

# Uber Supply-Demand Gap Analysis

Causes  
&  
Recommended Solutions

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**Objective:** Identify the Root cause of the revenue loss and recommend Solutions

**Problem description:**

- Uber is losing revenue due to high numbers of Cancellations and Non-availability of cars between Airport and City
- All the trip requests generated aren't fulfilled
- There is huge potential of eliminating this Demand-Supply gap and boost revenue by earning from these unfulfilled requests

**Contents:**

- Identify the causes of the problem
- Check the dependency on Hours or Pickup location
- Demand and Supply gap analysis
- Possible hypotheses for these gaps
- Recommended solutions

# Data- Raw and Derived

## Raw Data

Trip Data is collected with information of-

- Request ID
- Pickup point (Airport/ City)
- Request timestamp
- Drop timestamp
- Driver ID
- Trip Status: Completed / Cancelled / No cars

## Derived Data:

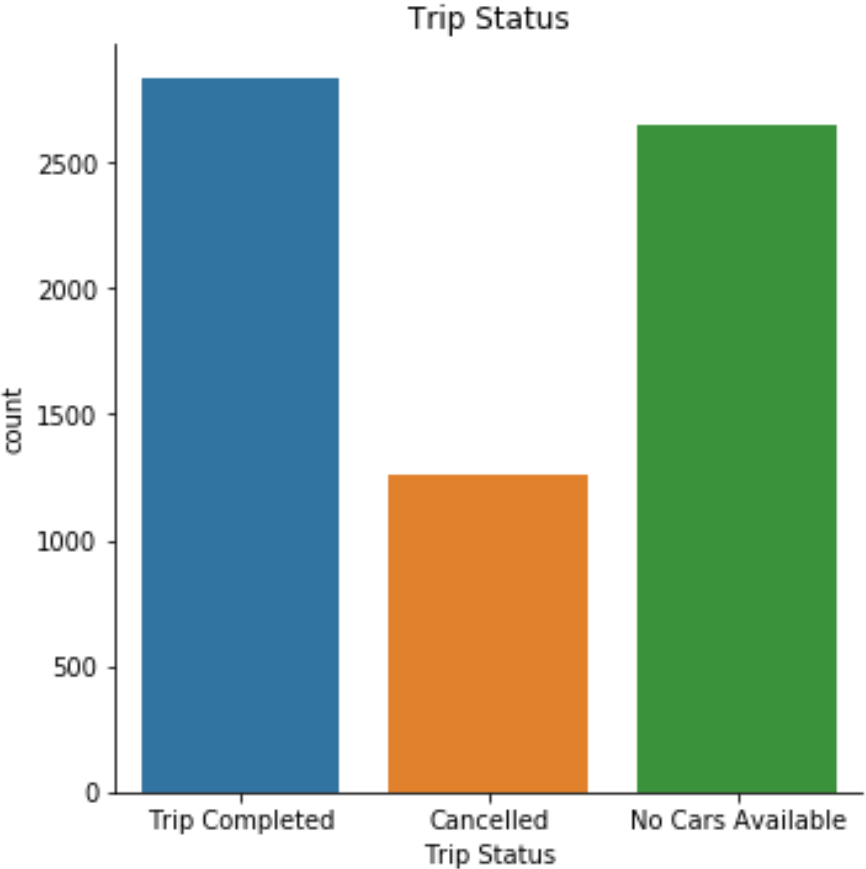
Useful new columns created from raw data

- Request hour is extracted from Request time stamp.
- Time slot (Morning/ Evening etc.)
- Demand & Supply
- Gap (Demand-Supply)
- Gap % (% of Unfulfilled trips out of total requests)

## Missing value treatment:

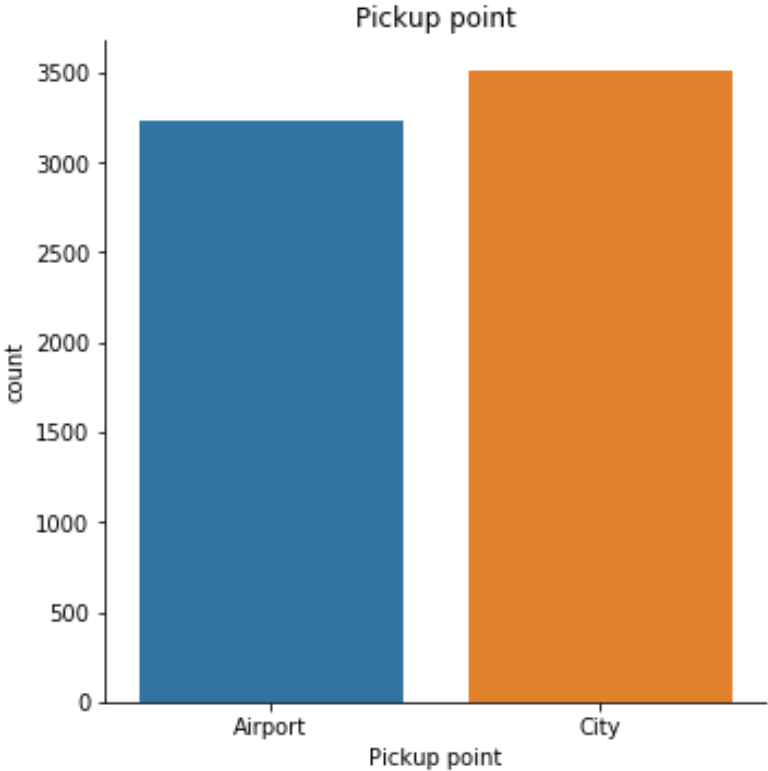
- For Trips with status- 'Cancelled' and 'No cars available', missing values are there in Driver Id and Drop time stamp. These rows can't be imputed/ removed as these entries will be unique.
- Further analysis is done by creating subsets based on Pickup location and Trip status.
- In these subsets, Driver ID and Drop timestamp columns are dropped for Cancelled and No cars subsets.

