311 Noise Complaints in NYC in the COVID-19 Pandemic

By Elizabeth Walker

Background

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Periods of Study:

3 month period: March 1, 2019 to May 31, 2019, and March 1, 2020 to May 31, 2020

6 month period: March 1, 2019 to August 31, 2019 and March 1, 2020 to August 31, 2020

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3. NYC's 311 Call Center received more daily **residential noise** complaints in the first three months of the pandemic compared to the same period in 2019
4. There is a relationship between a **zip code's median income** and its percentage **change in overall noise complaints** from the six-month 2019 period to the six-month 2020 period.

Data

- “311 Service Requests from 2010 to Present” dataset from NYC Open Data
- Filtered dataset to find complaints whose
  - Complaint Type contains the word “Noise,”
  - Are between dates 1 January 2018 and 31 December 2022
- 4 main variables used
  - Date/time created, complaint type, complaint descriptor, zip code
- Primarily used Pandas, MatPlotLib, and NumPy/SciPy for my data analysis

Temporal + Spatial Processing

Temporal

- Splitting date string
  - Year
  - Month
  - Date
  - Hour
  - Day of Week
- Aggregating complaints by time period

Spatial

- Linked zip codes to neighborhoods
  - UHF Index
- Median household income
  - Census data

Calculating Percentage Change

$$\%\ Change\ in\ Noise\ Complaints = \frac{\#\ 2020\ Noise\ Complaints - \#\ 2019\ Noise\ Complaints}{\#\ 2019\ Noise\ Complaints}$$

Note:

2020 noise complaints = # made between March 1, 2020 and May 31, 2020

2019 noise complaints = # made between March 1, 2019 and May 31, 2019

Statistical Tests

- Ran paired t-tests on daily average noise complaint calls of the following types to determine **difference in daily calls** between three-month 2019 period and three-month 2020 period
  - All noise complaints
  - Residential
  - Vehicle
  - Street/sidewalk
  - Commercial

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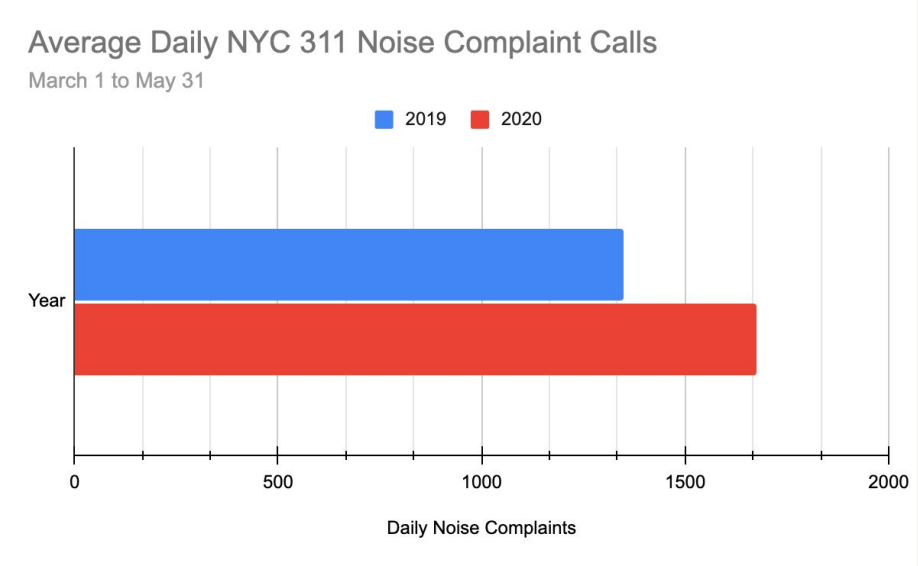
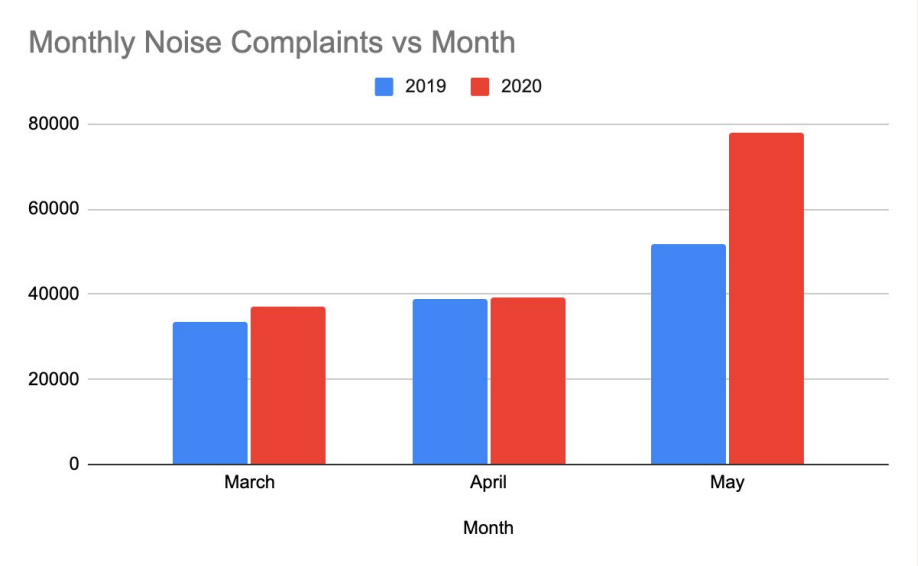
  - All noise complaints
  - Residential
  - Vehicle
  - Street/sidewalk
  - Commercial
- Ran linear regression to analyze **relationship** between a zip code's **median annual income** and its percentage **change in noise** from the six-month 2019 period to the six-month 2020 period

