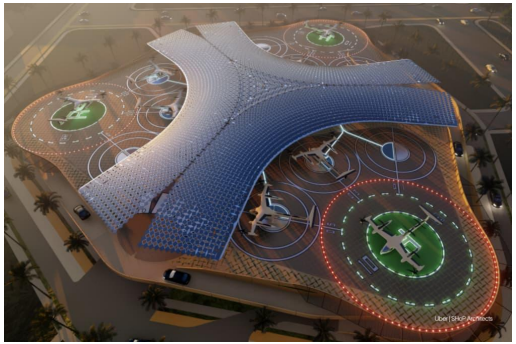
Uber Air for NYC

Data Analysis by Sae Huh

Uber
HOLLYWOOD

Uber Air’s 4 Components



Market consideration for Uber Air

A typical Uber Air market will usually have the following characteristics.

Size (land area)

A large human settlement spread over a large area, e.g Dallas/Fort Worth (DFW) Metroplex encompasses 4,848 square miles, and Los Angeles (LA) metro land area is spread over 8,928 square miles.

Population and population density

The population is greater than 1 million and the population density is greater than 1,000 people per square mile.

Existing transportation network

An expansive ground transportation network that includes public transportation systems. A strong existing transportation network is essential, as riders will be provided the option of an existing form of ground transportation to and from skyports as part of the Uber Air journey.

At least one large airport

Airports typically aggregate transportation demand. Airports that are separated from the city center by a trip of an hour or more due to distance, traffic, or other bottlenecks, provide a compelling use case for a foundational route.

Traffic congestion

Increasing traffic congestion that results in high travel times and congestion costs. For example, in 2019, each vehicle commuter, in DFW Metroplex, spent 45 hours in traffic at an annual congestion cost of $1,160. Similarly, annual congestion cost in LA area is $2,440. The ideal city is polycentric, with multiple dense nodes of development separated by frequent congestion.

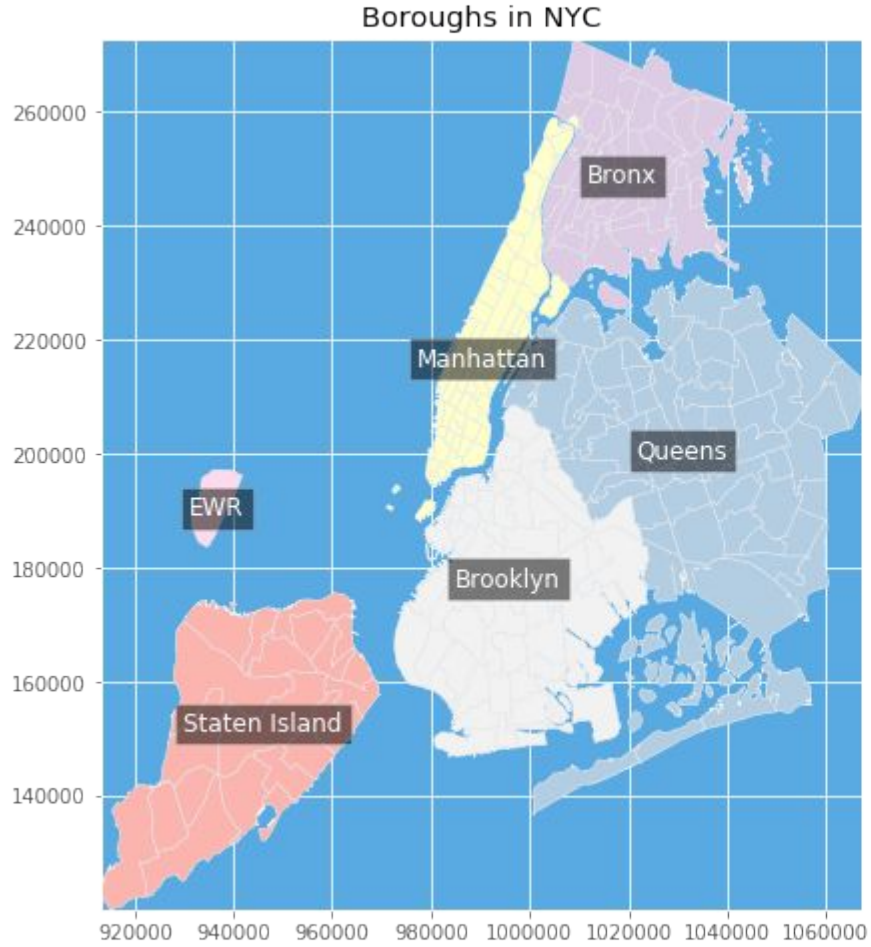
Stable environmental conditions

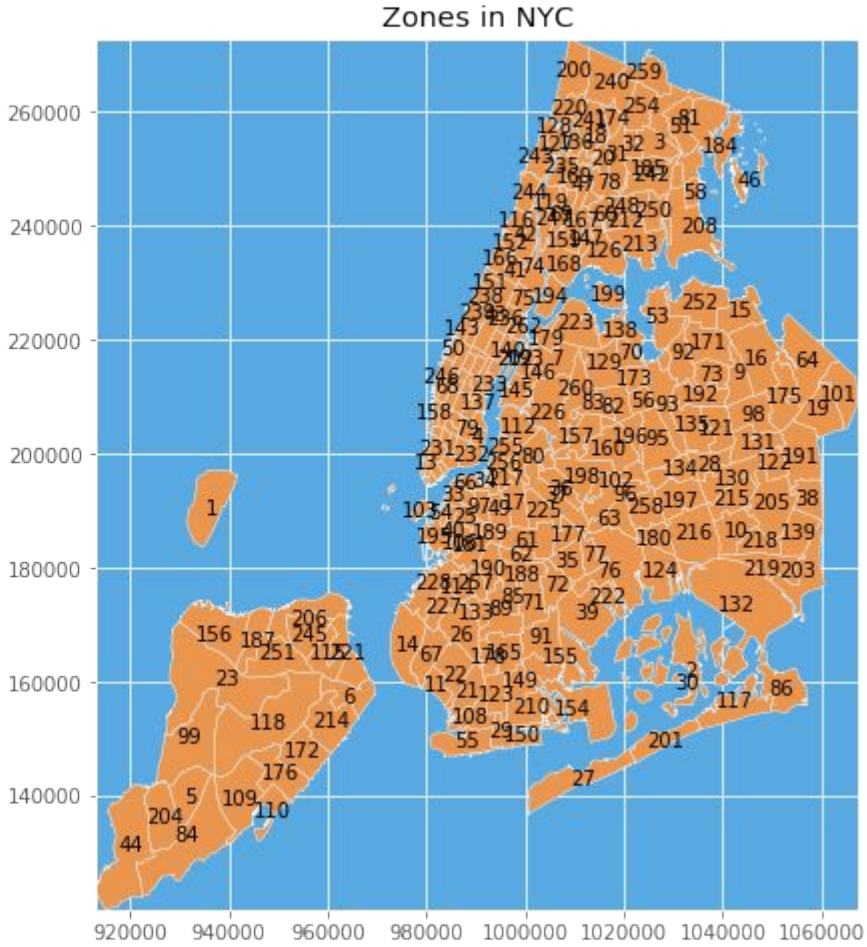
Adverse weather conditions can influence many components of Uber Air, including operational reliability, service supply, and rider comfort.

