

UBER CASE STUDY SUPPLY-DEMAND GAP

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Data Cleaning

Request and Drop Timestamp

In the given UBER data, we have 6 columns:

- Request id
- Pickup point
- Driver id
- Status
- Request timestamp
- Drop timestamp

	Request id	Pickup point	Driver id	Status	Request timestamp	Drop timestamp
0	619	Airport	1.0	Trip Completed	11/7/2016 11:51	11/7/2016 13:00
1	867	Airport	1.0	Trip Completed	11/7/2016 17:57	11/7/2016 18:47
2	1807	City	1.0	Trip Completed	12/7/2016 9:17	12/7/2016 9:58
3	2532	Airport	1.0	Trip Completed	12/7/2016 21:08	12/7/2016 22:03
4	3112	City	1.0	Trip Completed	13-07-2016 08:33:16	13-07-2016 09:25:47

Timestamps are not in uniform format across both the columns so, in the first step we are going to format timestamp columns

Driver Count Analysis

Lets have a look on the total number of drivers and trip request per day:

Number of Drivers	Average Trip Request Per Day	Average Trips Completed Per Day
300	1349	566.2

On average number of trip request per driver is approximate of **5**, but the trips completed by them on average is of **2**

Data Formatting

Data After Formatting Timestamps columns

	Request id	Pickup point	Driver id	Status	Request timestamp	Drop timestamp
0	619	Airport	1.0	Trip Completed	2016-07-11 11:51:00	2016-07-11 13:00:00
1	867	Airport	1.0	Trip Completed	2016-07-11 17:57:00	2016-07-11 18:47:00
2	1807	City	1.0	Trip Completed	2016-07-12 09:17:00	2016-07-12 09:58:00
3	2532	Airport	1.0	Trip Completed	2016-07-12 21:08:00	2016-07-12 22:03:00
4	3112	City	1.0	Trip Completed	2016-07-13 08:33:16	2016-07-13 09:25:47

Feature Engineering

After formatting timestamp columns, we used them to derive new metrics:

- Request timestamp Request Date, Request Time, Request Weekday, Request Hour
- Drop timestamp Drop Date, Drop Time

	Request id	Pickup point	Driver id	Status	Request timestamp	Drop timestamp	Request Date	Request Time	Drop Date	Drop Time	Request Weekday	Request Hour
0	619	Airport	1.0	Trip Completed	2016-07-11 11:51:00	2016-07-11 13:00:00	2016-07-11	11:51:00	2016-07-11	13:00:00	Monday	11
1	867	Airport	1.0	Trip Completed	2016-07-11 17:57:00	2016-07-11 18:47:00	2016-07-11	17:57:00	2016-07-11	18:47:00	Monday	17
2	1807	City	1.0	Trip Completed	2016-07-12 09:17:00	2016-07-12 09:58:00	2016-07-12	09:17:00	2016-07-12	09:58:00	Tuesday	9
3	2532	Airport	1.0	Trip Completed	2016-07-12 21:08:00	2016-07-12 22:03:00	2016-07-12	21:08:00	2016-07-12	22:03:00	Tuesday	21
4	3112	City	1.0	Trip Completed	2016-07-13 08:33:16	2016-07-13 09:25:47	2016-07-13	08:33:16	2016-07-13	09:25:47	Wednesday	8

Univariate Analysis - Trip Status

As we can see from the graph:

