



MTA Turnstile Activity Analysis

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Introduction

- Motivation –
 - Finance professional, interested in the linkages between unstructured data and the economy.
- Objective –
 - Study the relationship between MTA turnstile data and business activity in NYC.
- Goal –
 - Attempt to find answers to key questions:
 - Is there a link between turnstile activity and business activity?
 - How has the pandemic impacted MTA ridership and business activity?
 - Has business activity and ridership recovered to pre-pandemic levels?

Methodology

Data –

- MTA Turnstile data
 - Metropolitan Transportation Authority
- Legally Operating Businesses
 - Department of Consumer Affairs (DCA)
- COVID-19 Daily Counts of Cases, Hospitalizations, and Deaths
 - Department of Health and Mental Hygiene

Metrics –

- COVID-19 NYC daily case count frequency
- Business license creation frequency
- MTA turnstile activity aggregation

Methodology

Tools –

- Python3
 - pandas
 - matplotlib
 - seaborn



matplotlib

- SQLite
 - DB Browser for SQLite
 - SQLAlchemy



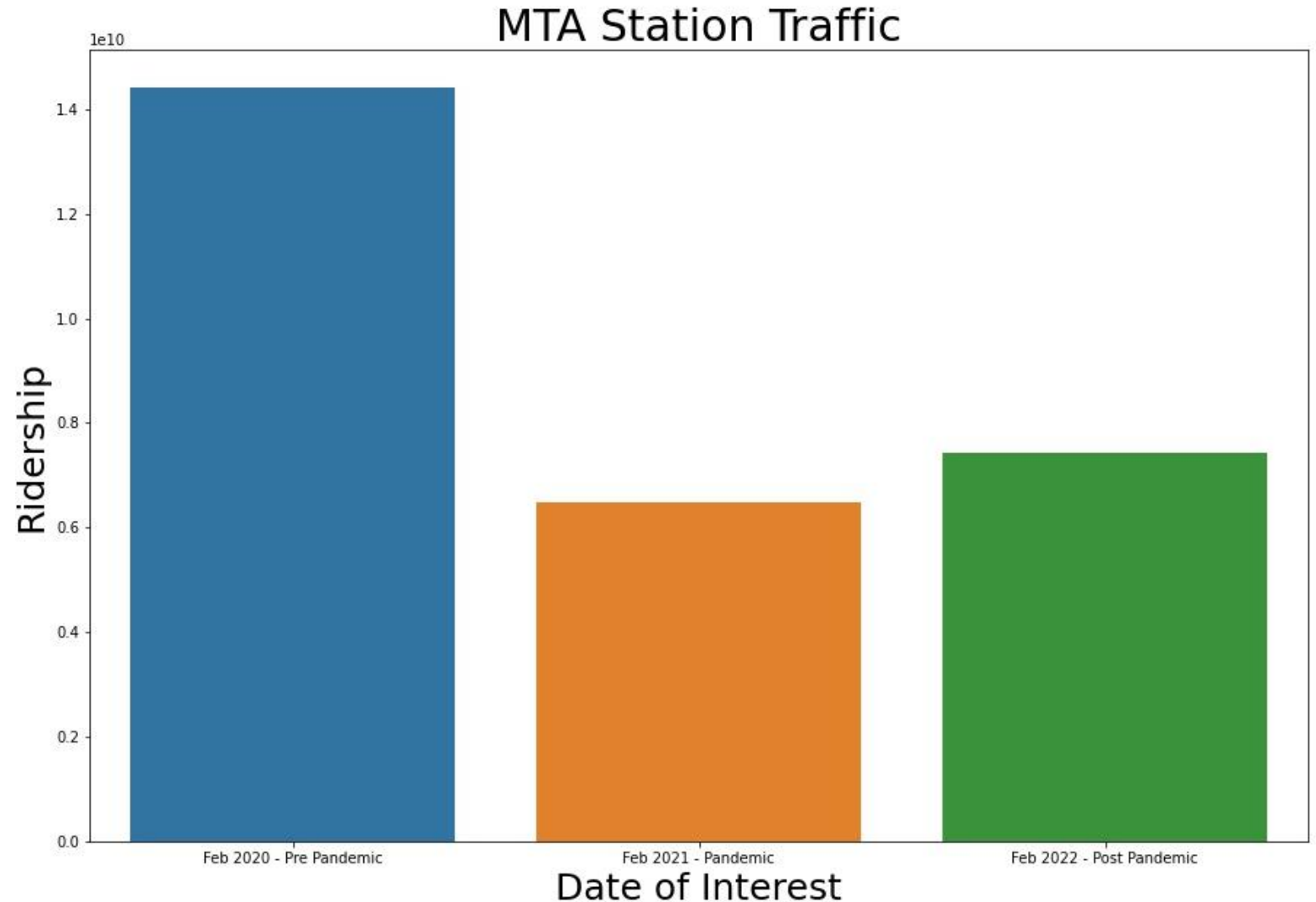
SQLAlchemy

Data Usage –

- MTA turnstile activity aggregated at the station and system level
- COVID-19 daily case counts measured over time
- Legally issued business licenses as a proxy for business activity

