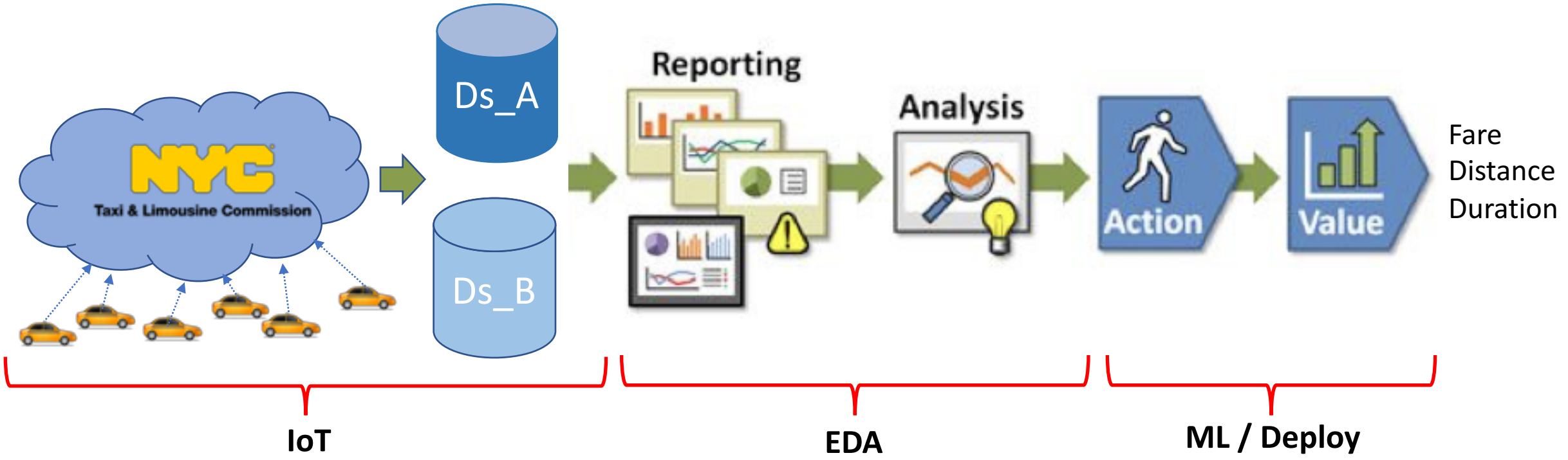
NYC Taxi - Trip Prediction Project

Universidad del Desarrollo

MDS18 - PP1 – Final Project
March 19

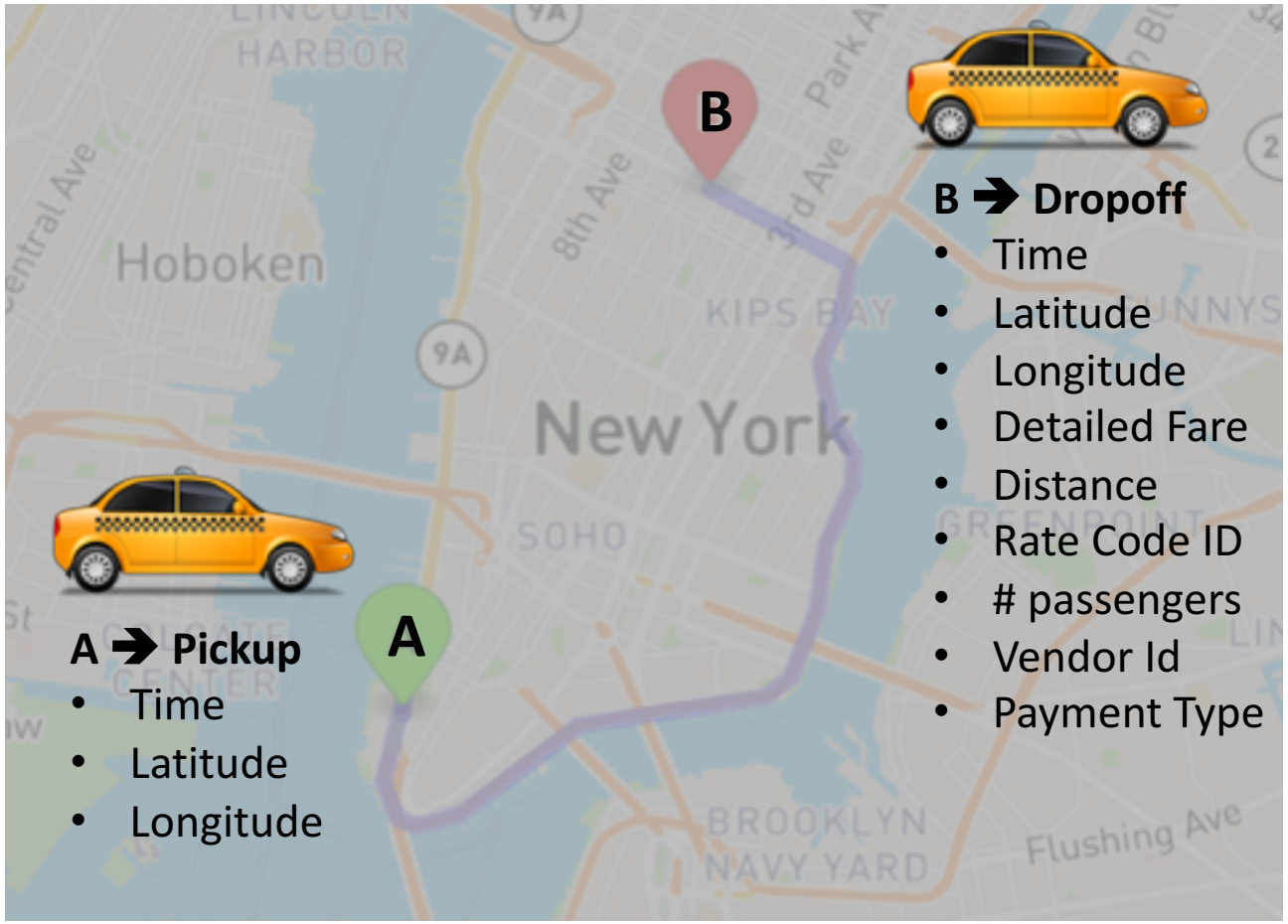
