



# MTA Turnstile Activity Analysis

# 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

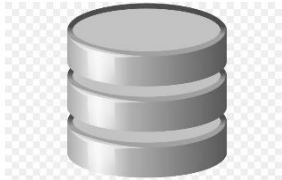
## Tools –

- Python3
  - pandas
  - matplotlib
  - seaborn



**matplotlib**

- SQLite
  - DB Browser for SQLite
  - SQLAlchemy



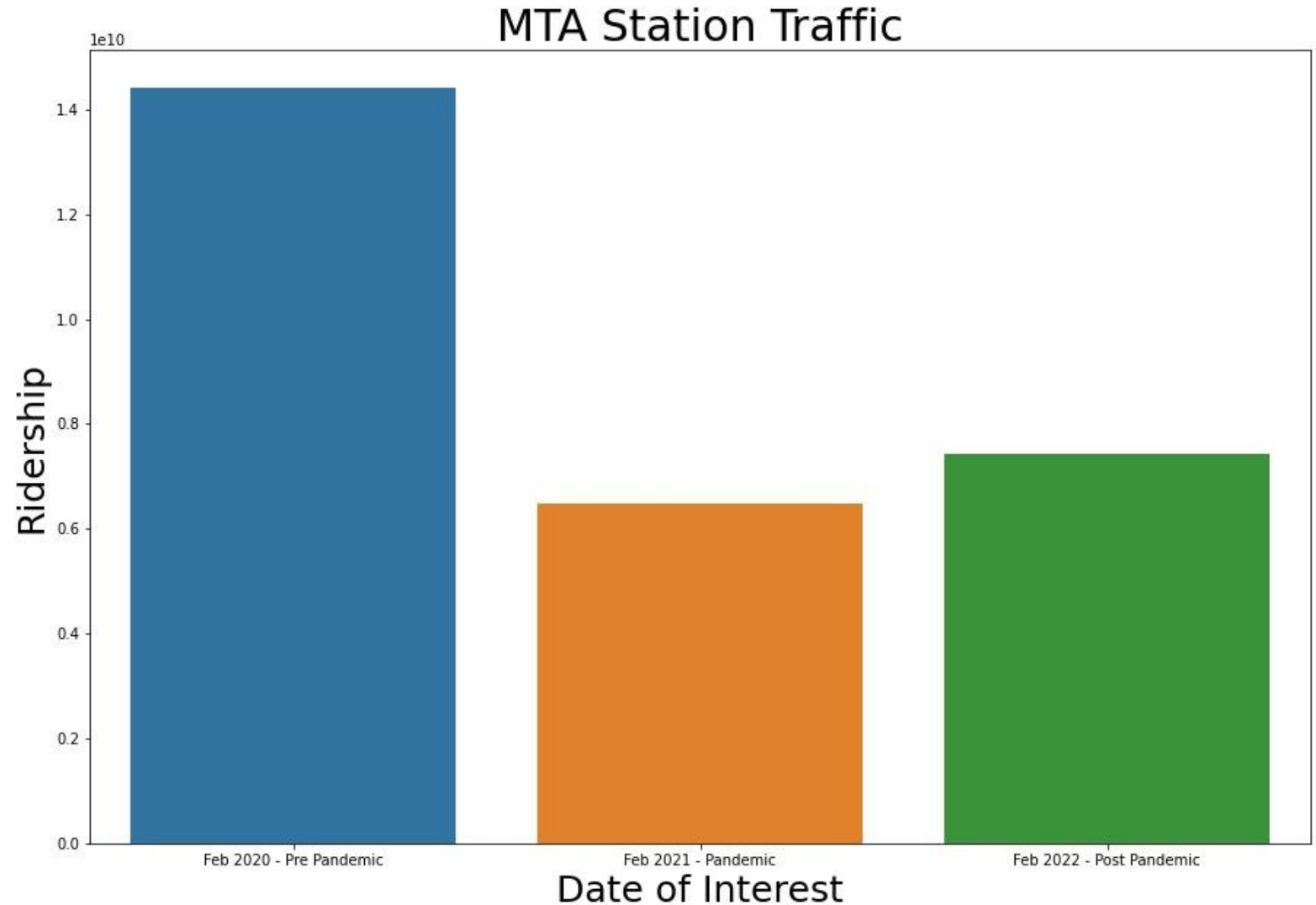
