UBER's SUPPLY vs DEMAND

Assignment Submission Report

- An assignment to study, visualize and solve Uber's Supply-Demand Gap Problem.

Business Objective

- The aim of analysis is to identify the root cause of Uber's problem (i.e. cancellation and non-availability of cars) and recommend ways to improve the situation.
- Note: For this assignment, only the trips **to and from the airport** are being considered.

The objective is thus classified into the following sub-goals:

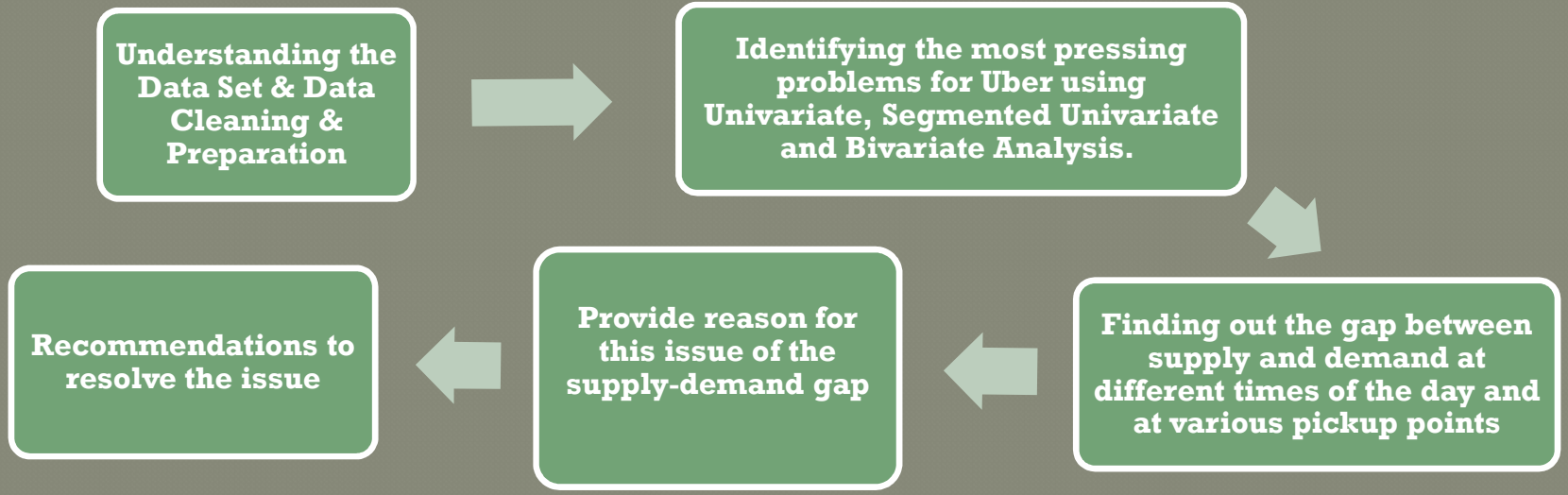
Visually identify the most pressing problems for Uber

Find out the gap between supply and demand and show the same using plots.

Provide reason for this issue for the supply-demand gap and recommend some ways to resolve the issue

Problem Solving Methodology

- The approach for this project has been to divide the entire case study into various checkpoints to meet each of the sub-goals using EDA and Visualization. The checkpoints are represented in a sequential flow as below:



Data Cleaning & Preparation

The following data cleansing processes were applied to make the data dependable so that it can provide significant business value by improving Decision Making Process:

Uniform Datetime Format

- The dates are of text datatype in an inconsistent format.
- Converting all values of the columns 'Request timestamp' & 'Drop timestamp' to an uniform datetime format with the help of pd.to_datetime() function with the option dayfirst=True.

