Analyzing University Response to COVID-19
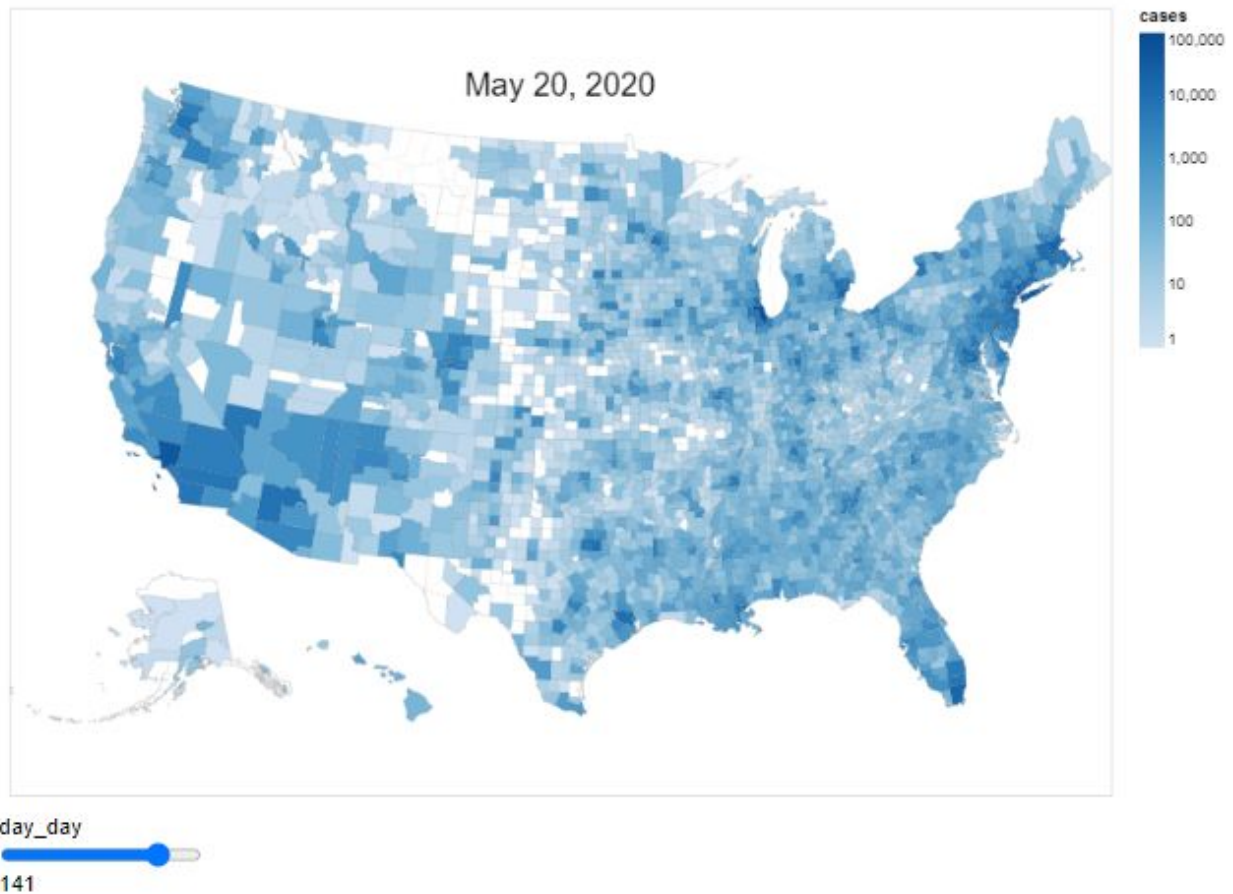
Team MASC off

Marc Mascarenhas, Aaron Alphonsus, Shashwati Shradha, Chang Xu

Over the course of the last few months, COVID-19 has drastically changed and affected lives and businesses all around the world. The following document does a case study on the impact of COVID-19 on universities across the United States of America.

For our study, we explored over [1000 universities who have announced their decision](#) for whether they are going to conduct classes in person or online next semester. There are 6606 universities in the US. While this data is not truly representative of all the universities in the US, it is big enough for us to see possible, non-causal trends.