Trip Completed	Cancelled Status	No Cars Available
2831	1264	2650

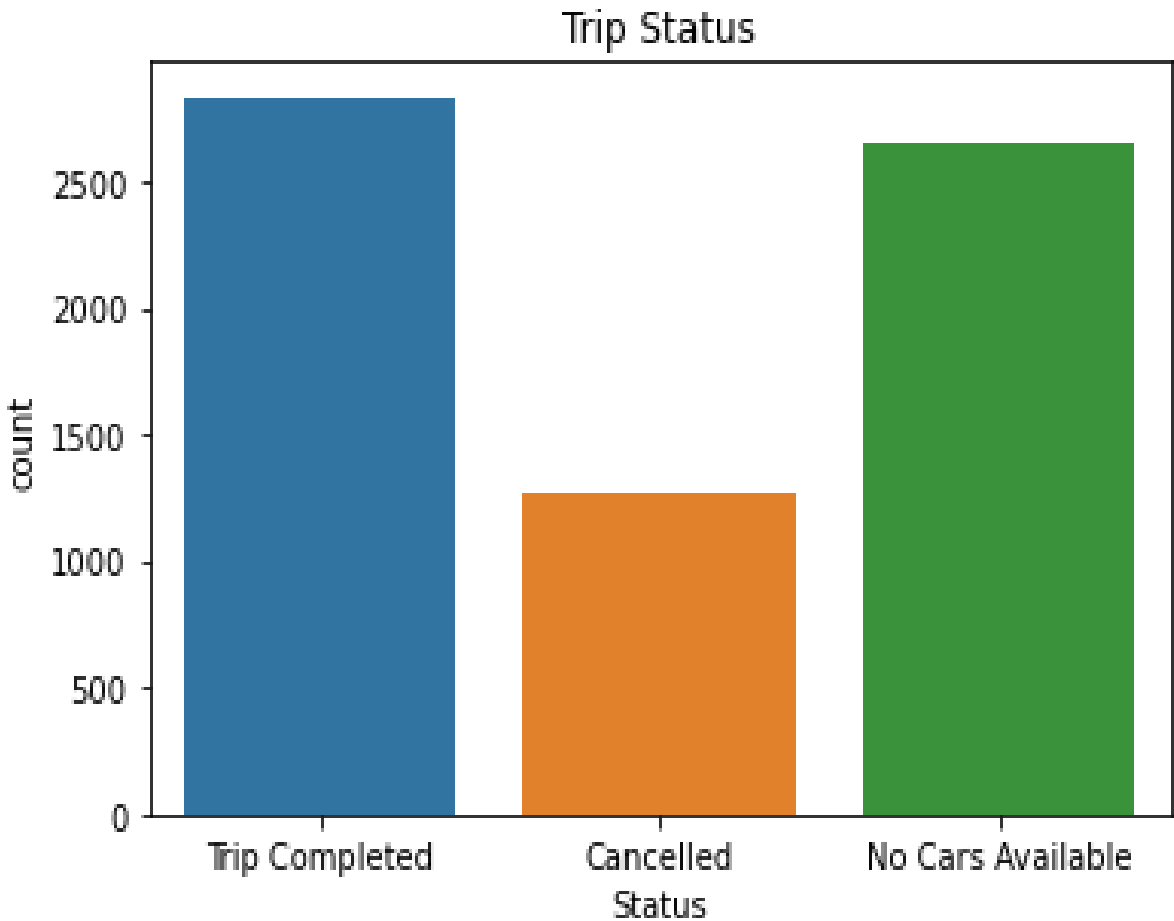
From the above table, we can observe:

Total Demand = 6745

Total Supply = 2831

Supply Demand Gap = 3914

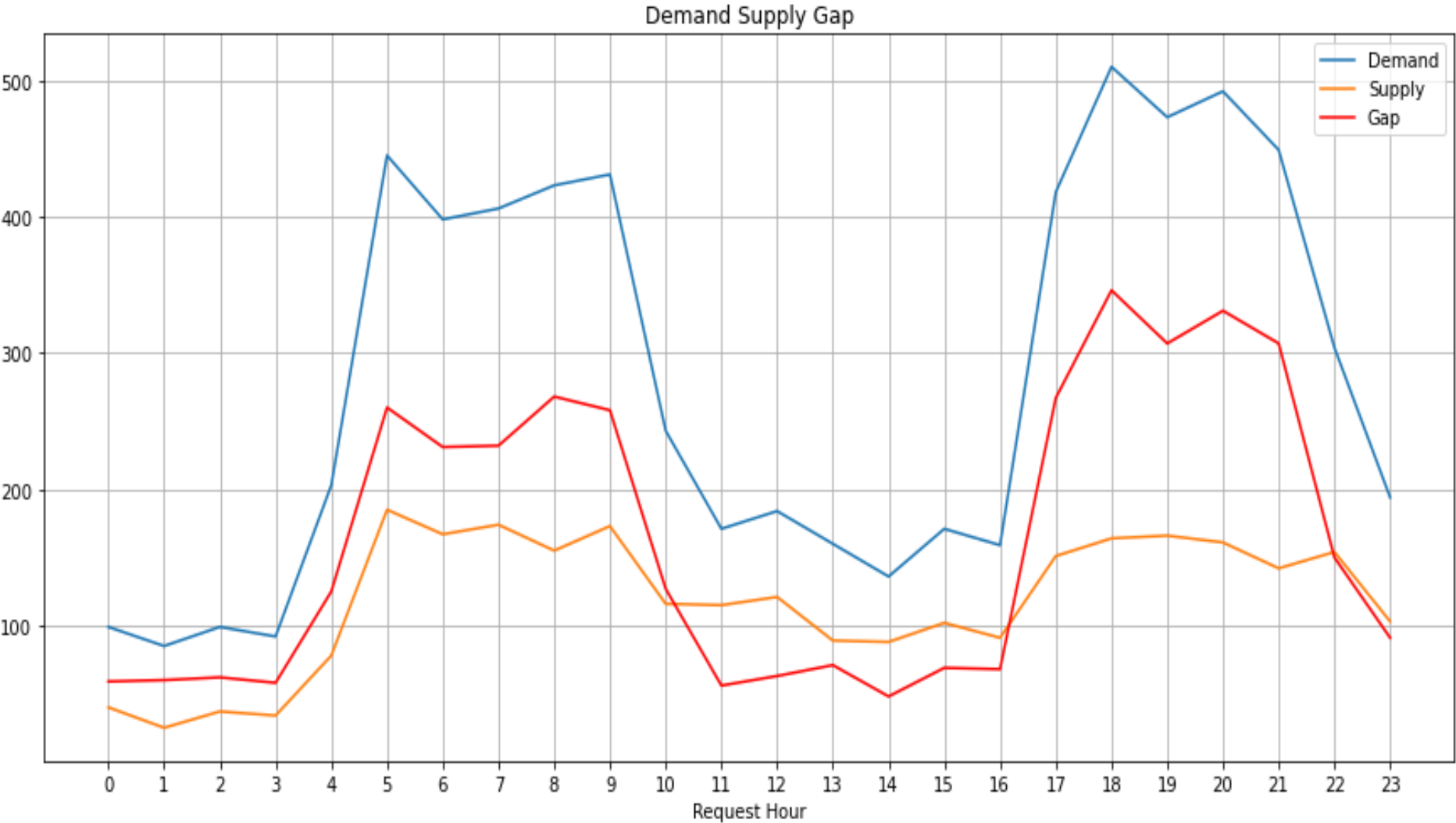
This shows only **42%** of total demand was met and there is a gap of **58%** of supply either due to trip cancellation or no cabs availability.