NYC Taxi Trip Prediction Project

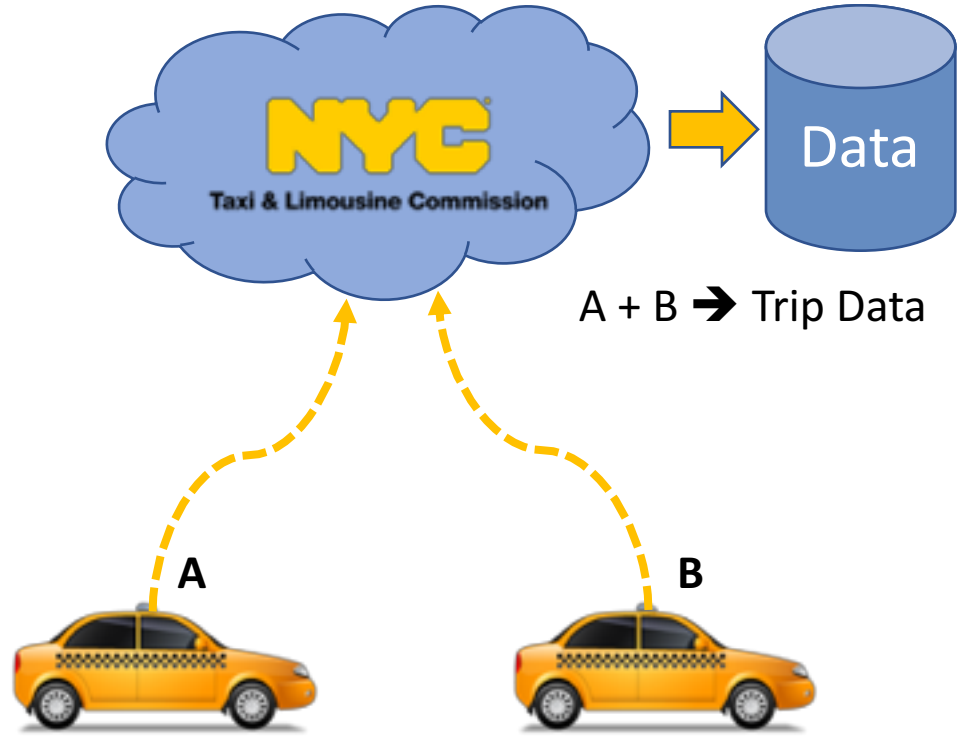


Ds_A ➔ 14M Trip dataset (full June/15) ➔ EDA ➔ Sample of 120K dataset ➔ Machine Learning

