Uber Supply-Demand Gap Assignment

Problem Statement

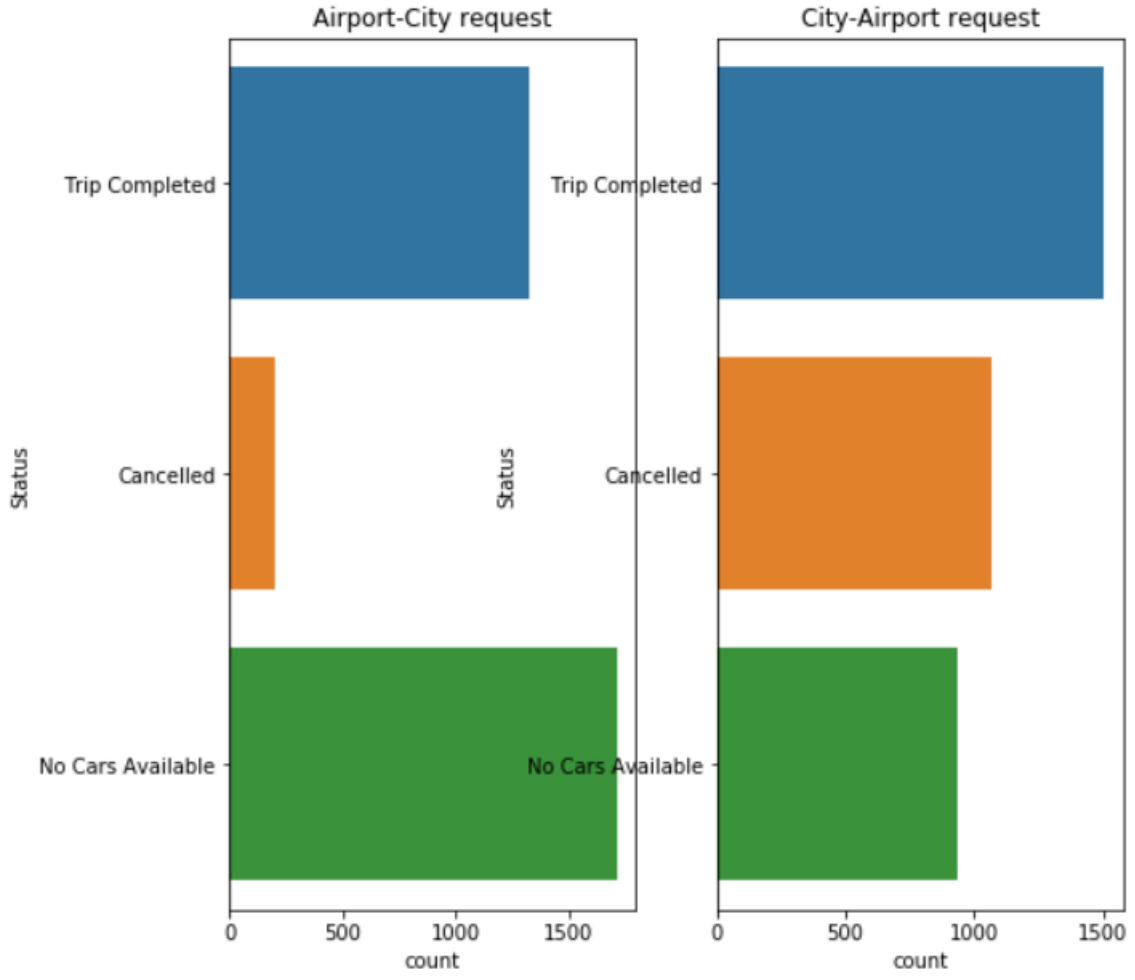
- The inability to book cabs either because of “No availability of the cabs” or because of recurring “Cancellations by drivers” affects business of Uber.
- The aim is to point out the reasons as to why we face this issue and what are the measures that we can take to fix it.

Pressing Issues

- The cabs either get ‘Cancelled’ or show ‘No Cars Available’ which is one of the issues faced by Uber.
- The most problematic type of requests mentioned are presented below with the help of following plots:
  i. City to Airport
  ii. Airport to City

- With the plot shown, we can understand that Airport-City Request has more number of “No Cars Available” which means either the Idle time or the trip time is high at the Airport.

- In case of City-Airport Request, the “Cancelled” and “No Cars Available” status is almost equal, making “City to Airport” type of request the most problematic request.