# Exploratory Data Analysis (EDA)



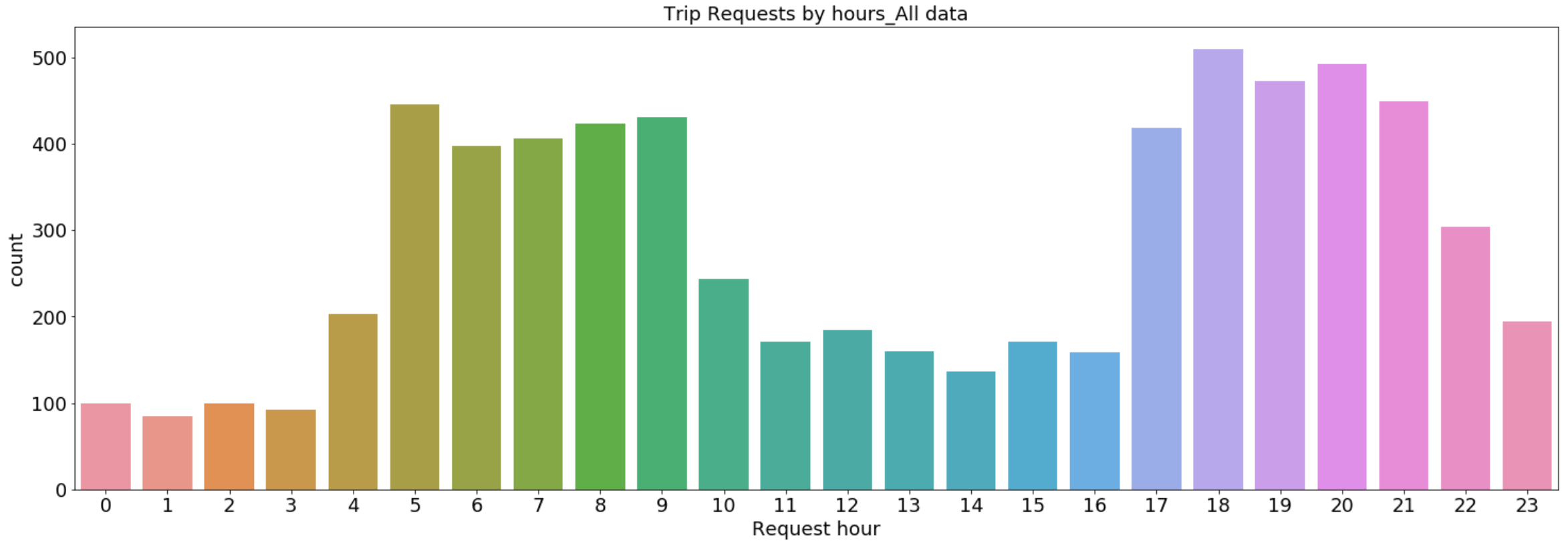
Status	Count	Percentage
Trip Completed	2831	41.97 %
No Cars Available	2650	39.29 %
Cancelled	1264	18.74 %
Total	6745	100

