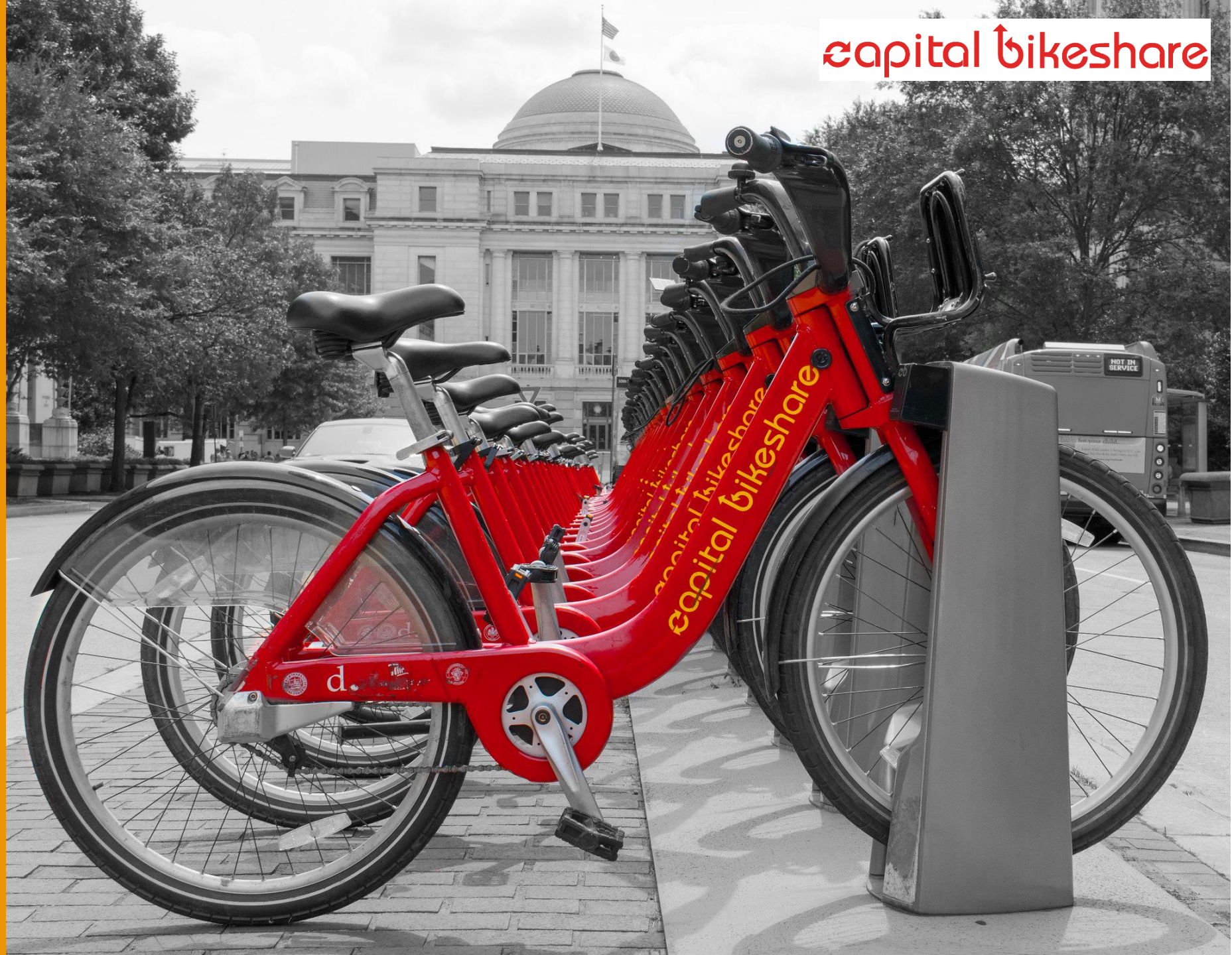


Highway to the capital of bike share

2021-03-22
CODE Analytics
Jay



capital bikeshare

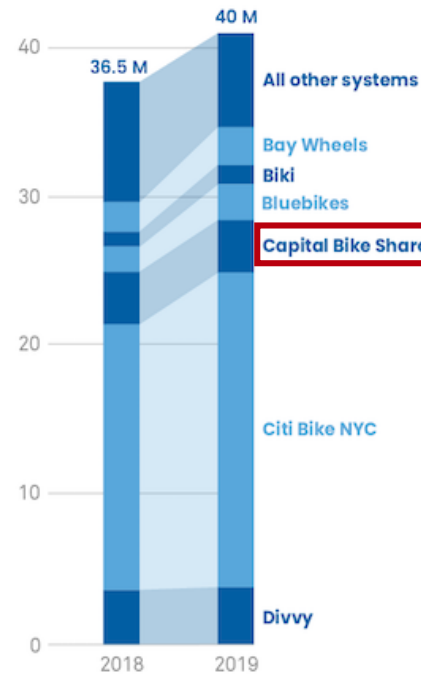
Table of contents

1. Introduction
 1. Bike sharing markets and Capital Bikeshare
 2. Covid19-related impacts on the market
2. Market Analysis 1
 1. Bikeshare users' general pattern : weekday/weekend
 2. Bikeshare users' pattern during specific timeline : weekdays/season
3. Market Analysis 2 - Problem & Solution
 1. The availability of bikes during specific timeline
 2. Predict the total demand using ML models
 3. Provide solutions for predicted demand
4. Future directions