Ds_B ➔ 120K Trip dataset (sample all months 2015) ➔ EDA and Machine Learning

NYC Taxi - IoT – Getting data





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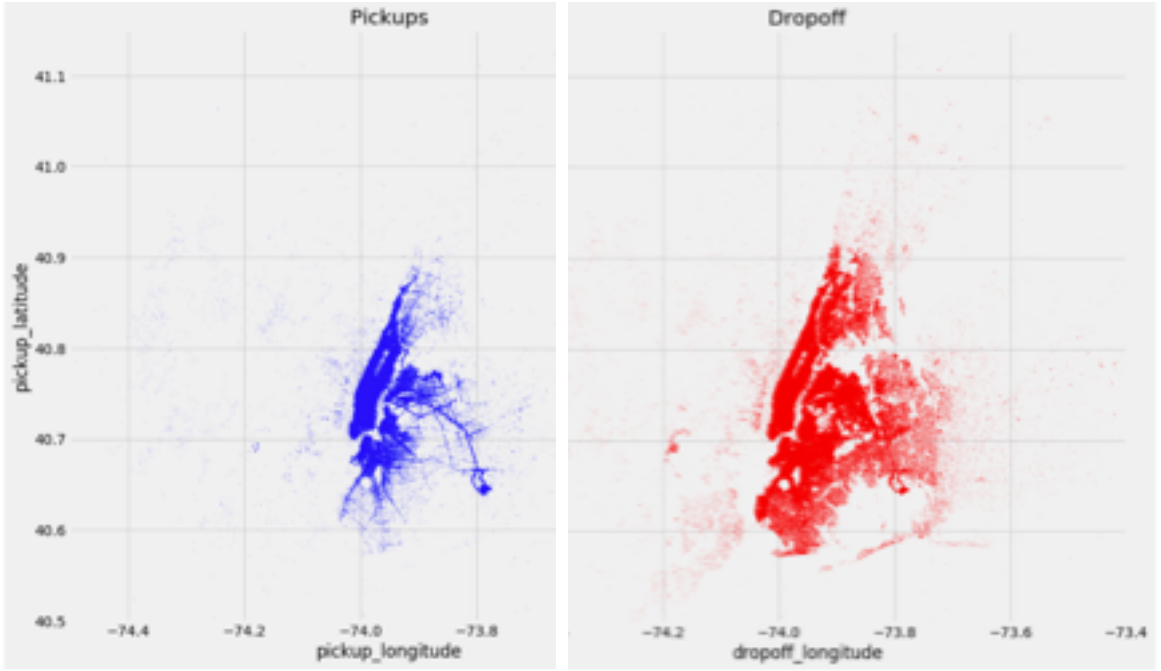
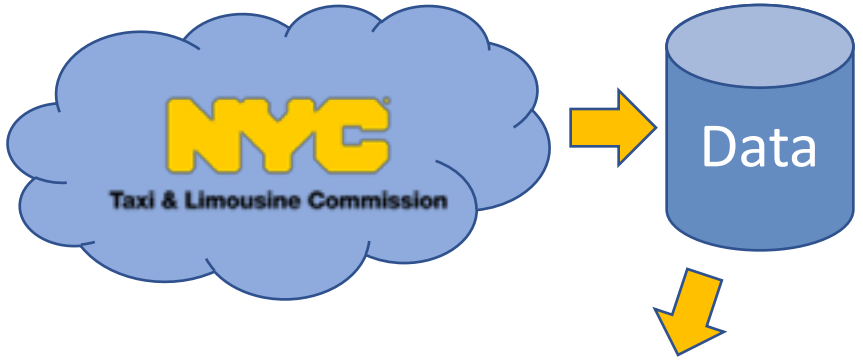
NYC Taxi - Dataset