Problem  
area



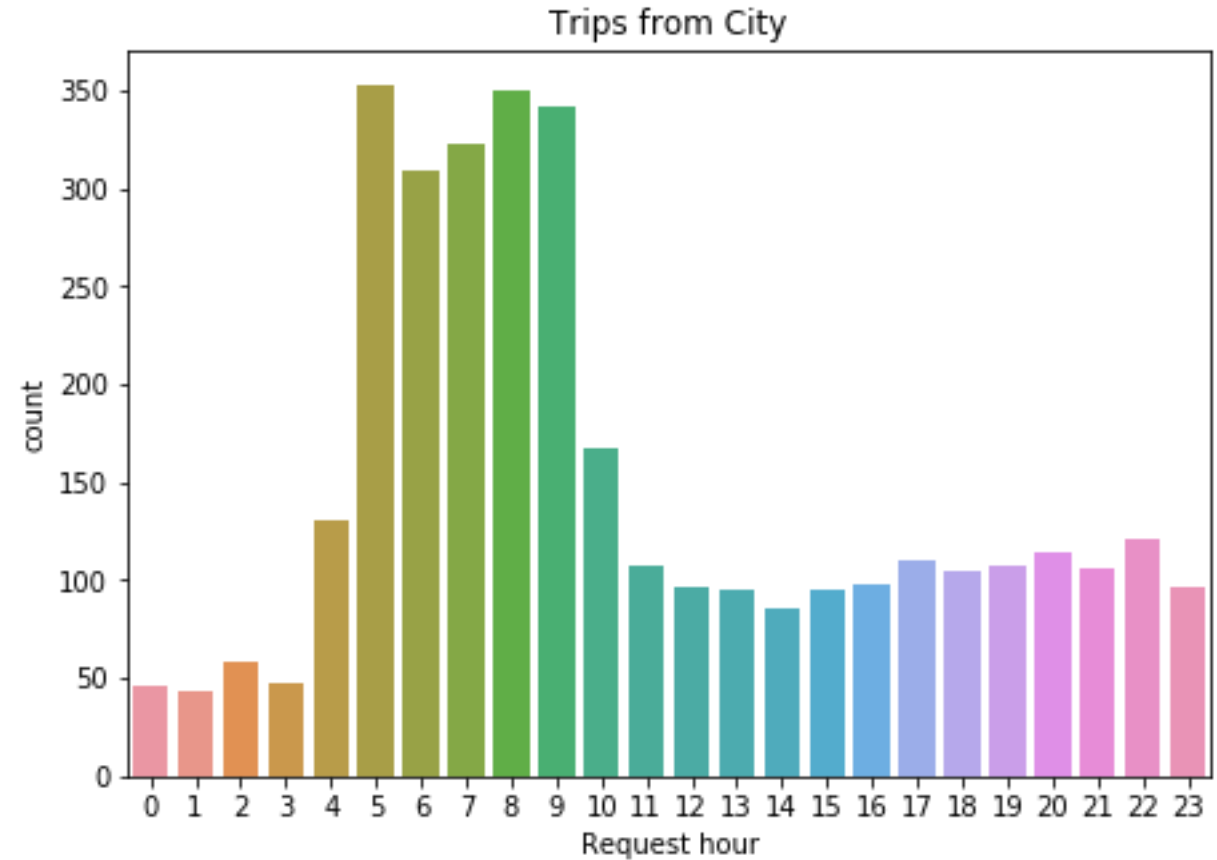
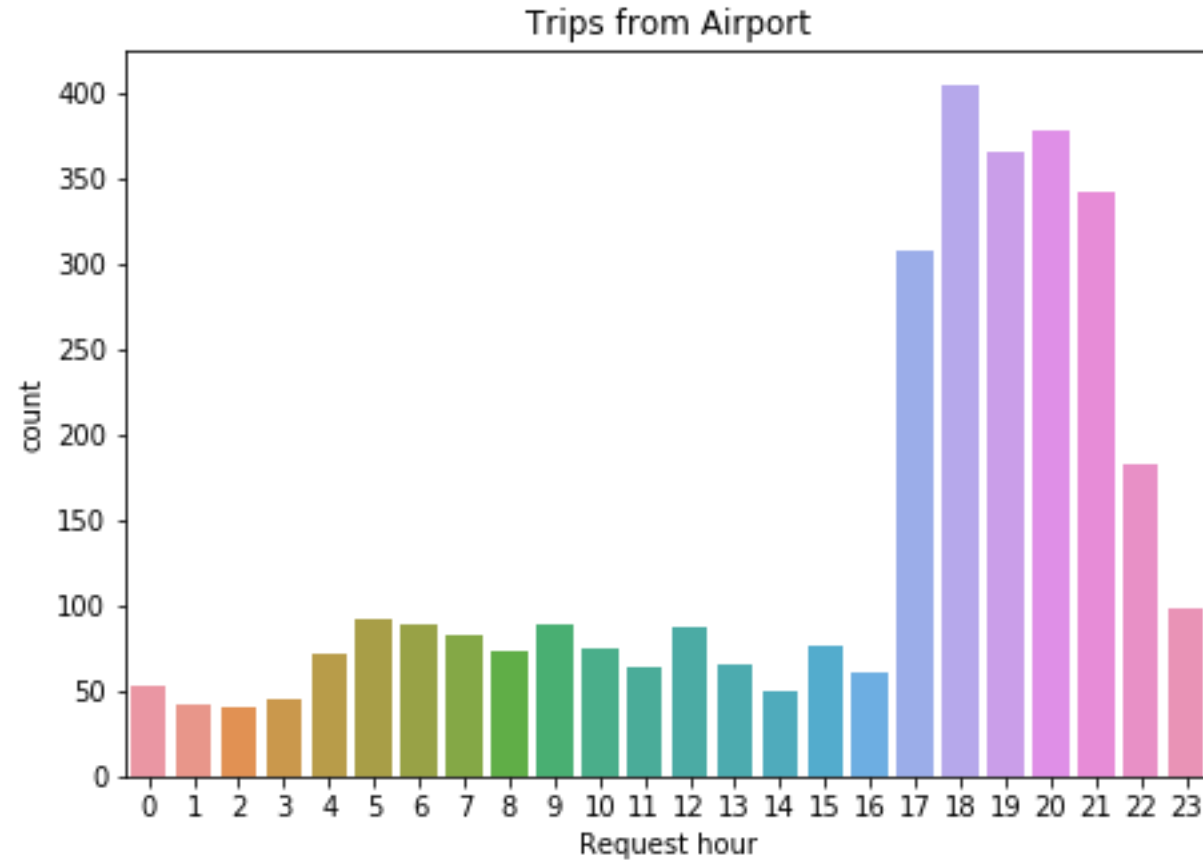
Pickup point	Percentage
Trips from Airport	48.01%
Trips from City	51.99%

## EDA: Trip requests- hour wise



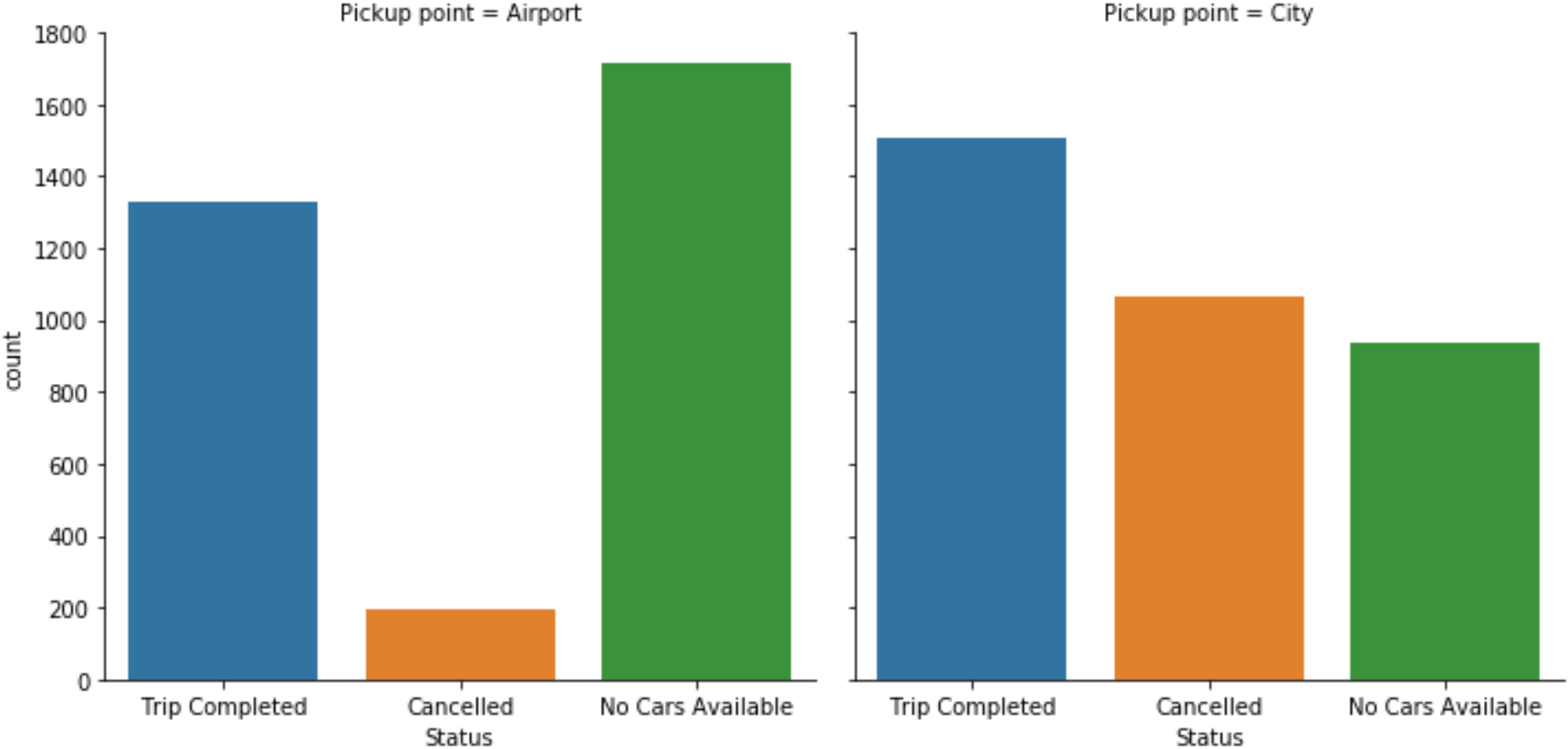
High demand is observed in 0500-1000 hrs. and 1700-2200 hrs.