Creating Derived Metrics

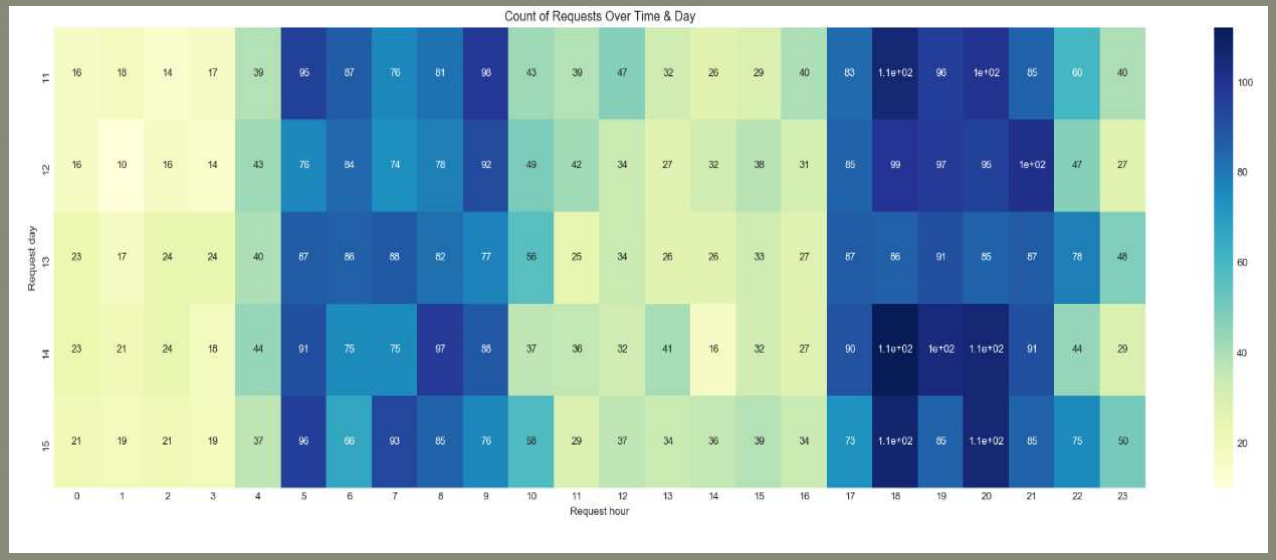
- Deriving 'Day', 'Month', 'Hour' & 'Time' columns from the 'Request timestamp' & 'Drop timestamp' columns.
- Dropping the the 'Request timestamp' & 'Drop timestamp' columns.
- Segmenting the Day into different timeslots based on Cab request hour.
- Derive the cab 'Inflow' & 'Outflow' columns based on Pickup points. Inflow = 1 & Outflow = 0 if Pickup point is 'City' and vice versa if Pickup point is 'Airport'.

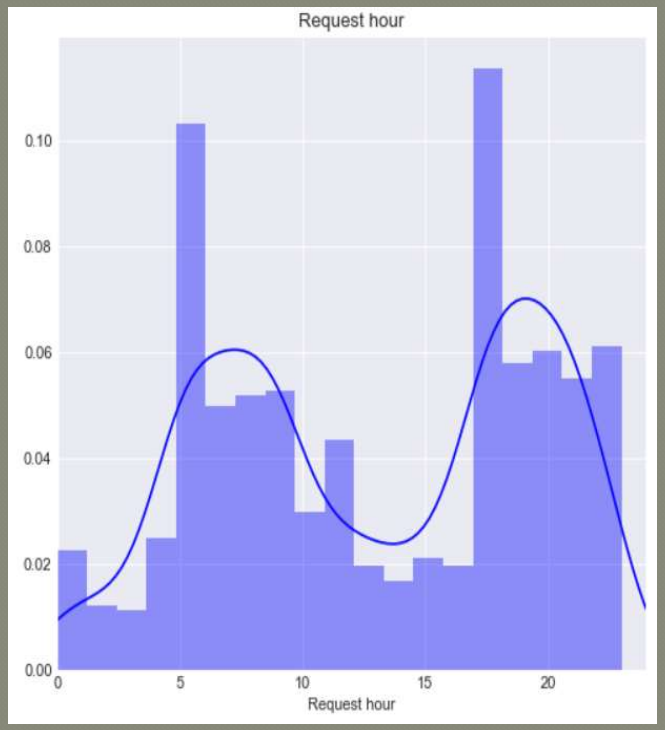
Dropping Null values & Duplicate Rows

- Finding rows with duplicate request_ids to drop them.
- No duplicate rows were found.
- Null values were only found in 'Driver id' column for trips with 'No Cars Available' statuses. They are left as is.