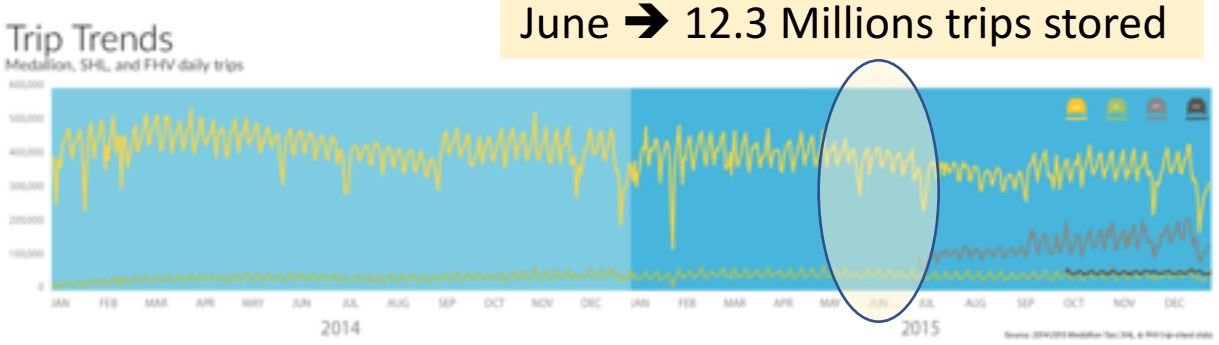




	VendorID	tpep_pickup_datetime	tpep_dropoff_datetime	passenger_count	trip_distance	pickup_longitude	pickup_latitude	RateCodeID
0	2	2015-06-02 11:19:29	2015-06-02 11:47:52	1	1.63	-73.954430	40.764141	1
1	2	2015-06-02 11:19:30	2015-06-02 11:27:56	1	0.46	-73.971443	40.758942	1
2	2	2015-06-02 11:19:31	2015-06-02 11:30:30	1	0.87	-73.978111	40.738434	1
3	2	2015-06-02 11:19:31	2015-06-02 11:39:02	1	2.13	-73.945892	40.773529	1
4	1	2015-06-02 11:19:32	2015-06-02 11:32:49	1	1.40	-73.979088	40.776772	1

dropoff_longitude	dropoff_latitude	payment_type	fare_amount	extra	mta_tax	tip_amount	tolls_amount	improvement_surcharge	total_amount
-73.974754	40.754093	2	17.0	0.0	0.5	0.00	0.0	0.3	17.80
-73.978539	40.761909	1	6.5	0.0	0.5	1.00	0.0	0.3	8.30
-73.990273	40.745438	1	8.0	0.0	0.5	2.20	0.0	0.3	11.00
-73.971527	40.760330	1	13.5	0.0	0.5	2.86	0.0	0.3	17.16
-73.982162	40.758999	2	9.5	0.0	0.5	0.00	0.0	0.3	10.30