**SQLAlchemy**

## Data Usage –

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

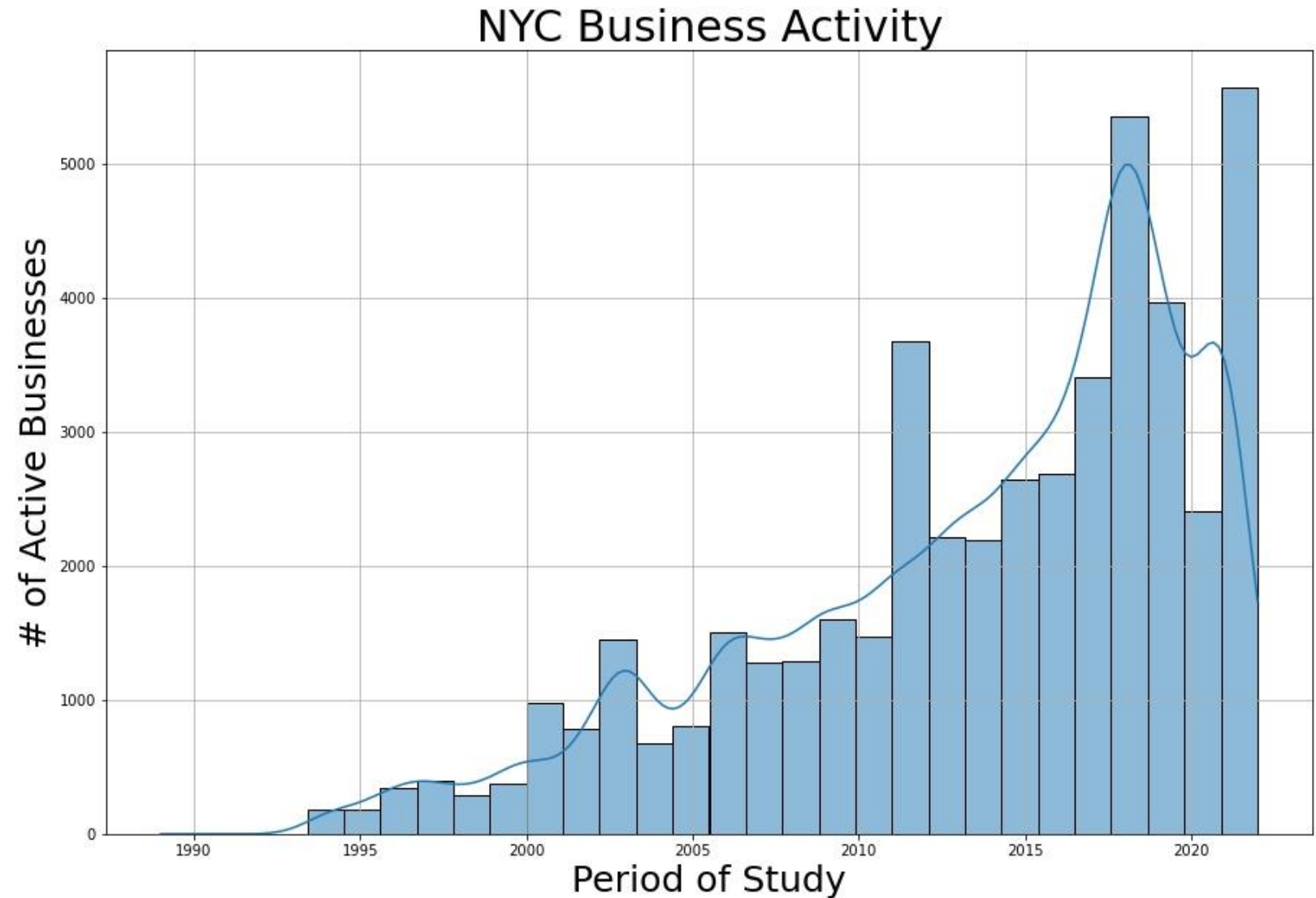
# Results

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



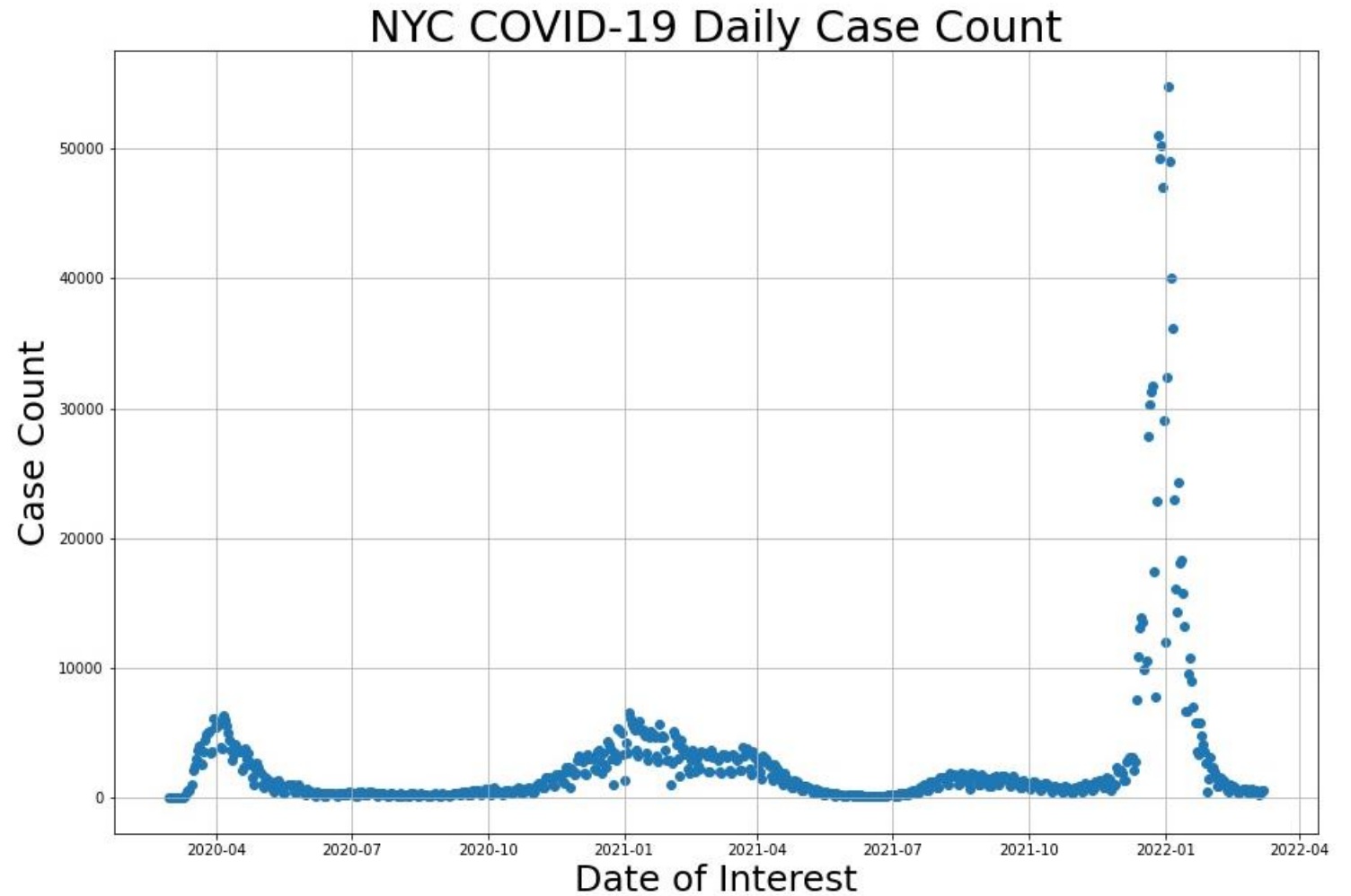
# Results

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



# Results

- SARS-CoV-2 Delta variant first detected February 23, 2021 in the US
- SARS-CoV-2 Omicron variant first detected December 1, 2021
- Now that case counts are lower, will we see an increase in ridership?
- 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?



