Austin MetroBikes

Austin MetroBikes – Background

- Austin's bike share program started in December 2013 and in 2020, CapMetro joined as a major stakeholder. Austin MetroBike has the potential to act as a non-vehicular mode of transportation provided by the city. The analysis sought to investigate bike share program usage over the lifetime of the program, the distribution of bike kiosks throughout the city, and usage based on various membership options.

Data sets

- Data from City of Austin MetroBikes program

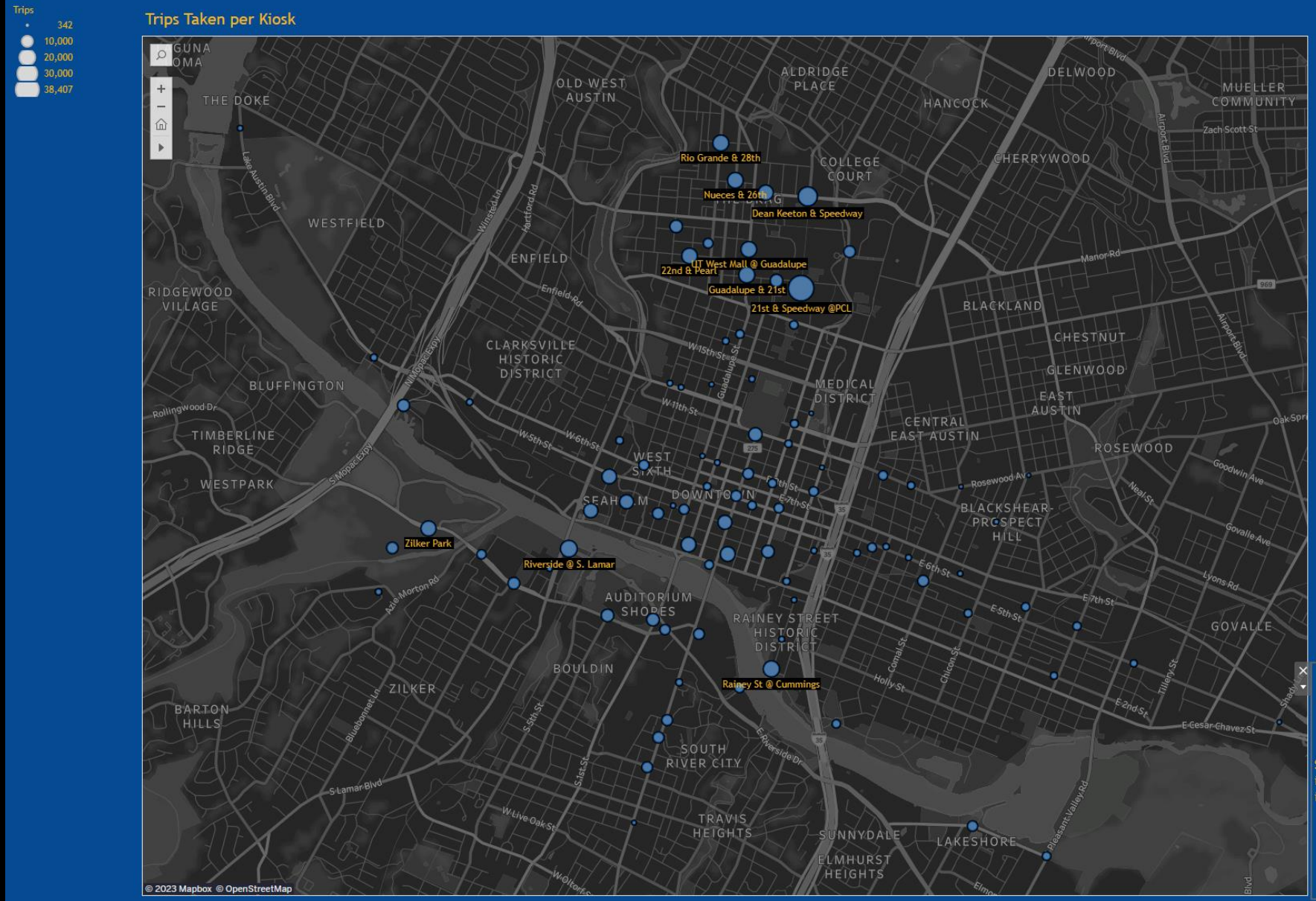
Tools

- Python
  - Pandas
  - Numpy
  - MatPlotLib
  - Folium
- Tableau
- Excel

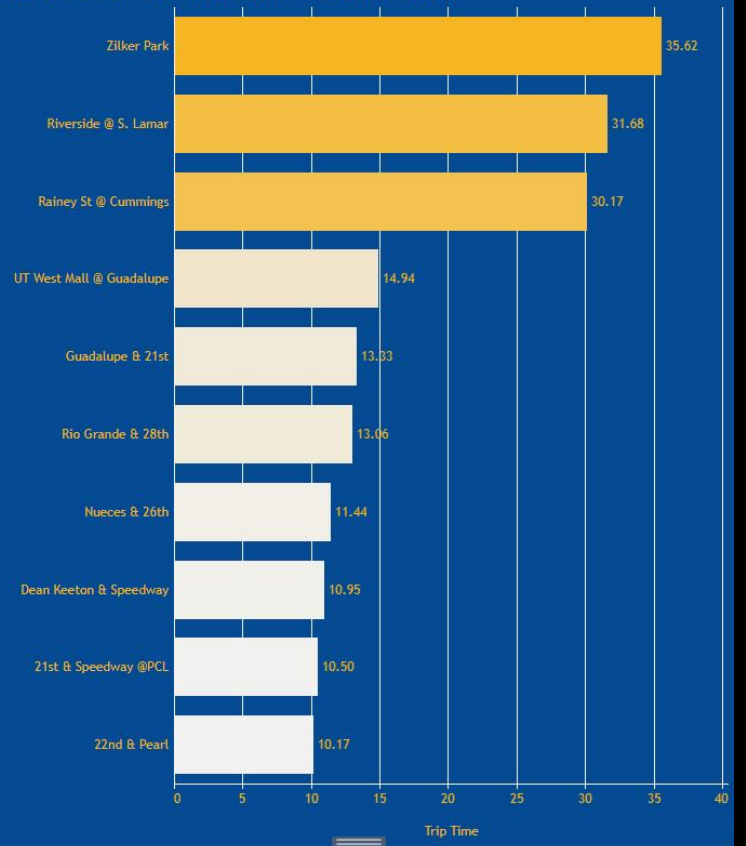
Analytical Skills

- Geospatial analysis
- Timeseries analysis
- Linear Regression
- Cluster Analysis
- Data cleaning, wrangling
- Exploratory data analysis