The exponential spread of COVID-19 in the US from 01/22/2020 - 06/12/2020

The exponential spread of COVID-19 in the US from 01/22/2020 - 06/12/2020

May 20, 2020

cases
100,000
10,000
1,000
100
10
1

day_day

141

One sector that is especially facing the repercussions of the virus is the university system in the US. The above graph shows the exponential spread of COVID-19 in the US from January till June. The link to the interactive plot is here.
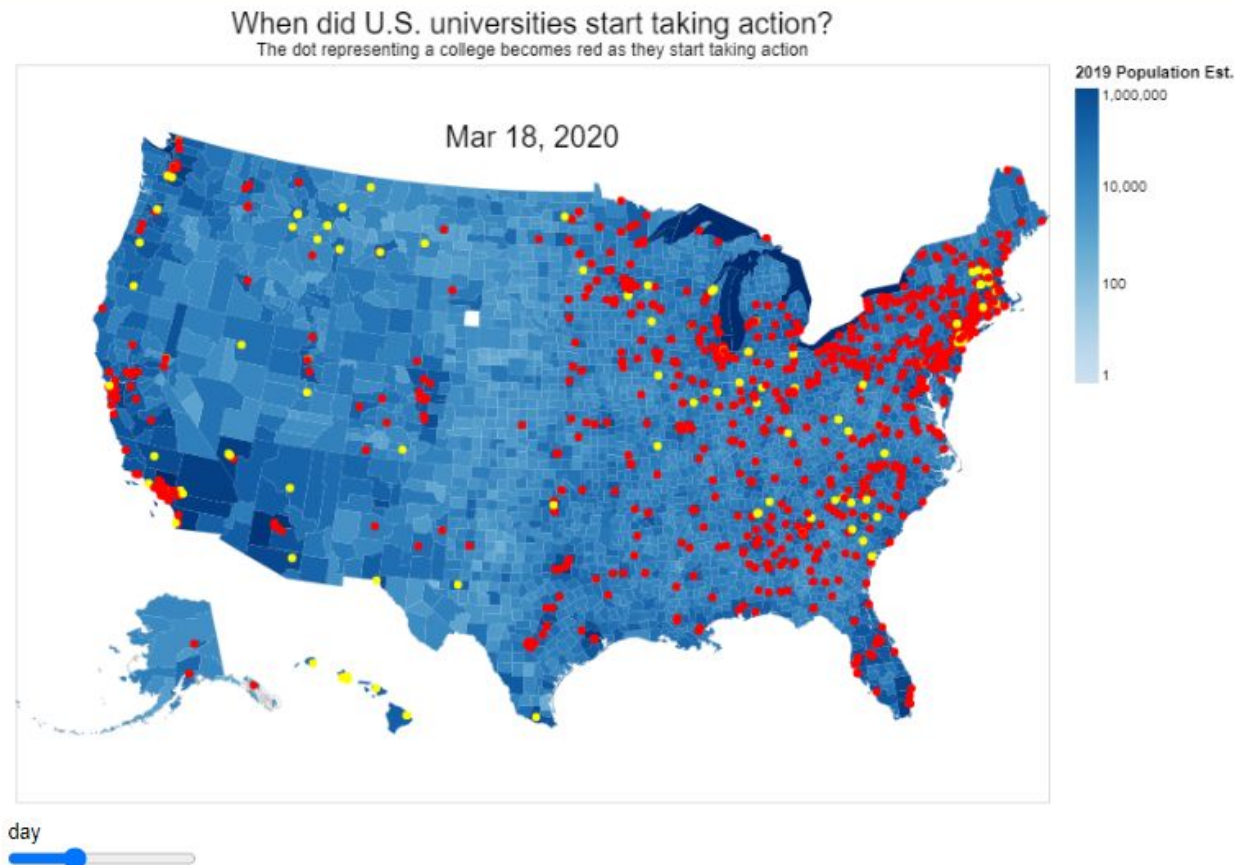
Universities started to take measures to combat the implications of the virus in early March. There are many factors that drove the decision-making process at each of the colleges.

- Are private colleges more likely to have in-person classes?
- Has the pandemic disproportionately affected lower ranked colleges?
- What has been the response of colleges which heavily depend on tuition from out-of-state and international students?
- Are Research universities more likely to do in-person classes?

We are interested in understanding the motivations and timelines behind how universities in the US have responded to COVID-19. This decision will impact the number of students enrolling in the university, the number of international students, the type of courses covered, the businesses around the university, and overall health of the education system in America.

When did U.S. universities start taking action?