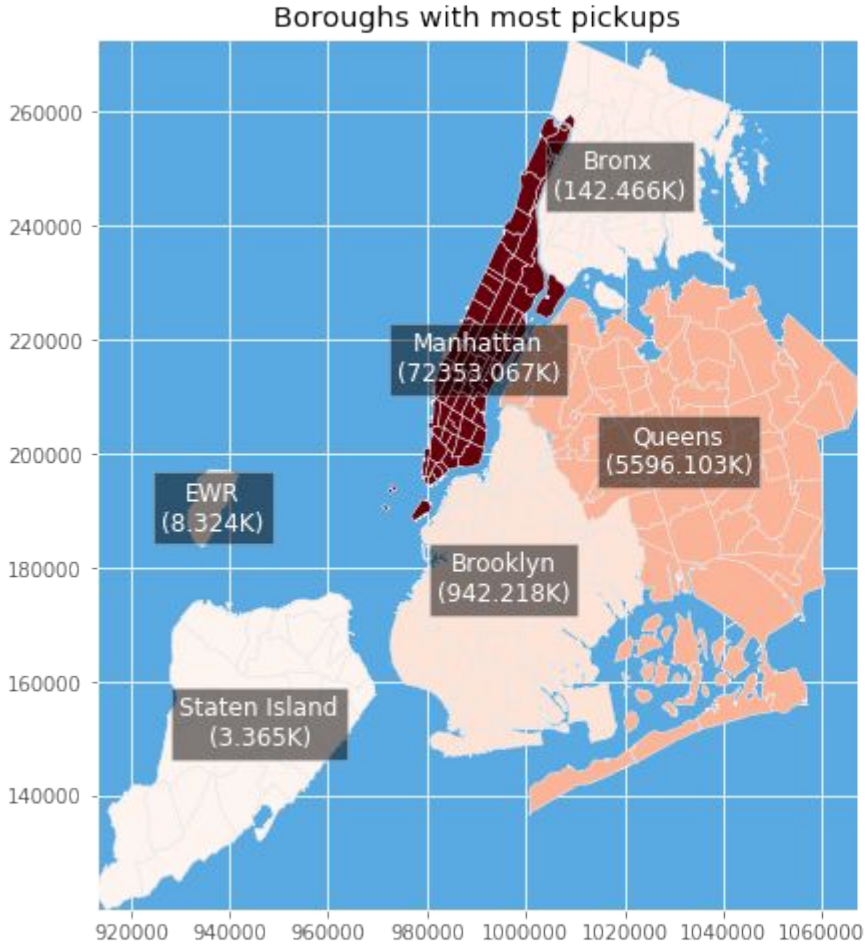
Questions

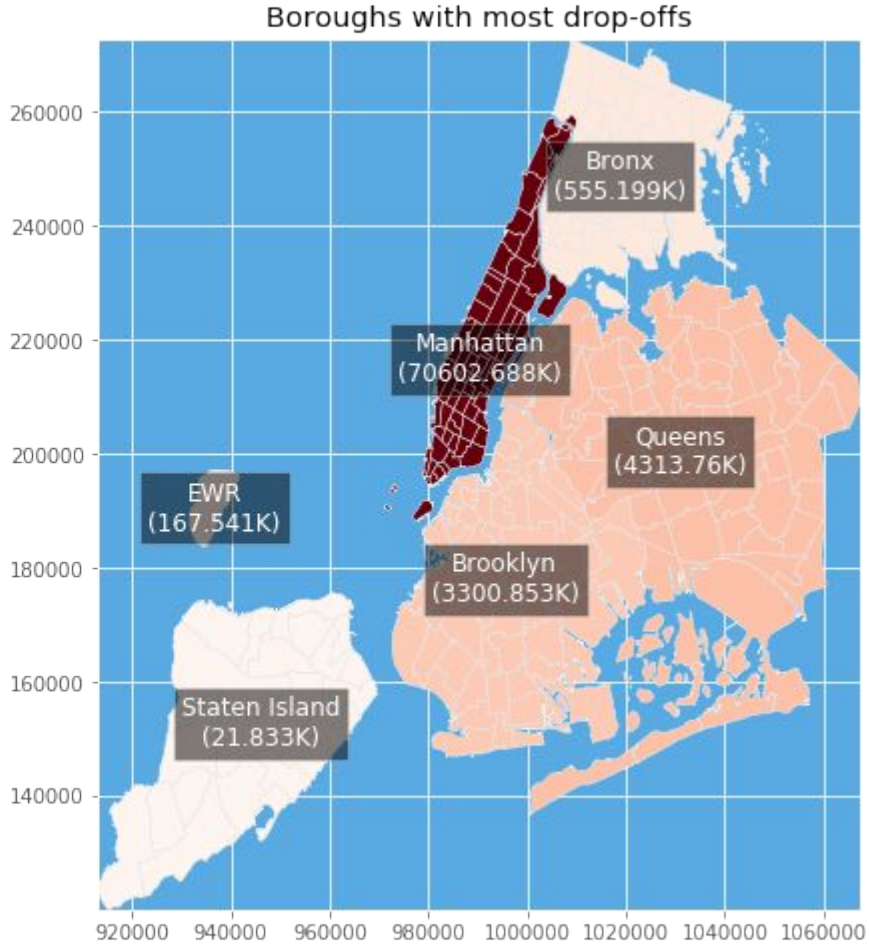
- Where in NYC should Uber Air run?
- When should it run?
- Does Uber Air’s announced rate and plan bring any value?

NYC Taxi Data


Boroughs in NYC
Bronx
Manhattan
Queens
EWR
Brooklyn
Staten Island
260000
240000
220000
200000
180000
160000
140000
920000
940000
960000
980000
1000000
1020000
1040000
1060000


Zones in NYC
260000
240000
220000
200000
180000
160000
140000
920000
940000
960000
980000
1000000
1020000
1040000
1060000


Boroughs with most pickups
Bronx
(142.466K)
Manhattan
(72353.067K)
Queens
(5596.103K)
EWR
(8.324K)
Brooklyn
(942.218K)
Staten Island
(3.365K)
260000
240000
220000
200000
180000
160000
140000
920000
940000
960000
980000
1000000
1020000
1040000
1060000


