Effectiveness of Quarantine for Flattening the Curve, and Costs on the Individual: a COVID - 19 Simulation

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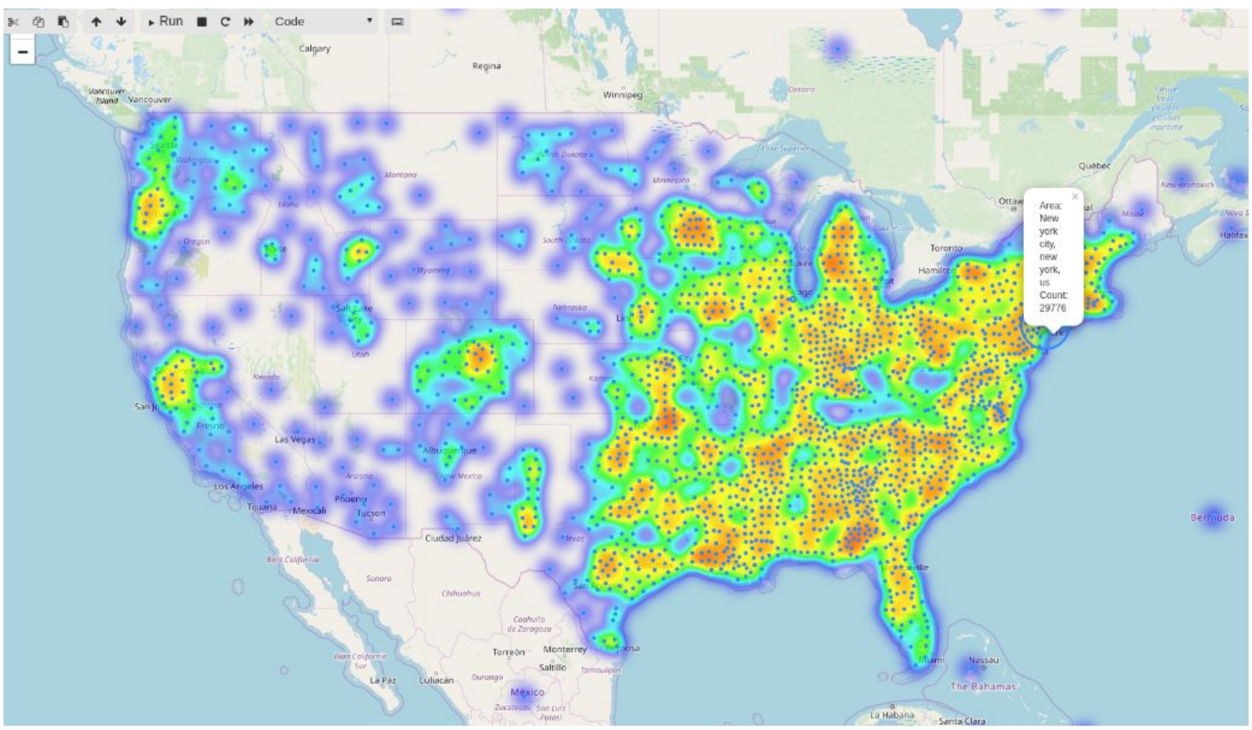
In this project, we will be building a machine learning model to discuss the spread of the Corona Virus as well as the effects on individuals.

Heatmap on COVID Data

Jason found a database online that is updated every day to every two days with COVID-19 statistics. We used the data to create a visualization heatmap using the Jupyter notebook. The heatmap gives us an idea of current outbreak points. It's based on [this Github dataset] and maps data groupings by cities that have at least one case, and display counts of Recovered, Confirmed, and Deaths in that city. **The density** of Infection is also easily visualized via the size of the rings around a city (bringing to light cities like New York, and those in Europe).



Continuing on, a pathway we could take is to further research this data by utilizing time series prediction models. How far is this virus predicted to spread? What are some things that will make the virus

Another pathway we're interested in testing how effective quarantining has been to "flatten the curve" in an interesting way: via simulation. In a simulation of people taking on their daily activities, what is the likelihood of infection if you are just going to the grocery store, or just delivery or takeout but otherwise staying home.

Simulation Deliberation:

1. By building a simulation, we will study the effects that viruses similar to COVID-19 would have on a small community of peeps.
2. We start our community with a population of 100 peeps.
3. A roll is a simulation step in which a peep can travel from home to go to the store, spend a roll at the store, then spend a roll going back home.
4. The peeps have three main personalities: homebodies, semi-homies, and outgoers.
5. The homebodies can only go to two locations: home and to the store when they run out of supplies.
6. The semi-homies travel from home to the store and the park.
7. The outgoers travel from home to restaurants, stores, parks, retail stores, and parties.
8. We have rules for the virus such that it may exist on a peep for a random value between and including 7-14 rolls.
9. When a peep gets the virus, there is a 1 out of 25 chance they will die immediately, but the risk is only taken at the start of an infection.
10. The virus can stay in a location for 2 rolls, infecting peeps at a rate of 2%.
11. Supplies are what keeps the peeps alive, and one supply is used per day.
12. Peeps go to the store for supplies and buy a random amount of 1-14 supplies, except for homebodies who always buy 14 supplies, but their chance at infection is doubled.
13. A peep gets the virus by going to a contaminated location and a location becomes contaminated from an infected peep.
14. When a peep has the virus, it does not leave its house - not even to get supplies at the store, except for the outgoing peep, who is a total jerk and doesn't care about anyone else.
15. Once a peep has the virus then the virus doesn't spread or stack. Meaning, if the virus is already lasting for 4 days on a peep, that number will not grow to 8 days.
16. Once a peep has recovered from the virus, they are immune from getting the virus again.
17. If a peep has the virus and runs out of supplies, and if they are unable to go to the store, that peep dies.

An example run of the simulation would go as follows: a homebody peep goes to the store because it ran out of supplies. The store is infected, and the unlucky homebody peep gets the virus due to its infection rate being doubled. The peep is even more unlucky when the virus decides to last on him a whopping 14 days. At the end of the 14th day, the homebody peep runs out of supplies and dies of the disease.

This example is the kind of insight we want to gather in our project. The peep did what it was supposed to do and died anyway. But, how much death of homebody peeps would happen on a simulation of 100 rolls? 1000 rolls? 10000 rolls? Would the virus eventually die out before peeps died out? Through multiple simulations, we want to find out whether the level of homebody peeps be safe, helpful, or not important to the disease. Does the mortality rate increase or decrease linearly based on the number of personalities? Although simple, this simulation could be expanded to support populations of that of large cities with numbers that are more precise. This is only a small demonstration of how to challenge social-distancing and come up with new ways to mitigate viruses spreading.

Other Updates:
We joined this Devpost COVID-19 Hackathon

We attended this COVID-19 and AI Online Conference put out by Stanford which gave some really interesting insights to fuel our research. One such insight is that countries that were deemed most successful in containing their local outbreaks often implemented technology to combat the outbreak. Such a technology example is an app on people's phones that used Bluetooth to measure the likelihood of infection between individuals. It would inform people how likely it was that the outbreak had spread to a location near them so they could self-isolate before the first confirmed case was announced in their area.

Conclusion:
Jason made a heatmap.
Andrea attended a COVID-19 conference.
Fried Eggs make good Toilet Paper.
Simulation programming underway.