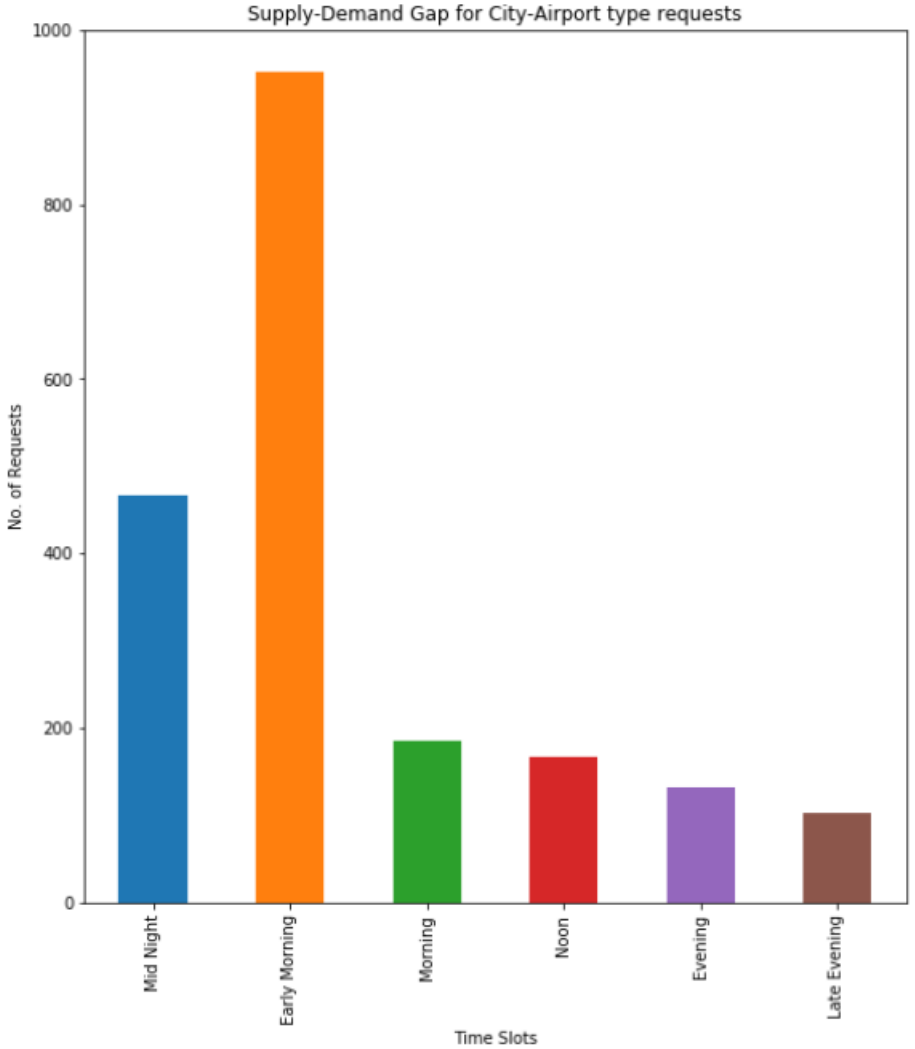
What is Supply-Demand Gap

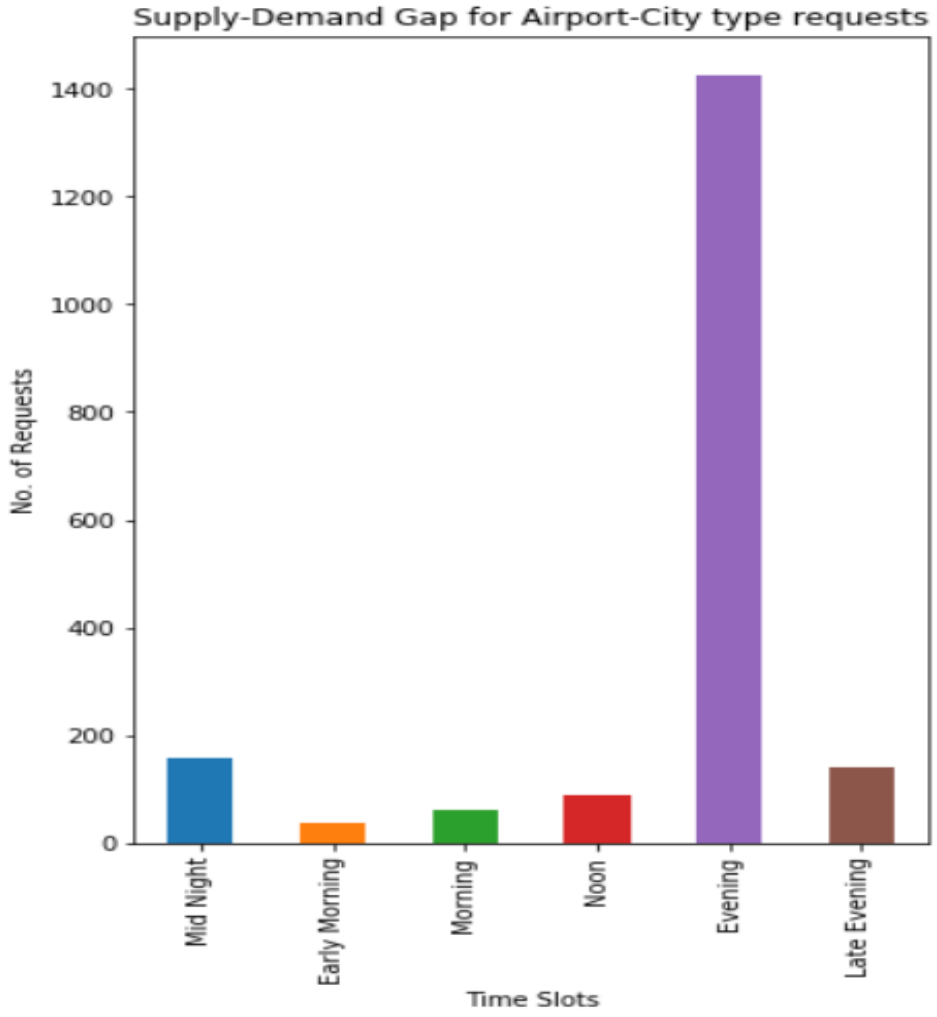
1. Demand : Demand means the total number of requests coming in on Uber.
2. Supply : Supply simply refers to the number of cabs available aiding in trips getting “completed” out of the number of requests coming in.
3. Gap : Hence, the Gap means the difference between Demand and Supply, meaning trips either get cancelled or show no cars available at the city or airport.

