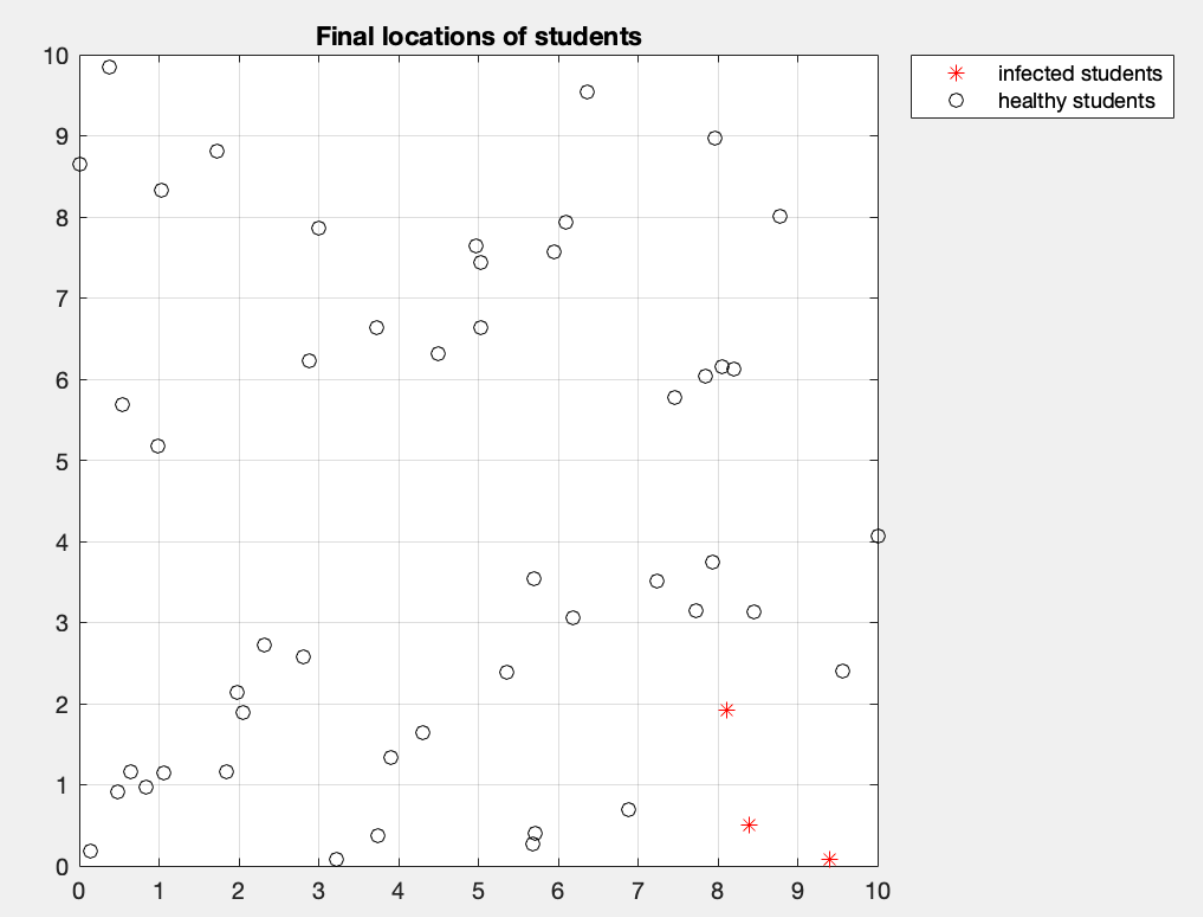
The question is: ***How many students get infected in an evening of 4 hours?***

In order to solve the problem, firstly a population of 50 people is generated in a uniform distribution. They will perform random walks based on their previous location in a normal distribution. Limit them in a square of 10x10 m. Then, the simulation is executed for 1000 times to find solution.

The problem is simulated in ***Matlab*** programming language.
There are 2 cases.

1. We supposed that the exposed students are not infectious:

The result shows that the mean of all simulation is 6.19. This means that the average number of students infected by the last student, who is infected, is around 5 people after an evening of 4 hours. The following draft shows the final location of the last iteration.