Results: Change in Daily Average Noise Complaints





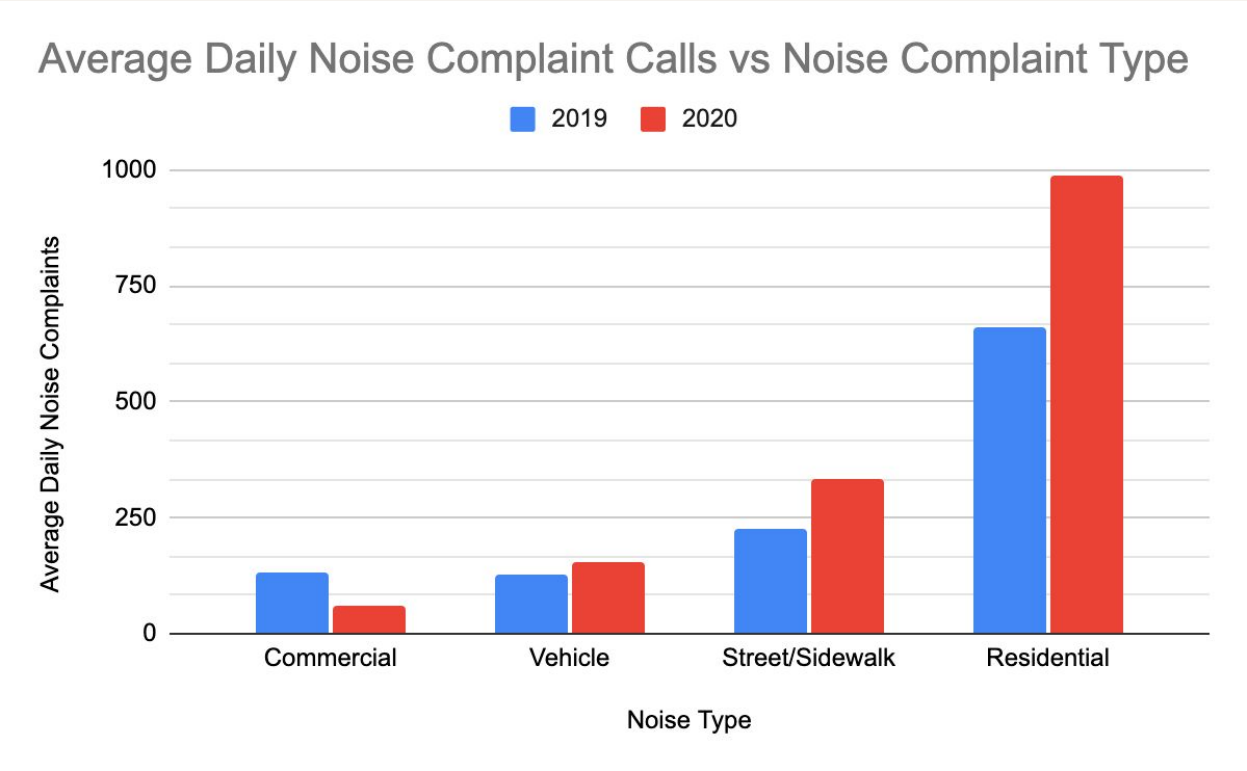
P-value < 0.001
Significant

P-value > 0.05
Not significant

P-value > 0.05
Not significant

P-value < 0.001
Significant

Results: Daily Average Noise Complaints (by Type)