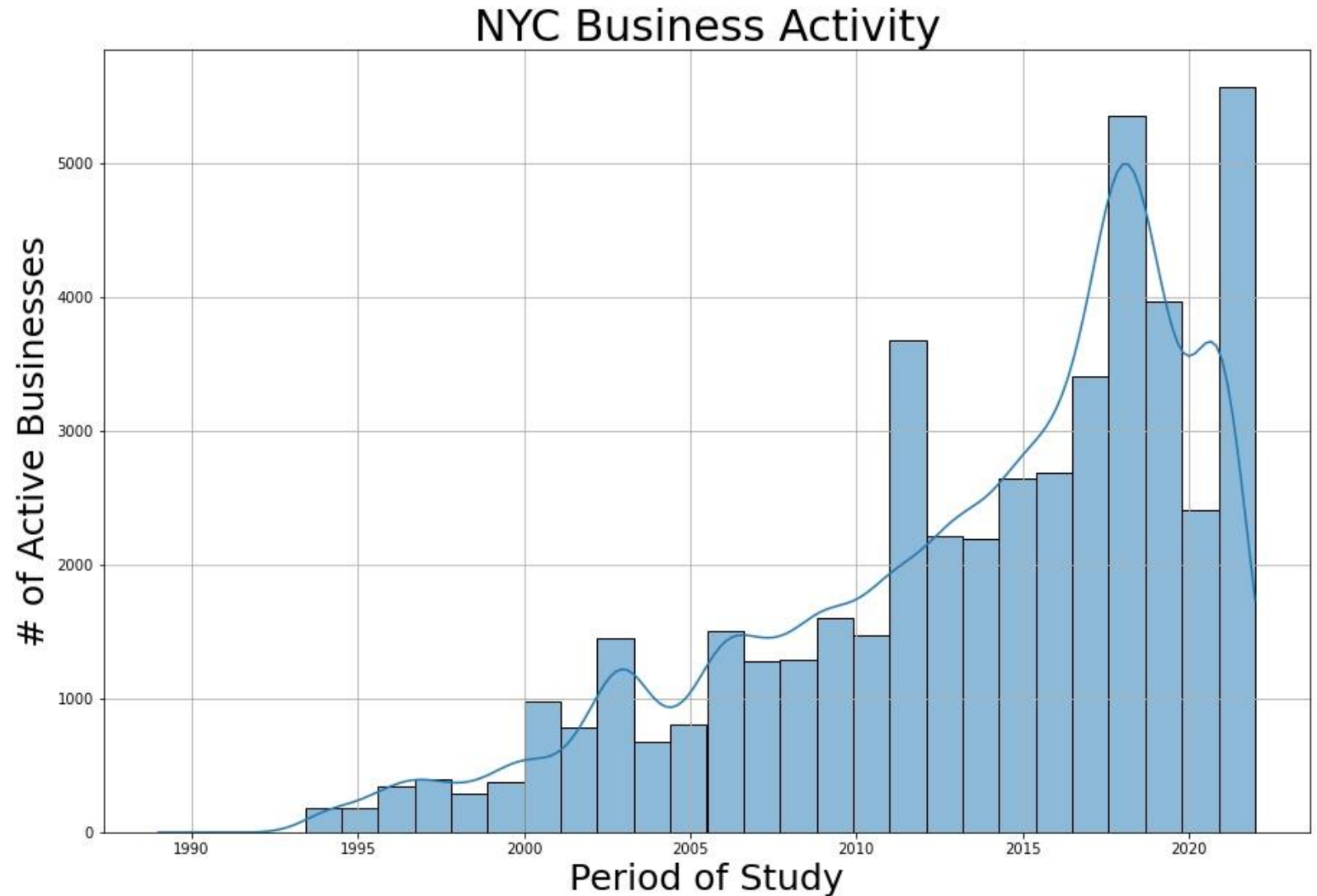
Results

- MTA Ridership hasn't returned to pre-pandemic levels
- Measure – turnstile activity aggregated at the station level and then aggregated up to the macro system level
- Recovery has been gradual. What gives?