June ➔ 12.3 Millions trips stored



2015: 13,500 Yellow Cabs. ➔ 400,000 trips/day

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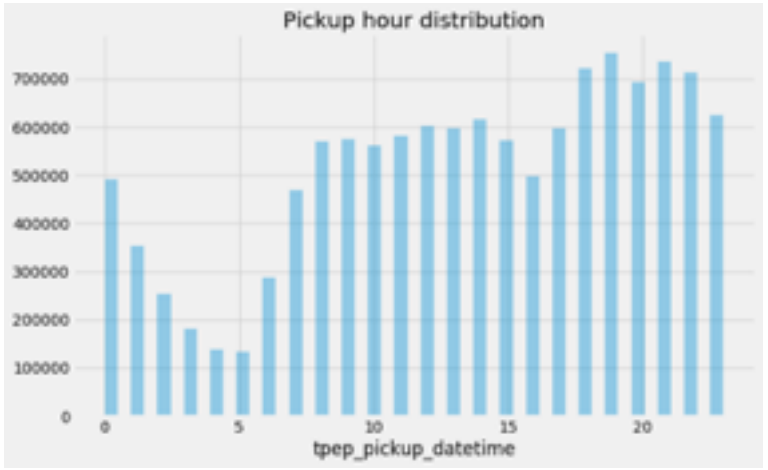
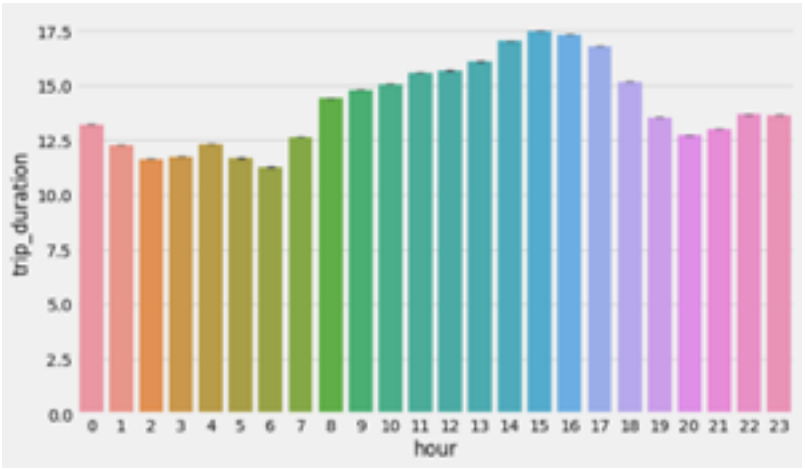
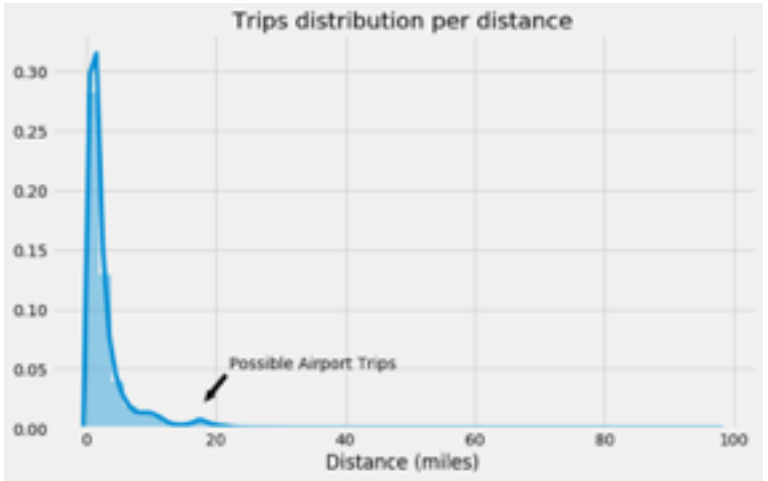
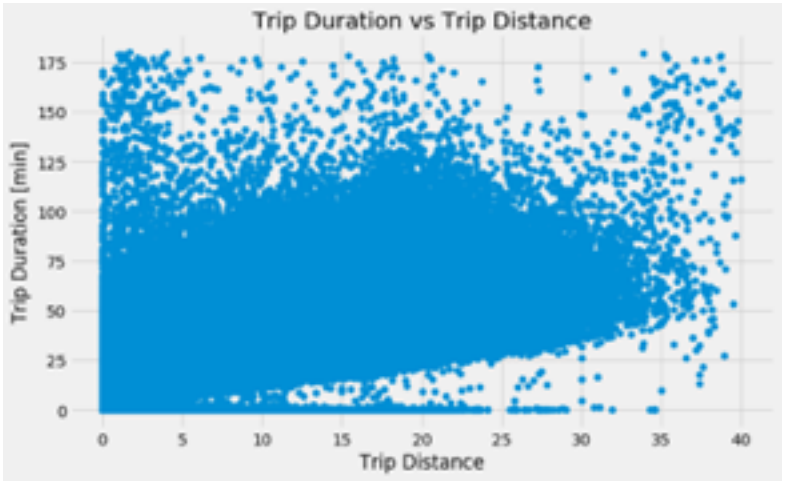
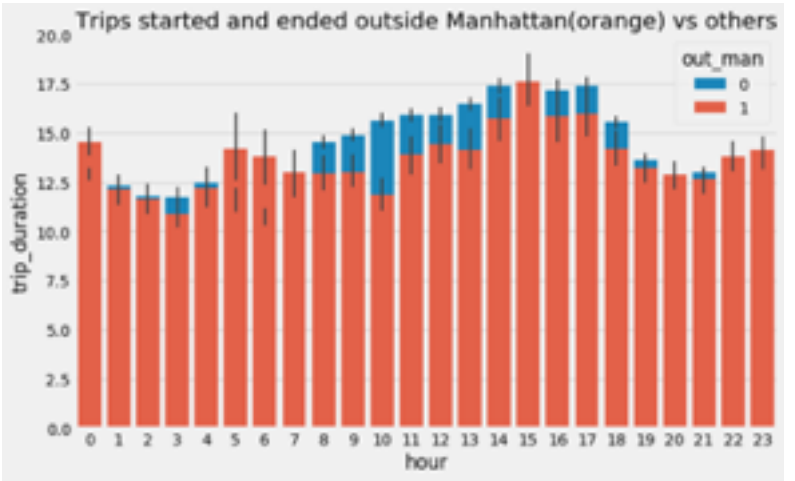
NYC Taxi Trip Prediction Project - EDA