Some *unexpected* results—Expected residential noise to be only increase

P-Values

Commercial: < 0.001

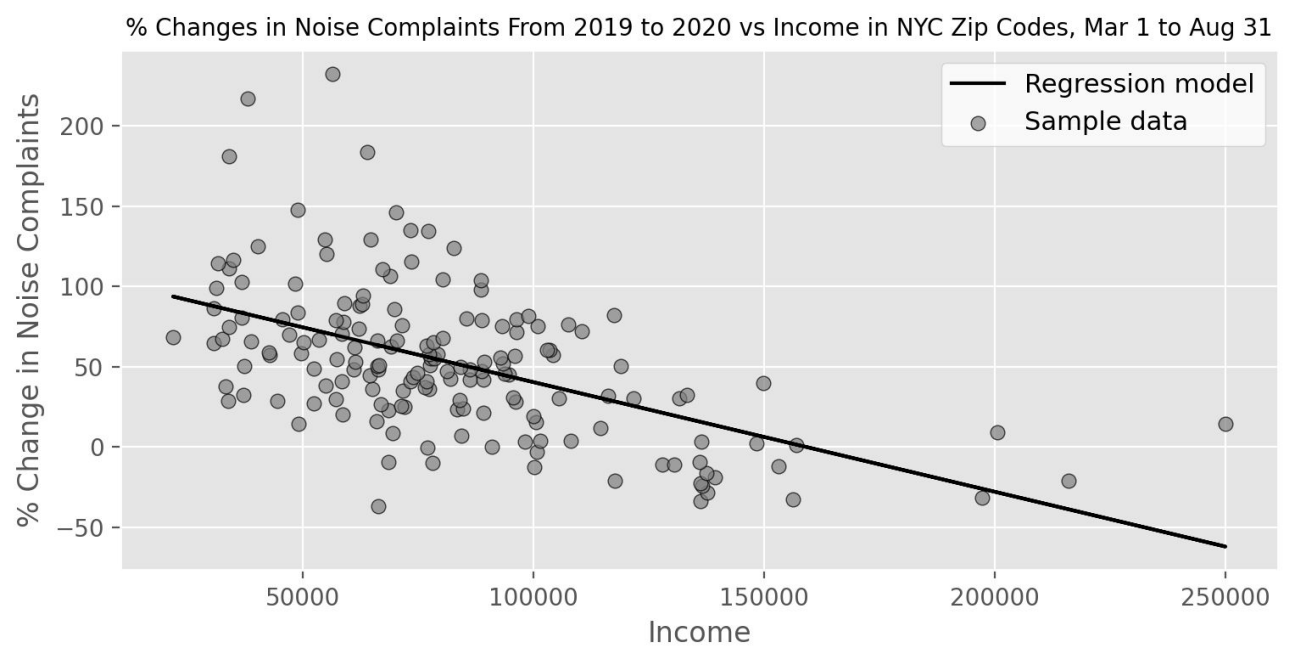
Vehicle: <0.05

Street/Sidewalk: <0.001

Residential: <0.001

All significant

Results: Income vs Change Noise Complaints Relationship



Model Equation

$y = -0.0006825x + 108.591$

R-Squared Value

$R^2 = 0.291$

P-Value: <0.001

Significant

Note: removed 10466 area code outlier

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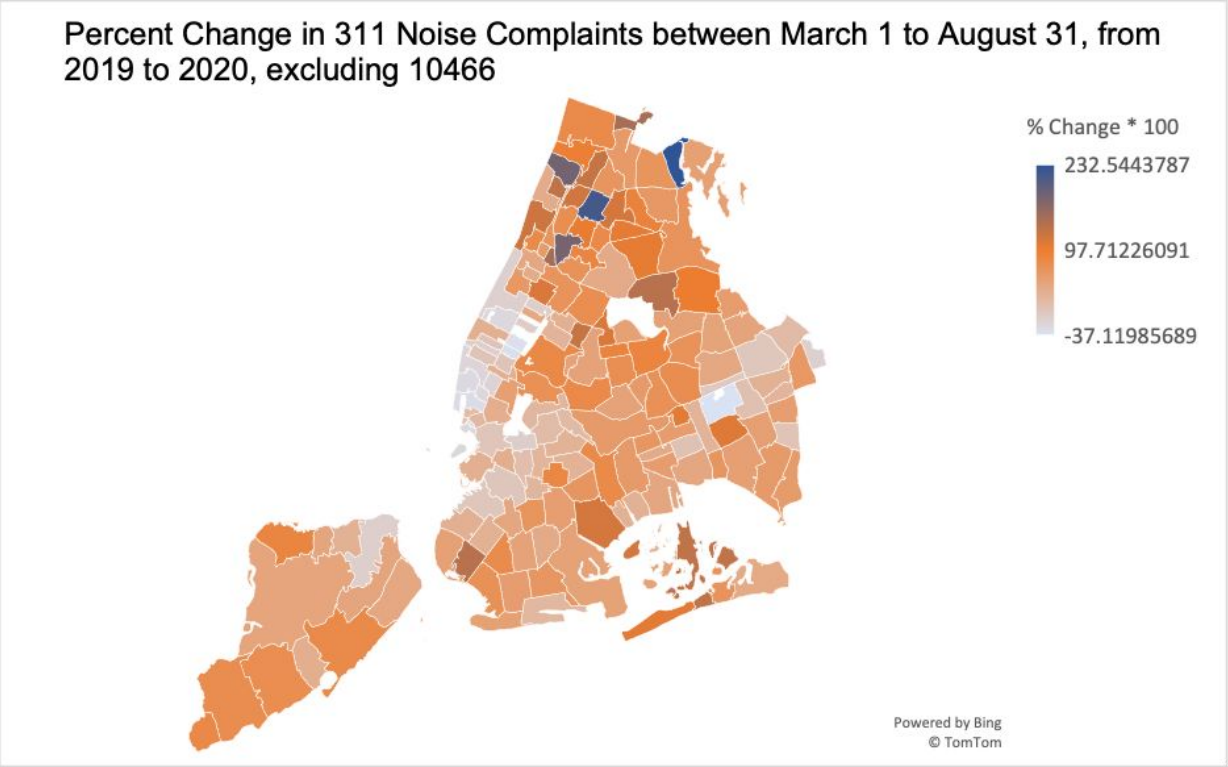

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    - Daily average **residential noise** calls
    - Daily average **vehicle noise** calls
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    - Daily average **vehicle noise** calls
    - Daily average **street/sidewalk noise** calls
  - **Statistically significant decrease** in
    - Daily average **commercial noise** calls
- Unexpected results: vehicle + street/sidewalk noise
  - Open Streets program