Supply-Demand Gap

1. The City-Airport type of request has the biggest gap during early morning time.

2. While Airport-City type of request has the most severe gap during evening time.





Metrics to find the root cause of the gap

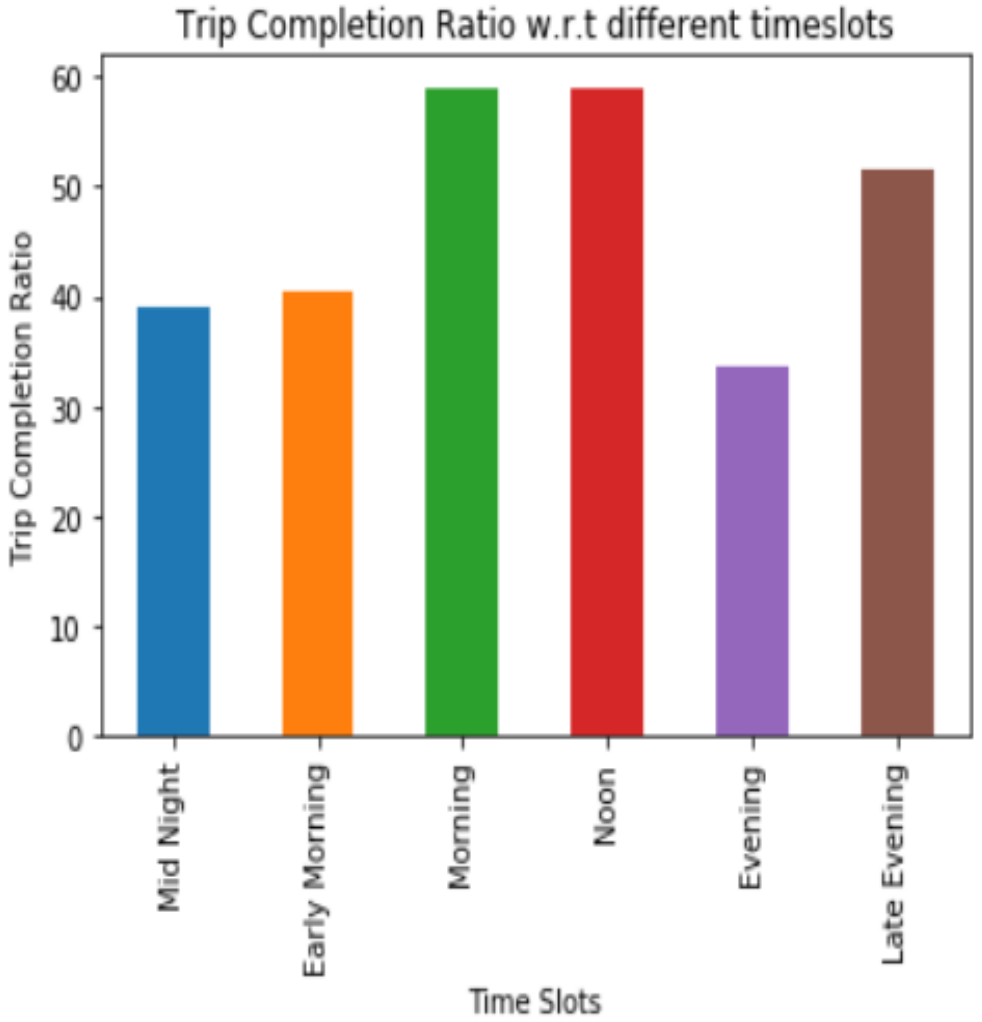
1. Trip Completion Ratio : When looking at different points of the day from 4 am to midnight, Trip Completion Ratio means at which hour do we get the request and what is the percentage at which they get completed. Lower value means there is not enough supply to meet the demand.
2. Flow of cars: Inflow of the cars going to the airport with the outflow of the cars leaving the airport by hour of day from 4am to 1am. There are more cars going to the airport in the morning and more cars leaving from the airport at night, leading to imbalance, which in turn leads to idle time showing up at different times of the day.
3. Idle Time : Greater the idle time, greater the chances of drivers cancelling the pickup for that location.
4. Trip Time: Trip time simply is the duration of the trip from Request Timestamp to Drop Timestamp. Ideally, the longer the trip, the more money will be earned by the driver. Hence, the cab will be absent for that much duration for the next pickup.

Hence, we need to figure out a way to balance the flow to make sure to balance the market place equilibrium. Following plots show the time slots and the types of requests (city-airport or airport-city) when the highest gap exists.