Boroughs with most drop-offs
Bronx
(555.199K)
Manhattan
(70602.688K)
Queens
(4313.76K)
EWR
(167.541K)
Brooklyn
(3300.853K)
Staten Island
(21.833K)
260000
240000
220000
200000
180000
160000
140000
920000
940000
960000
980000
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1020000
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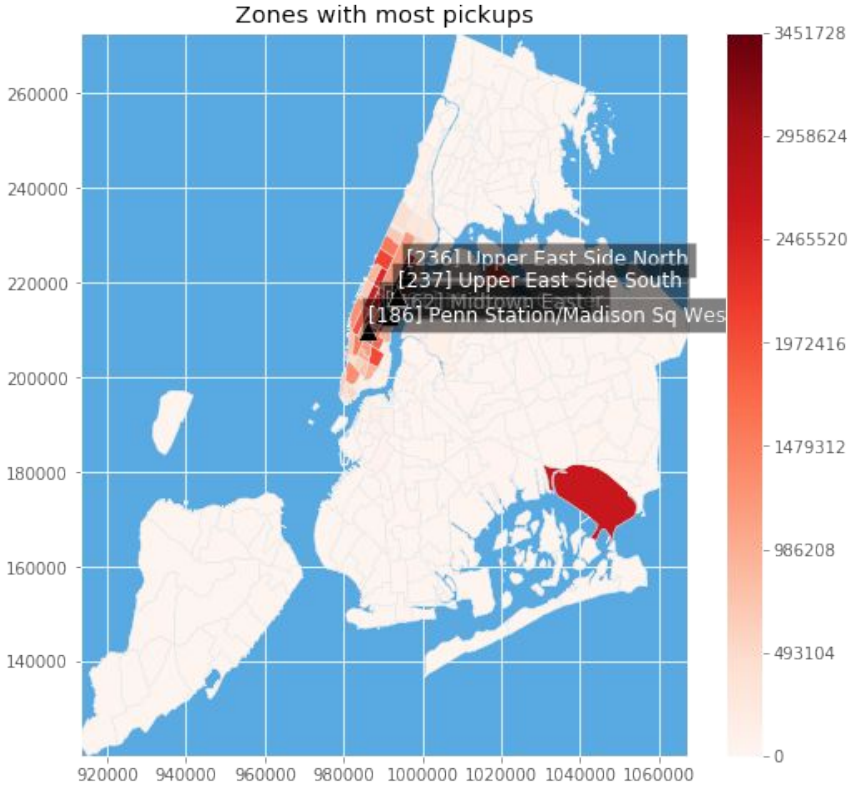
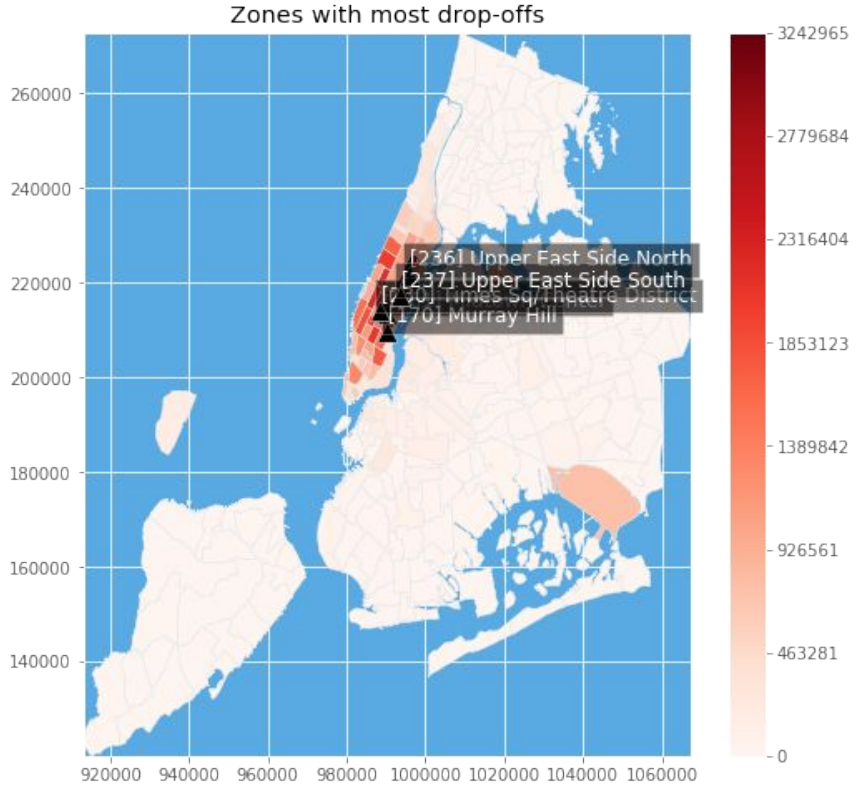
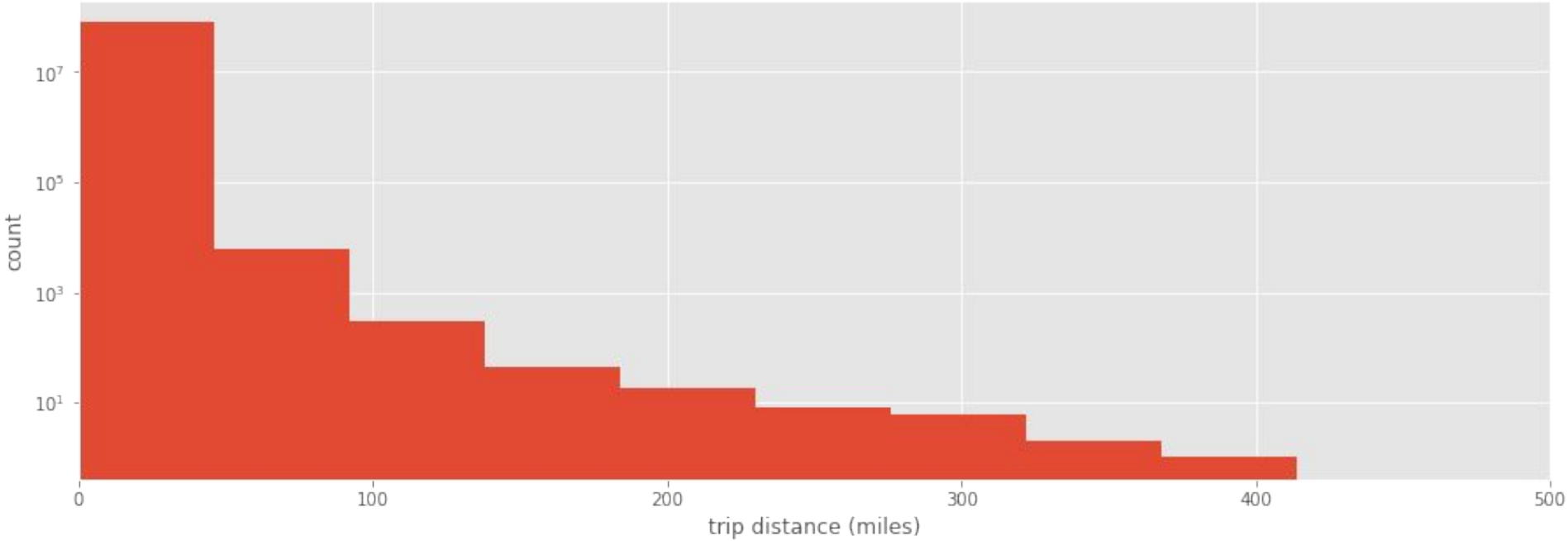
1060000

Locations


Zones with most pickups
[236] Upper East Side North
[237] Upper East Side South
[186] Penn Station/Madison Sq West
3451728
2958624
2465520
1972416
1479312
986208
493104
0
260000
240000
220000
200000
180000
160000
140000
920000
940000
960000
980000
1000000
1020000
1040000
1060000


Zones with most drop-offs
[236] Upper East Side North
[237] Upper East Side South
[170] Murray Hill
3242965
2779684
2316404
1853123
1389842
926561
463281
0
260000
240000
220000
200000
180000
160000
140000
920000
940000
960000
980000
1000000
1020000
1040000
1060000

Trip Distance



Top 5 Zones for Pick UP & Drop Off

	pickup zone	dropoff zone	short trips
18185	Upper East Side South	Upper East Side North	508762
18282	Upper East Side North	Upper East Side South	432182
18184	Upper East Side North	Upper East Side North	426463
18283	Upper East Side South	Upper East Side South	412750
5317	Upper West Side South	Upper West Side North	223234

	pickup zone	dropoff zone	long trips
4878	JFK Airport	Times Sq/Theatre District	95909
171	JFK Airport	Clinton East	62142
1212	JFK Airport	Midtown South	58794
1336	JFK Airport	Murray Hill	54396
991	JFK Airport	Midtown Center	53391

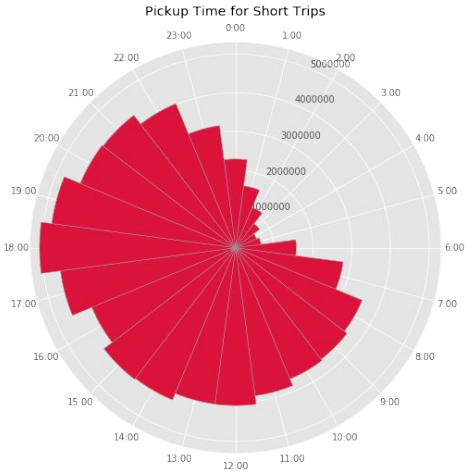
Uber Air should operate between **Upper East Side** and **JFK Airport**