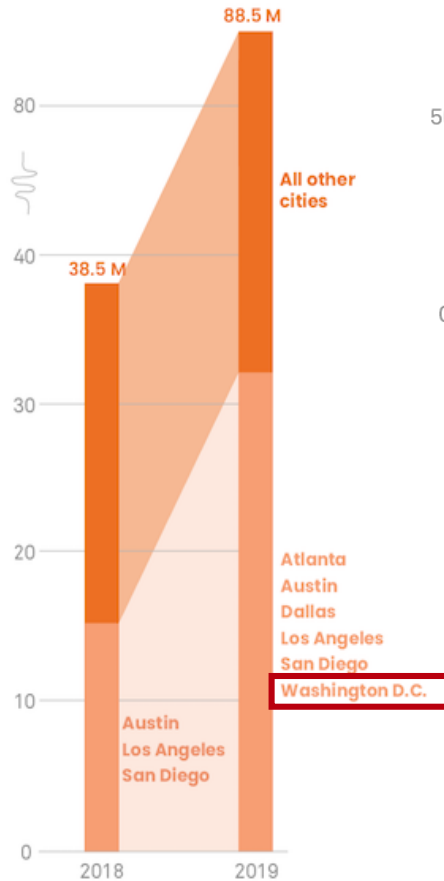
Situation 1

Fast-growing Micro-mobility markets

STATION-BASED BIKE RIDERSHIP IN 2019
IN MILLIONS OF TRIPS



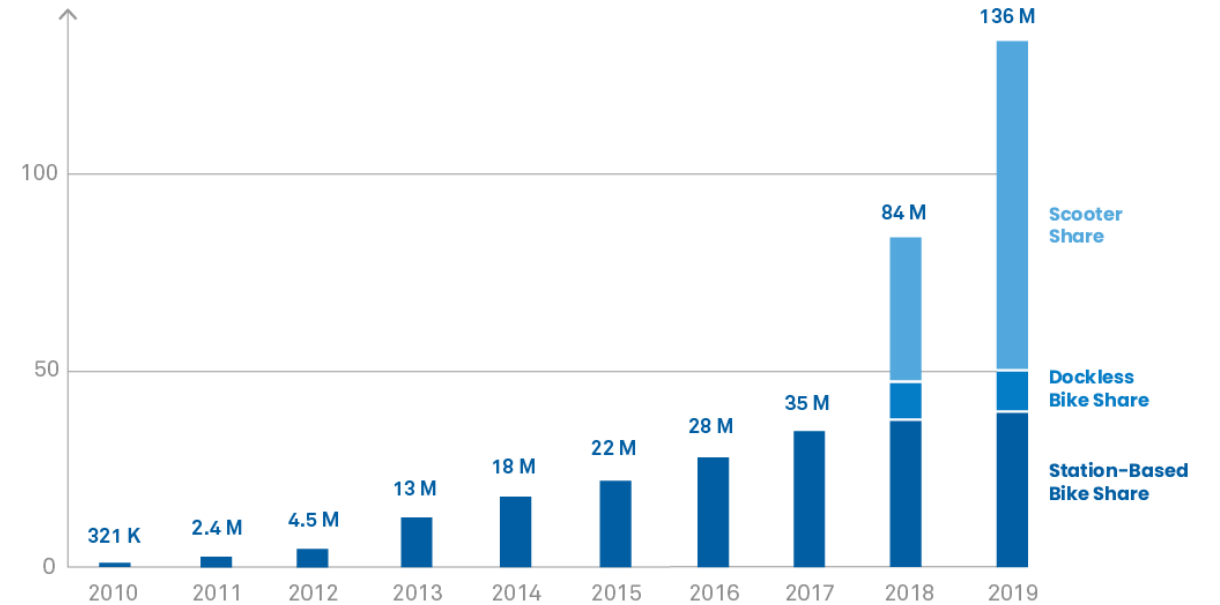
SCOOTER RIDERSHIP IN 2019
IN MILLIONS OF TRIPS



Source: NACTO

SHARED MICROMOBILITY RIDERSHIP GROWTH FROM 2010-2019,
IN MILLIONS OF TRIPS

Source: NACTO



Shared micro-mobility markets will keep growing & playing a critical role in transportation networks in cities.

