Uber Supply-Demand Gap Assignment

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Problem Statement

- To analyze the supply-demand gap existing for City to Airport and Airport to city rides for Uber.
- Identify the root cause of the problem (i.e. cancellation and non-availability of cars).
- Recommend ways to improve the situation.

Assumptions:

- Supply : Number of completed trips.
- Demand: Number of trips requested (including Cancelled and No Car Available).
- Number of Cabs Available: 300 (Distinct number of driver id).

Problem Solving Methodology

1. Data Exploration.
2. Cleaning data for formatting issues in Request timestamp and Drop timestamps. Convert it into standard date time format.
3. Analysing NaN for various columns like driver_id, Drop timestamp.
4. Deriving other metrics and variables from given data like hour_of_day, day (request day), trip_status, trip_time and time_slot.
5. Plotting data to visualize the frequency of requests getting cancelled or showing no cars available for different time slots and for type of request.
6. Plotting data to identify the time-slots for highest gap in demand and supply and also plotting for type of request during these time-slots.
7. Proposing hypothesis for the problem and recommending ways to alleviate the problem.

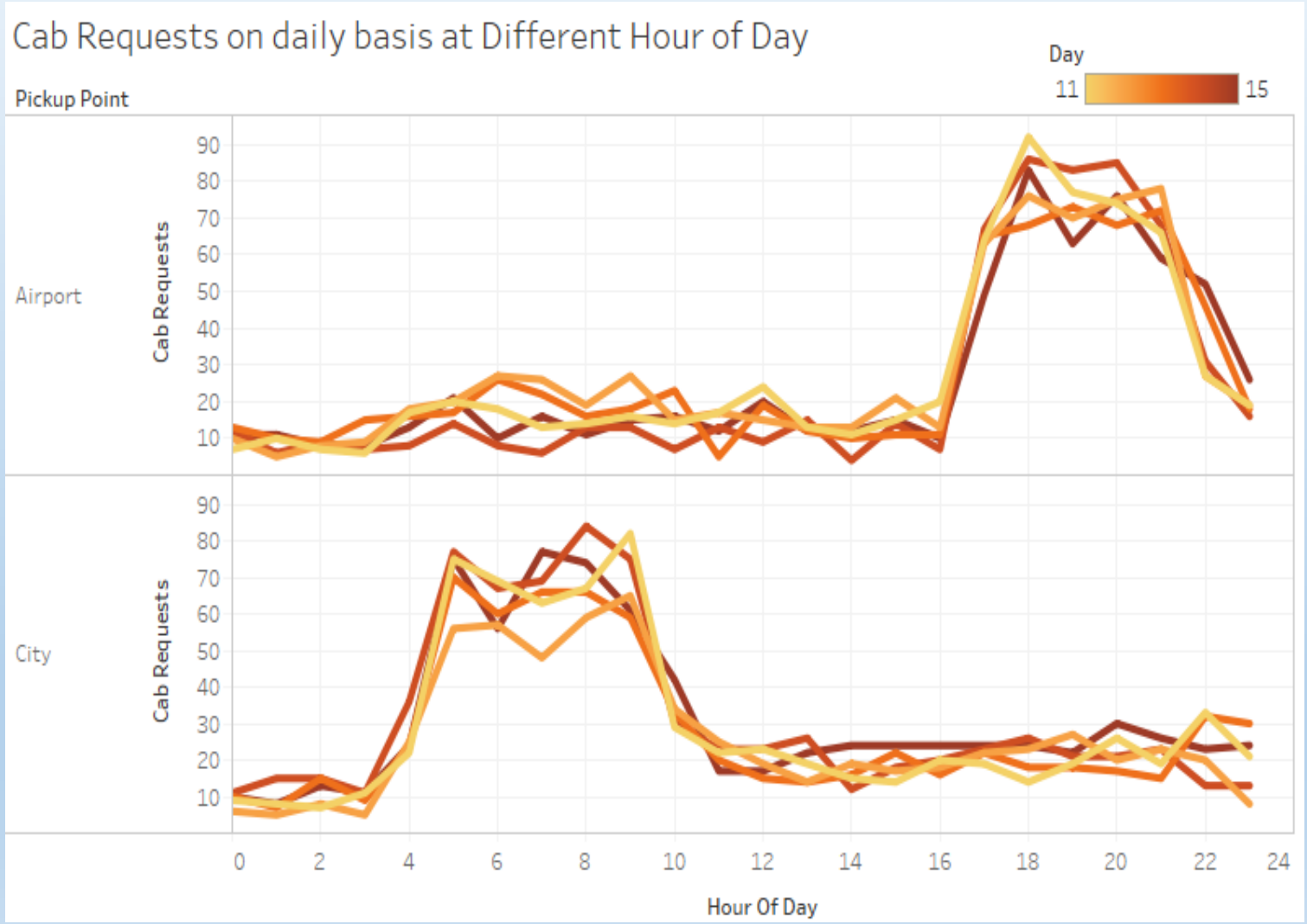
Identifying Time Slots

Observations:

- For both Pickup Points there seems to be a similar pattern across all days.
- Based on this pattern we can identify the time slots for doing the analysis further.
- At all points number of request are less than 300 (total cabs available).

Time Slots:

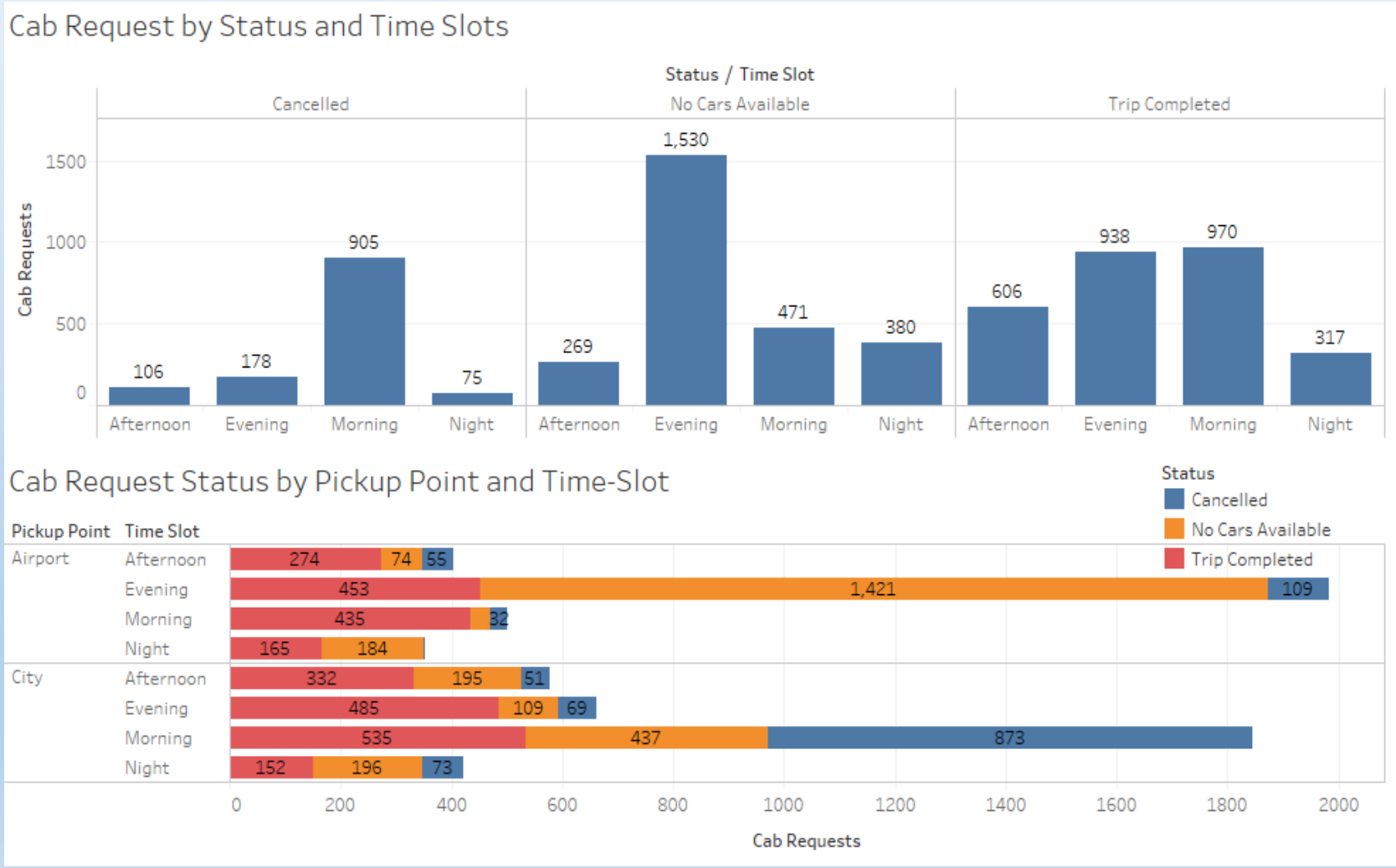
Time Window (both inclusive)	Slot Name
5 AM – 10 AM	Morning
11 AM – 4 PM	Afternoon
5 PM – 10 PM	Evening
11 PM – 4 AM	Night