  - Changes in types of vehicle noise

Income vs Percentage Change Noise Complaints Discussion

- **Statistically significant relationship** between median annual income and percentage change in noise complaints in a given zip code from 2019 six month period to 2020 six month period
- As median annual income decreases, percentage change in noise complaints increased
    - Implications for low-income communities
    - Noise annoyance correlated with stress and anxiety

Conclusion

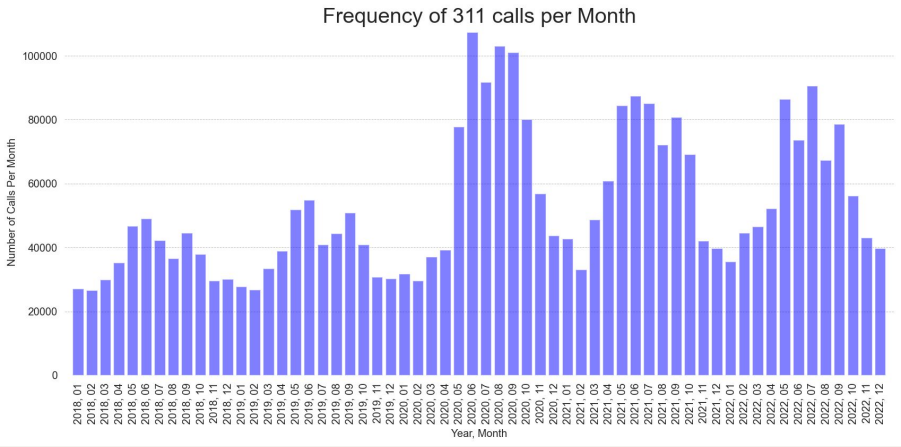
- Identified **significant increase** in the following call types made to NYC 311 Call Center
  - Overall noise complaint calls, residential noise complaint calls, vehicle noise complaint calls, street/sidewalk noise complaint calls
- Found **significant decrease** in daily average commercial noise complaint calls
- Discovered **significant relationship** between a zip code's median income and its percentage change in overall noise complaints