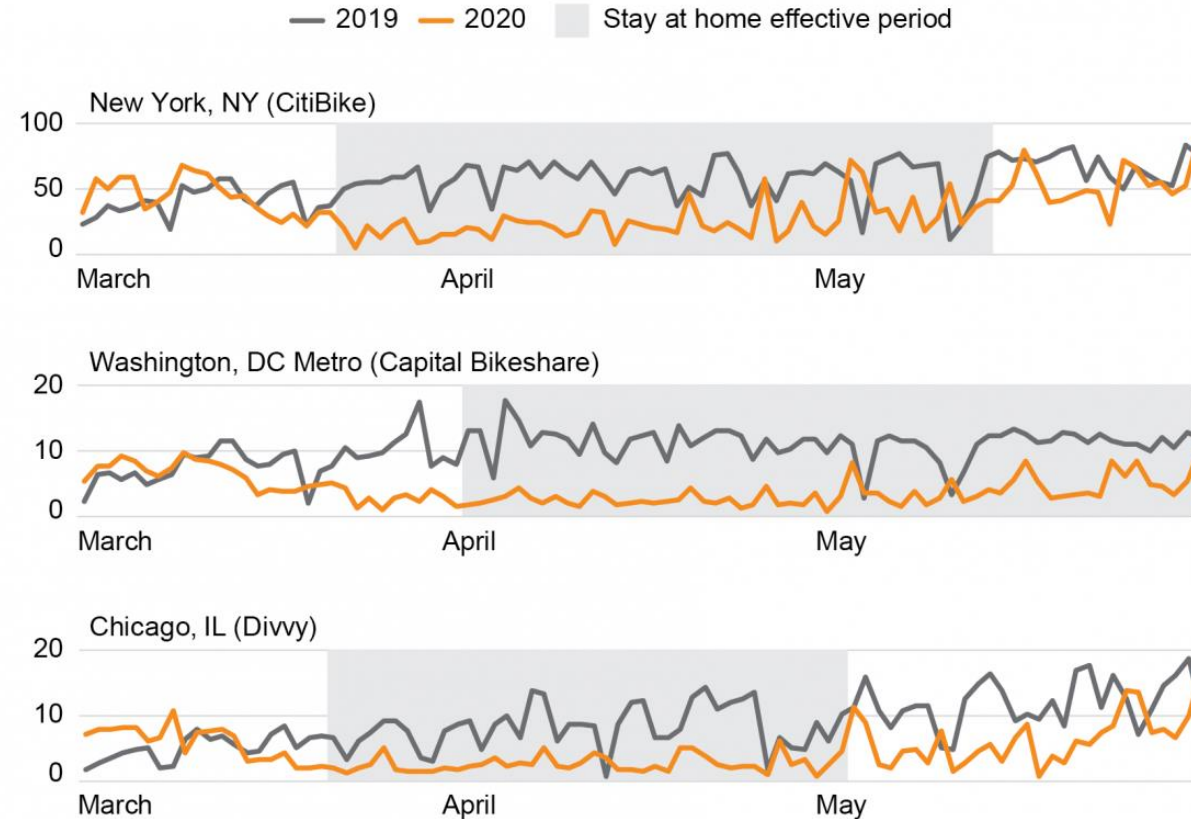
[NACTO: National Association of City Transportation Officials](https://nacto.org/)

Situation 2

Covid19-related changes: Less trips

During March through August 2020, many bikeshare (docked and dockless) and e-scooter systems closed temporarily in response to COVID-19 and some systems closed permanently.

Figure 2: Docked Bikeshare Ridership, Top 3 Largest: March through May (thousands of trips)



NOTE: 2019 dates refer to same days of week as 2020.
Citibike graph set to separate y-axis scale as does not include trips part of New Jersey Citibike.

Even after re-opening in May 2020, total trips still remain below compared to 2019

Tasks

How to expand the market, while keeping current customers

- 1) Reduce the complaints from registered users; *e.g. the availability of bikes*
- 2) Avoid (similar/potential) complaints from casual users
- 3) Reduce the financial risks during covid19