Supply Demand Gap Analysis

Hourly Gap Between Supply and Demand

As per the graph, the hourly trend of demand versus supply and the gap variation throughout the day. Demands remains constant between 100 to 200 with a sudden surge between 4 to 10 am in the morning and 5 to 10 pm at night.



Data Analysis

As per graph, we can observe
peak-hours of demand:

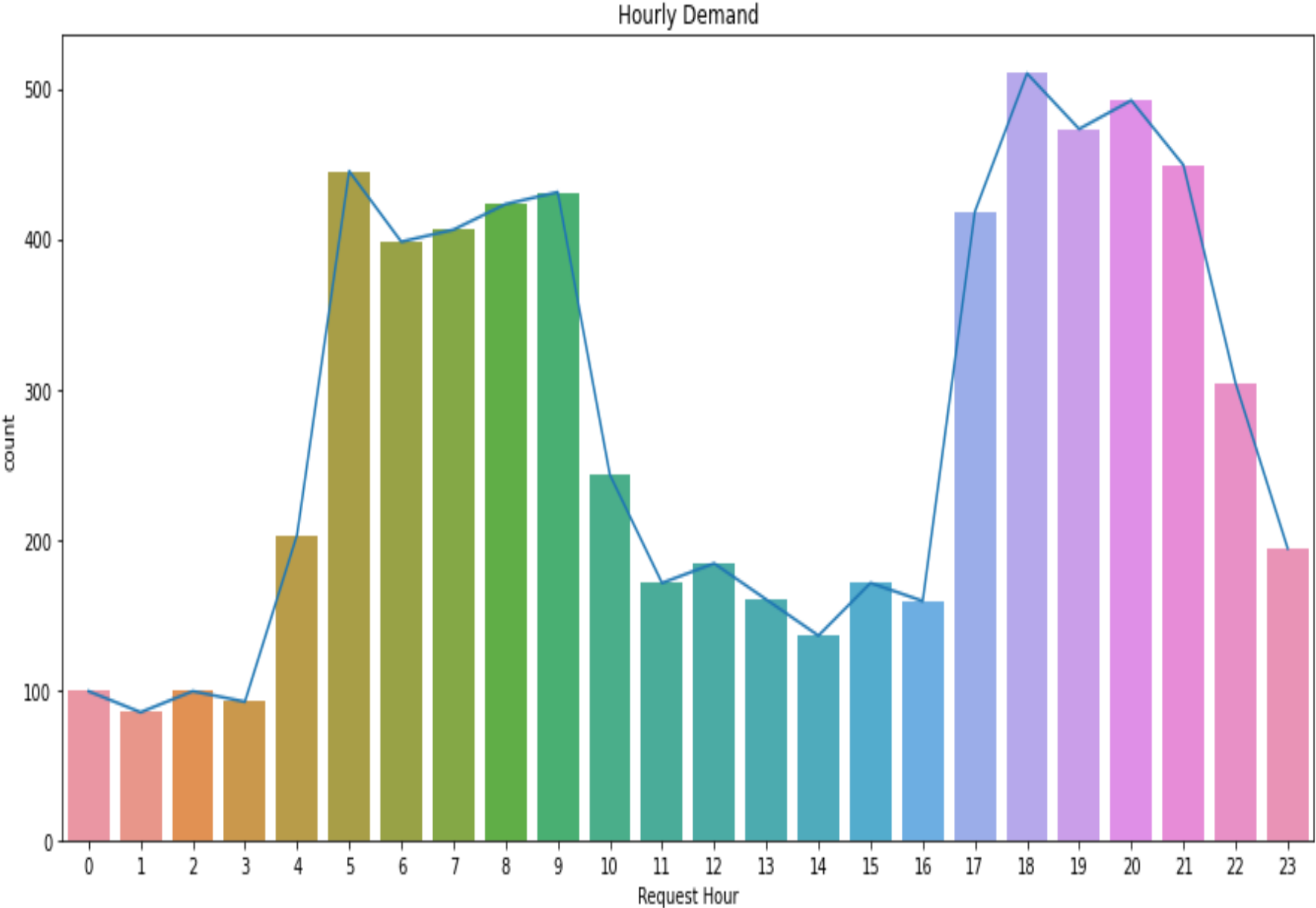
In morning

It is between **04:00 10:00**

In evening

It is between **17:00 22:00**

Hourly Demand

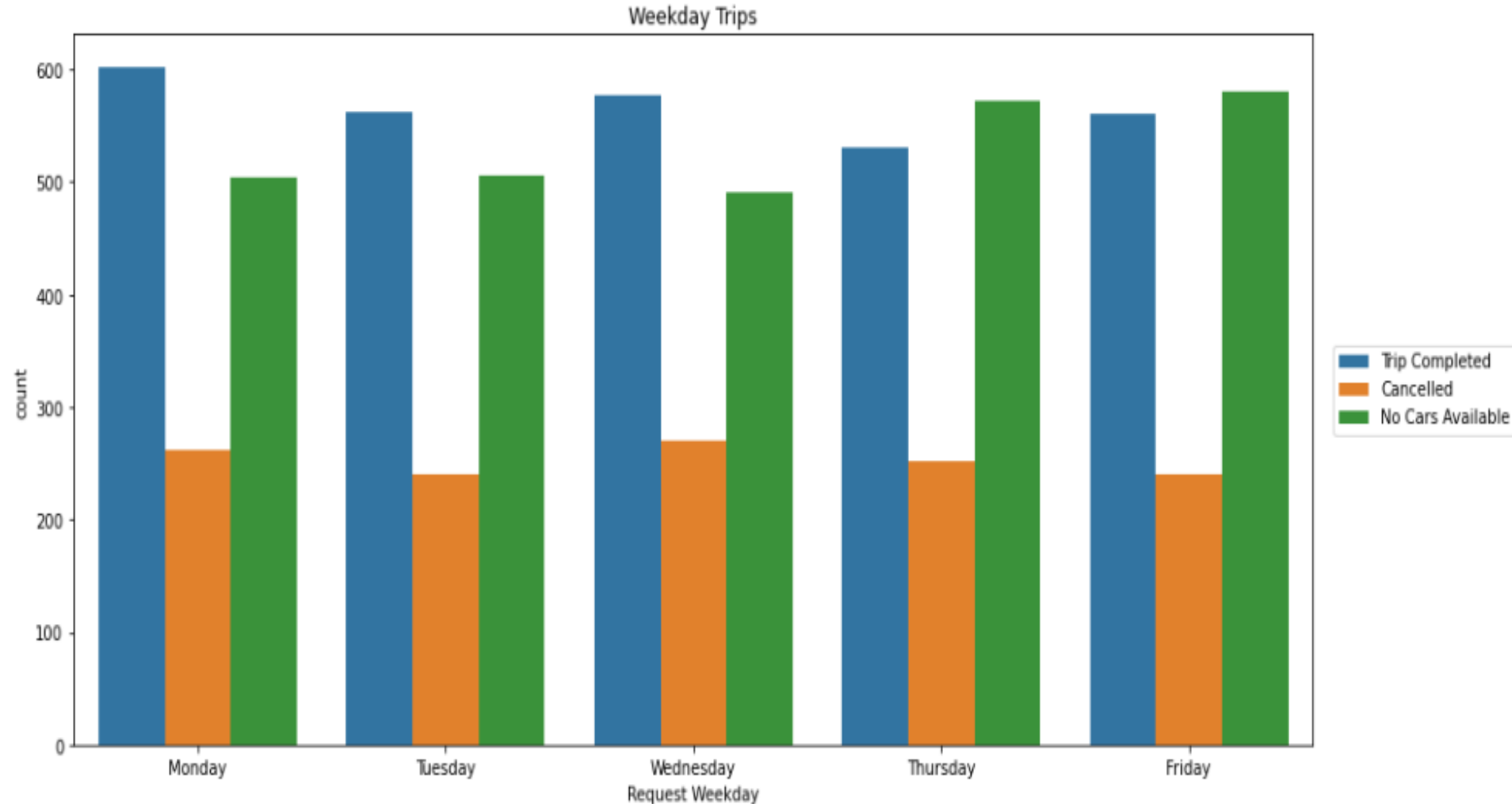


Weekday Status Count Analysis

Daily Trip Analysis

Observation :