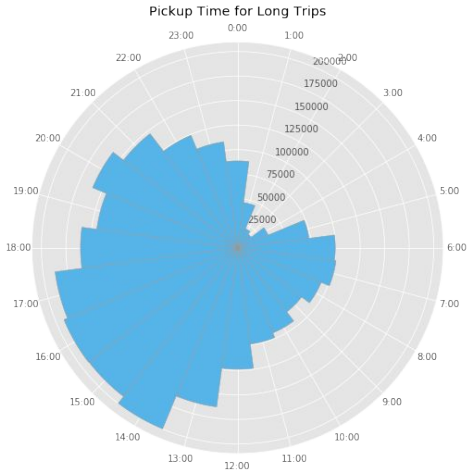
Hours of Operation

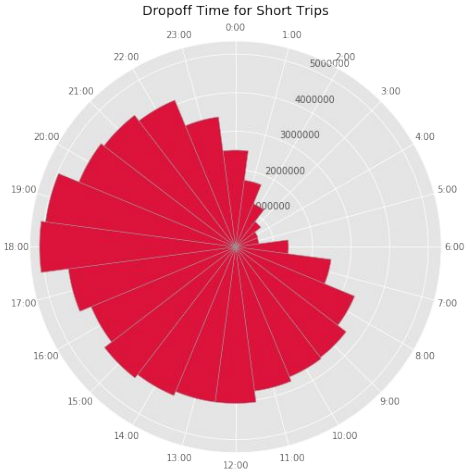
1. Short Trips
   - the hours of robust activity are from 9AM to 10PM
   - the peak hours are from 6PM to 7PM

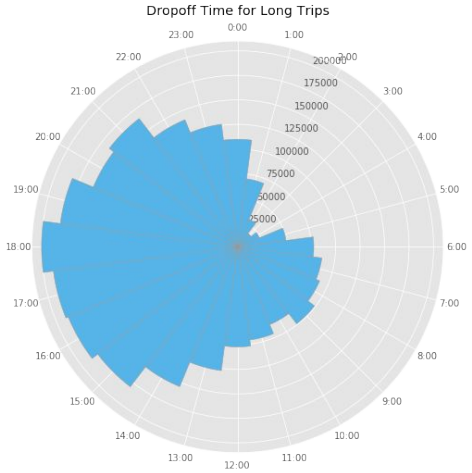
2. Long Trips
   - the hours of robust activity are from 9AM to 10PM
   - the peak hours for pickups are from 2PM to 6PM
   - the peak hours for dropoffs are from 4PM to 7PM