Actions

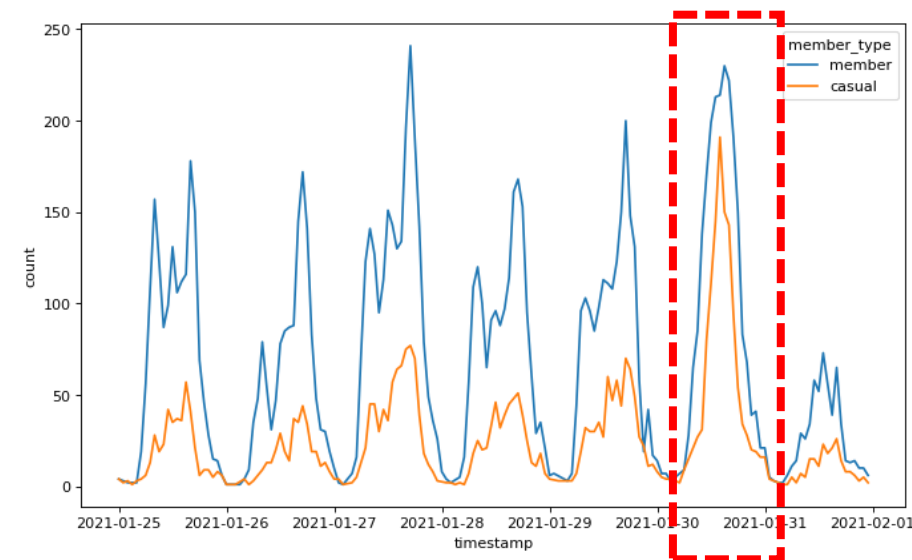
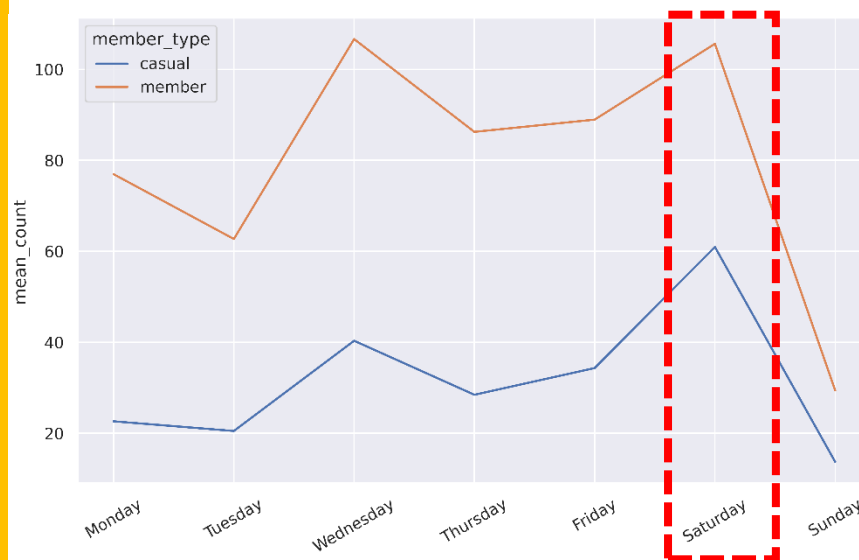
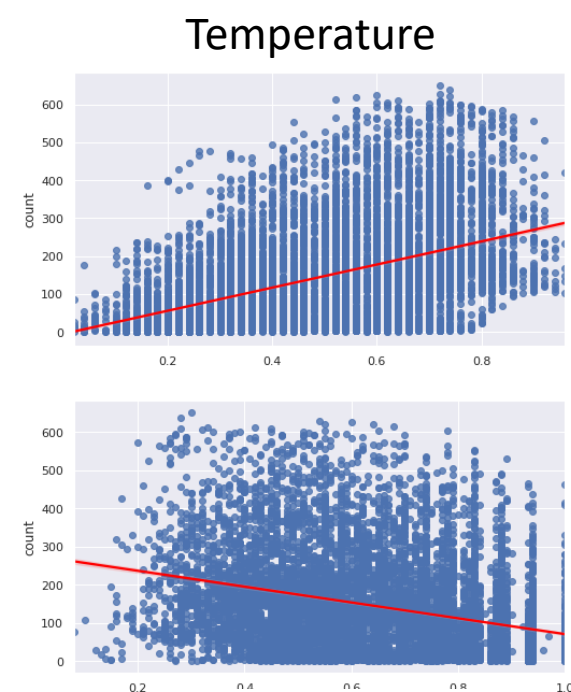
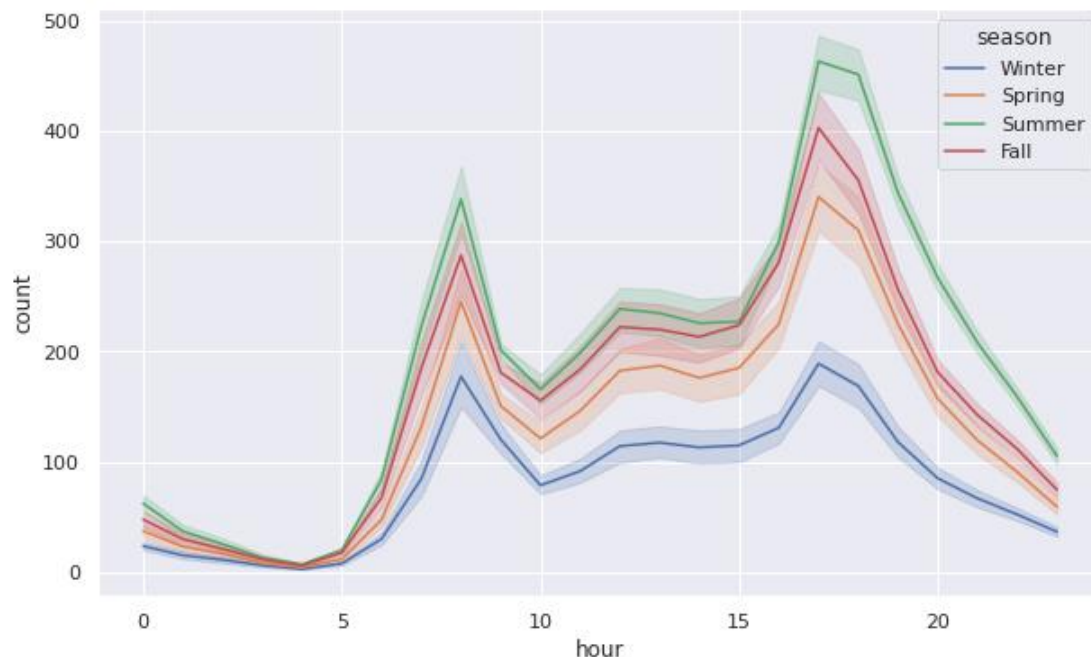
- 1) Analyze the pattern of demand from registered and casual users
- 2) Predict the total demand of users during specific timeline
 - Registered users: commute hours/daytime, weekday/weekend
 - Casual users: daytime during weekdays and weekend
- 3) Suggestions based on predictions from ML models
- 4) Suggest additional plans to increase the financial stability during covid19