## EDA: Trip requests- by Pickup point



Airport has high demand in Evening whereas City has high demand in morning.

# EDA: Trip status: by Pickup point



Huge variation exists in Cancelled and Car availability between Pickup points Airport and City.

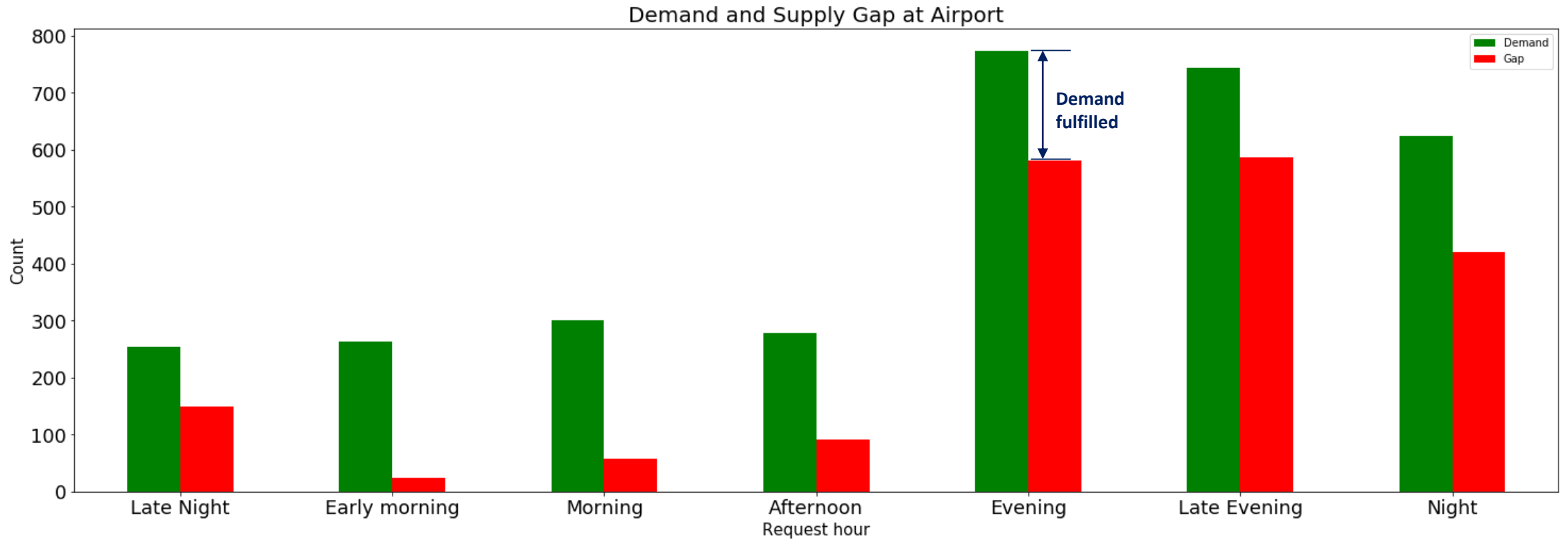
# Data analysis

- Demand-Supply Gap analysis is carried out by subsets of Pickup point (Airport or City)
- Time slots are created as-

Request hour	Slot
00:00-04:00	Late Night
05:00-07:00	Early Morning
08:00-11:00	Morning
12:00-15:00	Afternoon
16:00-18:00	Evening
19:00-20:00	Late Evening
21:00-23:00	Night