Uber Cab – Generic Trend

Most trip requests are made either in the 'Early Morning' or during Evening Rush with sudden spikes at 5am and 5 pm.





Problems of Uber

Identifying the most pressing problems for Uber using Univariate, Segmented Univariate and Bivariate Analysis –

'NO CARS AVAILABLE' is by and large the biggest problem for Uber throughout the Day owing to about 40% of the total requests made.

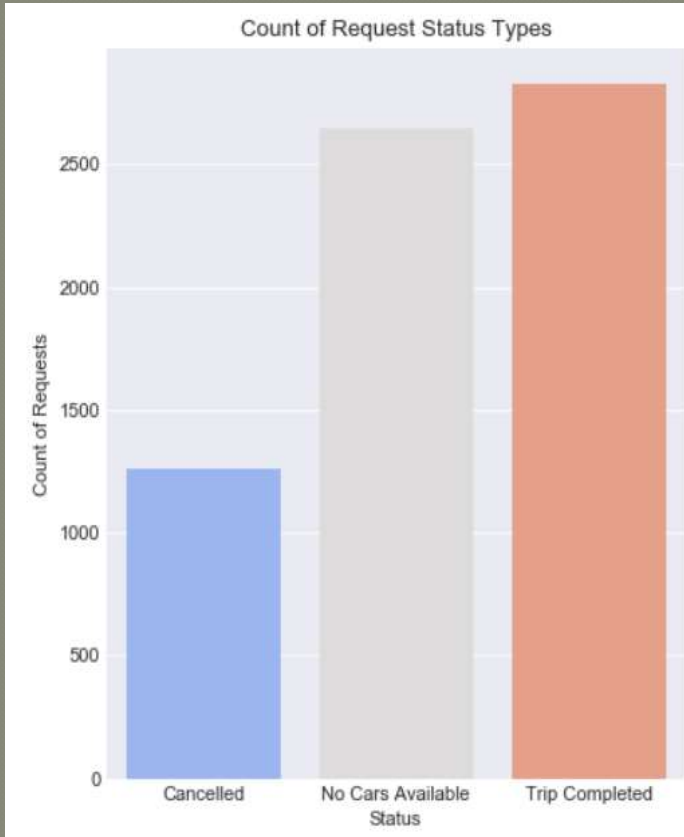
- 'No Cars Available' trip statuses are higher in the evening from **5pm and 9pm.**
- The frequency of 'No Cars Available' Statuses are higher in general from Airport to City.
- **'No Cars Available'** Statuses are unusually high in the evening from the Airport.

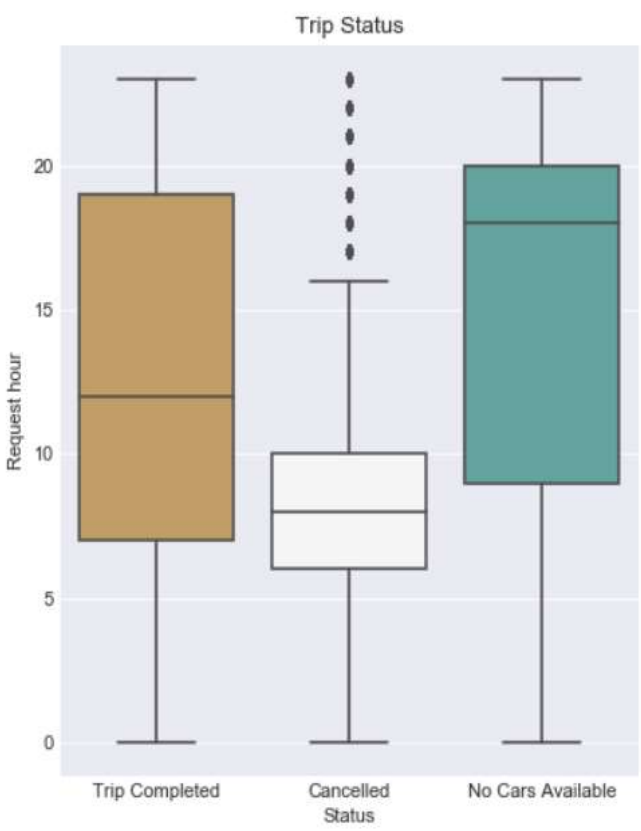
'Cancelled' trip requests are the 2nd biggest problem for Uber owing to about 19% of the total requests made.