General pattern of users' total demand

High demand in Summer/Fall

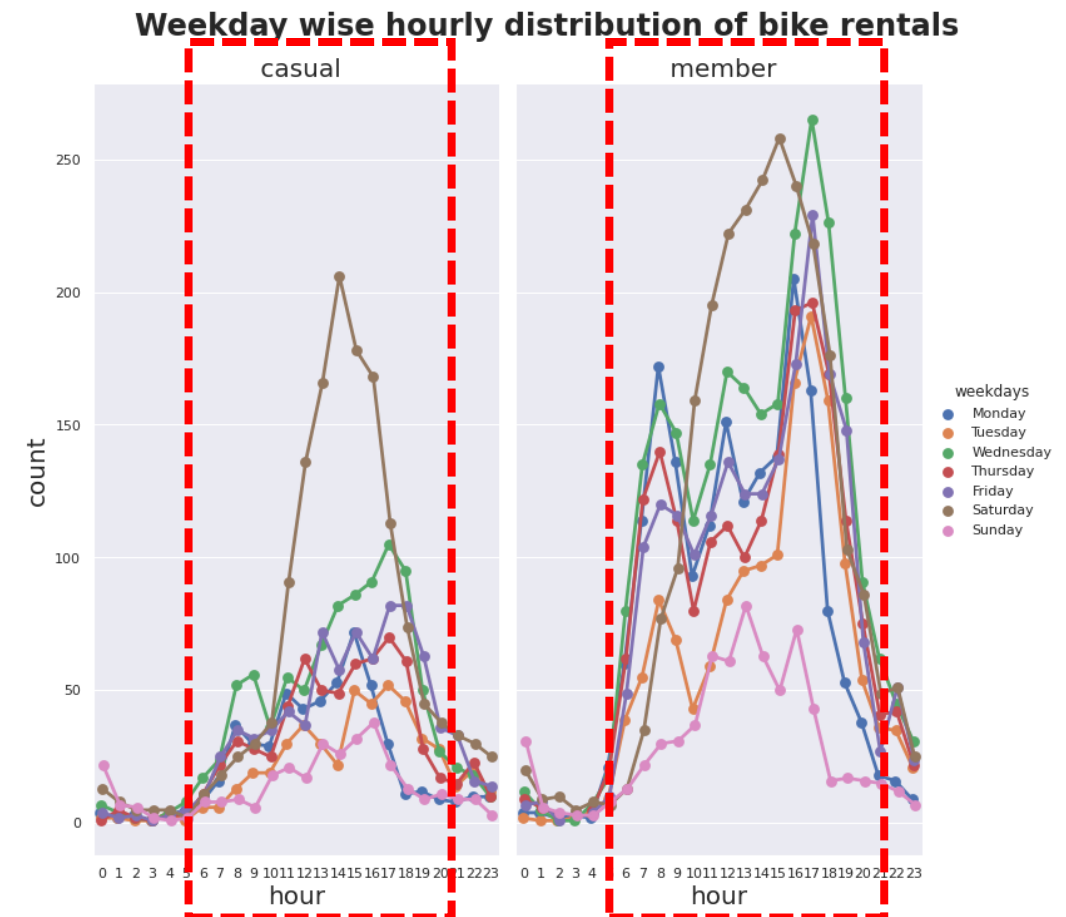
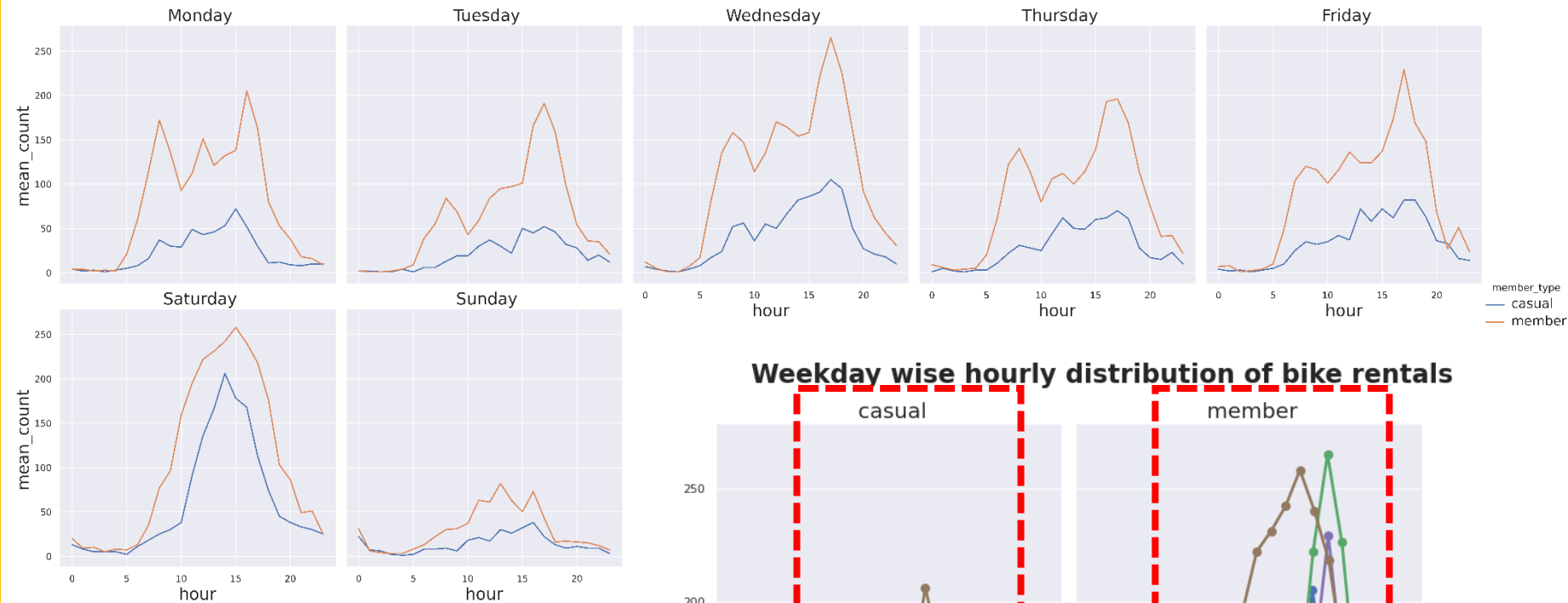
More demand from Registered Users,