Trips Taken per Kiosk

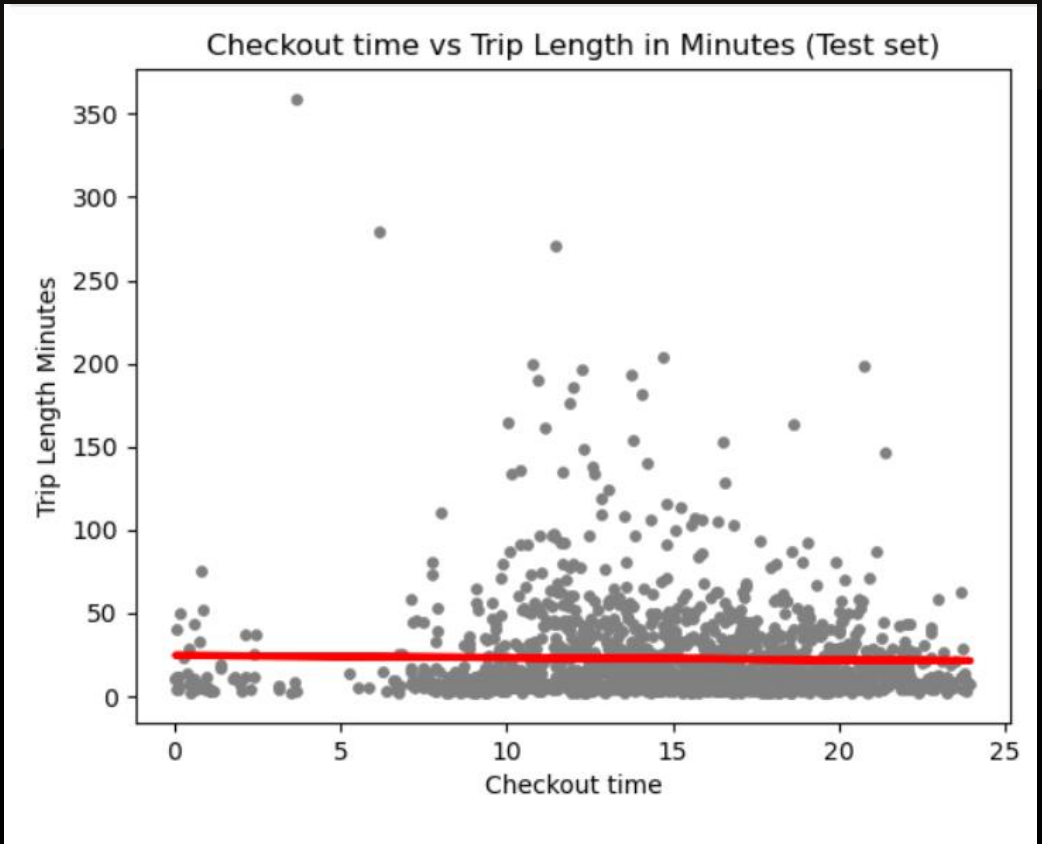


Average Trip Times for Ten Highest Traffic Kiosks

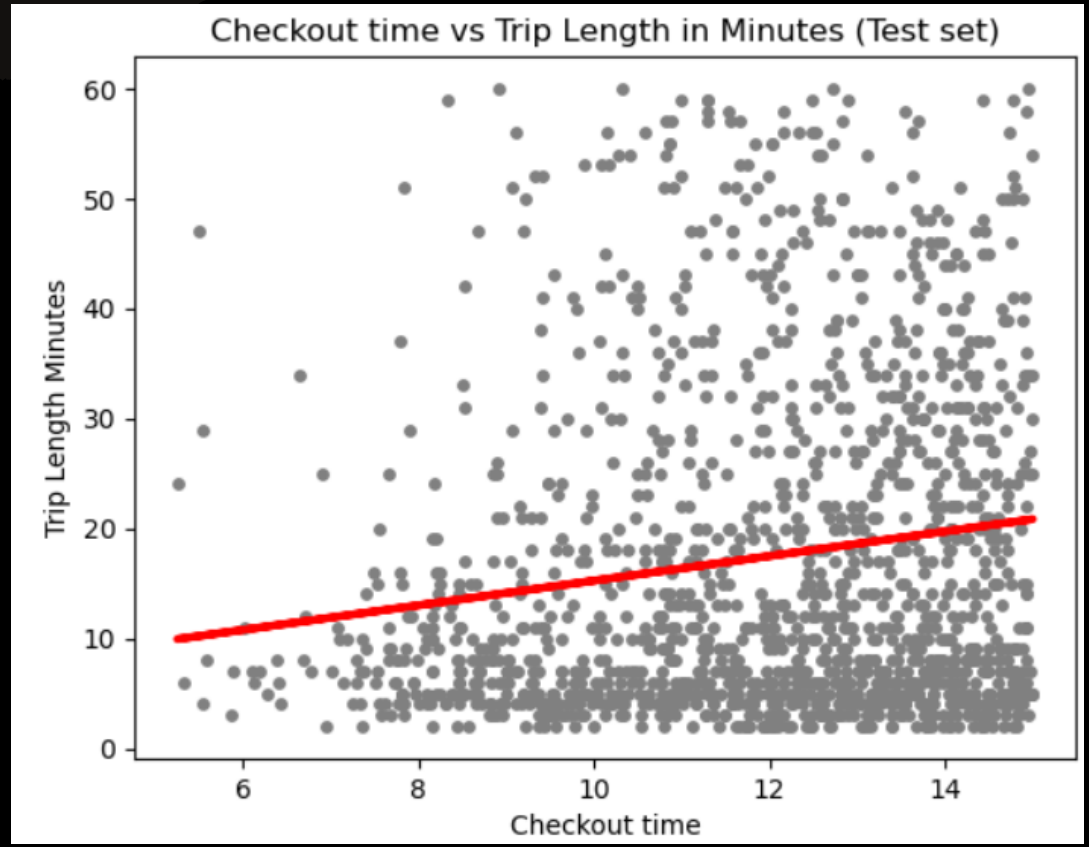


Seven of the ten highest traffic kiosks are concentrated around the University of Texas. Kiosks in the university area have trip durations that are half to one third of those in tourist points of interest located along the hike and bike trail and Zilker Park.