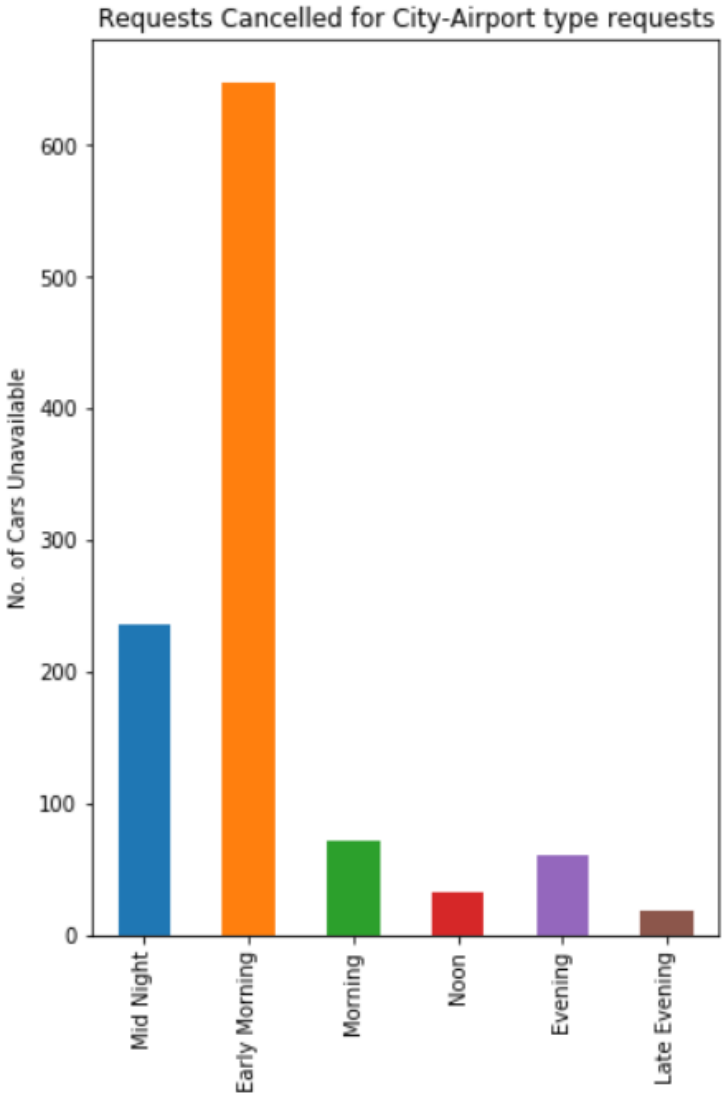
Trip Completion Ratio

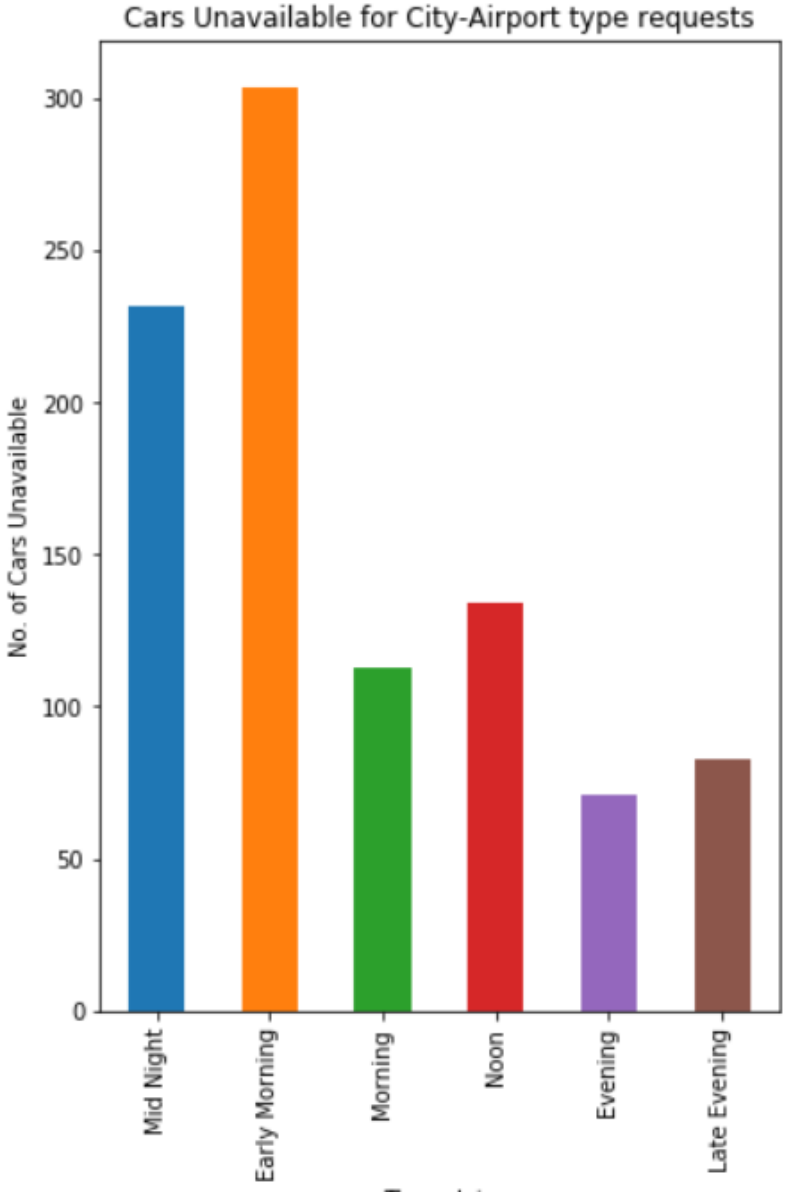
- We can infer from the plot that the value of ratio is highest during noon time from 12 p.m. to 4 p.m, which means the supply meets the demand during this period.

- The value of the ratio is the lowest during evening time, as can be seen from the plot causing an imbalance in Market Place Equilibrium.