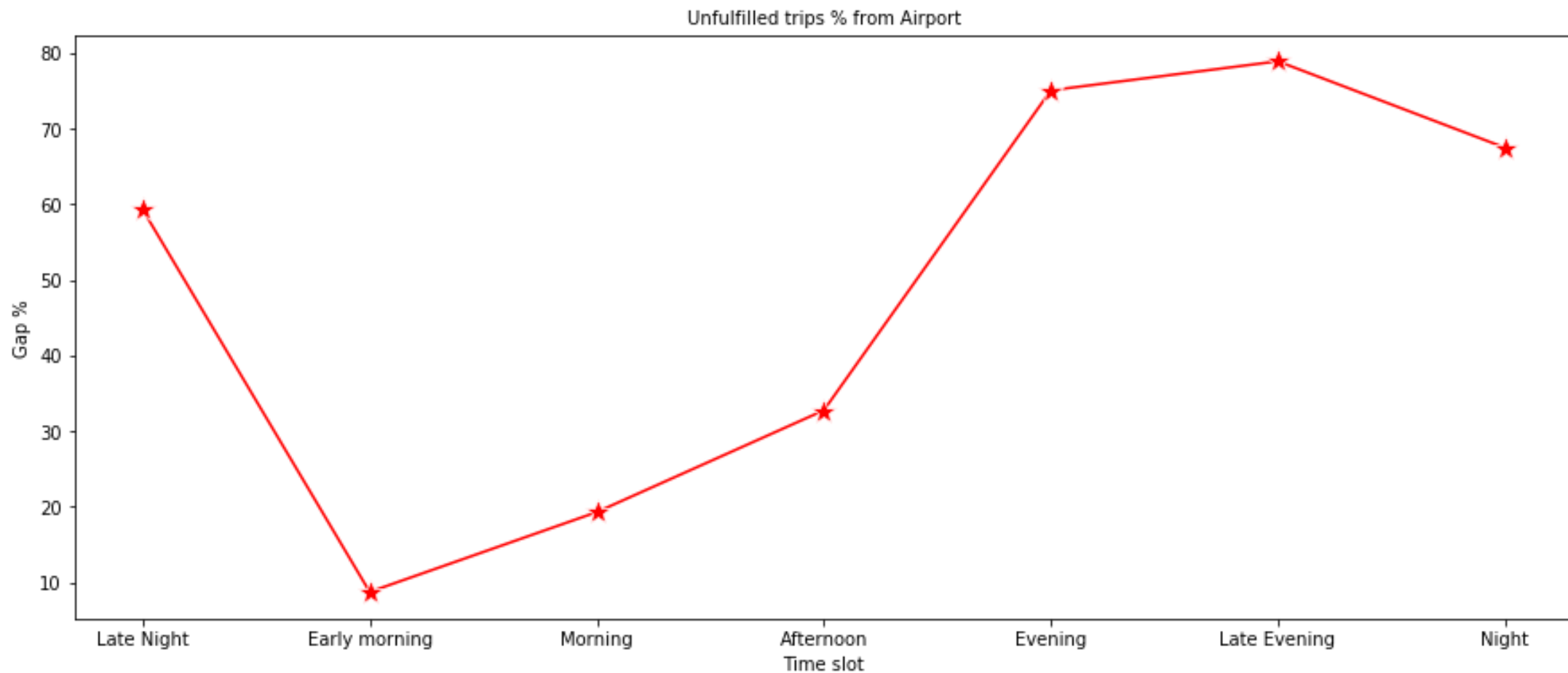


# Gap analysis at Airport



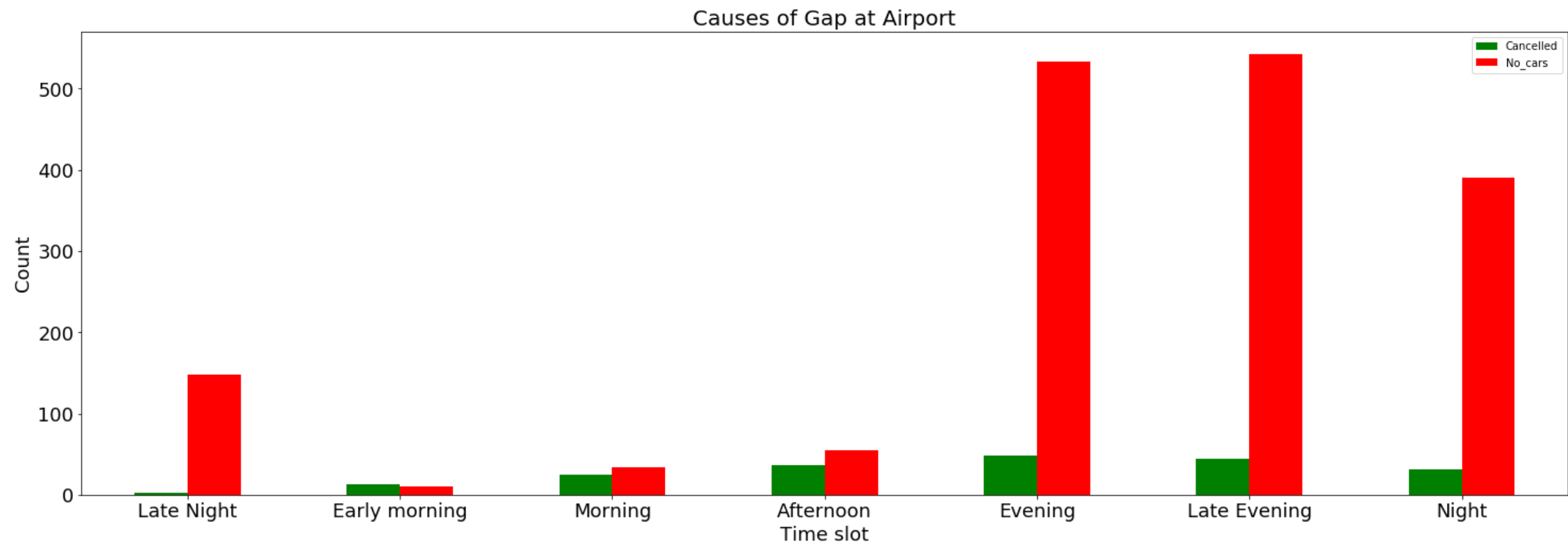
- At Airport, Demand is highest in Evening, Late evening and Night hours.
- Interestingly, The Supply gap (Cancellation and Non Car availability is also highest in this period.)