Linear Regression

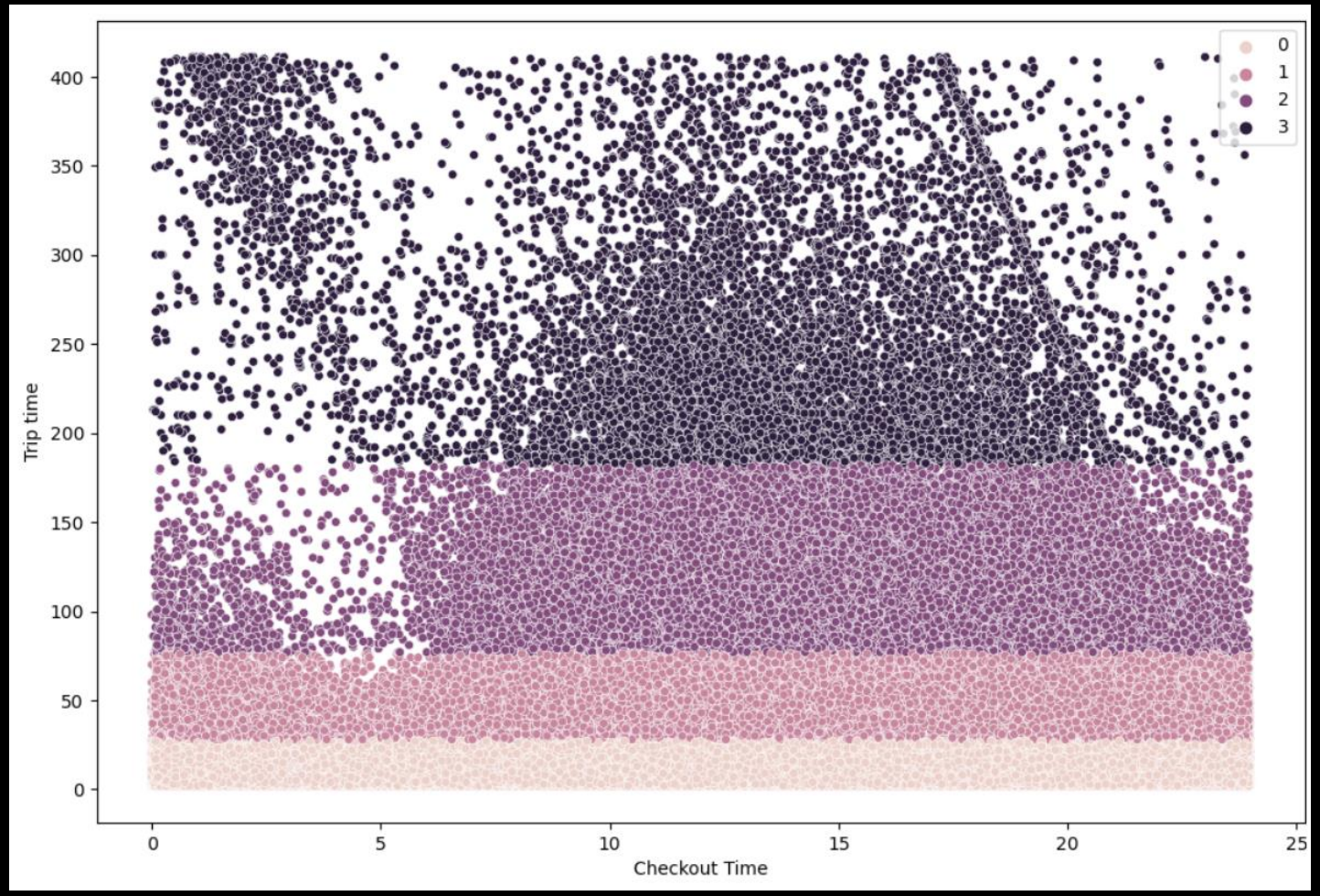


Linear regression model of cleaned dataset. The model was a poor fit.