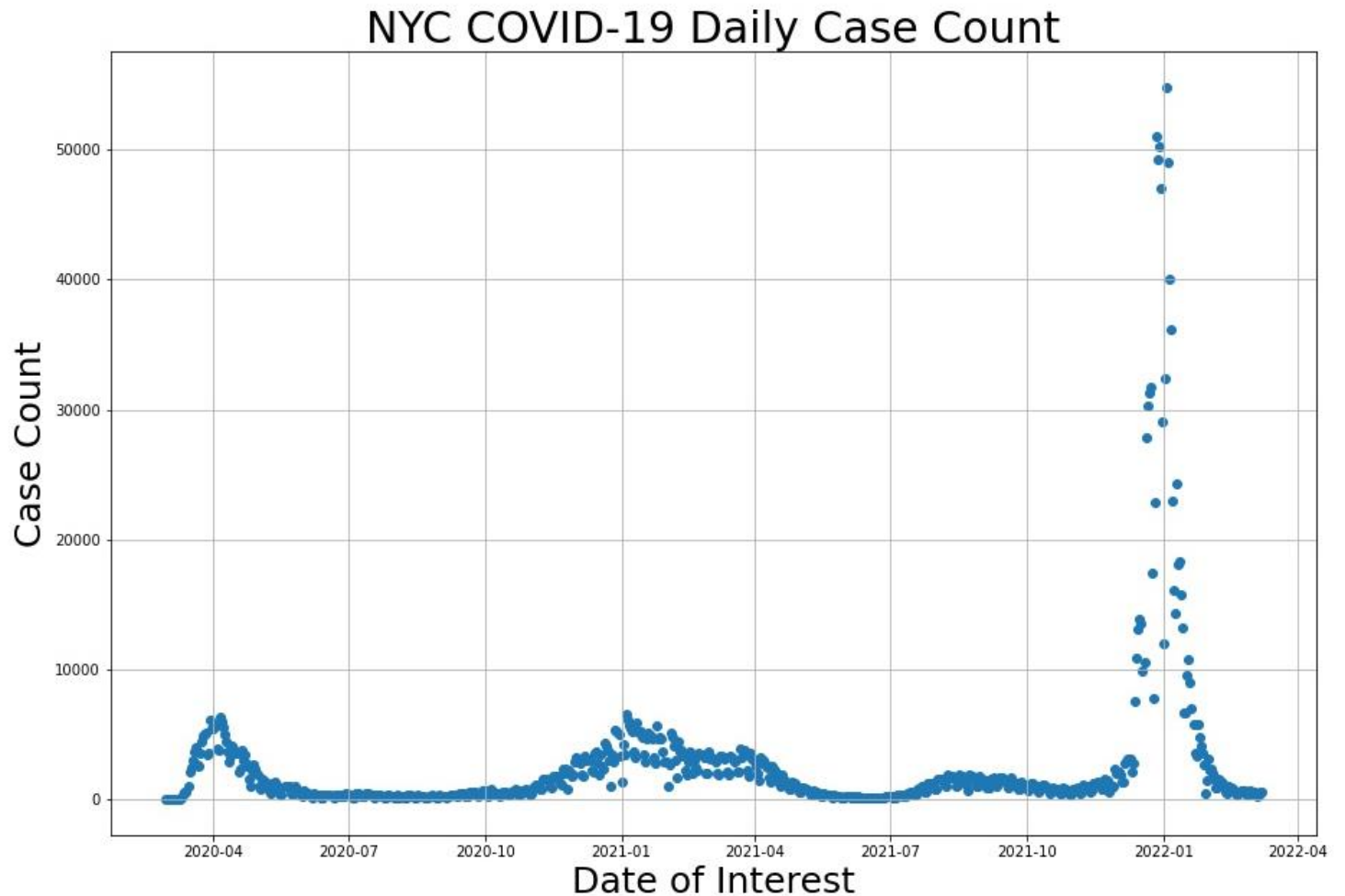
Results

- Business activity measured as business license creation, dropped dramatically in 2020
- Business activity has rebounded strongly and, surpassed pre-pandemic levels
- Why hasn't MTA ridership experienced the same magnitude of recovery?



Results

- COVID
 - Delta variant first detected February 23, 2021 in the US.
 - Omicron variant first detected December 1, 2021
- Have MTA riders become more risk averse to public transportation due to prior COVID outbreaks?
- Why has the magnitude of change in business activity been so much greater than MTA ridership post-pandemic?