Cab Request Analysis

Observations:

- High number of cancellations for City to Airport rides during Morning hours.
- High Number of No Cars Available for Airport to City rides during Evening hours.
- Morning and Evening are the peak hours slots.



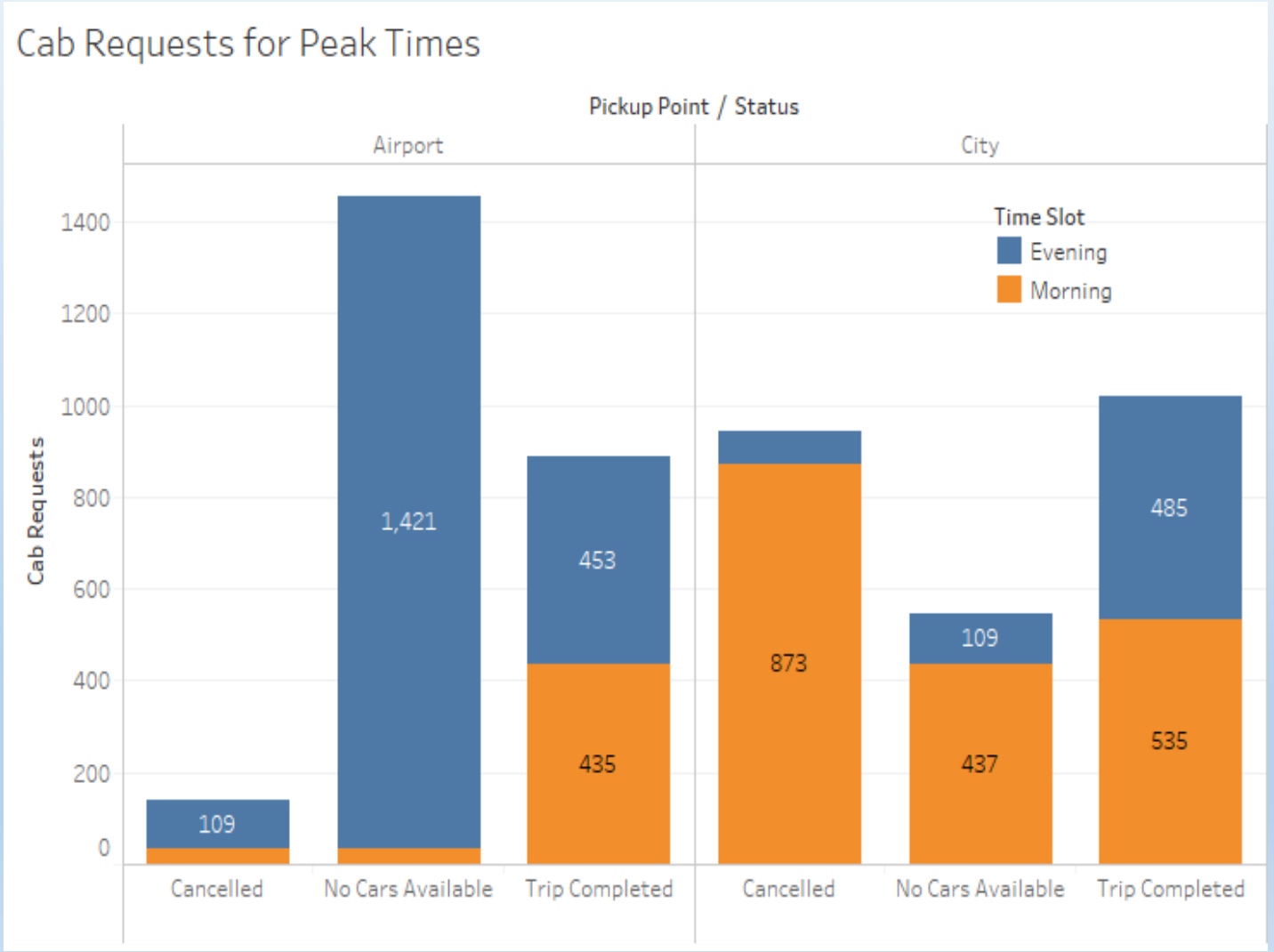
Peak Time Analysis

Pickup Point	Time Slot	Demand	Supply	Demand Supply Gap
Airport	Evening	1983	453	1530 (77.16%)
Airport	Morning	501	435	66 (13.17%)
City	Evening	663	485	178 (26.85%)
City	Morning	1845	535	1310 (71.00%)

During peak hours there are :

1. High Number of Cancellations in City.
2. High number of No Cars Available Status at Airport.

Pickup Point - Time Slot	Cancellations	No Cars Available
Airport – Evening	109 (5.49 %)	1421 (71.65 %)
City - Morning	873 (47.31 %)	437 (23.68 %)