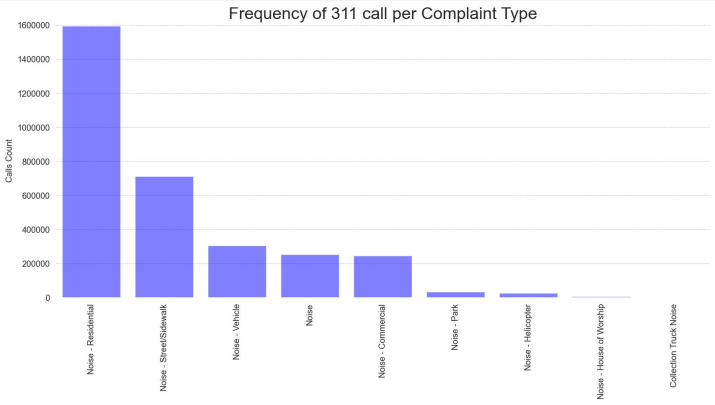
Main Takeaway: Super fun project getting to do data exploration on a large dataset and finding many significant findings using a ton of Python libraries!

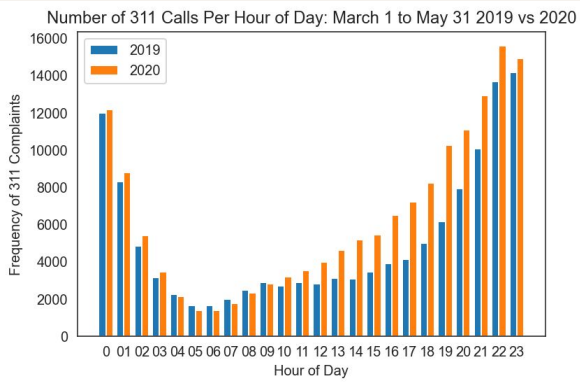
Future Work

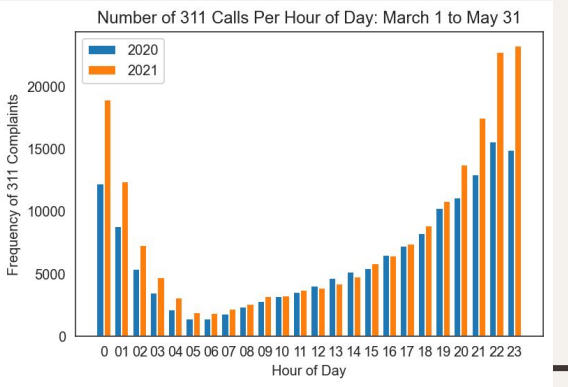
- Changes in number of noise complaints by hour of day + day of week
  - Made graphs for these, but no significance testing yet
- Expand timespan to include more pandemic noise complaints
- Noise annoyance prevention techniques
  - Particularly in low-income communities

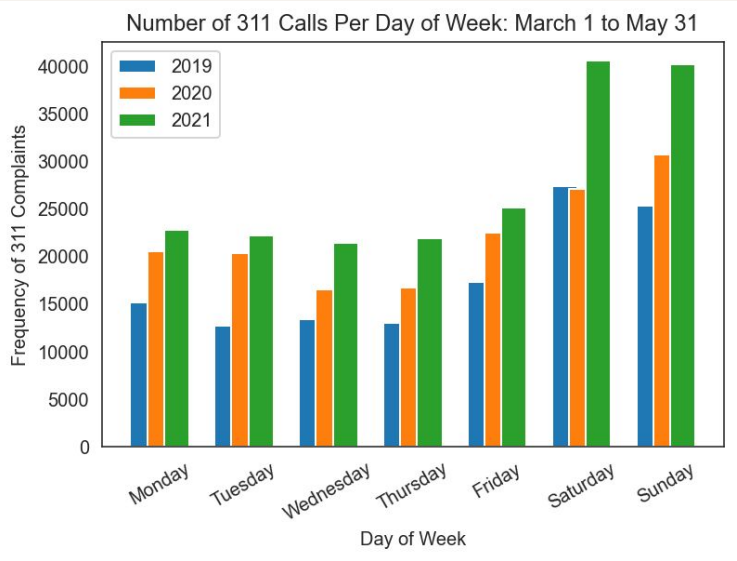
Bonus Graphs











Thank you!

Questions?

ejw2173@columbia.edu

elizabethwalker.site