Final Project Report CS443
Group Members:
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Topic: COVID-19 Spread Simulation

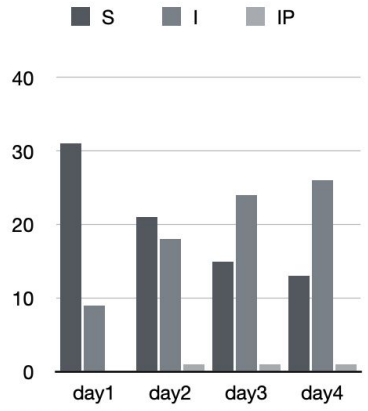
Introduction:
We simulated the COVID-19 infection spread use the data from the SIR model of infection speed to test the effect of different social norms (face mask) and analysis it with diagrams.

Design:
We designed a prison with 40 prisoners and give them different roles at different times. We used the chance of getting infected with close contact from a research paper about COVID-19 (about 3%) and simulated the spread in prison.
The 3 social norms will be no mask for all, masks for infected people, and masks for everyone. 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).

	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

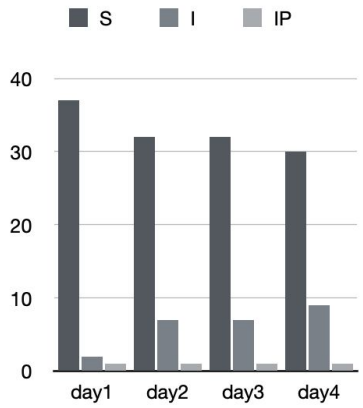
Result&Evaluation:
No masks:

no mask	day1	day2	day3	day4
Number of S	31	21	15	13
Number of I	9	18	24	26
Number of IP	0	1	1	1



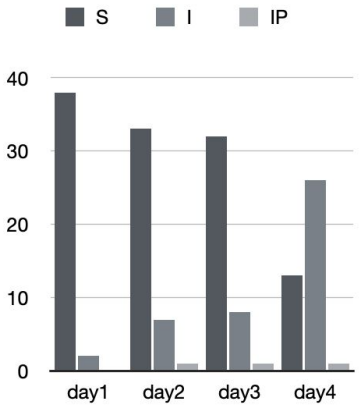
Masks for all:

mask for all	day1	day2	day3	day4
Number of S	37	32	32	30
Number of I	2	7	7	9
Number of IP	1	1	1	1

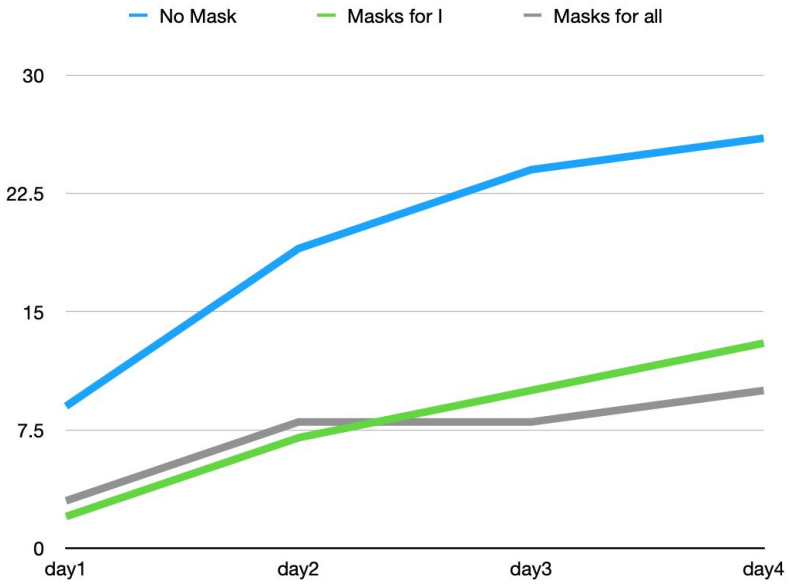


Masks for infected people:

mask for I	day1	day2	day3	day4
Number of S	38	33	30	26
Number of I	2	6	9	13
Number of IP	0	1	1	1



Compare the infected people with different social norms:



We use the group of no mask as the baseline and can see after the four-day simulation, the number of people gets infected is decreased in the group with masks. The group that only infected people wear masks has 48.1481% decreased from the baseline and the group that all wearing masks get 62.963% decrease from the baseline. (the lower the better).

Demo:
no masks: https://youtu.be/oPd7fdMBVuM
masks for all: https://youtu.be/klBcFb4-MKc
masks for infected: https://youtu.be/0YtoYNKkeq8