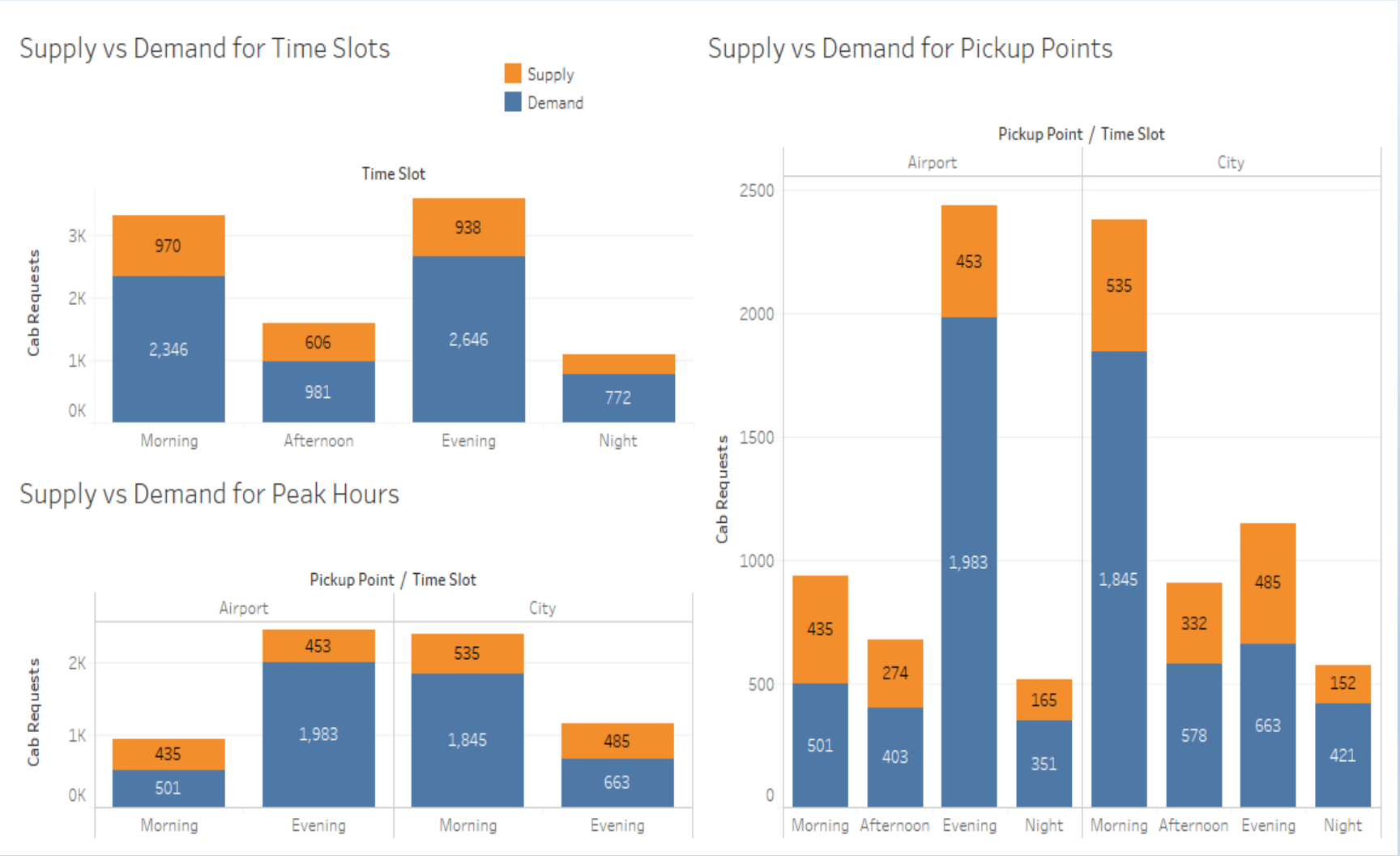


Supply vs Demand Gap Analysis

There is a huge gap between supply and demand during peak hours.

There are a lot of rides which go incomplete (Cancelled or Unavailable) in comparison to completed.

This gap can be fixed by focusing more on peak hours as they contribute more towards the gap and overall number of rides requested.



Hypothesis

Challenges in City:

- During Morning time-slot there is demand-supply gap of 71%.
- 47% cancellations by driver.
- In 24% cases there is no car available.

Possible Causes:

- More flights are departing from city due to which there is high demand to go-to airport.
- Less number of flights arriving during this time slot.
- Driver going to the airport during this time-slot have to wait long time to get booking back from the airport or have to return without a customer which causes them to lose on both time and money.
- During this time-slot they might make money by doing trips in other parts of city. Hence high number of cancellations by the driver.
- Drivers are doing trips on other routes so, this might be a reason for no car available.

Challenges at Airport:

- During Evening time-slot there is demand-supply gap of 77%.
- 72% of times there is no car available.

Possible Causes:

- More flights are arriving in the city during this time slot due to which demand for airport to city is high.
- Less number of flights departing from Airport during this time-slot.
- Number of cabs reaching to the airport during this time-slot is low which is resulting in no cars available.
- Drivers don’t prefer to go to airport without any passenger as this is not economically viable for them.

Recommendations

Proposed Solution for City:

- To reduce number of cancellations drivers need to be incentivized for their time and fuel money.
- This can be done by having surge pricing for peak hours (1.25x – 2x of base price) depending on the demand.
- Drivers can be given weekly bonus for completing more than 12 (avg. trip per driver = 3507/300) trips to airport during a week.
- Uber can implement cab-pooling for people going to the airport from same location. This will help them to increase driver share in revenue.
- In worst case drivers can be penalized for cancelling more than a threshold (pre decided number) rides for City to Airport during a week.

Proposed Solution for Airport:

- To increase number of cars available Uber can provide weekly rewards to the drivers completing certain number of pickups from Airport during certain peak hours of the day.
- Uber can identify the cabs in vicinity (5-7 KM) of the Airport during peak hours and divert them towards Airport to pickup passengers.
- Car-pooling can be implemented for the passengers going in the same direction which will boost the supply further.
- Uber can implement a pre booking service for customers at some additional price. This can be used to compensate drivers for their wait time.