

Final Project Proposal CS443

Group Members:

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Topic: COVID-19 Spread Simulation

Project Description:

We want to simulate the COVID-19 infection spread use the data from SIR model of infection speed to test the effect of different social norms (impact factors) and analysis it with diagrams.

Introduction:

The COVID-19 has spread in many prisons so we decided to simulate multiple day schedule trial for a prison with some initial infected people. An example of schedule might be: cell -> breakfast -> work -> lunch -> work -> yard -> supper -> cell.

In this case, prisoner may not have ability to follow the social distance while they are in dining and working, and may not follow it while in the yard and those are the chances they get infected. Also they have to remove their masks while eating.

For the social norms, we decided to simulate prisoner wearing no mask, only masks for sick, and mask for everybody. However, we will also add a random incubation period for those people who just get infected since they will not be tested for no symptoms and can still infect other people.

Design:

For the 3 social norms, the prisoner will have different probability to get infected or infect others. We will not consider the R(removed population) in this simulation, so there will only be S(susceptible population) in this case the health prisoners, I(Infected) is this case the infected prisoners, and IP(people in incubation period). We do not have the disease propagation parameters for now but there is an example:

	no mask	masks for sick	masks for everyone
S	Risk of being infected: high for all time	Risk of being infected: high while dining or close with IP	Risk of being infected: high while dining
I	Risk of infect others: High for all time	Risk of infect others: high while dining	Risk of infect others: high while dining
IP	Risk of infect others: High for all time	Risk of infect others: High for all time	Risk of infect others: high while dining

Evaluation

We will use no mask as the baseline and compare the improvement of non-infection rate between different social norms to see which way is the best and we will use plots to vitalize the result. We will also do analysis about which location that the prisoner has the highest chance to get infected and compare it with different social norms.