## Gap % variation by Hour



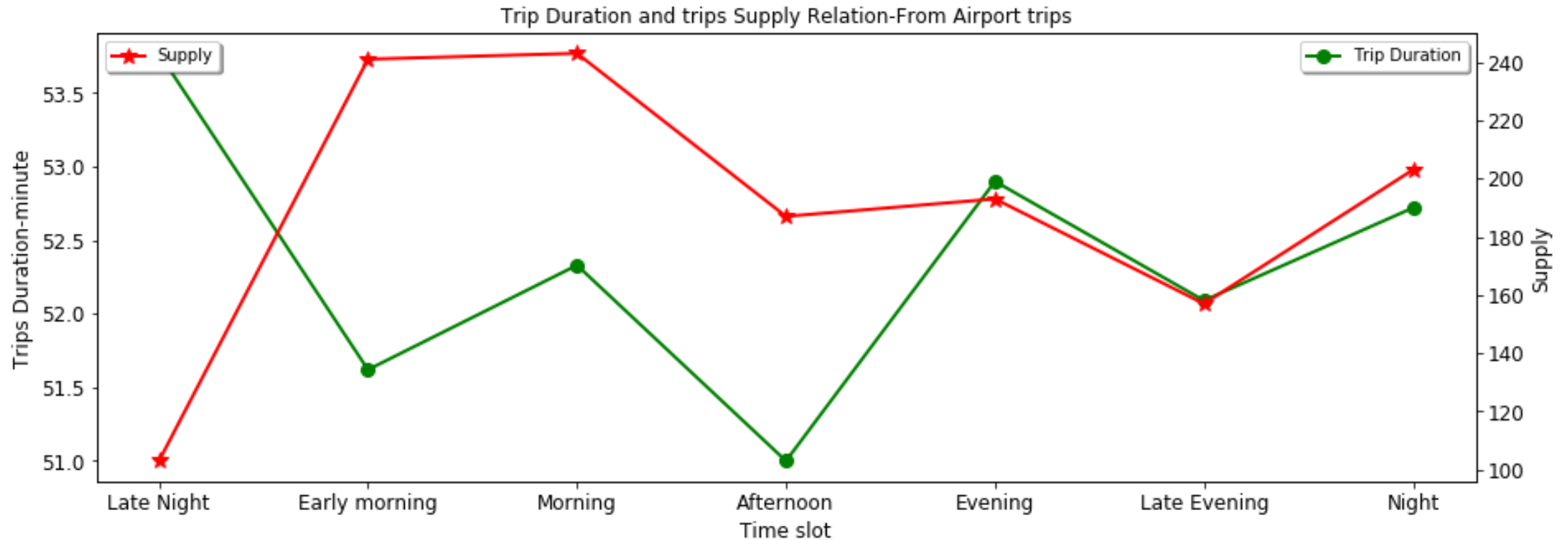
- Demand Supply gap increases at Airport from Morning till Night.
- Gap is least in Early Morning hours, when demand is also low.

# Analysis of Gap Causes at Airport



Car availability during Evening and Night hours is a major concern at Airport than Cancellation.

# Trip Duration and Supply



- As trip duration increases, Supply may decrease. Because drivers may be reluctant to drive for longer distances and times
- Above plot shows- average trip time across 24 hours varies within 4 minutes. (very less)
- The correlation coefficient between trip duration and Supply is **(-0.54)** i.e. moderate relation
- Average trip time varies very less for a Driver to not take up the trip

# Analysis-Airport

## Causes

- Evening, Late Evening and Night are highest demand periods at Airport.
- This period coincides with highest Non car availability.
- Uber is losing hugely in this peak demand period.

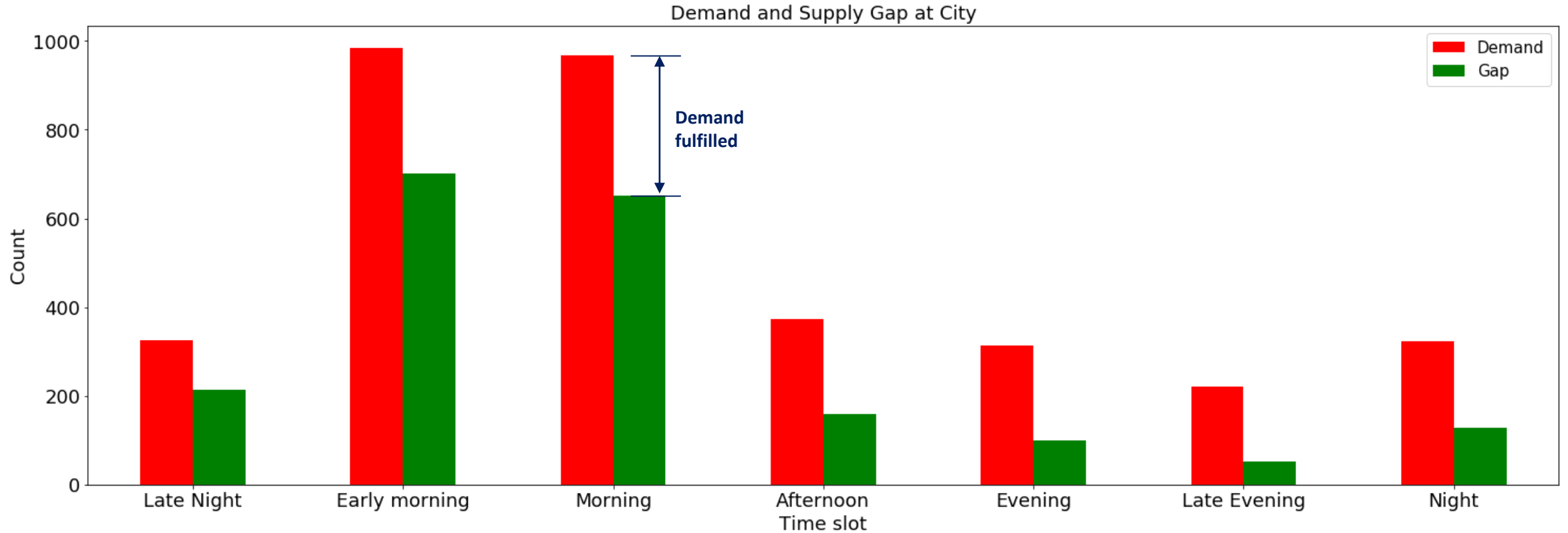
## Hypotheses

The possible reasons may be-

- Most Drivers are unwilling to stay at airport during Late evening and Night hours
- Shortage of Cars with Uber
- Driver accepts the trip but Drop point is very far where he is unwilling to go and cancels
- May be Cancellations happen due to Drivers' unwillingness to travel in High trip duration periods, however these have negative correlation, so ruled out.
- Weak correlation still exists between availability and trip time