High demand on Saturday



Bike users' pattern during specific hours

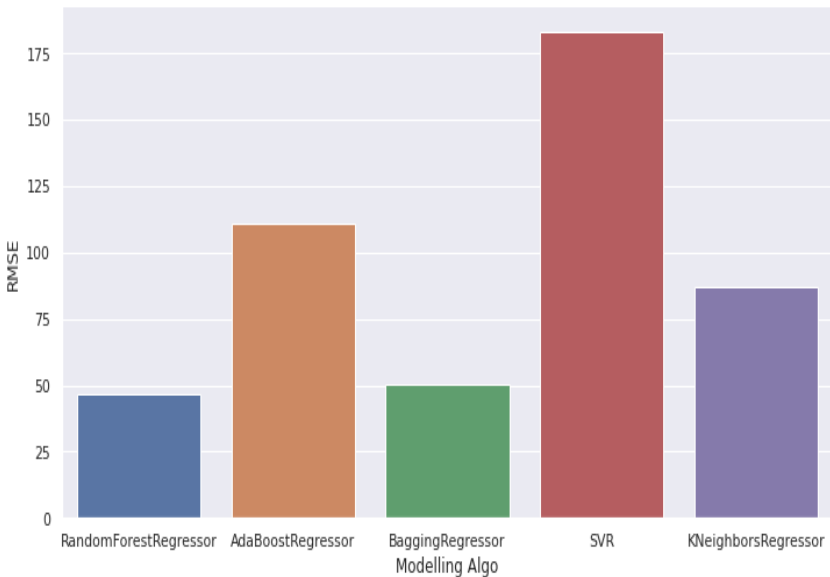
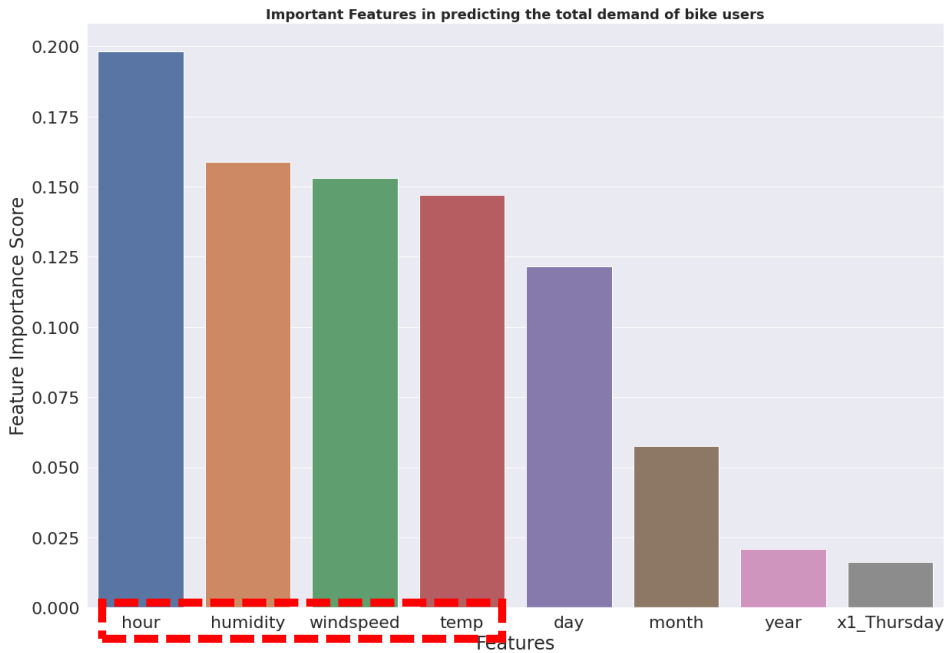
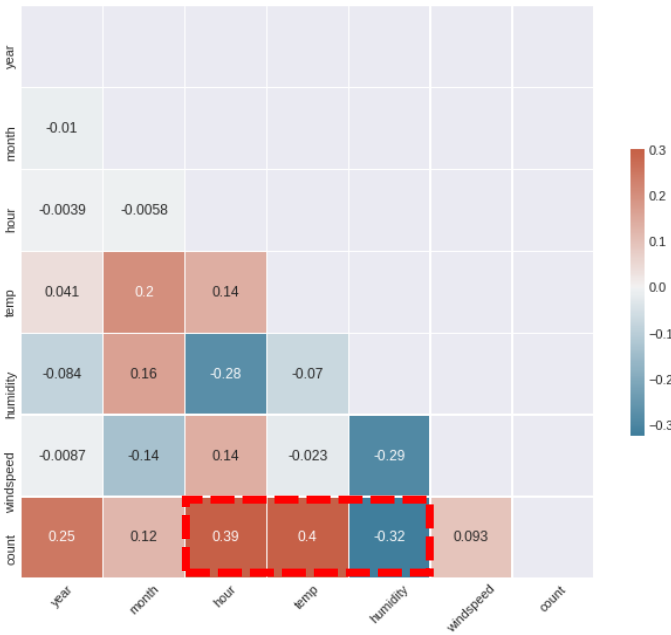
- **Registered Users:**
High demand in commute hours, across weekdays, daytime on Saturday
- **Casual Users:**
High demand on Saturday
- **Sunday: lowest demand**
still high demand from registered users similar to the demand from casual users during weekdays



Analysis & Results

Impact of timeline (hour, day, month, year) and weather related factors on model predictions

Random Forest Regression Model showed the best performance
(lowest score in RMSE; Root Mean Square Errors)

