

Introduction

Different parts of Los Angeles County (LAC) dealt with COVID-19 differently

- 92,947 deaths in total
- 10.4 million cases

By using traffic patterns in different zip codes of LAC, we are able to see how effective the stay-at-home order was in different areas. This helps us better understand how disease control interventions might be more effectively used in future disease outbreaks.

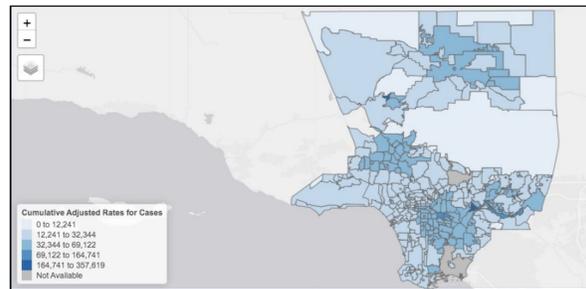


Figure 1: LA County COVID-19 Surveillance Dashboard

Objective & Impact of Professor's Research

The impact of Professor Suen's research is that it helps LAC understand how different areas were affected by COVID-19 and how busy different areas were during the quarantine. This allows LAC to properly allocate resources, testing centers, and vaccine locations for future disease outbreaks.

How This Relates to Your STEM Coursework

This program helped give me an idea of what industrial systems engineering is like. It also introduced me to Python programming and allowed me to learn how to use this programming software.

Skills Learned

Python Programming

- Programming using Google colab and different packages such as pandas and pickle

Data Interpretation and Data Cleaning

- Taking full sets of data and removing unnecessary information
- Interpreting data and finding means/medians of datasets to better understand the data I was given

Statistical Tools

- I used hypothesis testing to see if different demographics of people were affected in a statistically significant way to other demographics
- I used regression analysis to see if there were any significant values of different demographics of people related to other demographics
- I also learned PCA Analysis, as shown below. PCA is a way of interpreting data sets with a large number of variables and making dimension reductions.

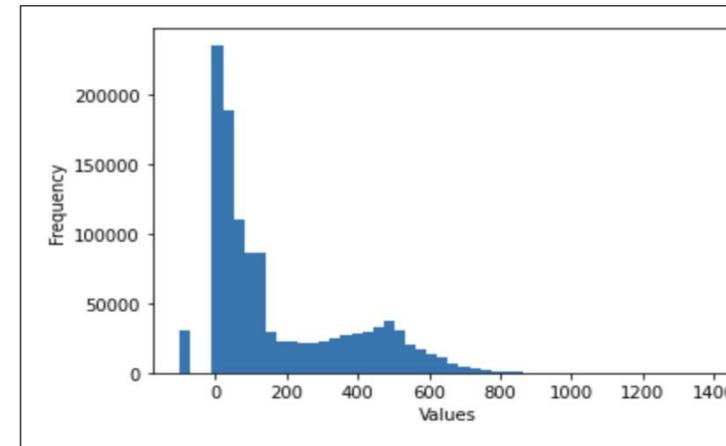


Figure 2: Frequency of of total number of Station ID's
the negative values are for station IDs missing values

Data Analysis

Data Visualization

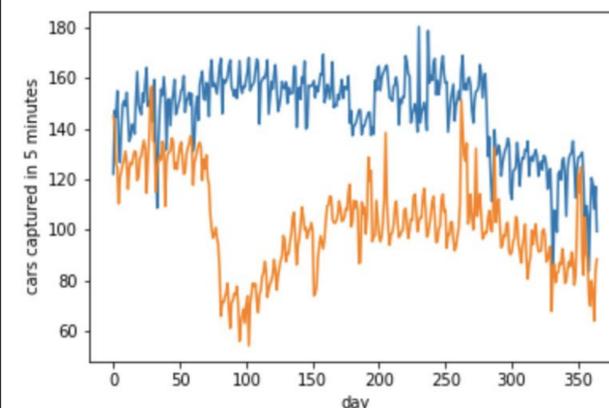


Figure 3: Traffic Data in Zip Code 90401 2019 vs 2020

- Blue: Traffic data in zip code 90401 in 2019
- Orange: Traffic data in zip code 90401 in 2020

Traffic flow decreased after COVID-19 hit meaning that at the beginning, the stay-at-home order was effective, but later in the year traffic begins to increase after the lockdown period ended.

PCA Analysis

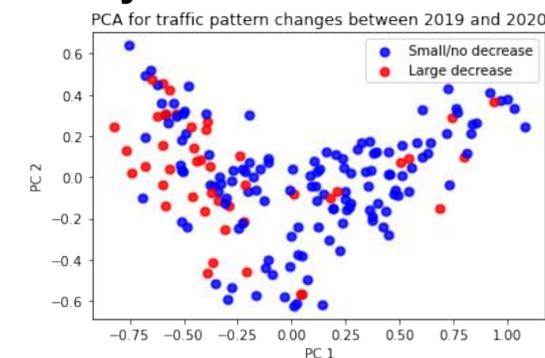


Figure 4: PCA Analysis diff 2 for different demographics in Los Angeles County

Between the dates of March 18th - May 18th 2020, area with a larger decrease in traffic flow tended to have a PC1 score, since there are more red dots on the left hand side of the graph. Since non-hispanic white and hispanic people have a greater impact on PC1 than other demographics, this could mean that these two populations have a stronger connection to the traffic flow change during the lockdown.

Next Steps for You

I will use the skills that I learned in the SHINE program to further my STEM education. This program also helped me realize how I like both programming and Industrial Systems Engineering and could see both as possible career paths.

Advice for Future SHINE Students

For future SHINE students, give the program a week or so because the beginning will most likely consist of giving you new information so it may not be the most interesting. After learning basic skills, the program is super fun!

Acknowledgements

Thank you to Professor Suen for allowing me to work on such an important project and always ensuring that I had new and engaging things to work on. Thank you also to my PhD mentor Suyan for helping me throughout my project and always answering any questions I had. Thank you to Dr. Katie Mills for being my center mentor, for always being available to talk and answer questions, and for creating this incredible program. Lastly, thank you to my parents for allowing me to participate in SHINE and always supporting my STEM journey.

References

Figure 1: "Map of Adjusted Rates for Cases by City/ Community." LA County COVID-19 Surveillance Dashboard - LA County Department of Public Health, 2022, http://dashboard.publichealth.lacounty.gov/covid19_surveillance_dashboard/