Colleges started taking action vis-à-vis the virus in early March. We collected data of the population densities in each county and plotted the university response over time. As you can see in the below graph, some colleges were more proactive than others:

The population is indicative of the risks of spreading COVID-19. The universities that took earlier actions were in regions along the coast that have high population density.
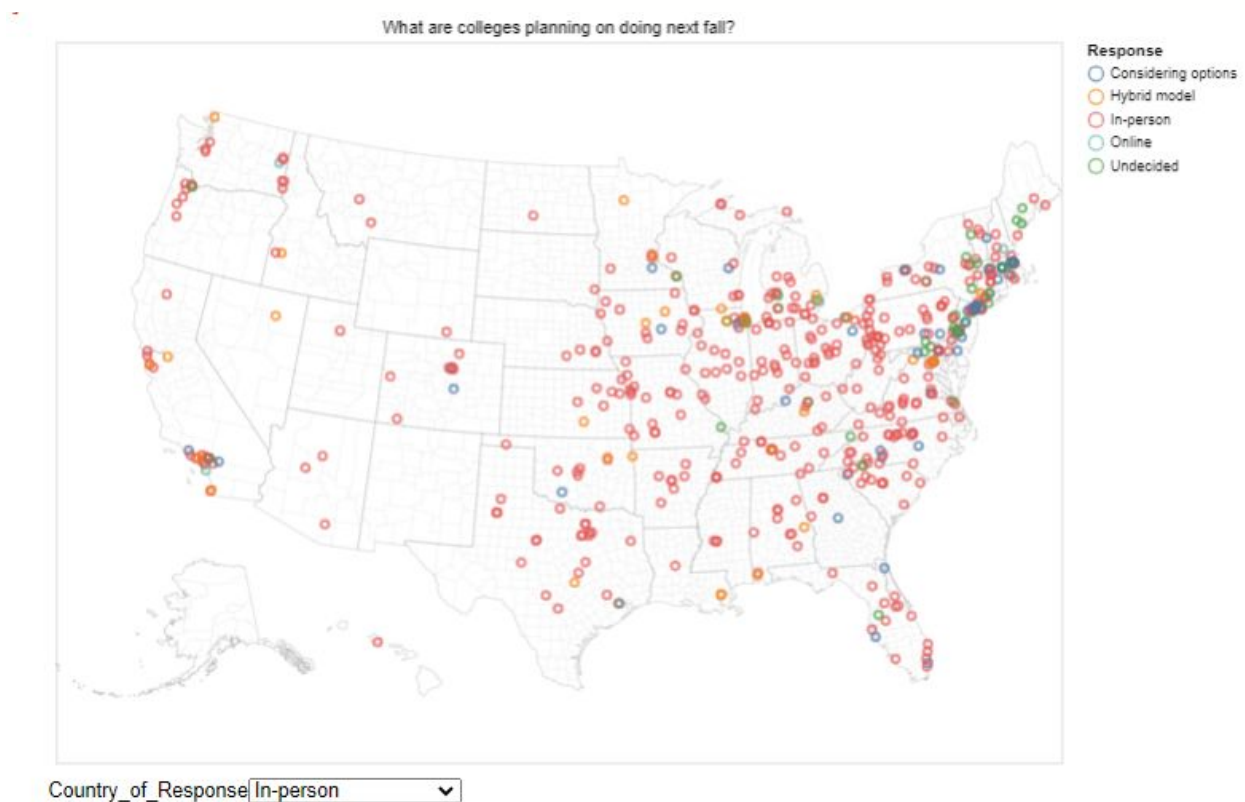
Exploring the response of universities