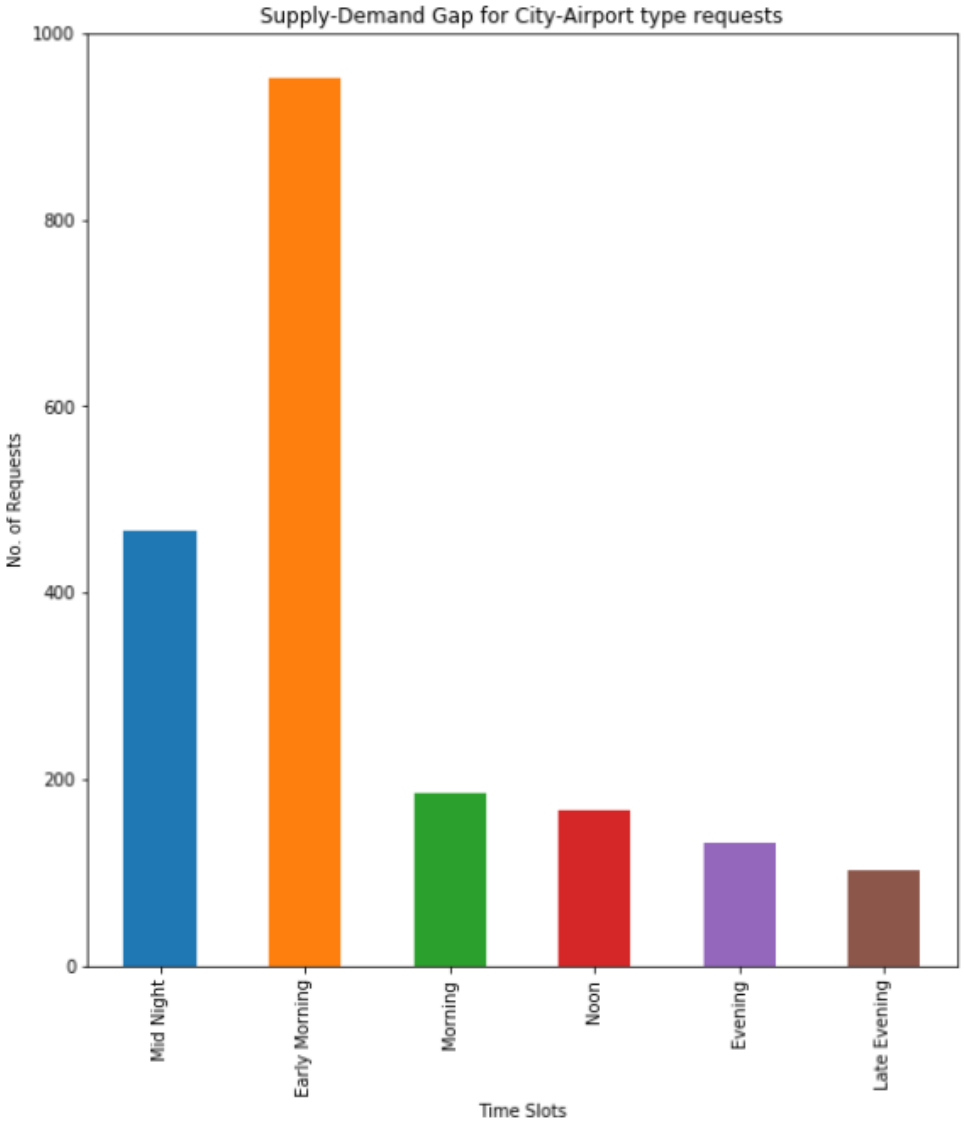


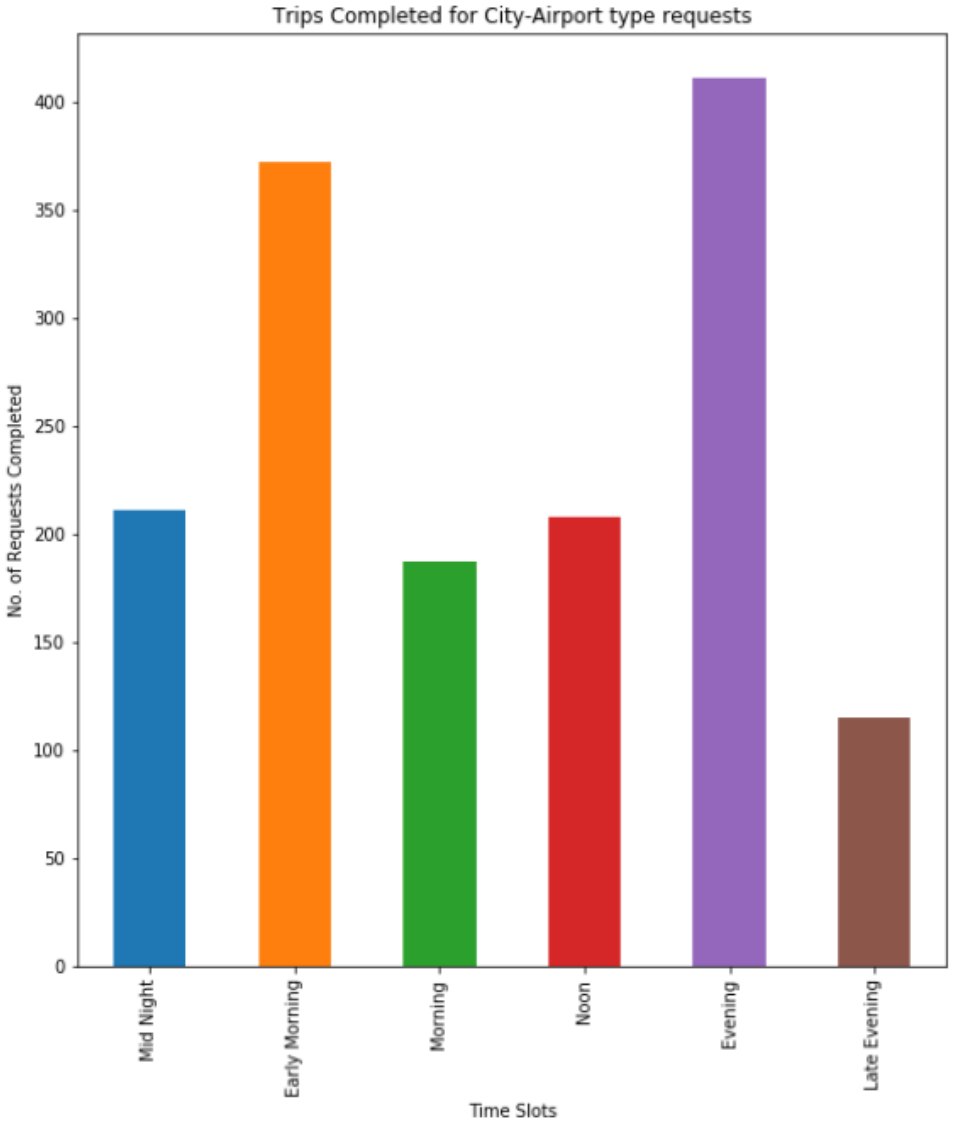
Flow of cars: City-Airport





Flow of cars: City-Airport

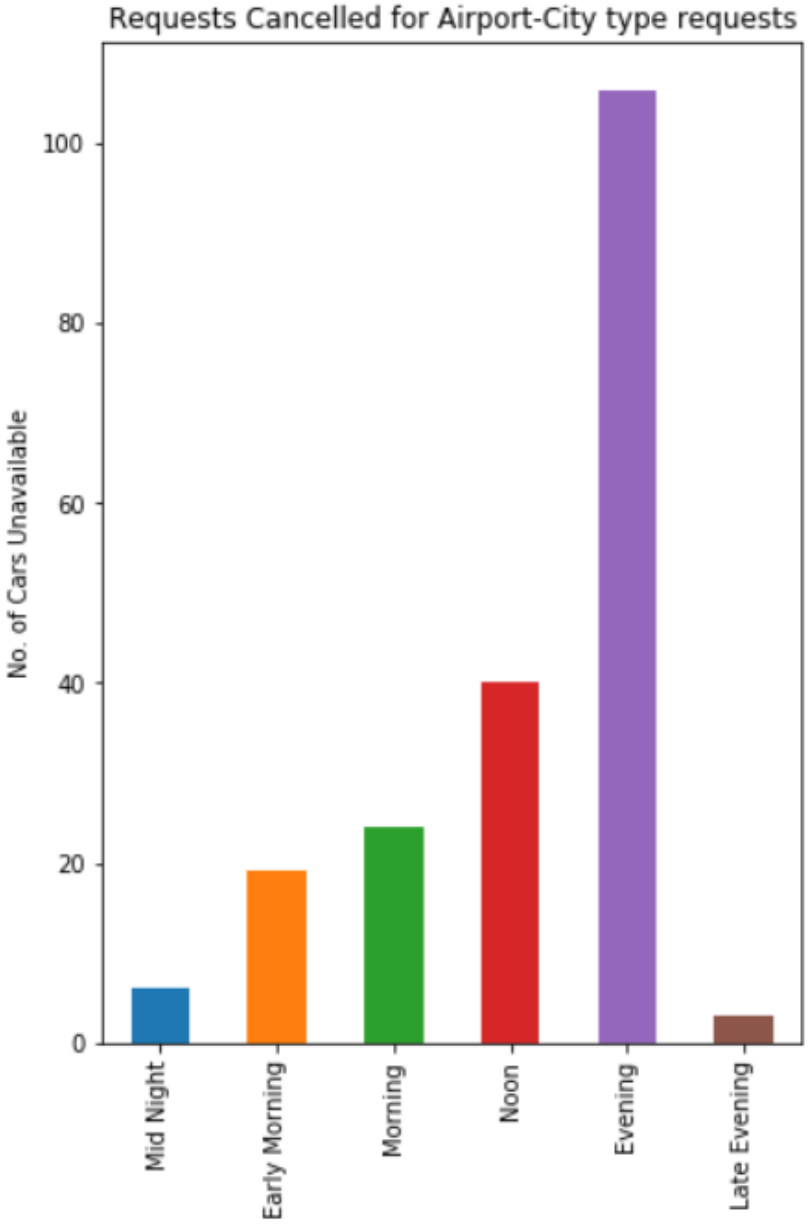


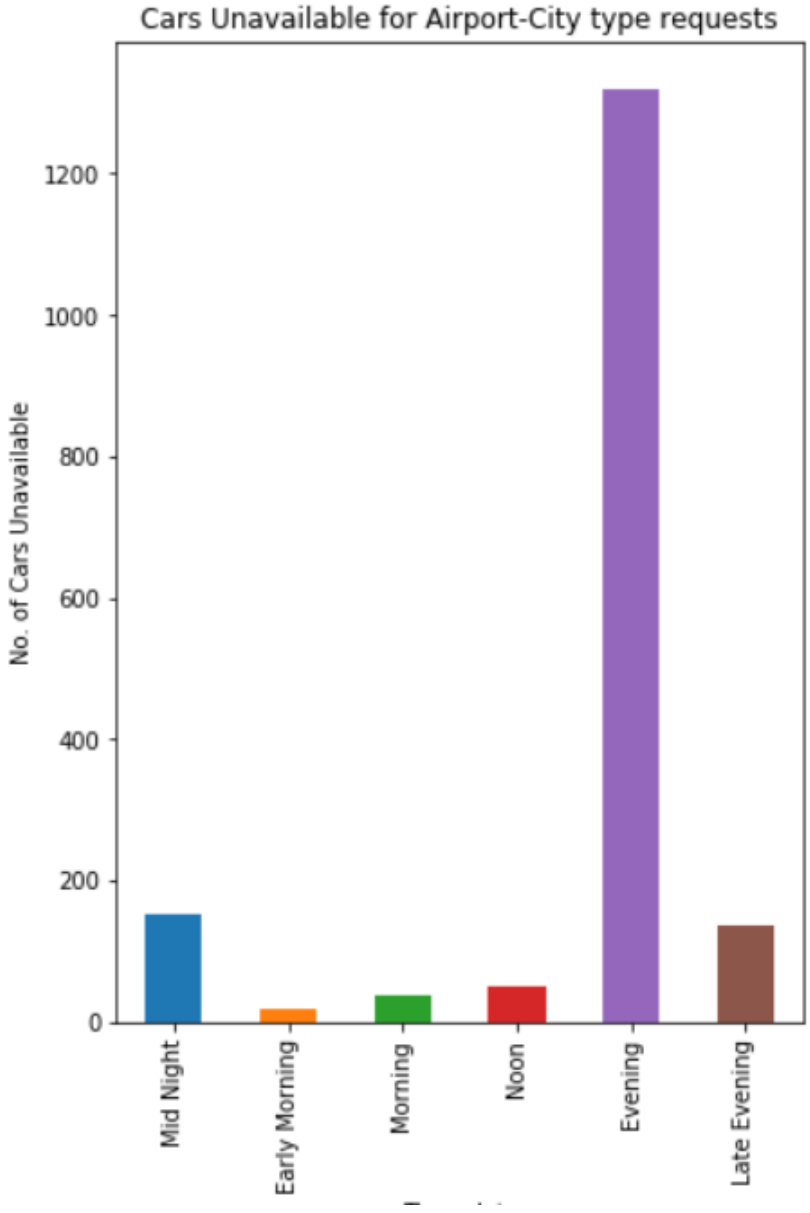


Flow of cars: City-Airport

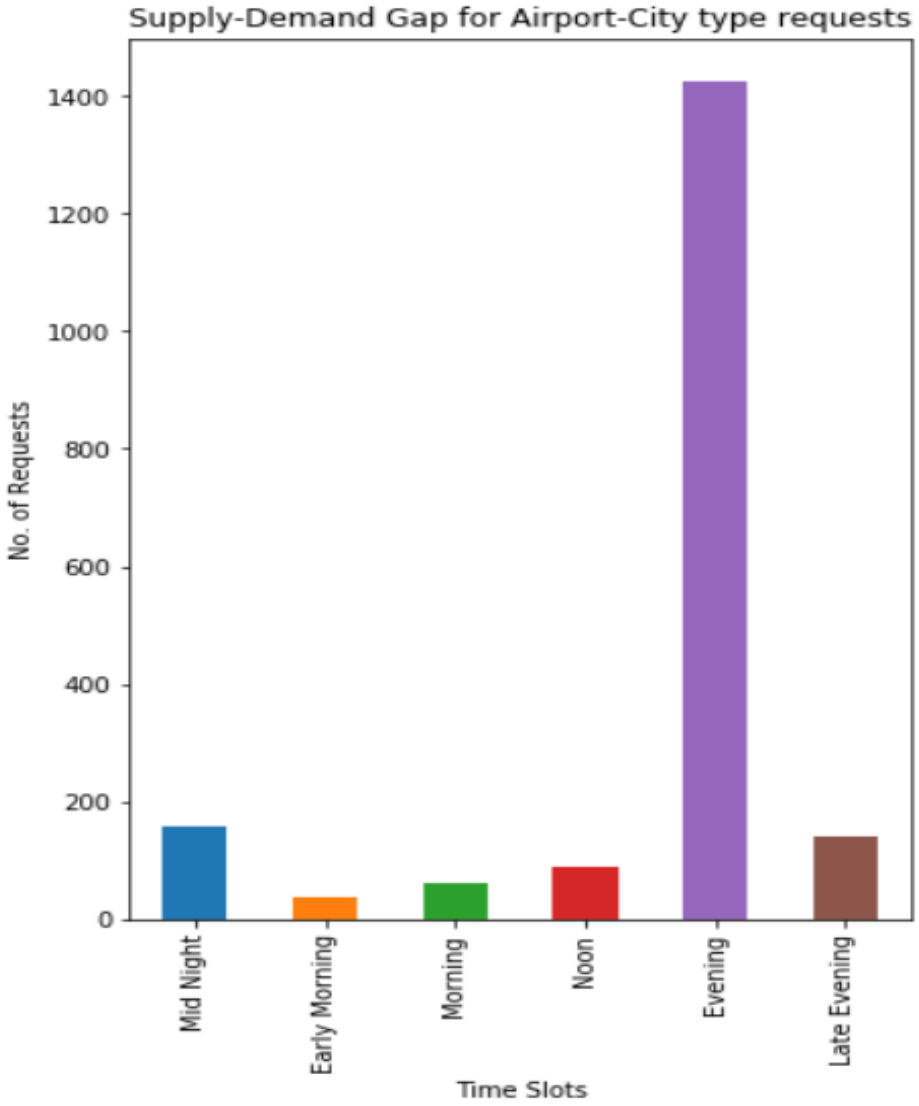
- The Gap is the most during “Early Morning Time”. We can calculate the gap by seeing the number of Unavailable cars and cancelled requests out of the trips completed, which shows a bigger gap during “Early Morning Time” in the Airport.
- Hence, there is more flow of cars from City-Airport in the early morning as compared to the rest of the timeslots, causing an imbalance which leads to idle time showing up at different times of the day.