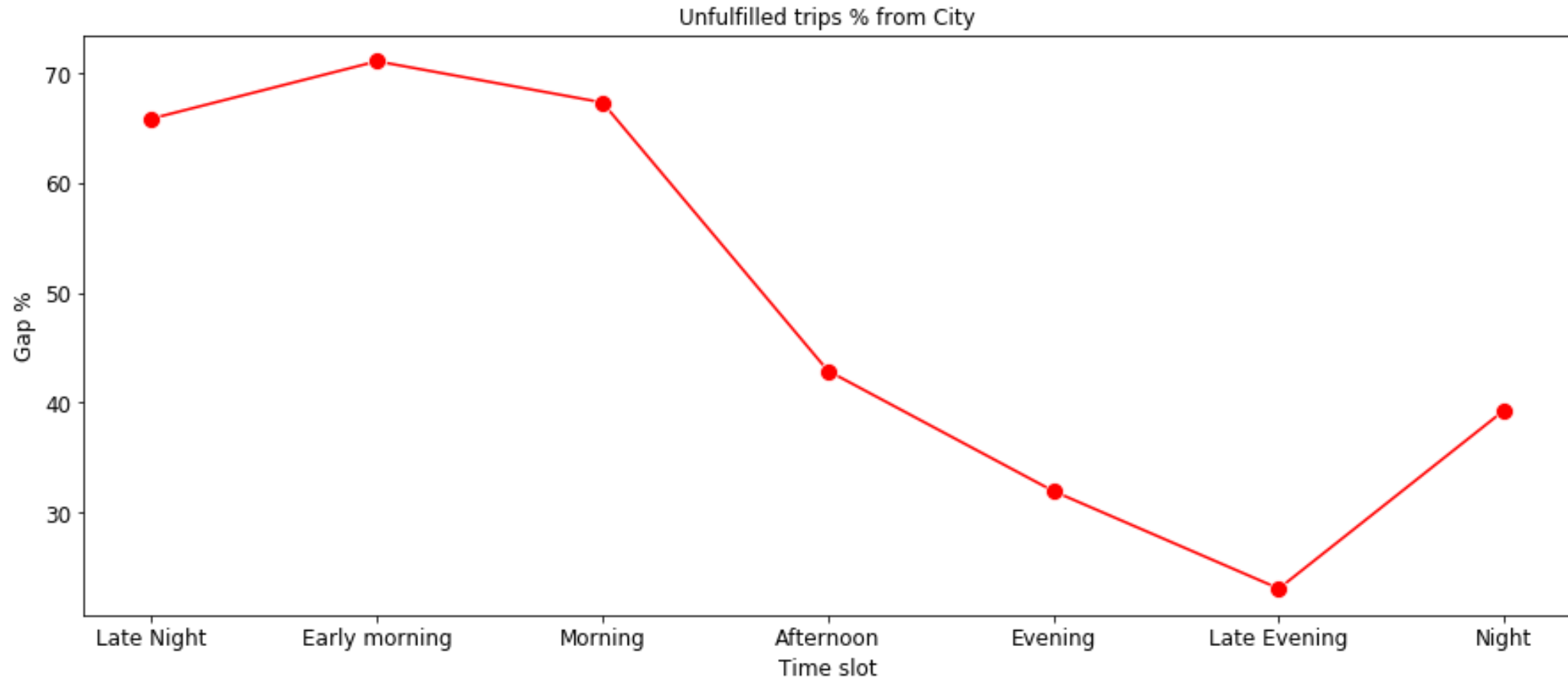
Relation	corr. Coeff.
Trip Duration-Cancellation	-0.32
Trip Duration-No cars	0.33

# Gap analysis at City



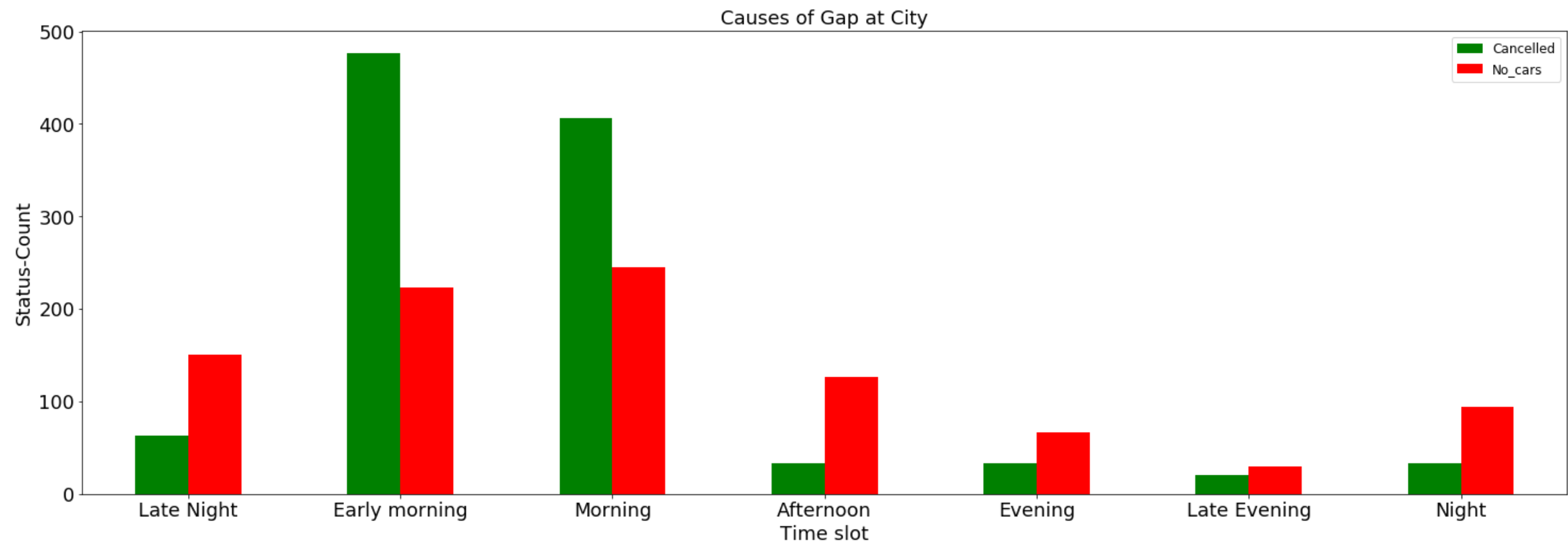
- At City, Demand is highest in Early morning and Morning hours.
- Interestingly, the Supply gap (Cancellation and Non Car availability) is also highest in this period