3. Off hours are from 11PM to 8AM

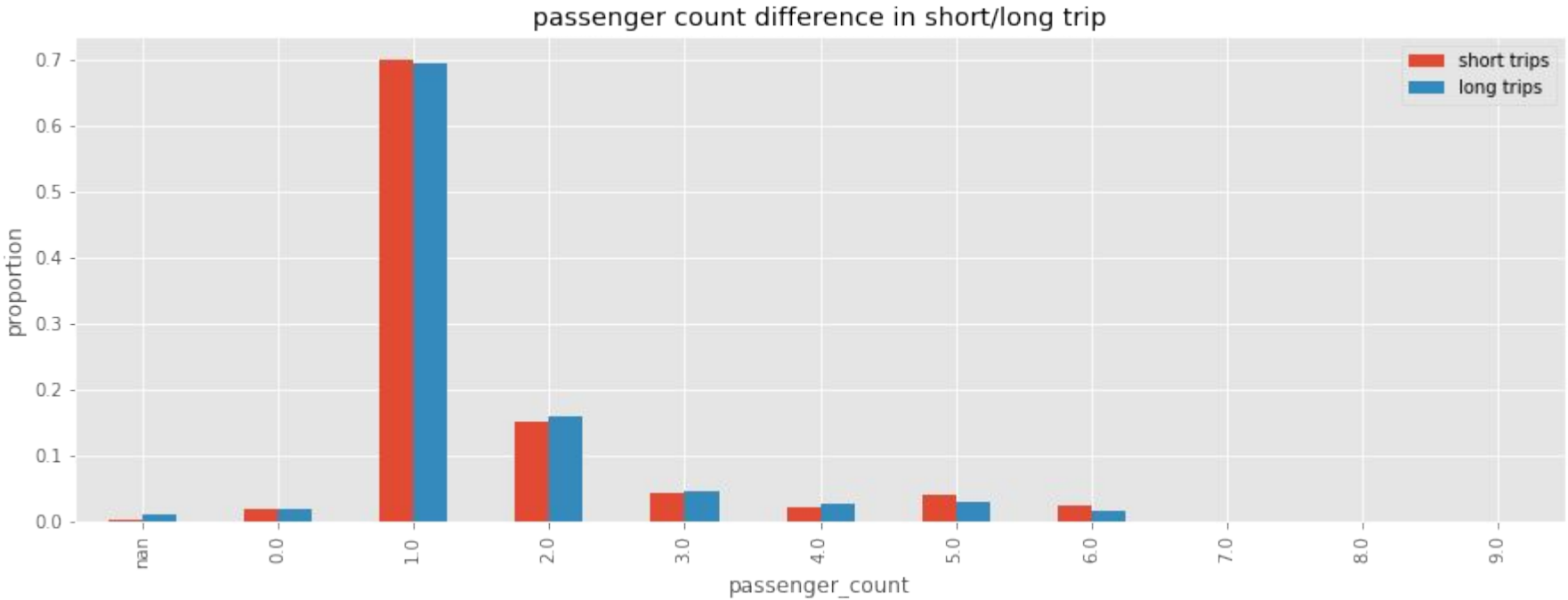




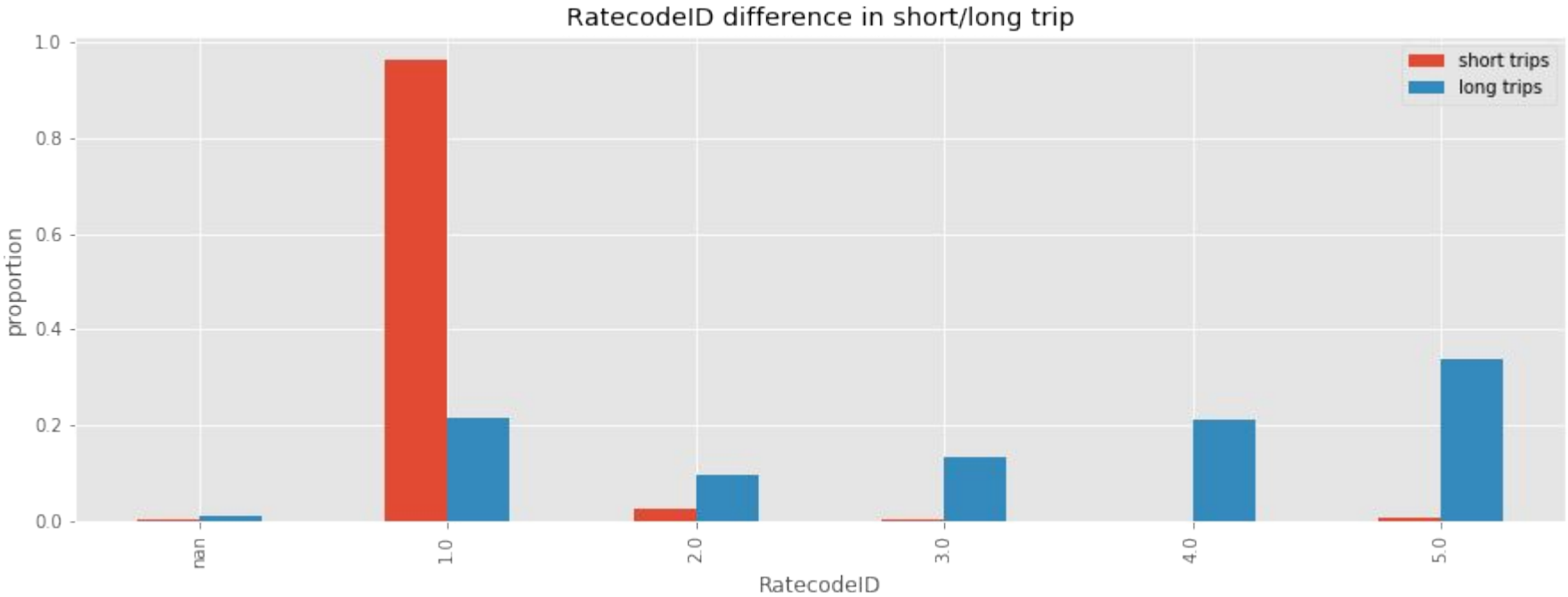




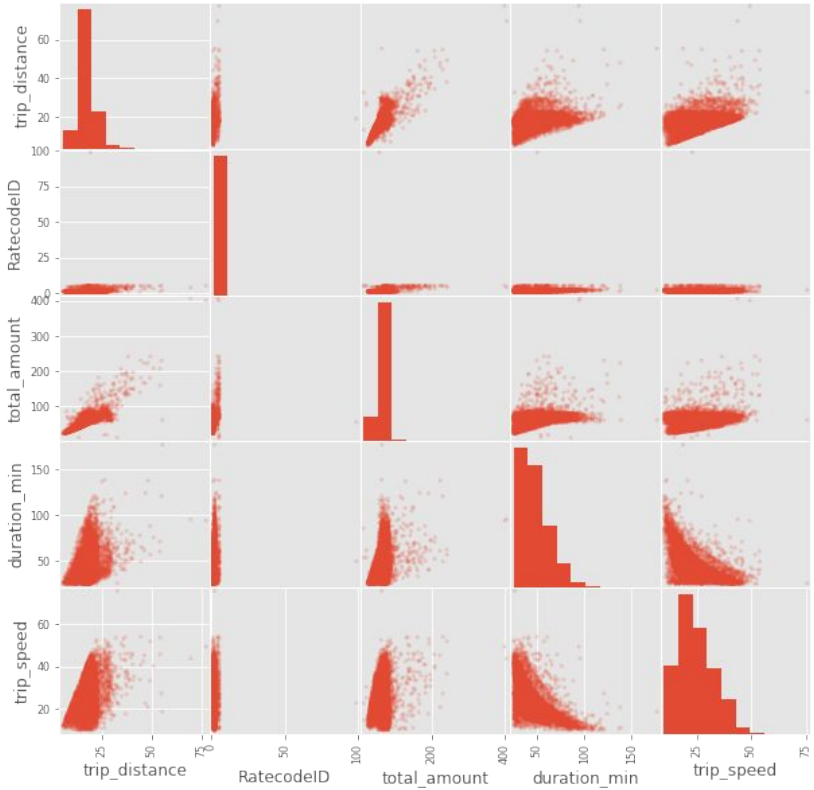
Passengers


passenger count difference in short/long trip
short trips
long trips
proportion
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
nan
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
passenger_count

Rates


RatecodeID difference in short/long trip
short trips
long trips
proportion
1.0
0.8
0.6
0.4
0.2
0.0
nan
1.0
2.0
3.0
4.0
5.0
RatecodeID

Deeper Exploration



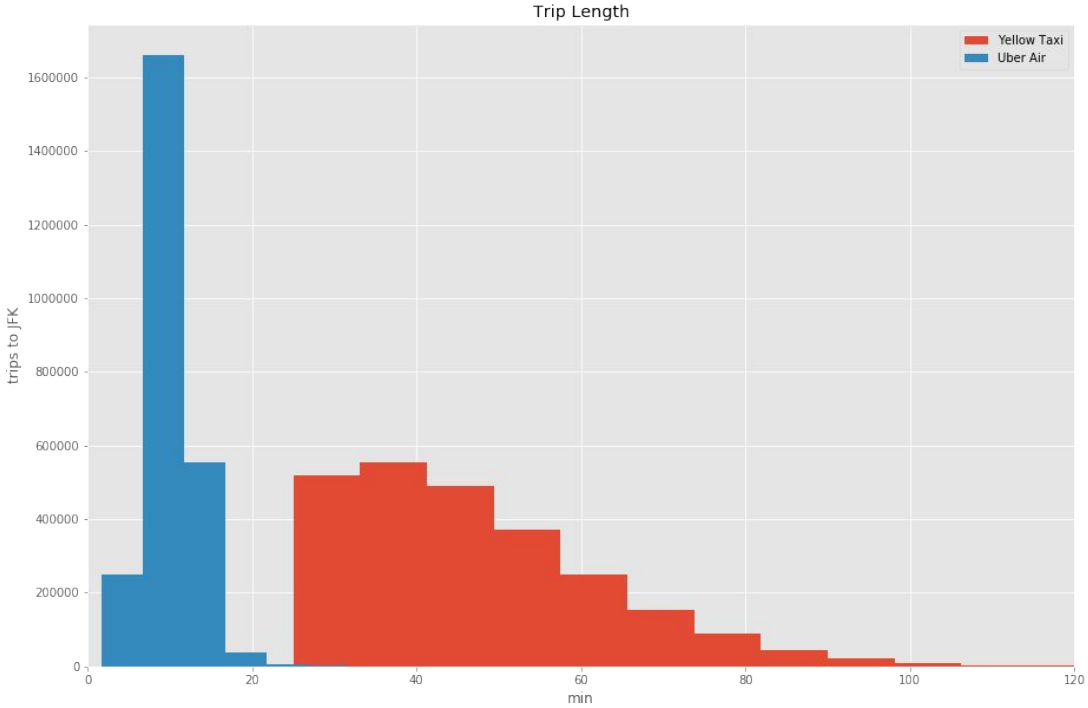
Trips to/from JFK(sample)

```
df_jfk.describe()
```

	passenger_count	trip_distance	RatecodeID	PULocationID	DOLocationID	total_amount	trip_duration
count	2.512294e+06	2.512576e+06	2.512294e+06	2.512576e+06	2.512576e+06	2.512576e+06	2512576
mean	1.622064e+00	1.781621e+01	1.767932e+00	1.390771e+02	1.452416e+02	6.533778e+01	0 days 00:47:03.851017
std	1.226027e+00	4.026216e+00	6.909373e-01	3.348037e+01	6.623380e+01	1.722468e+01	0 days 00:15:51.565783
min	0.000000e+00	4.200000e+00	1.000000e+00	1.000000e+00	1.000000e+00	1.030000e+01	0 days 00:25:01
25%	1.000000e+00	1.650000e+01	1.000000e+00	1.320000e+02	1.070000e+02	5.892000e+01	0 days 00:34:43
50%	1.000000e+00	1.785000e+01	2.000000e+00	1.320000e+02	1.320000e+02	6.636000e+01	0 days 00:44:06
75%	2.000000e+00	1.928000e+01	2.000000e+00	1.320000e+02	1.880000e+02	7.367000e+01	0 days 00:56:10
max	9.000000e+00	5.430900e+02	9.900000e+01	2.650000e+02	2.650000e+02	4.993000e+02	0 days 07:11:11

Where does Uber Air fit?