Conclusions

- There doesn't seem to be a strong link between MTA turnstile activity and NYC business activity using legally operating business licenses as a proxy. A correlation study may yield more information.
- MTA ridership has not recovered to pre-pandemic levels, however, business activity has rebounded strongly.
- The pandemic seems to have impacted ridership recovery to a greater degree.
- Is this a trend or an actual shift to alternate modes of transportation?

Future Study

- Correlation study between ridership and business activity. Was the correlation greater in the past?
- Have new forms of transportation permanently reduced MTA ridership?
- Does the relationship look different if the focus is shifted to specific neighborhoods?
- How does the increase of Work-From-Home impact ridership in the future?

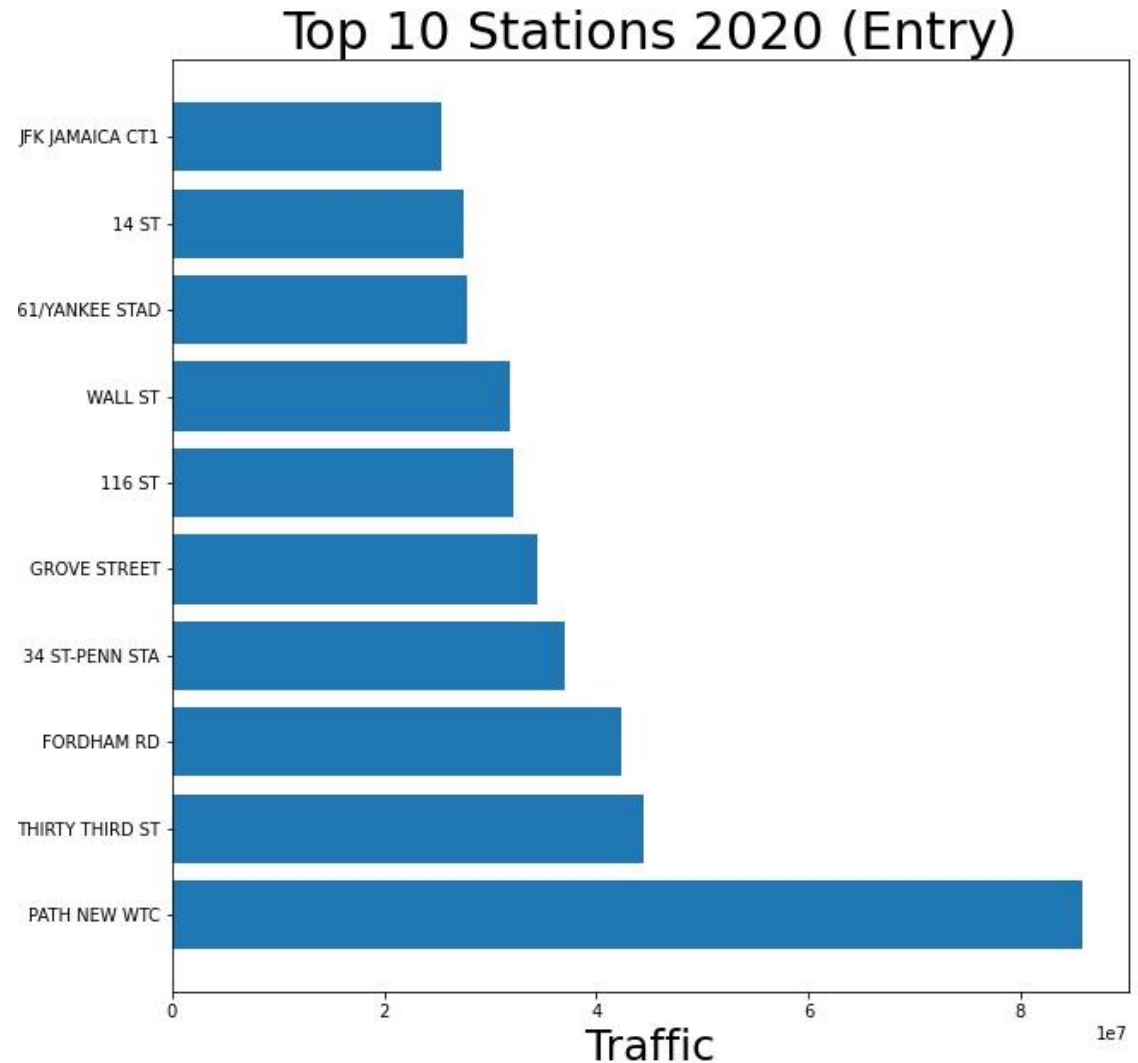
Appendix

Top 10 Station Analysis

Top 10 station composition has changed from pre-pandemic to post.