## Gap % variation by Hour



- Demand Supply gap decreases at City from Morning till Late evening and picks up in Night
- Gap is lowest in Late evening and highest in Early Morning hours

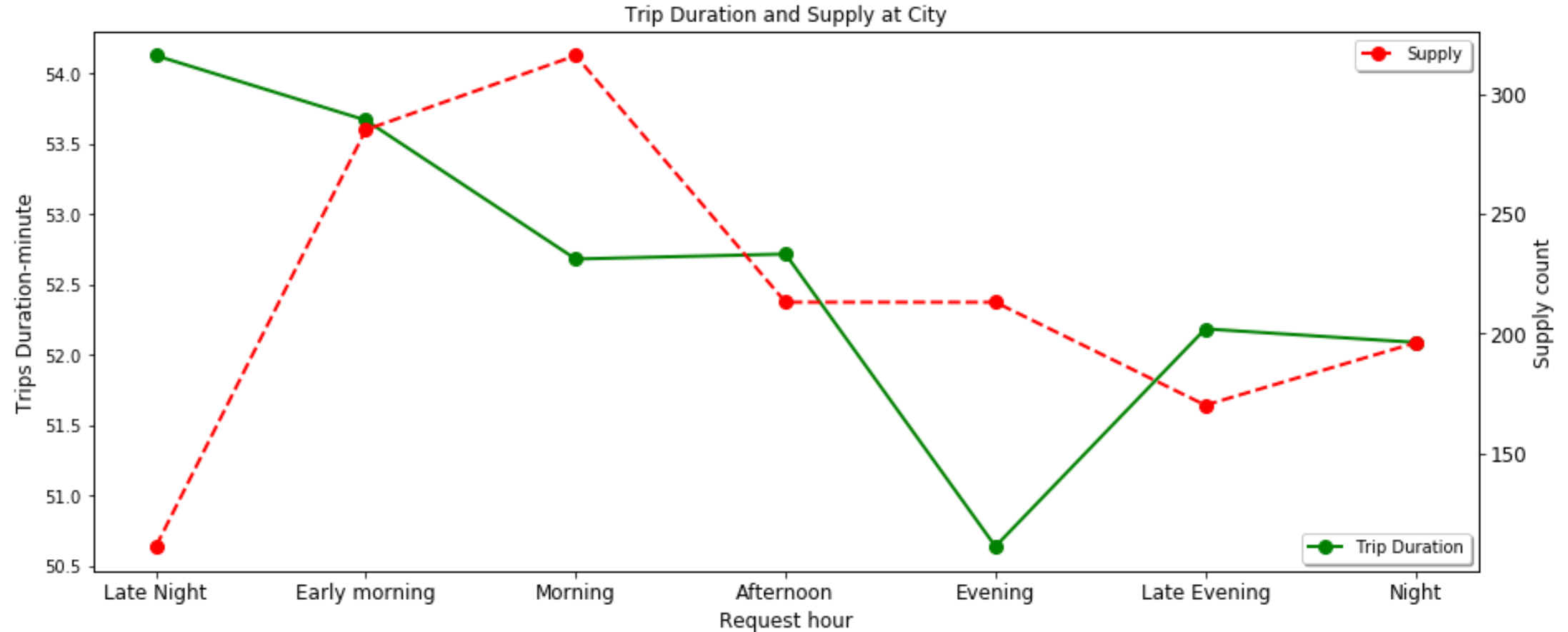
# Analysis of Gap Causes at City



Car cancellation is a major concern at City than Car availability.



# Trip Duration and Supply



- Trip duration may have impact- As trip duration increases, Supply may decrease. Because drivers may be reluctant to go on trips of longer distances and times.
- Above plot shows average trip time across 24 hours varies with in 5 minute. (very less)
- The correlation coefficient between trip duration and Supply is **(-0.09)** i.e. a very weak relation.
- Average trip time varies very less for a Driver to not take up the trip

# Analysis-City

## Causes

- Early morning and Morning are highest demand periods at City
- This period coincides with highest gap period
- Uber is losing hugely in this peak demand period, majorly due to cancellations

## Hypotheses

The possible reasons may be-

- Most Drivers are unwilling to start trips in early morning hours, hence unavailability
- Unwillingness to travel to Airport in morning as they might not get return trip from there during morning hours and idle time is high
- Driver accepts the trip but Drop point is very far where he is unwilling to go and cancels
- Shortage of Cars with company
- Cars not available due to Drivers' unwillingness to travel in High trip duration periods, moderate correlation (0.42)
- Higher trip duration has moderate effect on car availability also (0.6)
- **Trip Duration seems to be causing moderate impact on Gap at City**

Relation	corr. Coeff.
Trip Duration-Cancellation	0.42
Trip Duration-No cars	0.6

## Causes-Conclusion

- At the Airport or City, Demand is not met at their respective Peak periods
- Car availability at Airport is a pressing concern in Evening and Night, which should be targeted
- Huge demand rises from City in Early morning hours but Cars aren't there or cancellations
- Trip duration makes moderate impact on trips from City- either Cancellations happen or cars are unavailable

# Recommended solutions

- Uber must increase the supply of cars, maybe by increasing the fleet of Cars
- Drivers may be given incentive for-
  - driving from Airport in Evening, Late night and Night periods
  - driving from City in Early morning and Morning hours

This will increase Supply of cars as Drivers will be willing to earn more.