- The frequency of 'Cancelled' trip requests are higher in the early morning from **5am - 9am**
- The count of 'Cancelled' trip requests are higher in general from City to Airport.
- **'Cancelled'** trip requests are unusually high in the early morning from the City

		Status		
Pickup p..	Request Times..	Cancelled	No Cars Availa..	Trip Completed
Airport	Day Break	2	148	103
	Early Morning	23	21	382
	Evening Rush	87	1,106	299
	Late Night	3	136	142
	Morning Rush	33	58	200
	Noon	50	244	201
City	Day Break	63	151	111
	Early Morning	820	385	472
	Evening Rush	44	54	334
	Late Night	19	83	115
	Morning Rush	81	145	241
	Noon	39	119	231

Problems of Uber : Visualization





- **The above bar graph show clearly that frequency of 'NO CARS AVAILABLE' trip requests are usually highest throughout the day, followed by the frequency of 'CANCELLED' trip requests.**

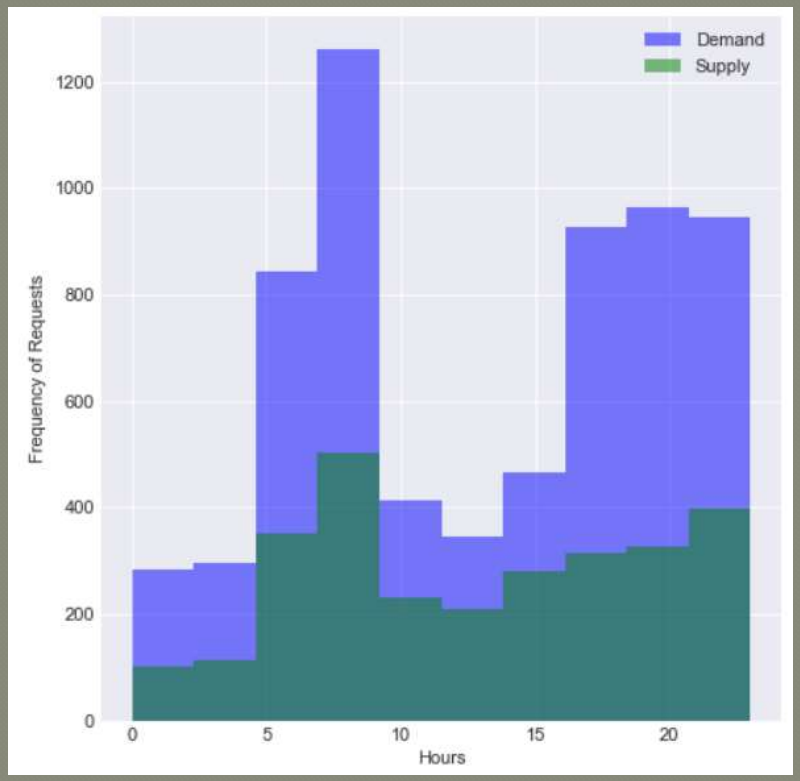
- **The Boxplot tells that the frequency of 'CANCELLED' trip requests are usually high early morning from 5am - 9am with median at around 7am. And that the frequency of 'NO CARS AVAILABLE' trip requests are usually high in the evening between 5pm and 9pm with median at around 7pm**

Supply – Demand Gap Analysis

Finding out the gap between supply and demand at different times of the day:

The Supply-Demand Gap is always negative, meaning Demand is more than Supply throughout the day. However the difference increases drastically during Early Morning (5am-9am) and Evening Rush(5pm-9pm).