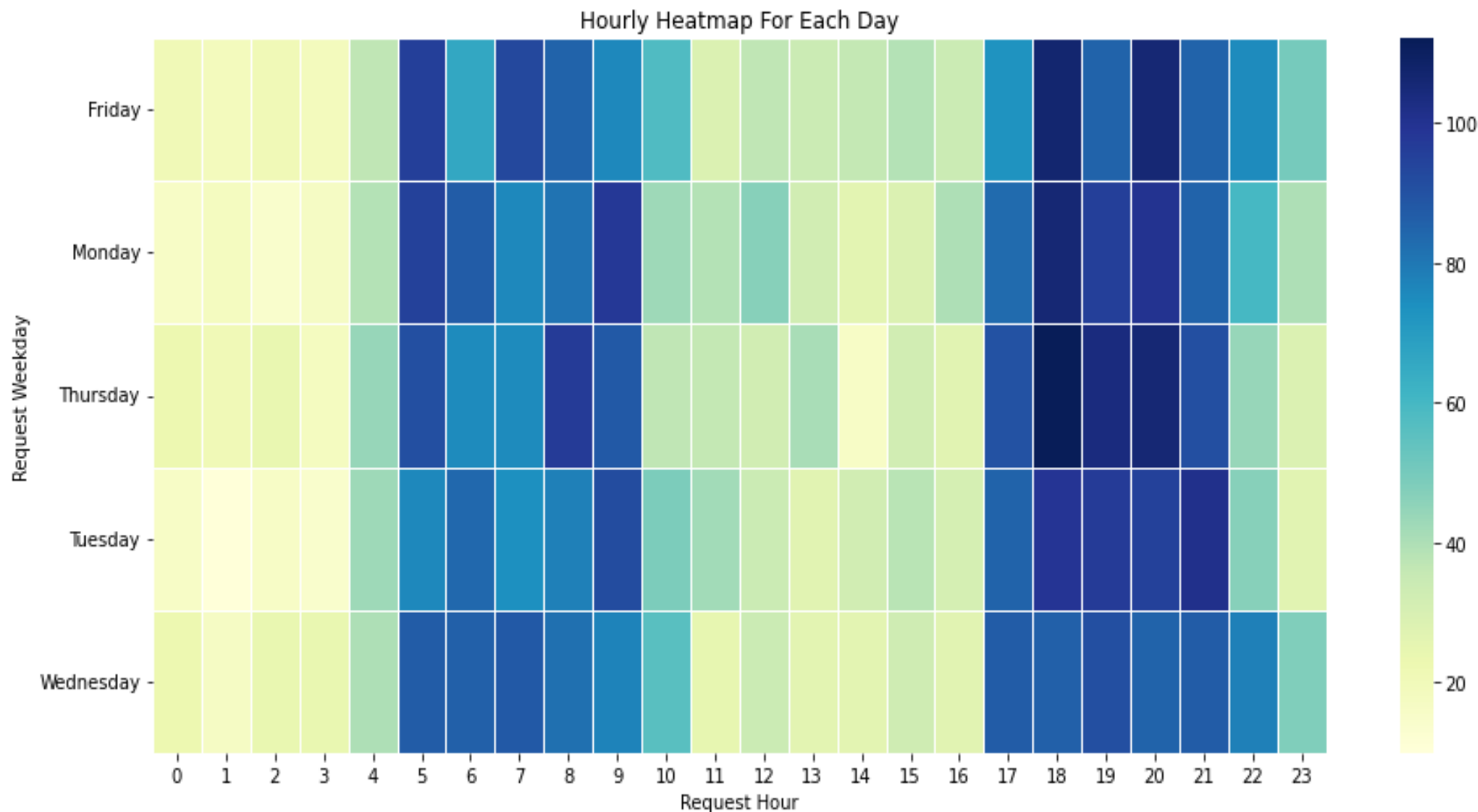
- Number of trips completed is higher on Monday and least on Thursday
- Number of trips cancelled on Wednesday is higher
- Number of no cars availability is higher on Thursday and Friday and slightly lower on other days



