Necessary libraries

```
library(tidyverse)
library(geojsonsf)
library(sf)
library(tmap)
```

Outline

- Changes to the topic
  - Shift from trying to predict changes in dynamics to instead focusing on how much of an impact each travel mode makes
- Changes to the timeline
  - Need to create a timeline
  - retroactively mark when progress has been made. Look forward to what progress still needs to be done.
- Review of the original timeline:
  - more detailed information on what has changed for the project
- A more detailed version of the methods to be applied.

Questions

- corrections for changes in census tracts ### Updated approach
- Network auto-correlation of OD desire lines for 2019
- Network auto-correlation of MTA system
- Network auto-correlation of Highway system
- Network correlation of contiguous NTAs
- Regression to compare the MTA and Highway systems, to see which has the greatest effect
- Is there are way to measure the shift in the networks?

Started with interest in Triboro line ridership - Interest in the four boroughs that are severed by the subway system - Manhattan overwhelms the travel patterns throughout the boroughs of interest - Insufficient data to track the total ridership and the means - Travel surveys did not offer the level of detail or confidence - Shifted to looking specifically at work commuting patterns within a single borough - Focused on what correlation each transporation system has with the OD patterns

Data sources

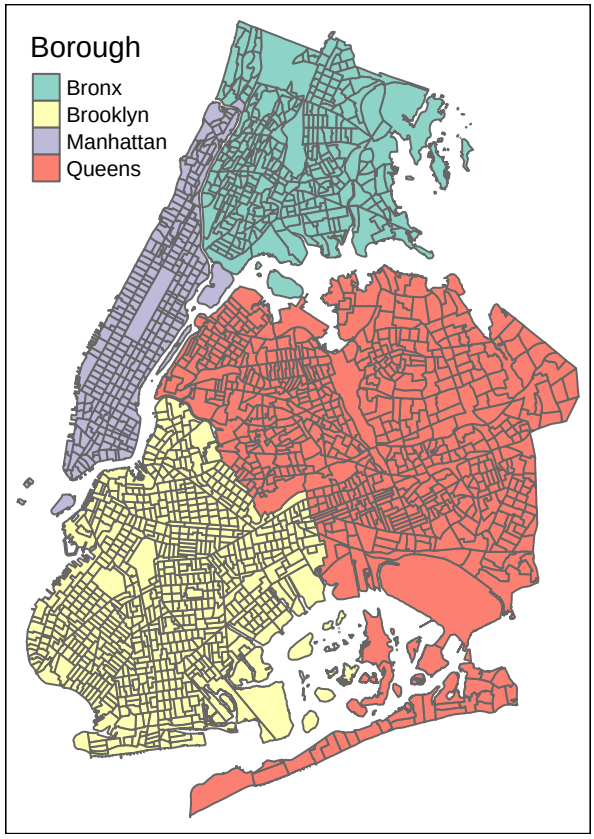
- Origin and Destination data for NYS in 2019 at the block level
- NYC Census tract borders
- Borders of NYC boroughs
- Equivalency of Neighborhood Tabulation Areas
- Subway routes
  - Good for data exploration
  - Will need to be suplemented with a routing service
- Arterials and Major Roads
  - Good for data exploration
  - Will need to be supplemented with a routing service

Visualize the census tracts and ntas, providing context for their size

```
bois_names <- c("Manhattan", "Bronx", "Brooklyn", "Queens")
bois_census_tract_borders <- geojson_sf('./data/nyc_2010_census_tract_borders.geojson') %>%
```

```
  dplyr::filter(BoroName %in% bois_names)

tm_shape(bois_census_tract_borders) +
  tm_polygons(
    col = "BoroName",
    title = "Borough"
  )
```



Estimate the average distance from the center to the edge of tract

```
avg_tract_area <- sum(bois_census_tract_borders$Shape__Area)/ length(bois_census_tract_borders$Shape__A
avg_tract_radius <- sqrt(avg_tract_area/pi)
print(avg_tract_radius)
```

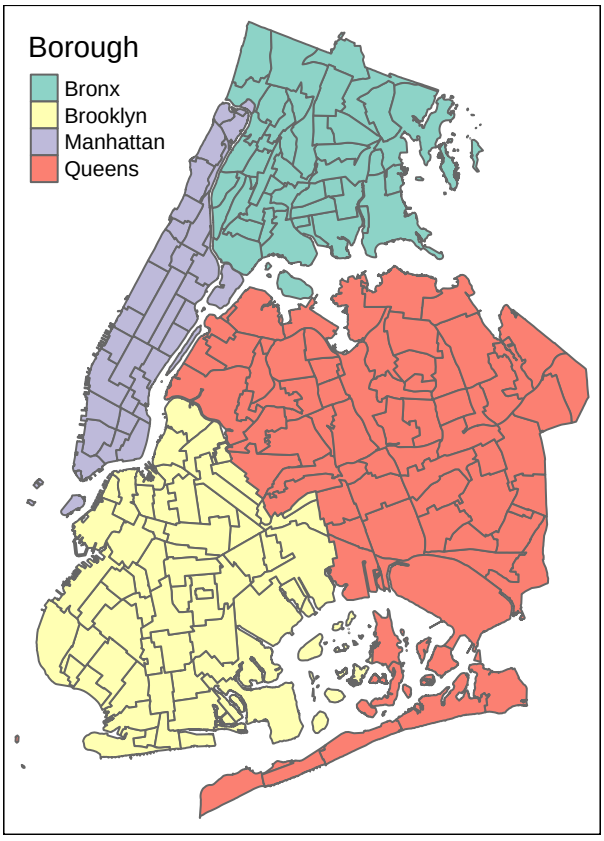
```
## [1] 1026.25
```

Visualize the ntas

```
bois_nta_borders <- geojson_sf('./data/nyc_2010_nta_borders.geojson') %>%
  dplyr::filter(BoroName %in% bois_names)

tm_shape(bois_nta_borders) +
  tm_polygons(
    col = "BoroName",
    title = "Borough"
```

```
)
```




```
avg_nta_area <- sum(bois_nta_borders$Shape__Area) / length(bois_nta_borders$Shape__Area)
avg_nta_radius <- sqrt(avg_nta_area/pi)
print(avg_nta_radius)
```

```
## [1] 3506.898
```

Demonstrate the disparity between Manhattan and the other boroughs of interest