As the Fall 2020 semester is approaching, universities are in a tough spot to make a decision about their medium of instruction for that semester. The risks and spread of the virus is increasing everyday in many cities. While some universities have announced their decision, others are still waiting to make a decision. The following section discusses the driving forces that were behind their decision making process.
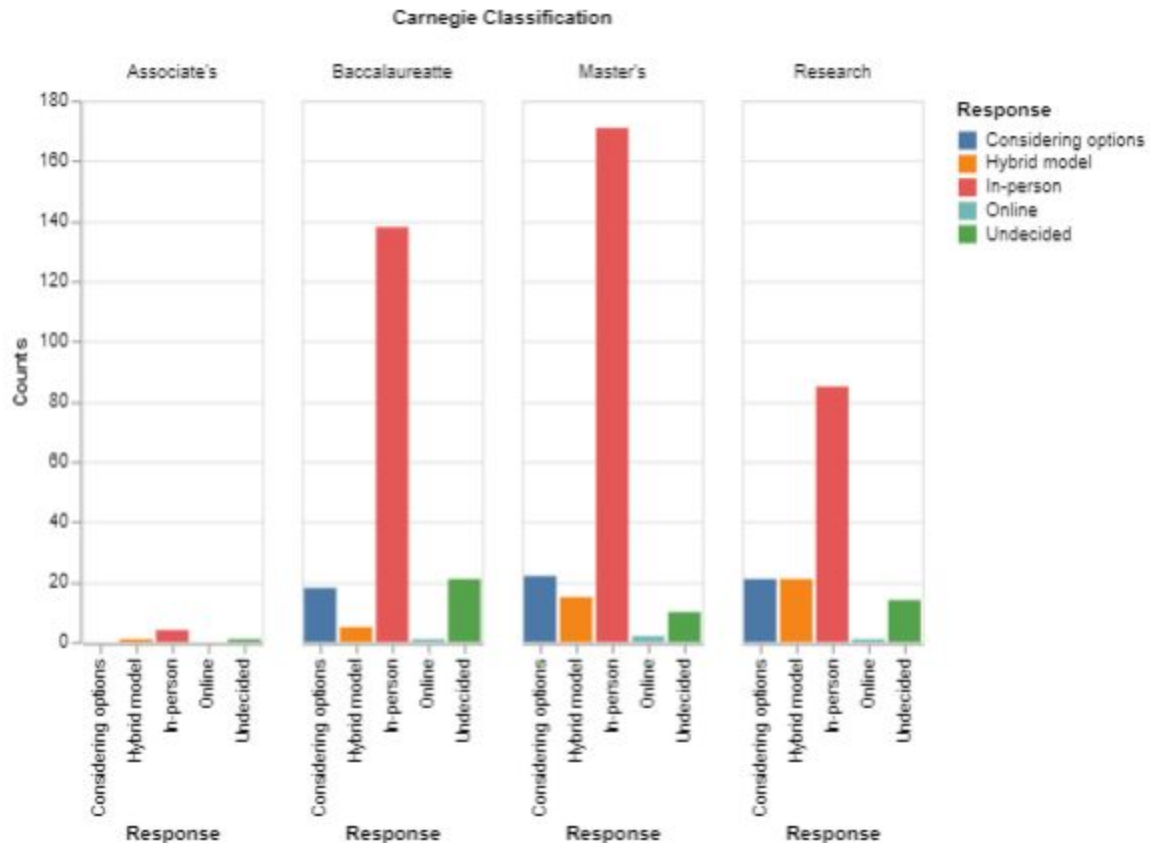
General response

In general, 66% of the universities are planning to go back to in-person classes. These universities are spread uniformly around the US. The universities that have not yet decided or are going with hybrid models are mostly located around the coast.

Factors affecting the response

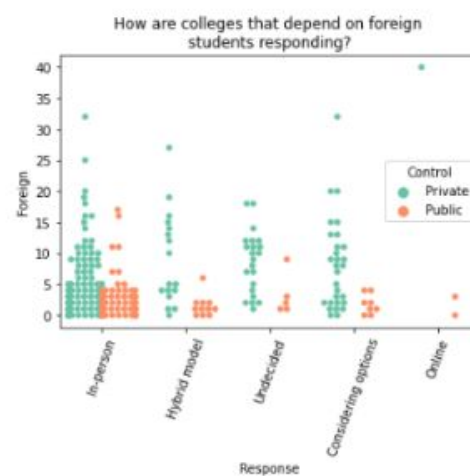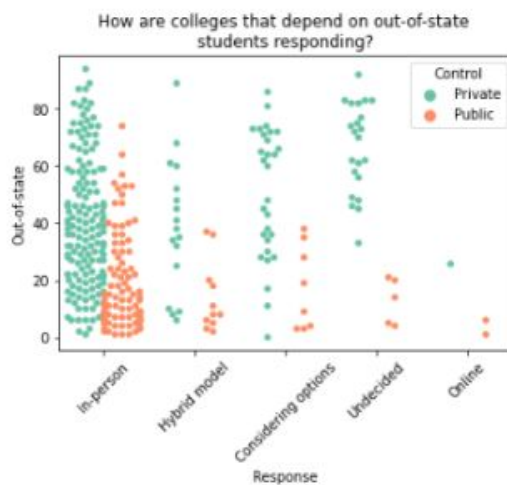# Carnegie Classification of universities

The Classification is a framework of categorizing the various colleges and universities in the United States. It primarily serves educational and research purposes, often being used to study institutions that are roughly comparable. According to the plot, Research universities are less likely to go on-line.