Request Timeslot	Supply	Demand	Supply Demand Gap
Day Break	214	578	-364
Early Morning	854	2103	-1249
Morning Rush	441	758	-317
Noon	432	884	-452
Evening Rush	633	1924	-1291
Late Night	257	498	-241

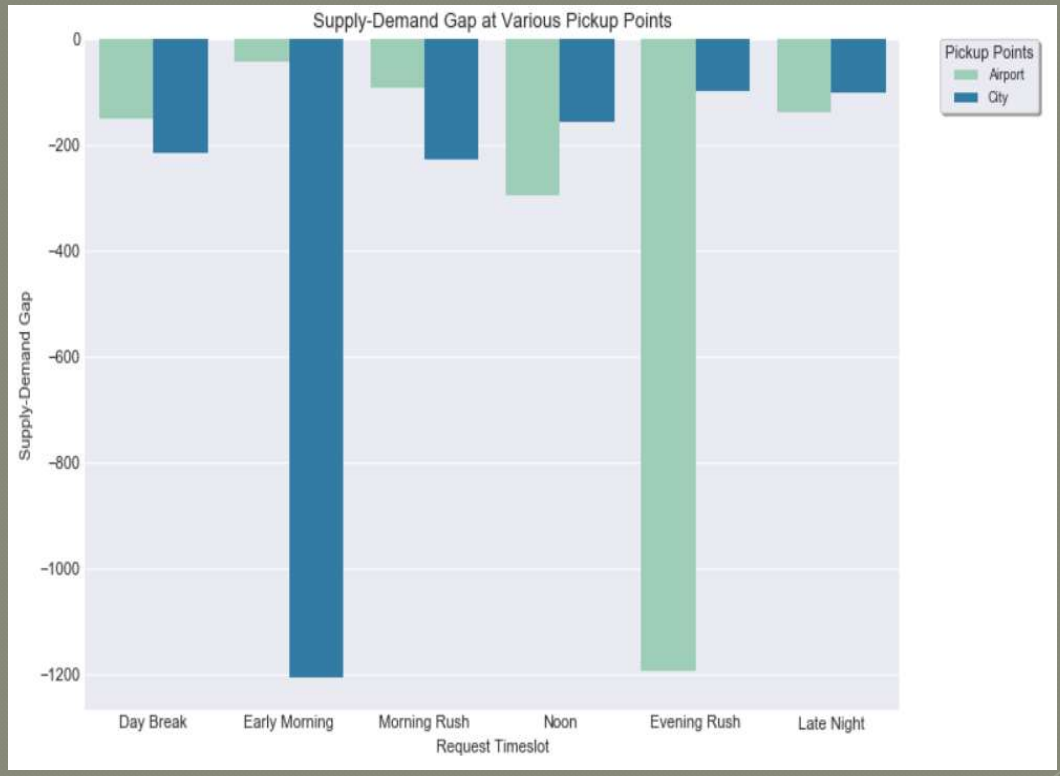


Supply – Demand Gap Analysis at City & Airport

Finding out the gap between supply and demand at different times of the day and at various pickup points:

The Supply-Demand Gap is always negative, meaning Demand is more than Supply throughout the day from both Airport and City. However the difference increases drastically during Early Morning (5am-9am) at the City and during Evening Rush(5pm-9pm) at the Airport.