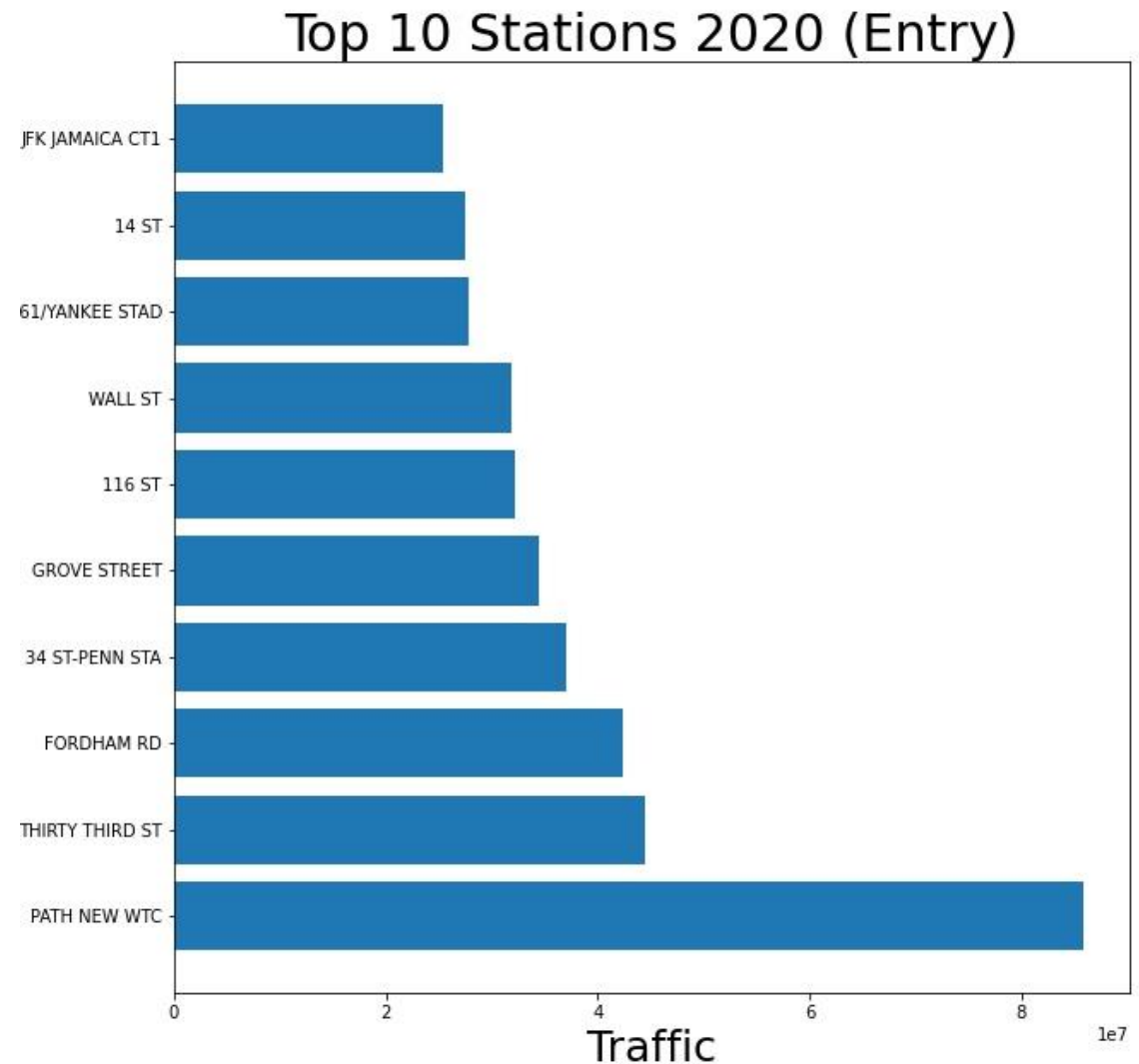
# Appendix

## Top 10 Station Analysis

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

New WTC is way out ahead

Further inspection of data required to verify results



# Appendix

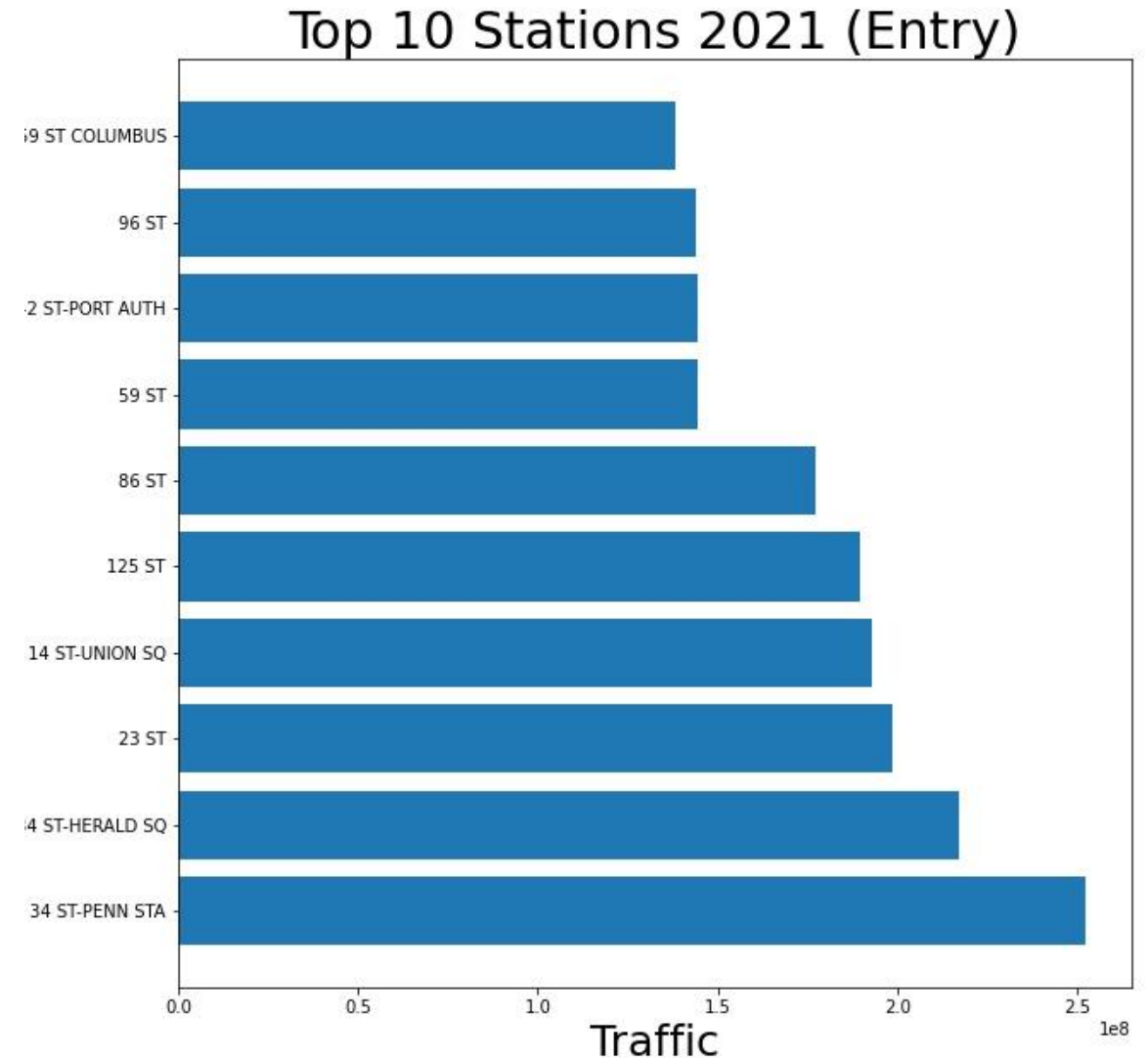
## Top 10 Station Analysis

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

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

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

2021 # 1 station was also Penn Station

Times square broker into the top 10 in 2022

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