Linear regression model with checkout times between 5AM and 3PM and trips 60 minutes or shorter. Model was still a poor fit.

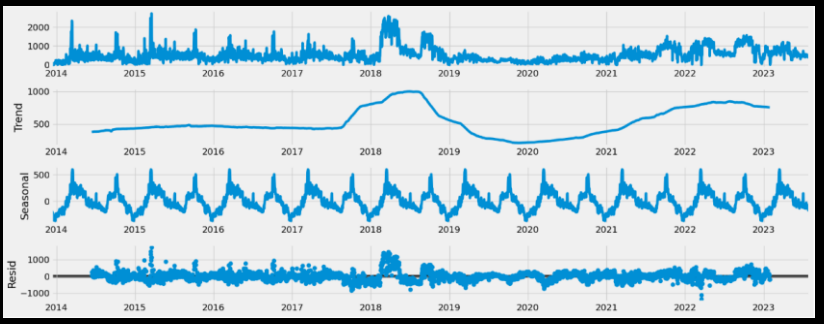
Cluster Analysis



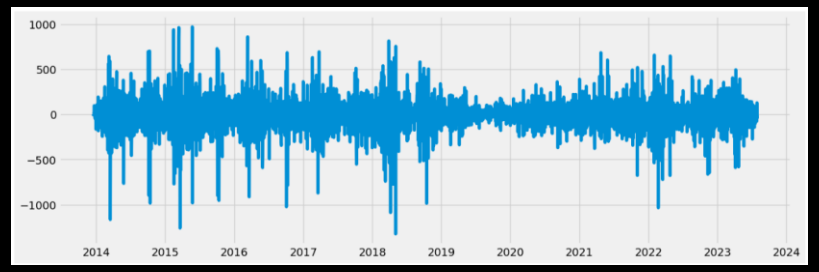
Clusters were based on trip time rather than a combination of checkout time and trip time. Trip times in every cluster happen at every checkout time. Checkout time does not appear to impact trip time dramatically.

Time Series Analysis

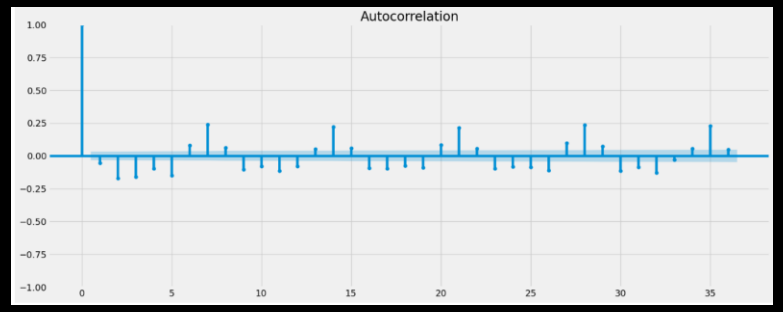
Data displayed clear seasonality.



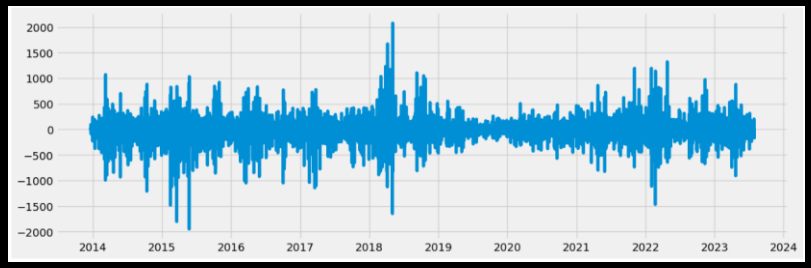
After first round of stationarizing data was still not stationary.