Foreign and out-of-state universities (% of students that are out of state/foreign)
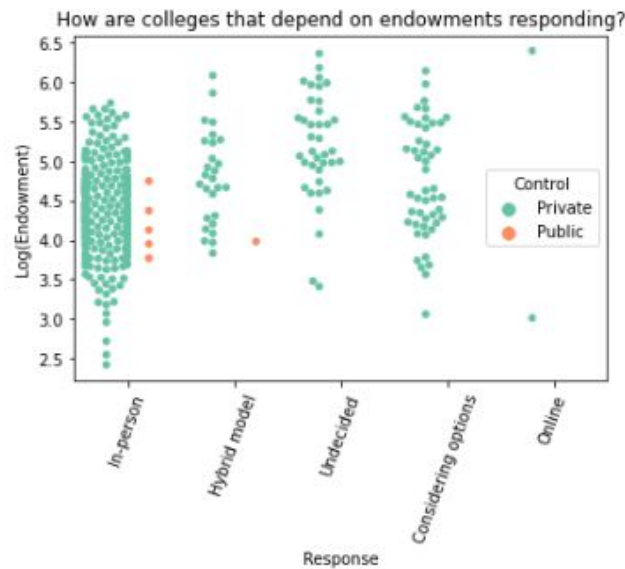
We hypothesized that colleges that depended on international students and were would likely wait for more clarity vis-a-vis the visa situation issued by the US embassy before making a decision for next fall. There were some weak trends to that effect.

We also noticed that a large majority of private colleges that heavily depended on out of state haven't yet made a decision about next semester. The public colleges that depend on out of state but made a decision most likely made one as they had to follow the rules of the state government of whose money they more heavily depend on.
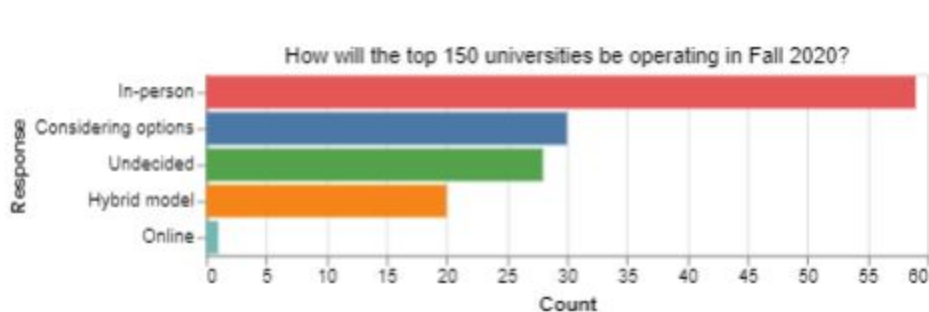
College endowments

The data that we found for college endowments was mostly for private universities. We hypothesized that colleges with less endowment were more likely to have in person classes. However we didn't notice anything that would greatly support that hypothesis.

College ranking

Most of the top 150 universities will be operating in-person instruction, as in-person instruction in general provides better educational experience. However, there is still a great number of universities that are still considering options and have not decided the means for instructions this fall as there is still much uncertainty under the COVID-19 situation.

Conclusion

In conclusion, it was really interesting to see the way the universities in the US responded to COVID-19. There were various factors that affected the response such as the geographic location, the population, funding, and the percentage of international and out-of-state students. The behavior of the top 150 universities varied based on this too. Overall, most universities are still planning to have in-person classes this Fall.

Some future work that would be interesting to look at would be to use clustering algorithms to understand what the undecided universities and the universities that are still considering different options are most likely to do and studying how the size of the city or town in which the university is located impacts its decision.

Datasets

- Colleges planning to reopen in Fall 2020: https://www.chronicle.com/article/Here-s-a-List-of-Colleges-/248626.
- Population estimates by county in 2020: https://www.ers.usda.gov/data-products/county-level-data-sets/download-data.aspx
- Kaggle American universities datasets: https://www.kaggle.com/sumithbhongale/american-university-data-ipeds-dataset
- School ranking data: https://www.kaggle.com/peterpenner445/american-university-rankings-top-150
- The New York Times COVID-19 dataset: https://github.com/nytimes/covid-19-data