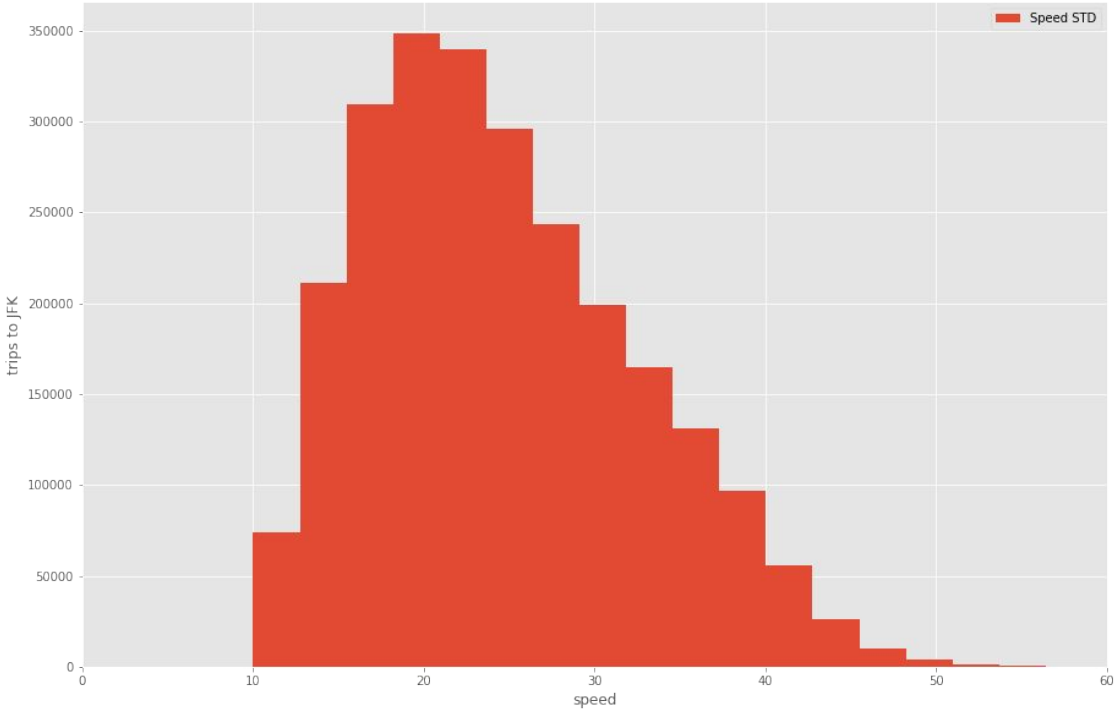
- Fare: $90
- Duration: 7 - 15 min
- Speed: 74 - 150 mph



Stand Deviations

Yellow Taxi's STDs:

- Fare: $17.2
- Duration: 15 min
- Distance: 4 miles
- Speed: 7.9 mph



Let’s calculate the value

Yellow Taxi

Distance: 18 miles

Duration: 47 min

Cost: $65

Dollar/min: $1.38/min

Uber Air

Distance: 18 miles

Duration: 10 min

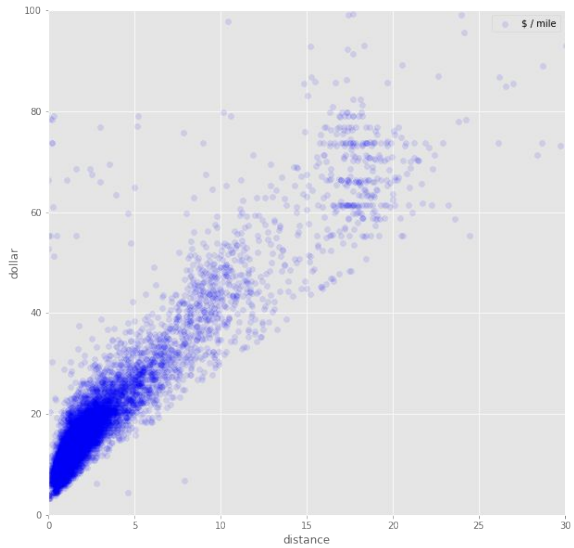
Cost: $90

Dollar/min: $9/min

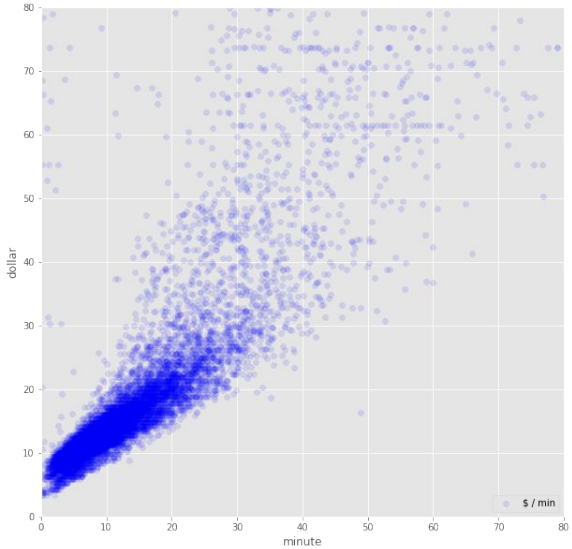
Is saving 37 minutes worth spending 25 dollars more?