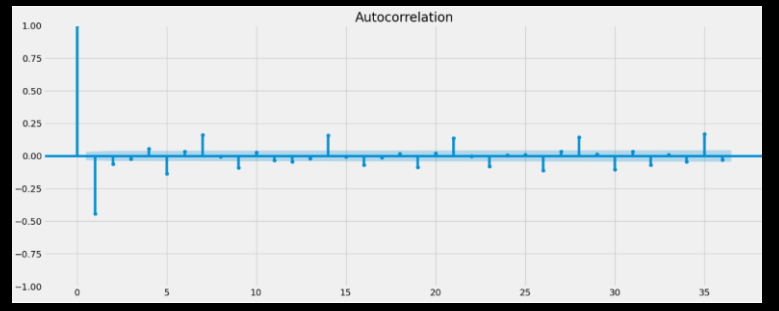
Dickey-Fuller Stationarity test:	
Test Statistic	-1.307270e+01
p-value	1.942270e-24
Number of Lags Used	2.900000e+01
Number of Observations Used	3.485000e+03
Critical Value (1%)	-3.432228e+00
Critical Value (5%)	-2.862370e+00
Critical Value (10%)	-2.567212e+00
dtype: float64	



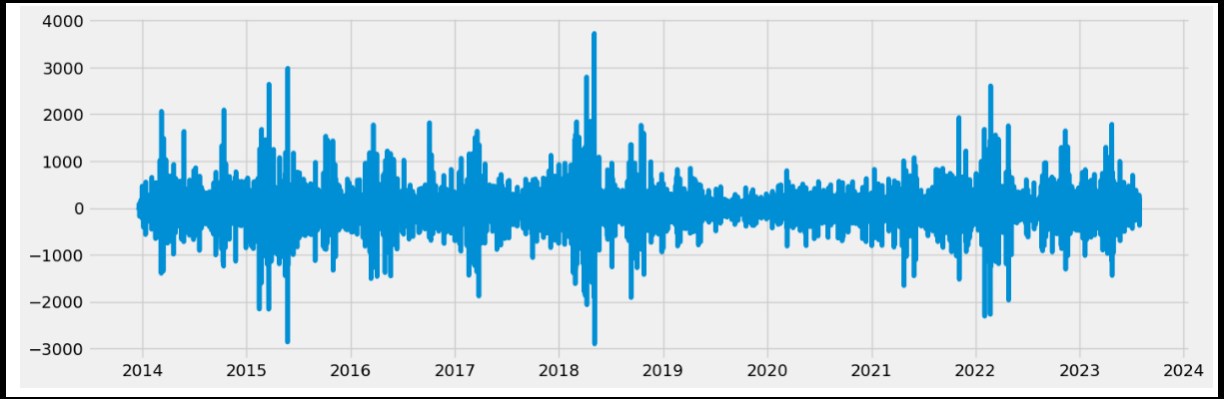
After the second round of stationarizing the Dickey Fuller test indicated stationarity but there was still high autocorrelation.



Dickey-Fuller Stationarity test:	
Test Statistic	-22.108587
p-value	0.000000
Number of Lags Used	29.000000
Number of Observations Used	3484.000000
Critical Value (1%)	-3.432228
Critical Value (5%)	-2.862370
Critical Value (10%)	-2.567212
dtype: float64	



Time series curve after stationarizing three times



Dickey-Fuller Stationarity test:	
Test Statistic	-26.313979
p-value	0.000000
Number of Lags Used	30.000000
Number of Observations Used	3482.000000
Critical Value (1%)	-3.432229
Critical Value (5%)	-2.862370
Critical Value (10%)	-2.567212
dtype: float64	

After two rounds where the test statistic was smaller than the 5% critical value so we could say the data was stationary.

Austin MetroBikes – Results

Insights

1. Festivals and the university semester schedule have the greatest influence on bike share usage. Peak months are March and October.
2. Student memberships take the most trips each month and the shortest trips (10-15 minutes).
3. Most trips are taken by student members, followed by walk ups.
4. Kiosks that have the greatest activity are those around the university followed by tourist points of interest.

Recommendations

1. Consider additional kiosk locations further north near established train stops such as Mueller and the Dell Children's Hospital campus as well as the Domain and FC stadium.
2. Obtain further kiosk information for each trip to determine bike availability at time of checkout at each station.
3. Obtain payment and demographic information for users to conduct further market analysis.
4. Compare scooter usage to MetroBikes to investigate competitor activity in areas of Austin not currently served by MetroBikes

GitHub

Tableau storyboard