New WTC is way out ahead in 2020.

Further inspection of data required to verify results.



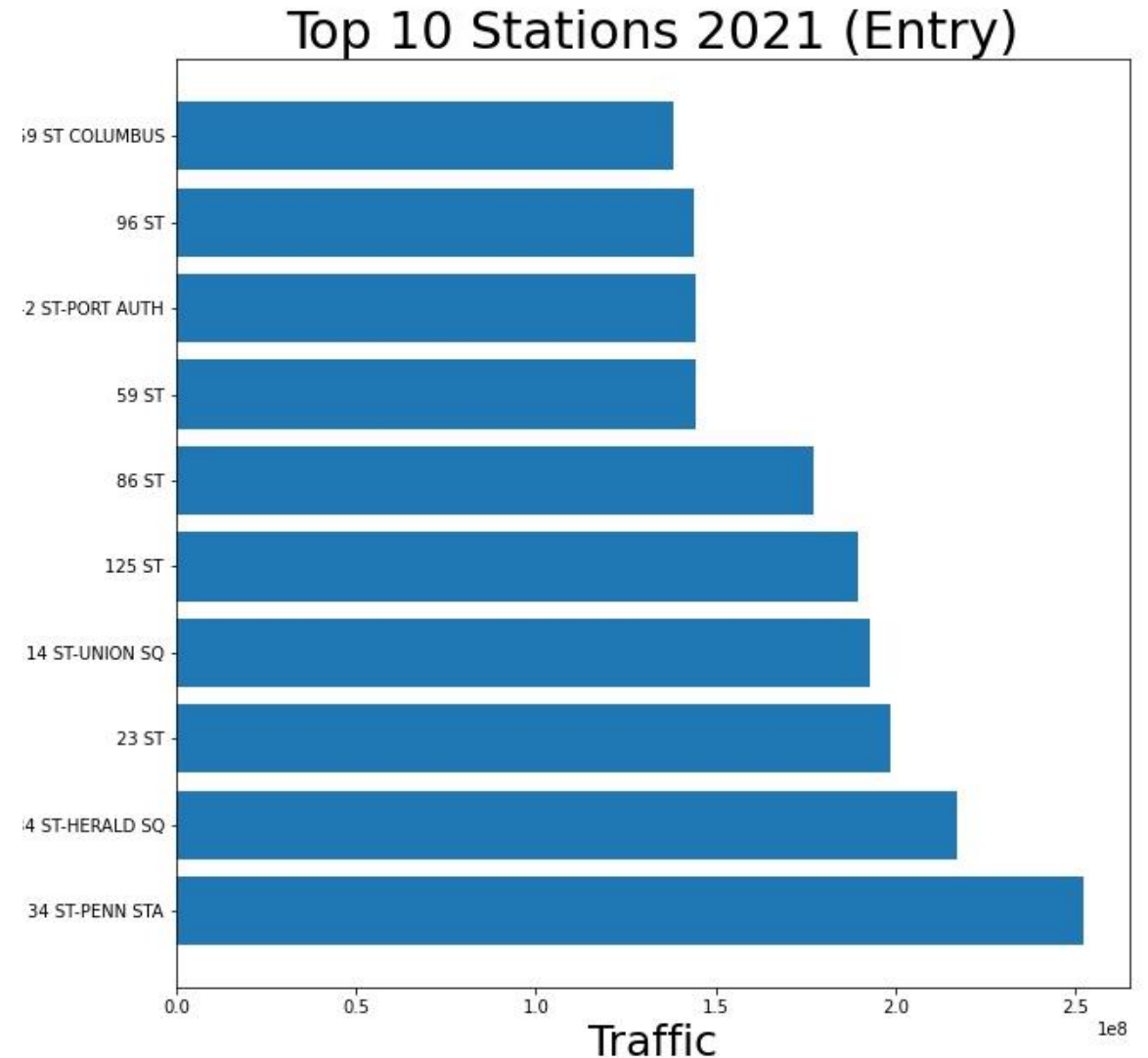
Appendix

Top 10 Station Analysis

2020 # 1 station was WTC.

Why did it change to Penn Station?

Does this imply there are more people traveling to the city for recreational activities?



Appendix

Top 10 Station Analysis

2021 # 1 station was also Penn Station.

Times square broke into the top 10 in 2022.

Does this data point support the conclusion that more people are traveling to the city for recreation?