	Request Timeslot	Pickup point	Supply	Demand	Supply Demand Gap
0	Day Break	Airport	103	253	-150
1	Day Break	City	111	325	-214
2	Early Morning	Airport	382	426	-44
3	Early Morning	City	472	1677	-1205
4	Morning Rush	Airport	200	291	-91
5	Morning Rush	City	241	467	-226
6	Noon	Airport	201	495	-294
7	Noon	City	231	389	-158
8	Evening Rush	Airport	299	1492	-1193
9	Evening Rush	City	334	432	-98
10	Late Night	Airport	142	281	-139
11	Late Night	City	115	217	-102



Root Cause Analysis

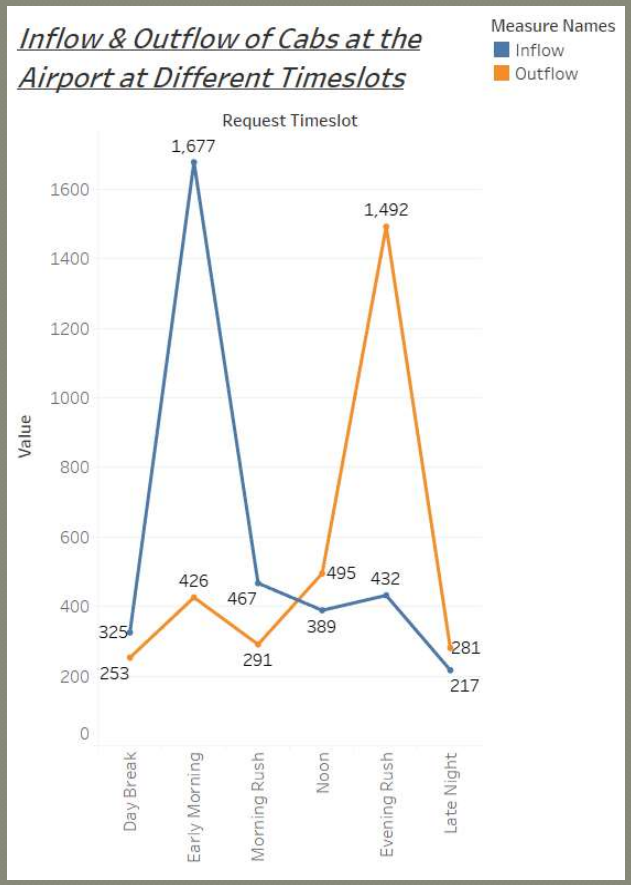
Identifying reasons for this issue of the supply-demand gap for Uber:

High percentage of 'Cancelled' trip requests from City-Airport in the Early Morning from 5am - 9am

- More flights take off and less arrive.
- This means **more inflow and less outflow of cabs**.
- This leads to more idle time at the airport due to lesser passengers.
- Since the driver invests time, gas, and mileage to go to the airport, he can't come back empty
- He could have utilised this time to get more trips within the city.

High instances of 'No Cars Available from Airport-City during Evening Rush hours from 5pm – 9pm

- More flights arrive and less take off.
- This leads to **more outflow and less inflow of cabs**.
- Since few cabs come to the airport to drop passengers, there's a shortage of cars for customers who are travelling to the city.



Recommendations for Resolutions

Identifying reasons for this issue of the supply-demand gap for Uber:

High percentage of 'Cancelled' trip requests from City-Airport in the Early Morning from 5am - 9am

- More incentives for drivers for Airtport Drops and Pickups in the morning to nullify the idle time at the airport.
- Establish surcharge rules on the base price for airport pickups for the customers.
- Introduce more no of cabs/drivers to meet the peak demand.
- Levy excessive cancellation charges for drivers for Airport Drops.

High instances of 'No Cars Available from Airport-City during Evening Rush hours from 5pm – 9pm

- Provide passenger discounts for airport drop to increase inflow of cabs to the airport. This will result in more cabs available for airport pickup.
- Increase Airport Pool charges from City to Airport so that people opt for individual cabs to the airport.
- Direct all cabs within 5Km radius of the airport to the airport instead of sending them to the City.
- More Incentives for drivers for airport drops.