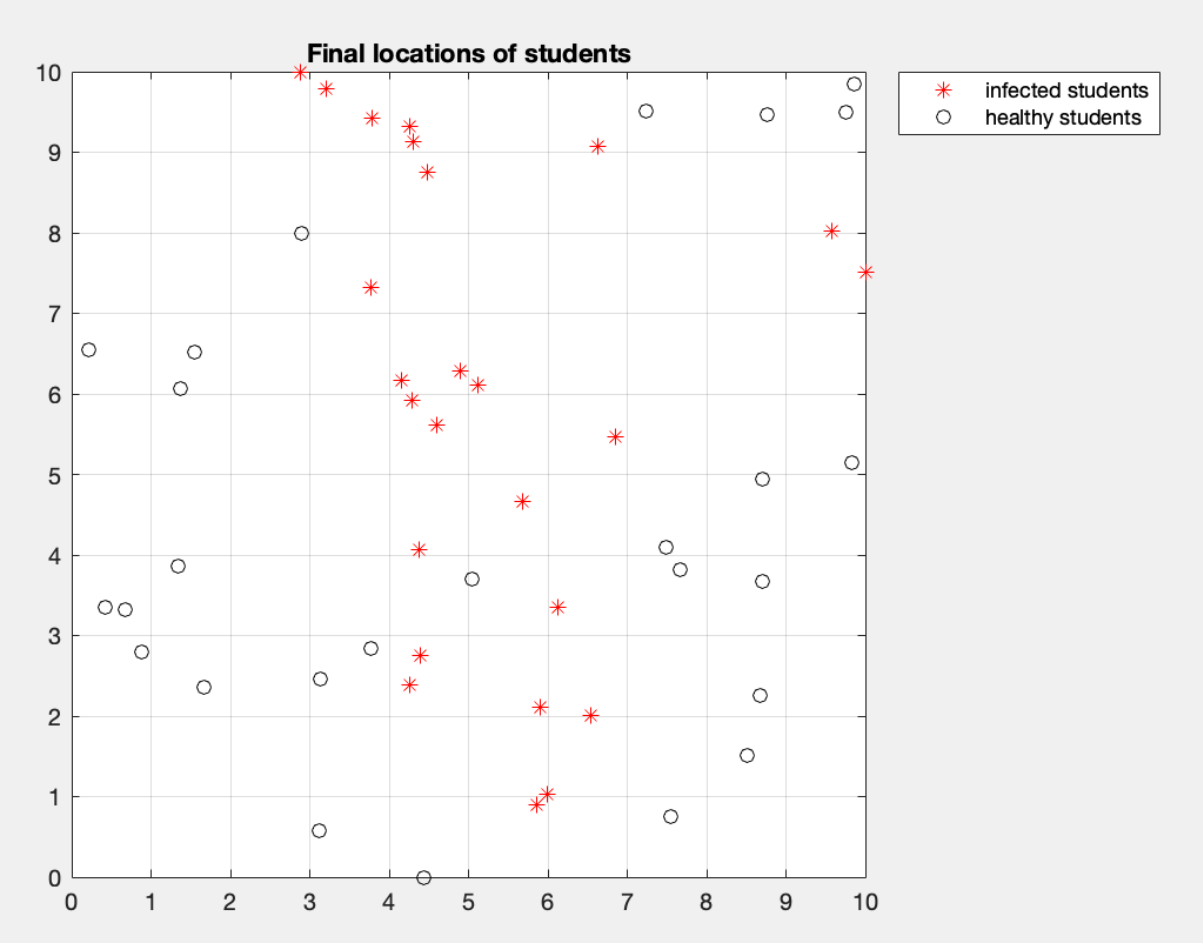


As in this figure, in the last step, there are total 3 infected students. However, the assumption is that the infected students moves randomly every 5 minutes; in reality, this student can walk

straight to his friends or acquaintances. Therefore, the number of infected students may be larger. But now, this experiment is theorized in stochastic situation.

2. We supposed that the bacteria can transmit between people straight away, which means that the infected students can infect others immediately.

This is the final locations of 51 students in the last iteration.



The final result shows the average of around 16.34. This means that the average students get infected is 15 people in an evening of 4 hours. Similar to the previous case, despite the assumptions; in reality, this student can walk straight to his friends or acquaintances. Therefore, the number of infected students may be larger. This experiment is theorized in stochastic situation.

The code lines are provided in Matlab file (.m)