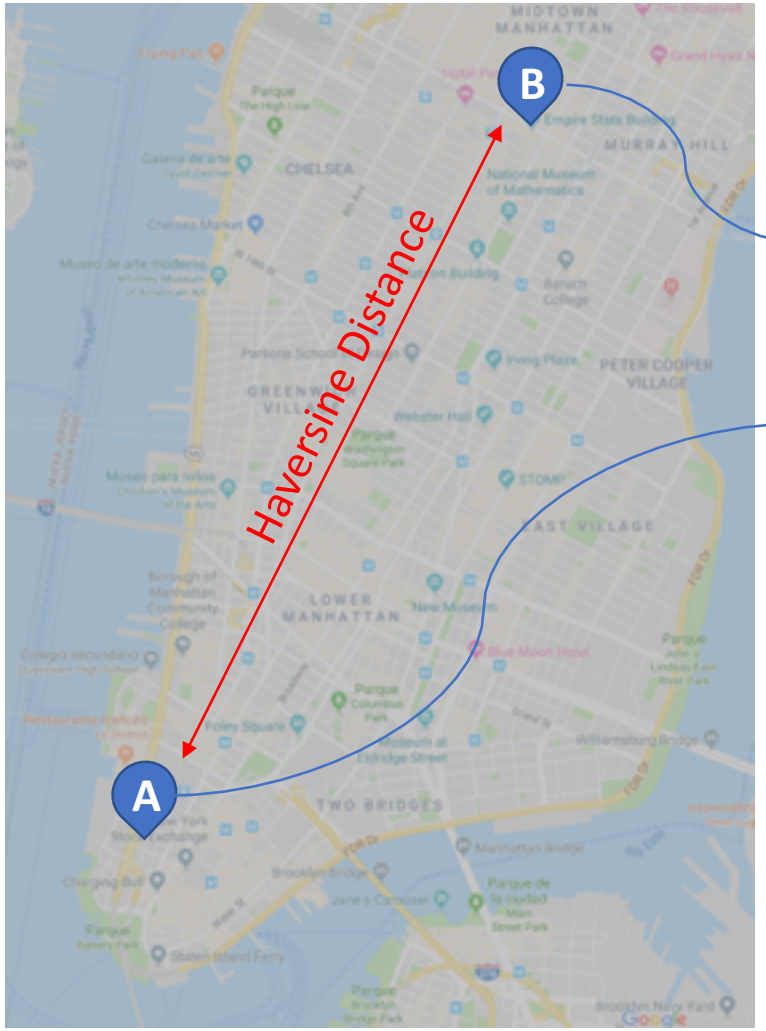








NYC Taxi Trip Prediction - ML

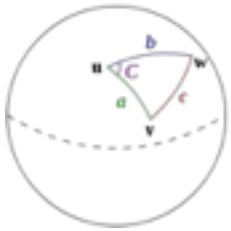


Dropoff Latitude
Dropoff Longitude

Pickup Latitude
Pickup Longitude
Pickup Time

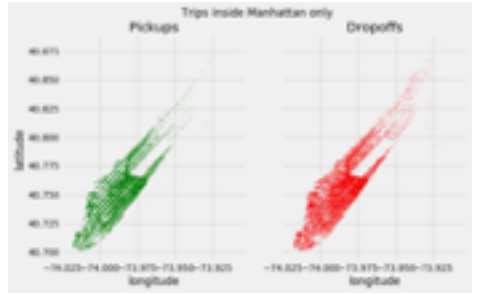
ML Models

Fare
Distance
Duration



$$2r\arcsin\left(\sqrt{\sin^2\left(\frac{\varphi_2-\varphi_1}{2}\right)+\cos(\varphi_1)\cos(\varphi_2)\sin^2\left(\frac{\lambda_2-\lambda_1}{2}\right)}\right)$$

Hav. Dist.
Rate Code
In/Out Manh.



NYC Taxi Trip Prediction - ML

	Fare DS_A	Fare DS_B		Fare DS_A	Fare DS_B
	RMSE	RMSE	Comparison A-B	Base line comparison	Base line comparison
Base Line	10,25	9,88	3,6%	0,0%	0,0%
Decisión Tree Regresor	3,25	3,21	1,2%	68,3%	67,5%
Random Forest Regressor	3,01	2,92	3,0%	70,6%	70,4%
Random Forest Regressor (Reducing features)	3,00	2,92	2,7%	70,7%	70,4%
Random Forest Regressor (Changing Hyper_param)	2,77	2,72	1,8%	73,0%	72,5%