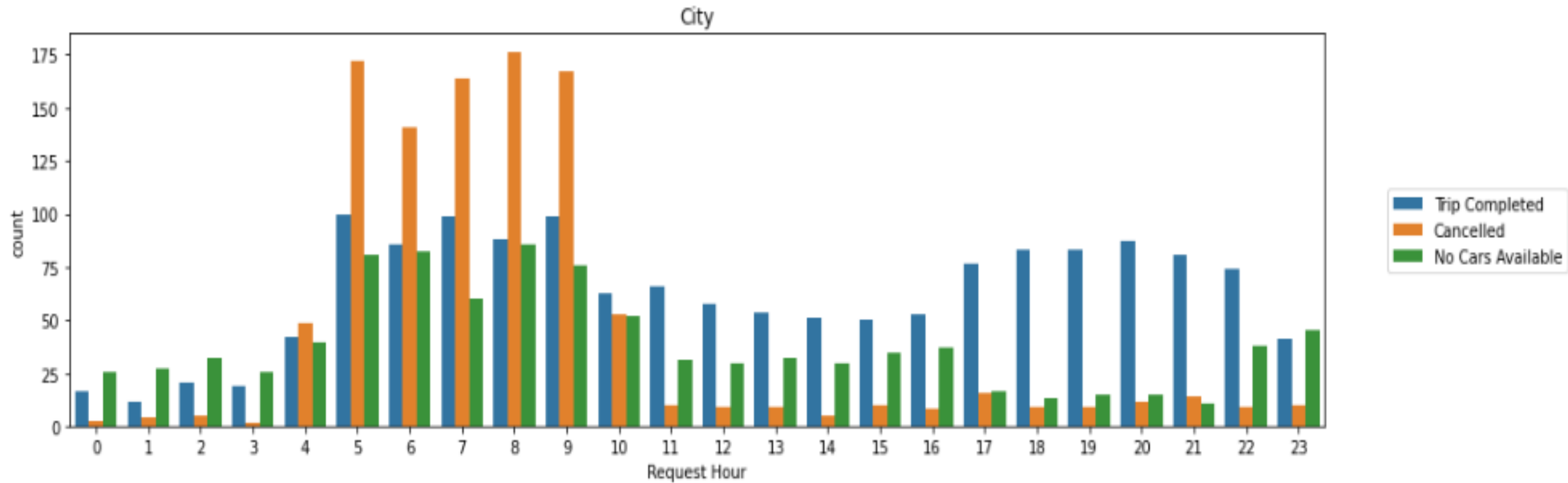
Data Plotting - Hourly Demand Heatmap

Observation:

We can observe peak hour for each day is between 04:00 to 10:00 in the morning and 17:00 to 22:00 in the evening and night. Demand is very high on Monday, Thursday and Friday between 18:00 to 21:00.

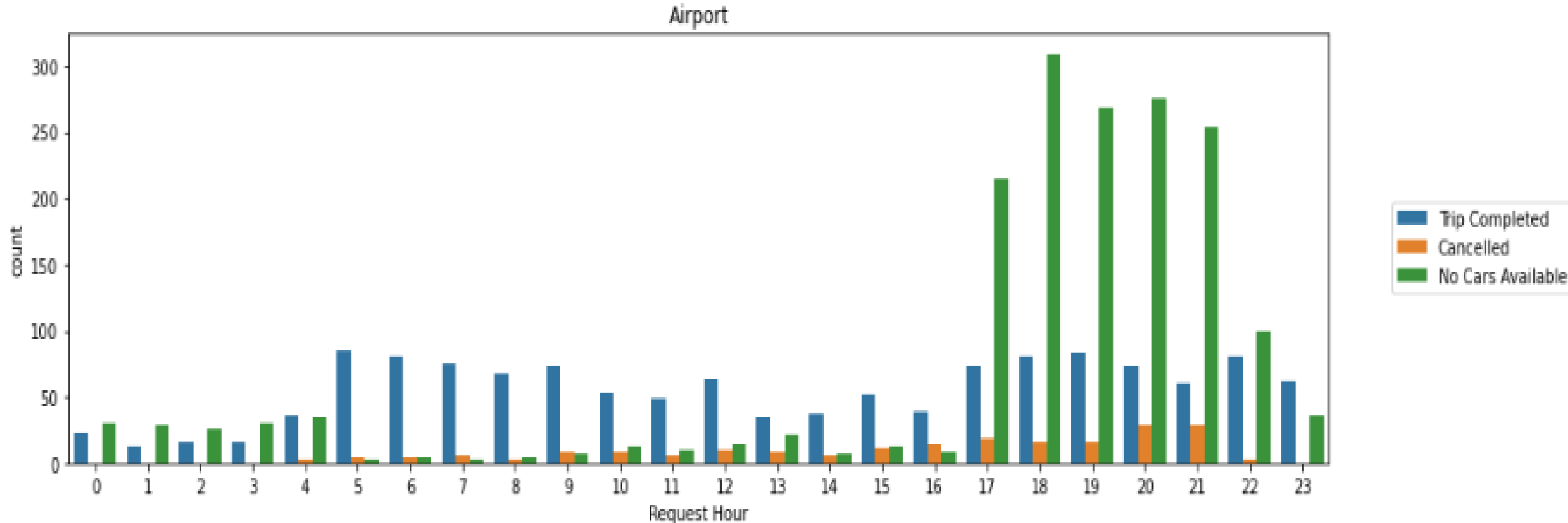


City to Airport Trips Analysis



- Demand is extremely high between **05:00 to 10:00** in the morning for city to airport trips
- Cancellation of trip request is also very high in the same time interval.