Fare Amount

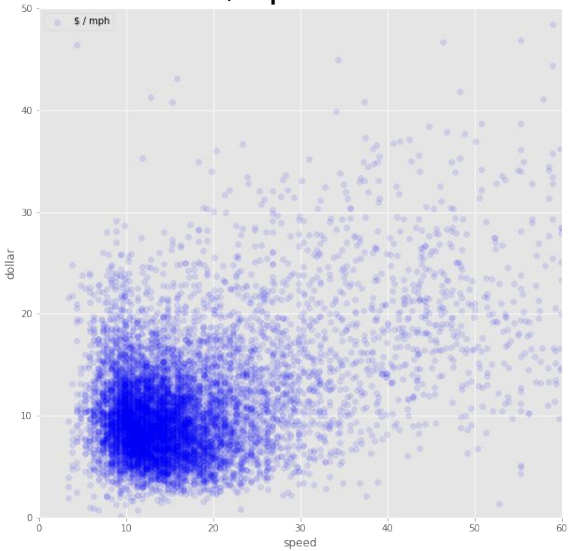
$/mile



$/min

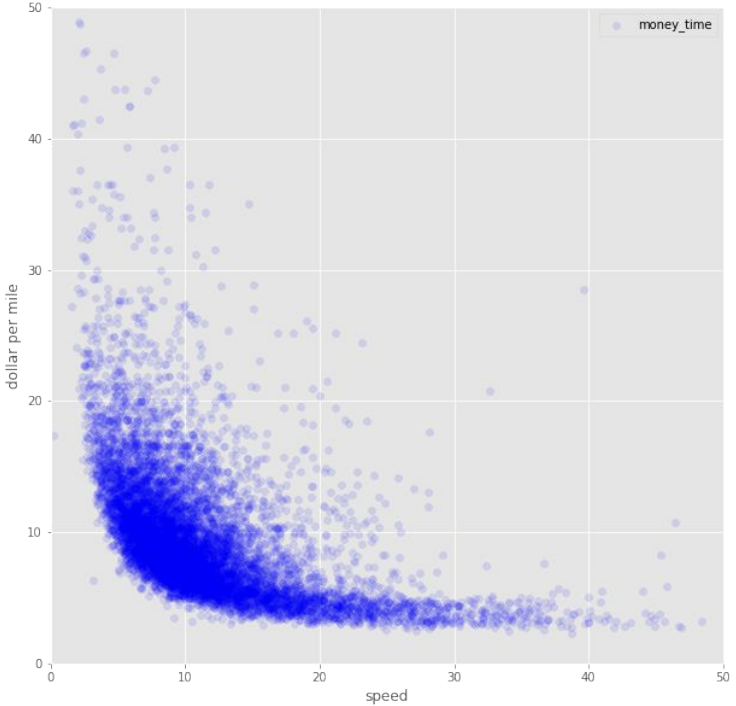


$/speed

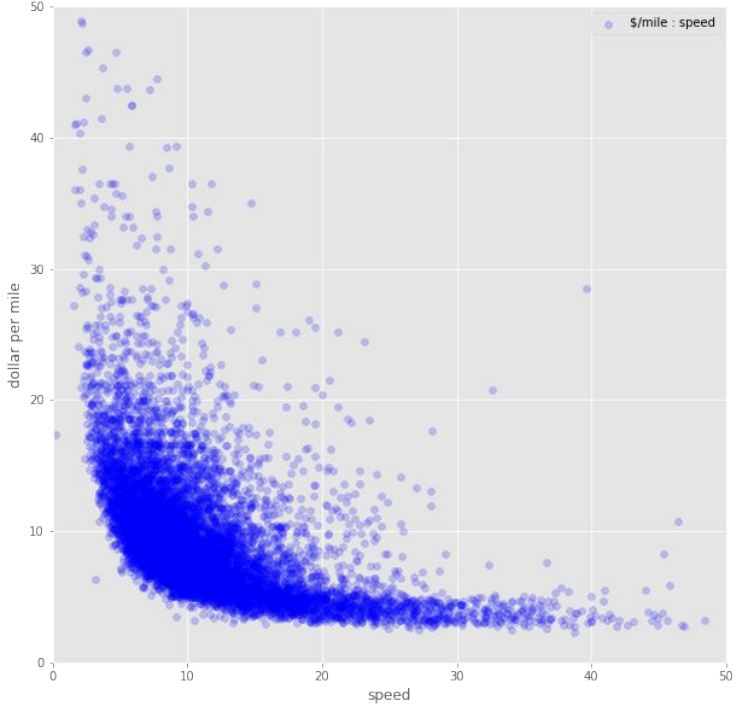


Speed

Dollar per Minute VS Speed



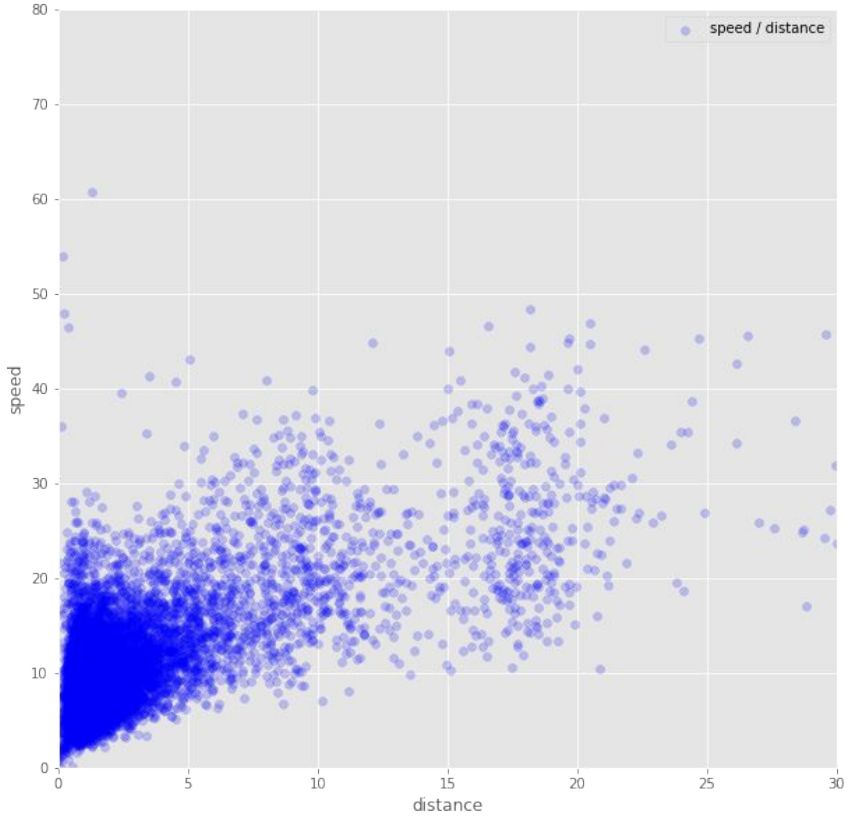
Dollar per Mile vs Speed



Speed per Distance

The longer the distance is faster the speed gets.

Do Yellow Taxi get faster beyond the distance of 30 miles and speed of 50 mph?



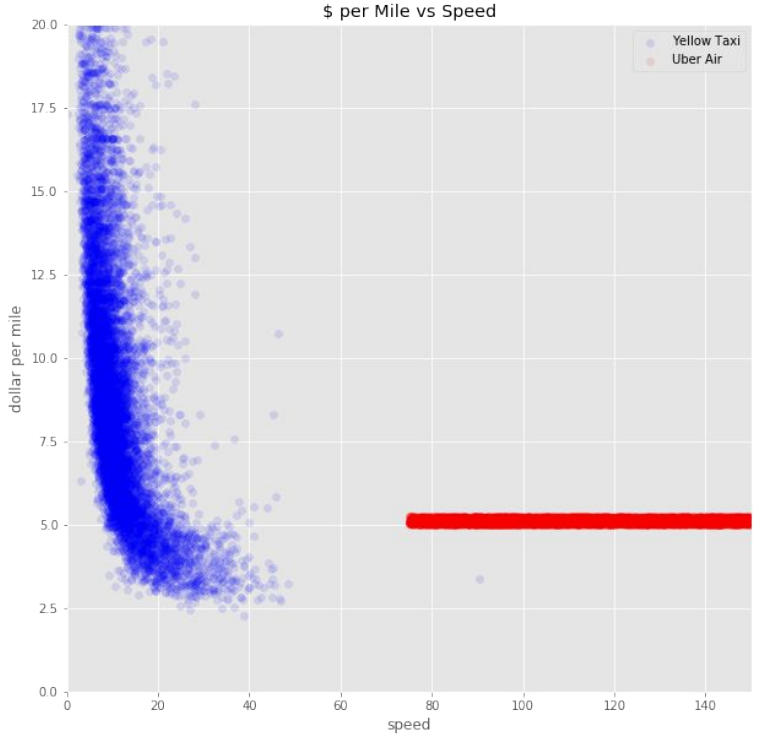
Yellow Taxi(Cars) vs Uber Air

Yellow Taxi cannot further reduce $/mile:

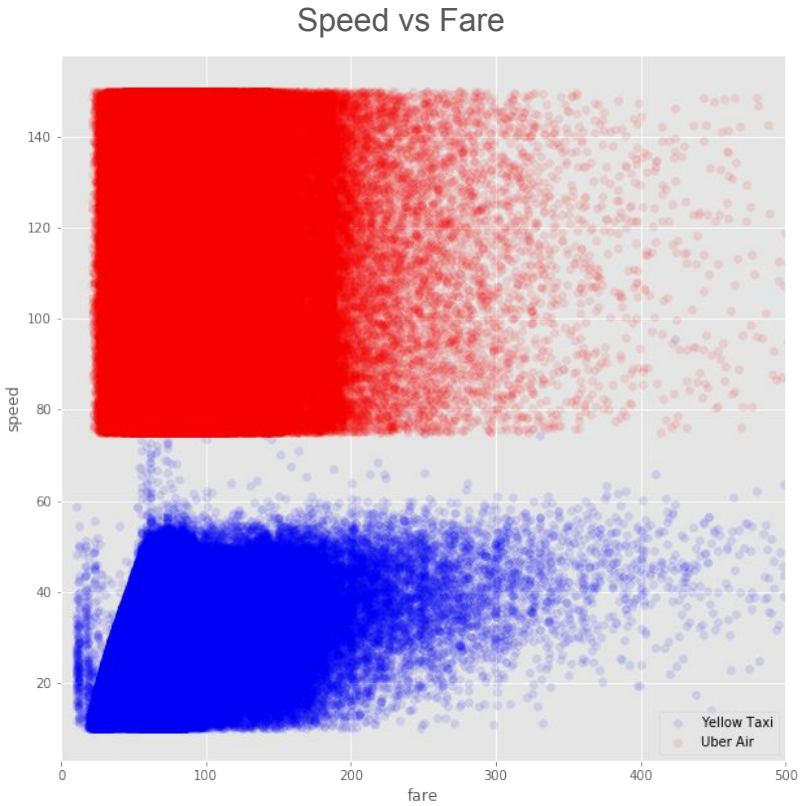
1. Legal Speed Limit
2. Extra Fees
3. Flat Rate
4. Limitation of Vehicles