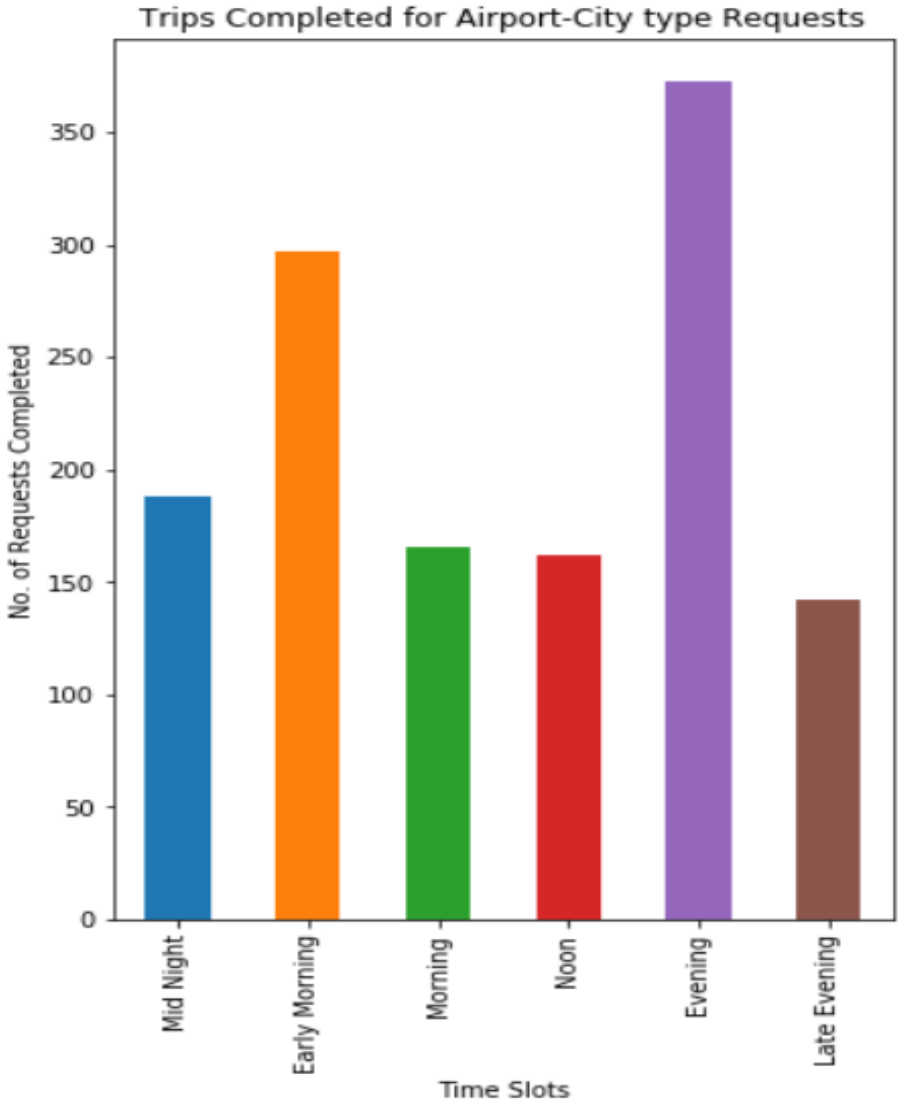
Flow of cars : Airport-City





Flow of cars : Airport-City



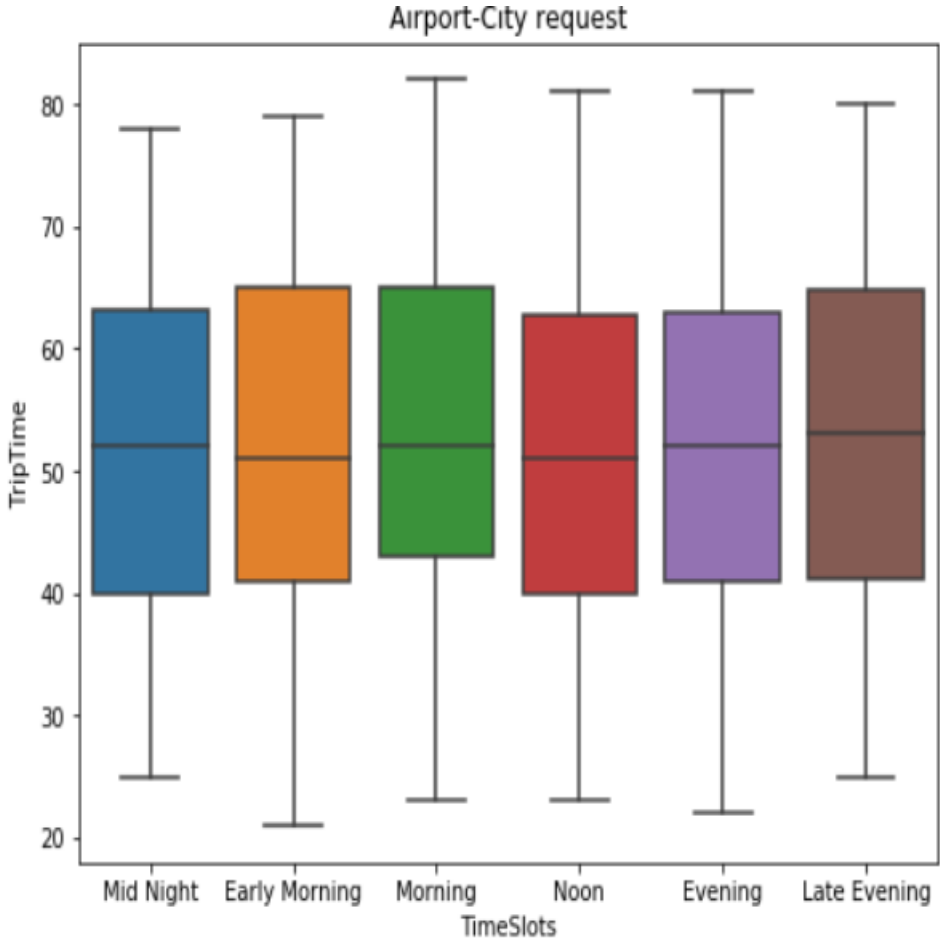


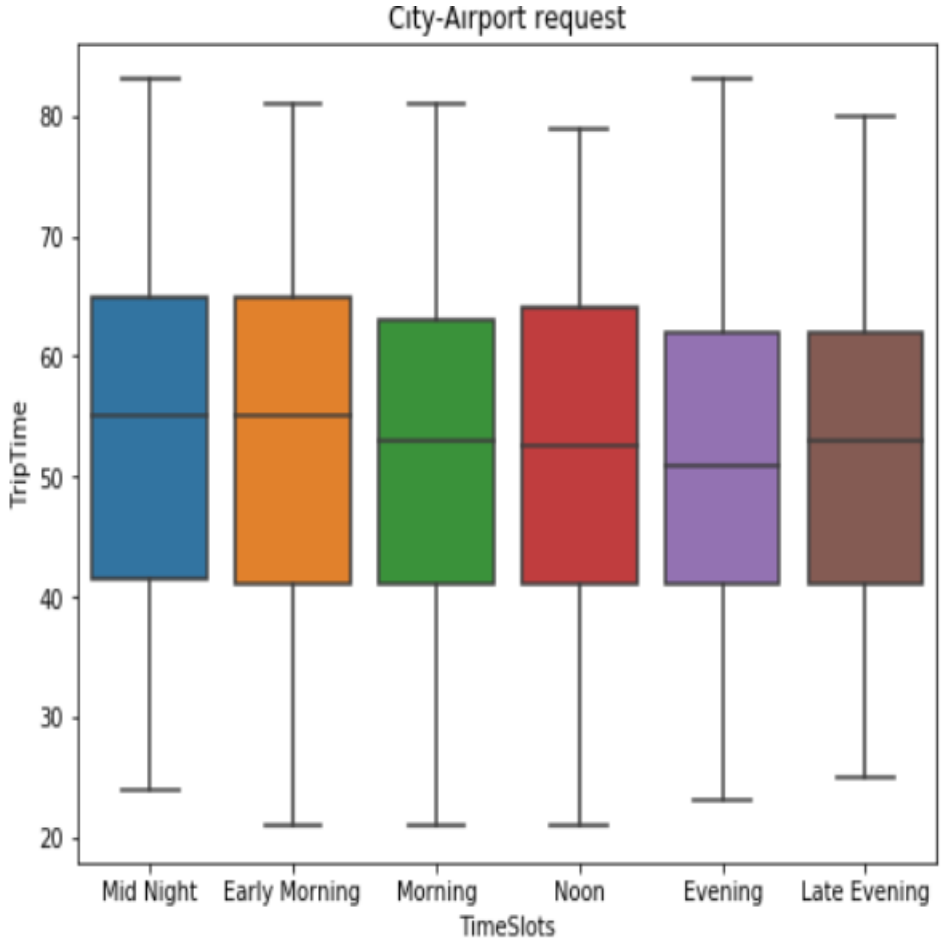
Flow of cars : Airport-City

- In this case, however, the Gap is the most during “Evening Time”. We can calculate the gap by seeing the number of Unavailable cars and cancelled requests out of the trips completed, which shows a bigger gap during “Evening Time” in the City.

- Hence, there is more flow from the Airport-City in the evening, meaning there are more cars leaving from the airport at night as compared to the rest of the timeslots, causing an imbalance which leads to idle time showing up at different times of the day.

Trip Time


Airport-City request
TripTime
80
70
60
50
40
30
20
Mid Night
Early Morning
Morning
Noon
Evening
Late Evening
TimeSlots


City-Airport request
TripTime
80
70
60
50
40
30
20
Mid Night
Early Morning
Morning
Noon
Evening
Late Evening
TimeSlots

Trip Time

- As we can see, the trip time does not have much effect on the business as it is almost constant.

- Hence, as we discussed in the pressing issues before, we can conclude that the idle time is higher, one of the metrics which affects drivers number of trips. Hence, they end up cancelling the requests, causing a dip in the Market Place Equilibrium.

- It also means that drivers end up cancelling more number of requests higher idle time. The drivers can finish more number of trips rather than wait for that one trip to finish with a higher idle time.

Analysis and Observations

- We can analyse that because of Lower value of Trip Completion Ratio means there is not enough supply to meet the demand causing a bigger gap in that interval.
- There are more cars going to the airport in the early morning and more cars leaving from the airport at night, leading to imbalance, which in turn leads to idle time showing up at different times of the day. Due to an uneven pattern of idle time showing up at different times in a day, it is difficult to pin-point as to why we have idle time more at a particular time more than the other.