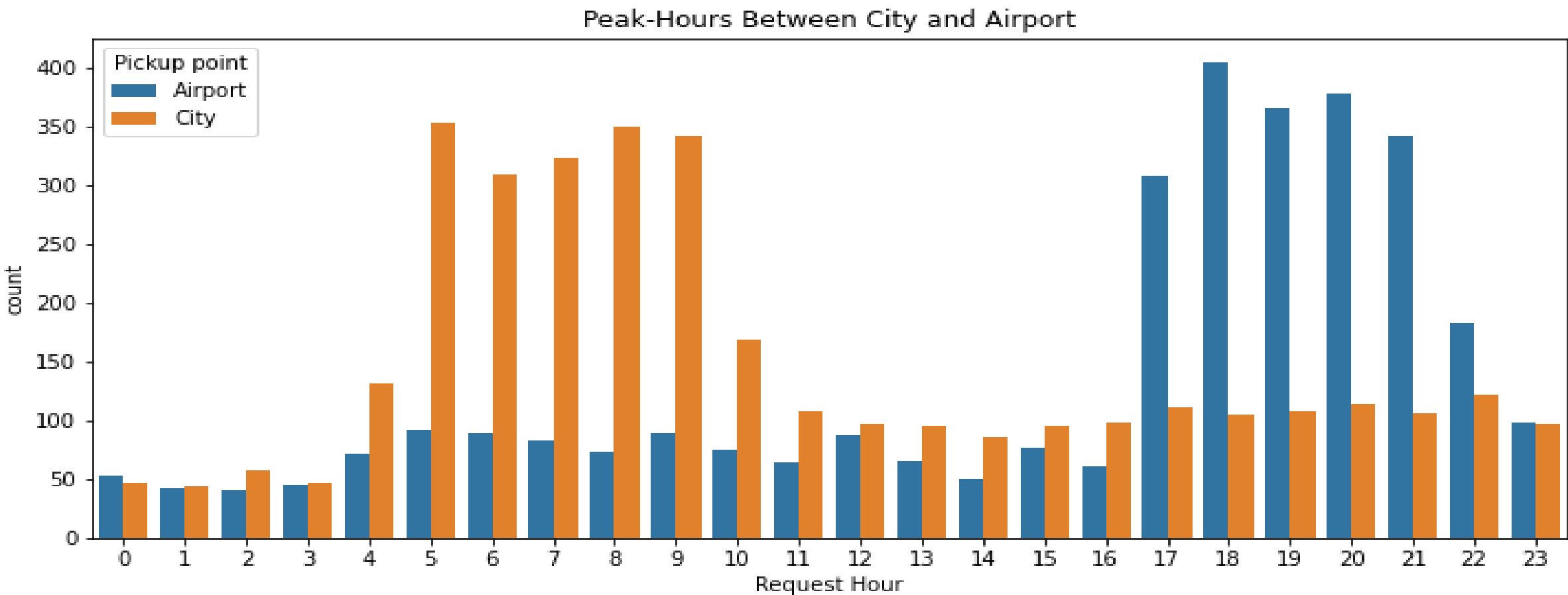
Airport to City Trips Analysis



- Demand is extremely high between 17:00 in the evening to 22:00 in the night for airport to city trips
- Availability of the car is the main issue for supply demand in this time interval

Pickup Point Based Demand Analysis

Insight of peak-hours for trips from City and Airport



As per the graph we can clearly observe, demand is high for the trips from **City Airport** between **05:00 to 10:00** in the morning, while for the trips from **Airport City**, the demand is high between **17:00 to 22:00** at night