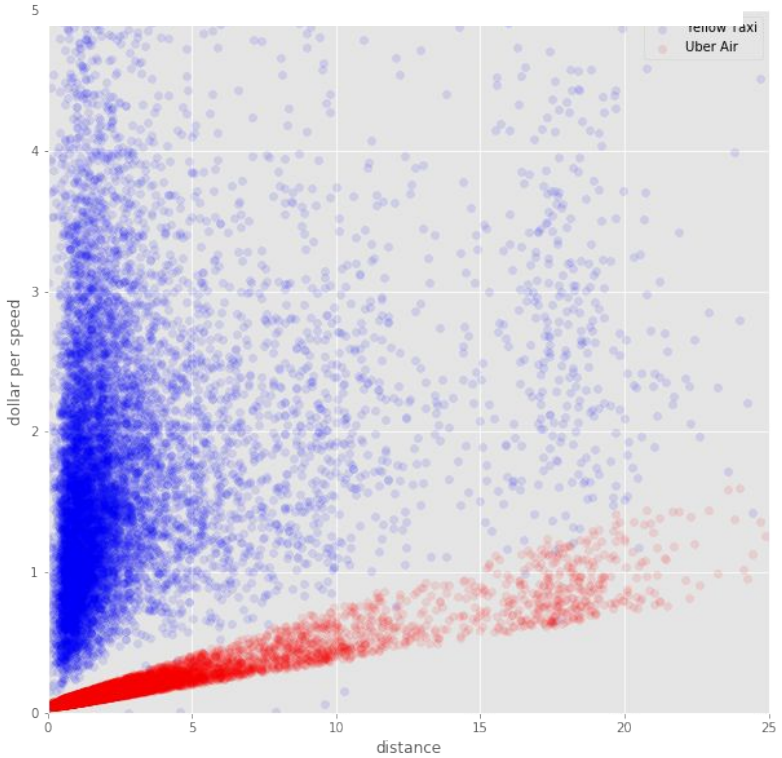
Uber Air:

- $5/mile
- 74 to 150 mph



Uber Air's Game





Summary

- Uber Air should launch between Upper East Side Manhattan and JFK Airport
- Uber Ais should operate between 12PM to 10PM with expanded capacity for 2PM to 8PM.
- Uber Air would transport passengers at $90 in 10 minutes(with 3 min STD).
- Uber Air’s launch would save 37 minutes at extra $25 than getting a Yellow Taxi

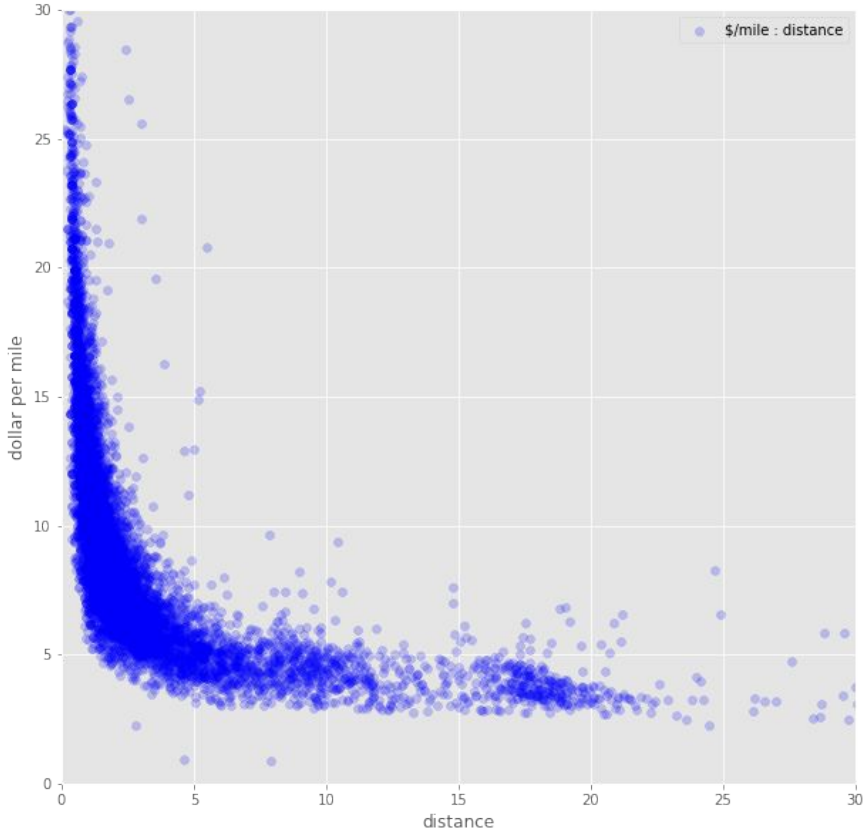
Future Analysis

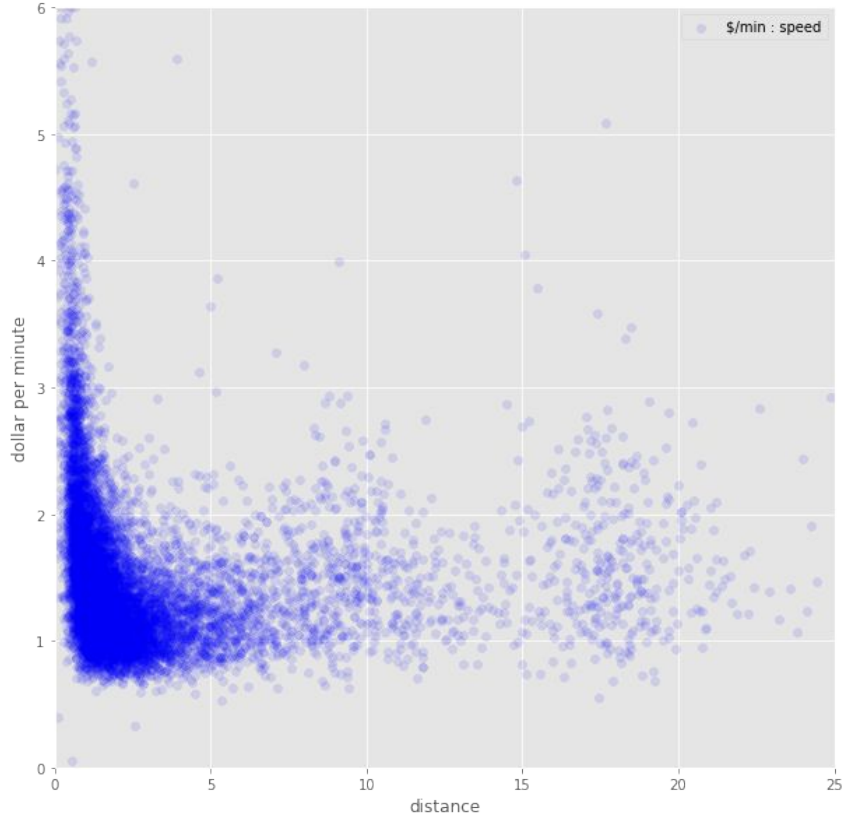
- What is the optimal scale of operation for its initial launch to justify the cost?
- At what point will Uber Air become profitable?
- If Uber Air can reduce the number of long distance trips either from or to Manhattan, what impact will it have in terms of relieving inner city traffic congestion?
- If carsi were able to get to their destination in 5% less time(potentially thanks to reduced traffic from Uber Air), how much cheaper would it be for the passengers?

Thank you.

Dollar per Mile vs Distance

Pricing: as distance increases, dollar per mile decreases...



Demand (Dollar per speed VS Distance)

After 10 miles, the dollar per minute starts to increase again but there aren't many data points. That's where Uber Air has a chance.