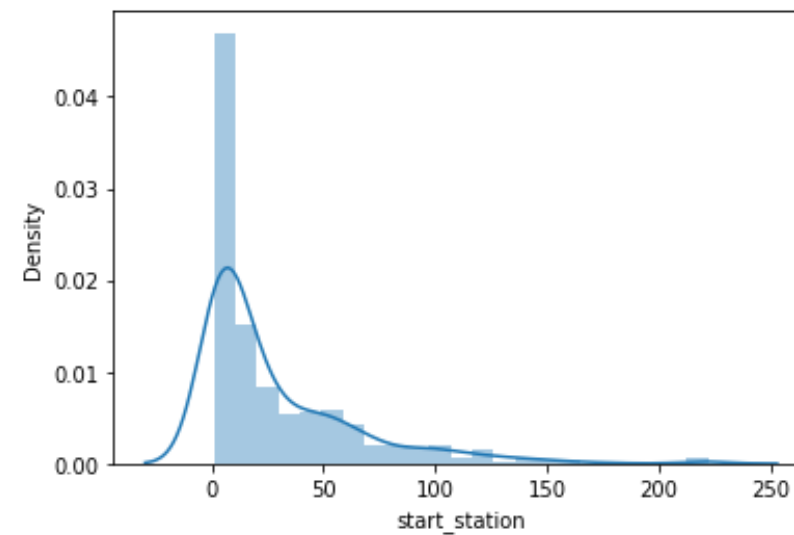
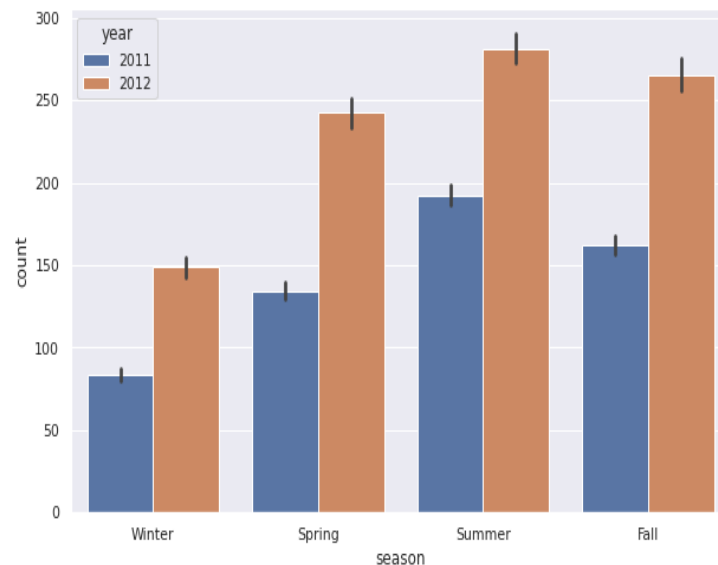
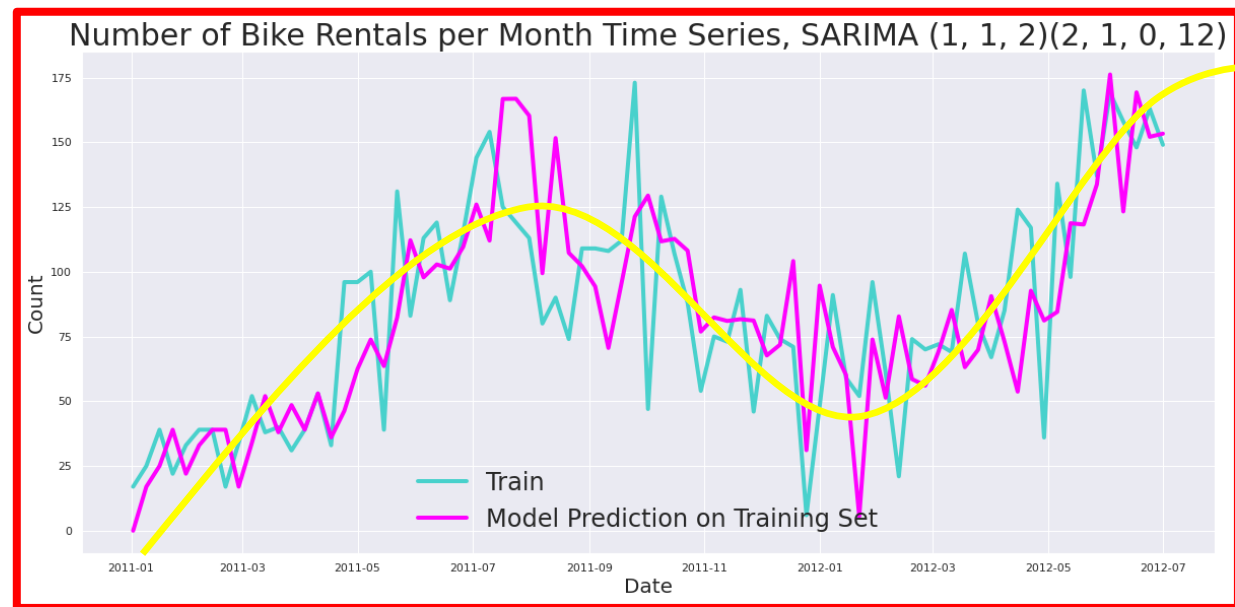


Modelling Algorithms	RMSLE	RMSE
RandomForestRegressor	0.38	46.83
AdaBoostRegressor	0.98	110.89
BaggingRegressor	0.40	50.14
SVR	1.49	183.20
KNeighborsRegressor	0.65	87.03

Future analyses

Comparison of total demand pattern before & after covid19

Pattern of demands at Top 10 stations



Future analyses

Key Performance Index*

KPIs	Definition
System usage	Average daily trips per registered user
Bicycle availability	Average number of bicycles per station
System market penetration	Registered users per total population