Time Slots and Pickup Point Analysis

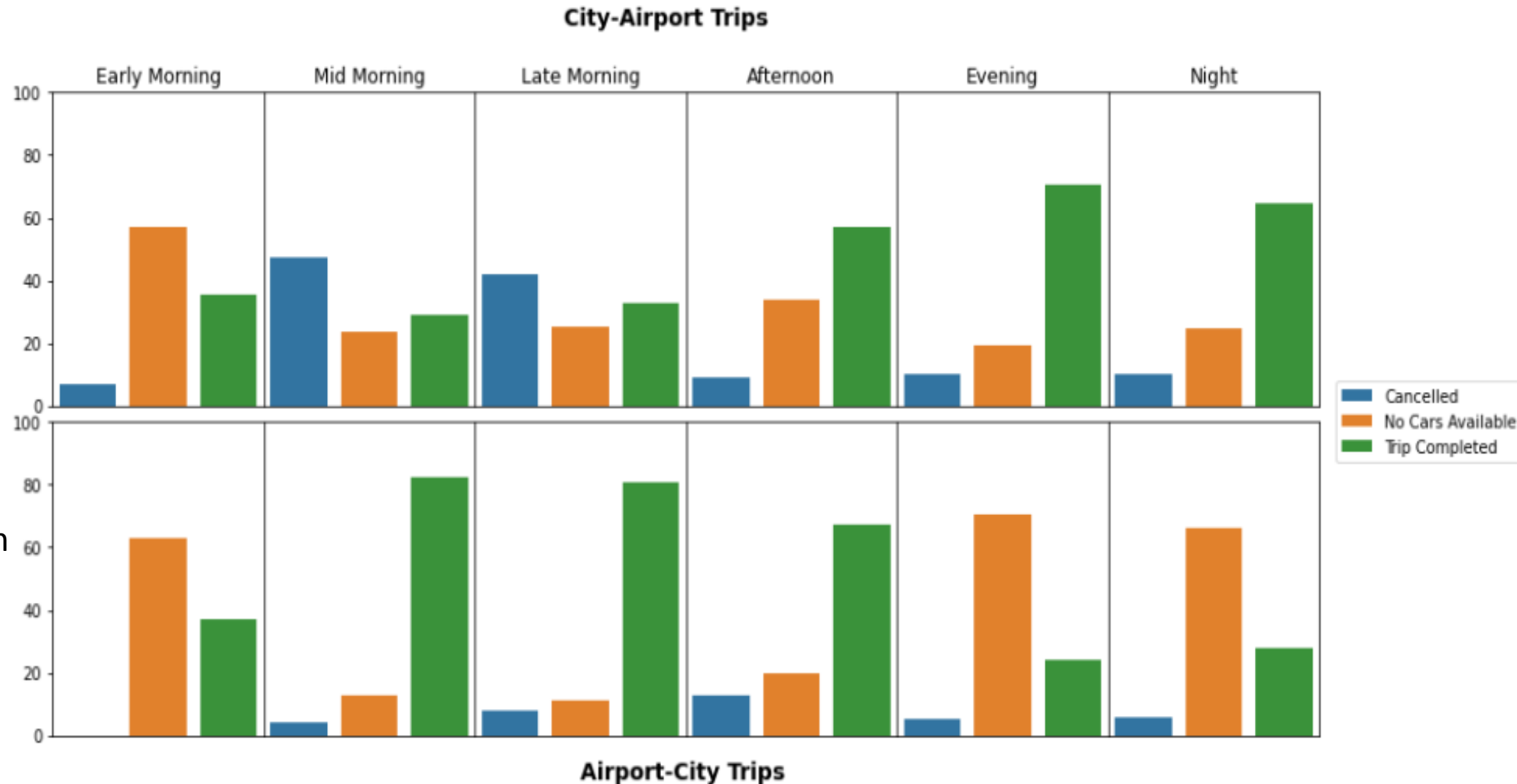
Trip Analysis in Different Time Slots

City-Airport trip:

- Trip completion is higher in afternoon, evening and night.
- Most of the trip are cancelled in mid morning and late morning.

Airport-City Trip:

- No cancelled trip in early morning and high number of no cars available in evening and night.
- Trip completion is higher in mid morning and late morning



Further Inferences Analysis on Time Slots and Pickup Point

Inferences	Early Morning	Mid Morning	Late Morning	Afternoon	Evening	Night
City To Airport	High supply demand gap due to less number of cabs available	Number of cancellations is higher	Cancellation is slightly higher then the trips completed	Supply is good in comparison to other time slots and can be improved if there are more cabs	Demand supply gap is least in this slot	Number of trips completed is highest in this slot and less number of cancellations
Airport To City	Cabs availability is the main issue in this slot to fulfill the supply demand gap as there is no cancellation	Number of trips completed is high in this slot and less no. of cancellations	Number of trips completed is high in this slot and less number of cancellations	Number of trips completed is high in this slot and less number of cancellations	Cabs availability is the main cause in this time slot	Cabs availability is the main cause in this time slot

Time-SlotName	Time-Interval
Early Morning	00:00:00-03:59:59
Mid Morning	04:00:00-07:59:59
Late Morning	08:00:00-11:59:59
Afternoon	12:00:00-15:59:59
Evening	16:00:00-19:59:59
Night	20:00:00-23:59:59

Final Results - Problem Statements

- No cars available is the main issue for supply demand gap as we observed from “Trip Status” graph. **39.2%** of total request was not fulfilled due to non availability of cars
- Number of drivers are less in comparison to daily demand which on average each driver can serve
- Sudden surge in demand between 4 to 10 am in the morning and 5 to 10 pm at night.
 - In morning from City to Airport trips
 - In evening from Airport to City trips
- Cancellation of trips are higher between 4 to 10 am time slot in City to Airport trips resulting in high gap between supply and demand. The difference between demand and supply is 1205. Out of 1677 requests, **48.9%** is due to cancellation of trip.
- Cabs non availability is the main issue between 5 to 10 pm time slot in Airport to City trip requests for the high supply demand gap. The difference between demand and supply is 1427. Out of 1800 requests, **73.9%** is due to non availability of car.

Final Results - Recommendations

- Introduction of higher incentive/perk during odd hours.
- Allotting certain percentage of cab driver in Airport specially during flight landing time in order to meet the sudden spike of passengers.
- Hiring more part time drivers to overcome the non availability of cars problem during peak hours.
- Increasing profit margins for drivers so that they don't cancel the trip for city to airport in peak morning hours.
- Surge pricing when the demand is high to increase revenue while maintaining transparency.
- Increase demand at the airport through marketing initiatives so that drivers don't have to wait for a longer time.
- Uber can pay drivers to come without passengers from the airport if they are not getting and pickups.

Thank You