- Greater the idle time, greater the chances of drivers cancelling the pickup for that location.
- The trip time did not have much effect on the business as it is almost constant.

What do you think is the reason for this issue for the supply-demand gap?

- As we can infer from the observations, we can understand the flight patterns because of flow of the cars. The more inflow of the cars in the Early Morning means that more flights land early in the morning, hence the drivers have more chances to expedite their business in that time slot.

- In other time slots, the drivers have to wait at the airport to get the next customer, which increases their idle time. This makes them prefer City Type Requests more over Airport ones. In turn, they cancel more trips with higher idle time at the evening time at the Airport, hence more cars leave from the airport at night, leading to an imbalance and a greater gap.

- The trip time being constant means the amount of money earned for almost all type of requests would be the same in all time slots. Hence, making them choose more trips with less idle time.

Measures to attain Market Place Equilibrium

Following are the ways to resolve the supply-demand gap:

- We can have a higher supply of cars available at all times at the airport. It will help in keeping a balance of cars supply at all times, leading to a better Market Place Equilibrium.

- We can work with driver's idle time, by letting them earn more if their idle time is more than a certain hour. This will aid in a better business as the drivers would tend to cancel such trips less.

- We can also have a better availability of cars in the evening time in the city so as to improve the Trip Completion or Request Ratio.

THANK YOU.

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