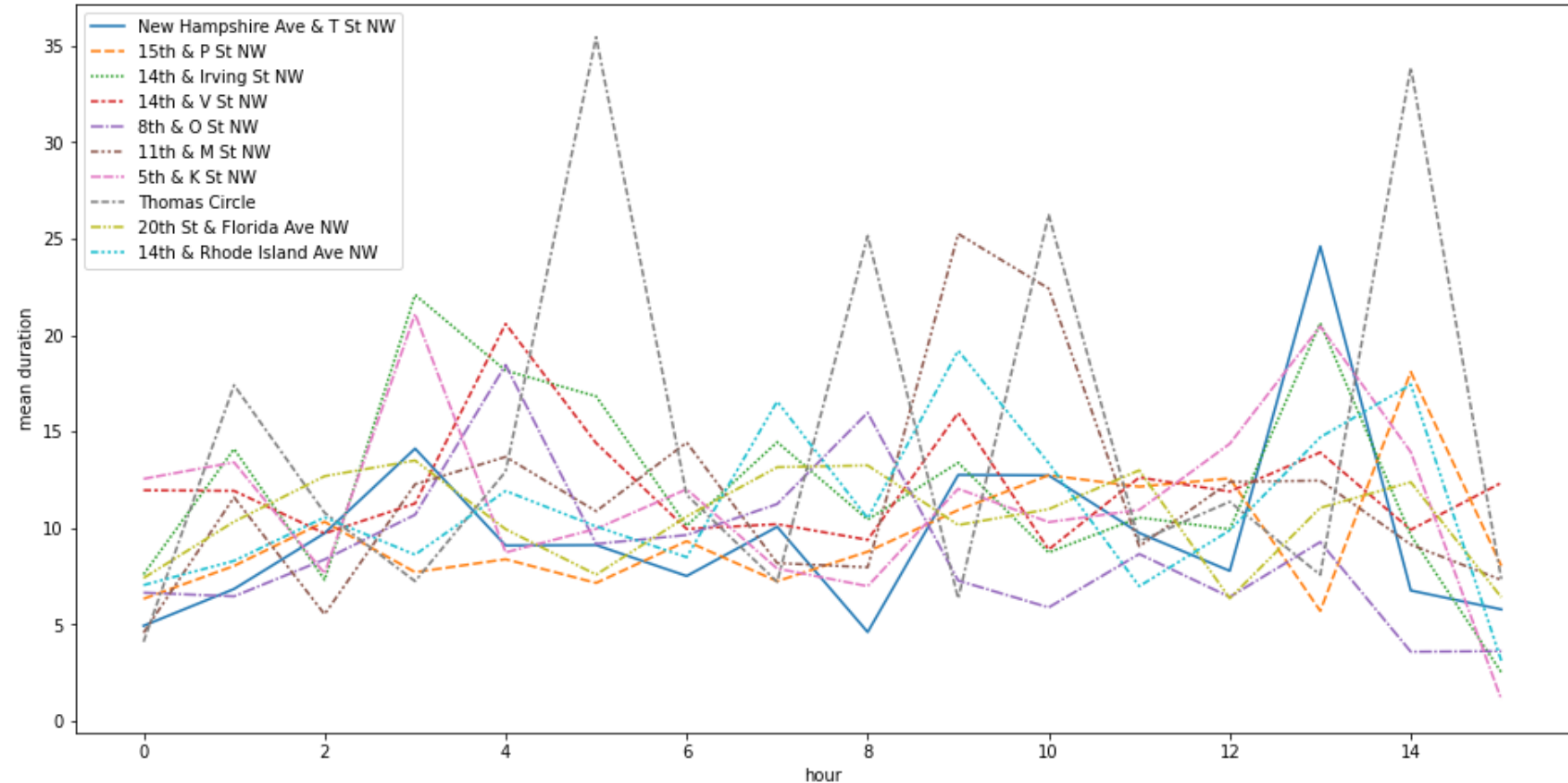
Useful source:

<https://nacto.org/shared-micromobility-2019/>

*indexes used to evaluate the performance of the system

The total number of stations: 543

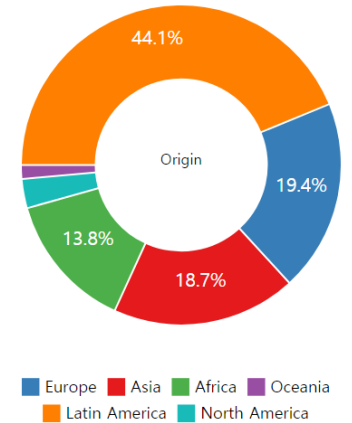
The mean duration of bike rentals at top 10 stations



Beyond Highway to the capital of bike share

- Go HIGH & DEEP with target group
 - **upgrade the general quality of bikes:** regular check on bike components. E.g., breaks/seats/wheels
 - **more benefits to registered users :** bike repair services, longer reservation time
- GO WIDE for new-comers:
 - bring **casual users to registered users:** mileage system (10km/20km => 1 free ride coupon)
 - **majority of population :** people of color (POC) - **63% !** specially Latine/x using more scooter share than other population. (1.5x).
- GO PUBLIC for social image:
 - **Covid19 - discount membership program:** supporting unemployed people for job interviews, medical appointment, or daily other essential needs
 - **Eco-friendly-partnership:** plant N trees under the name of top 10 users with longest trips every month
 - **Connect with local:** bike tour services

Origin of Non-Citizens



Non citizens include legal permanent residents (green card holders), international students, temporary workers, humanitarian migrants, and illegal immigrants.

For more infos:
jay@codeanalytics.com