	Time DS_A	Time DS_B		Time DS_A	Time DS_B
	RMSE	RMSE	Comparison A-B	Base line comparison	Base line comparison
Base Line	14,52	13,94	4,0%	0,0%	0,0%
Decisión Tree Regresor	11,47	10,75	6,3%	21,0%	22,9%
Random Forest Regressor	6,03	6,26	-3,8%	58,5%	55,1%
Random Forest Regressor (Reducing features)	5,60	5,73	-2,3%	61,4%	58,9%
Random Forest Regressor (Changing Hyper_param)	5,26	5,38	-2,3%	63,8%	61,4%

	Dist DS_A	Dist DS_B		Dist DS_A	Dist DS_B
	RMSE	RMSE	Comparison A-B	Base line comparison	Base line comparison
Base Line	3,61	3,46	4,2%	0,0%	0,0%
Decisión Tree Regresor	0,90	0,82	8,9%	75,1%	76,3%
Random Forest Regressor	0,83	0,75	9,6%	77,0%	78,3%
Random Forest Regressor (Changing Hyper_param)	0,78	0,71	9,0%	78,4%	79,5%

ML Model: Random Forest Regressor

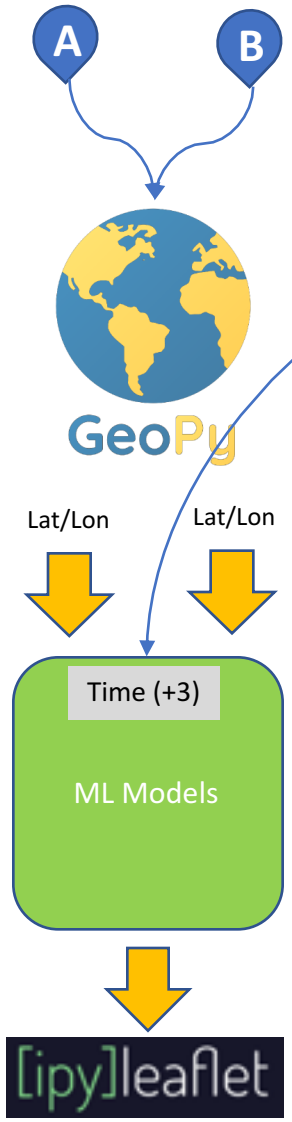
➔ Fare: < $3.00

➔ Time: > 5 min

➔ Dist: > 0.7 mile

Errors

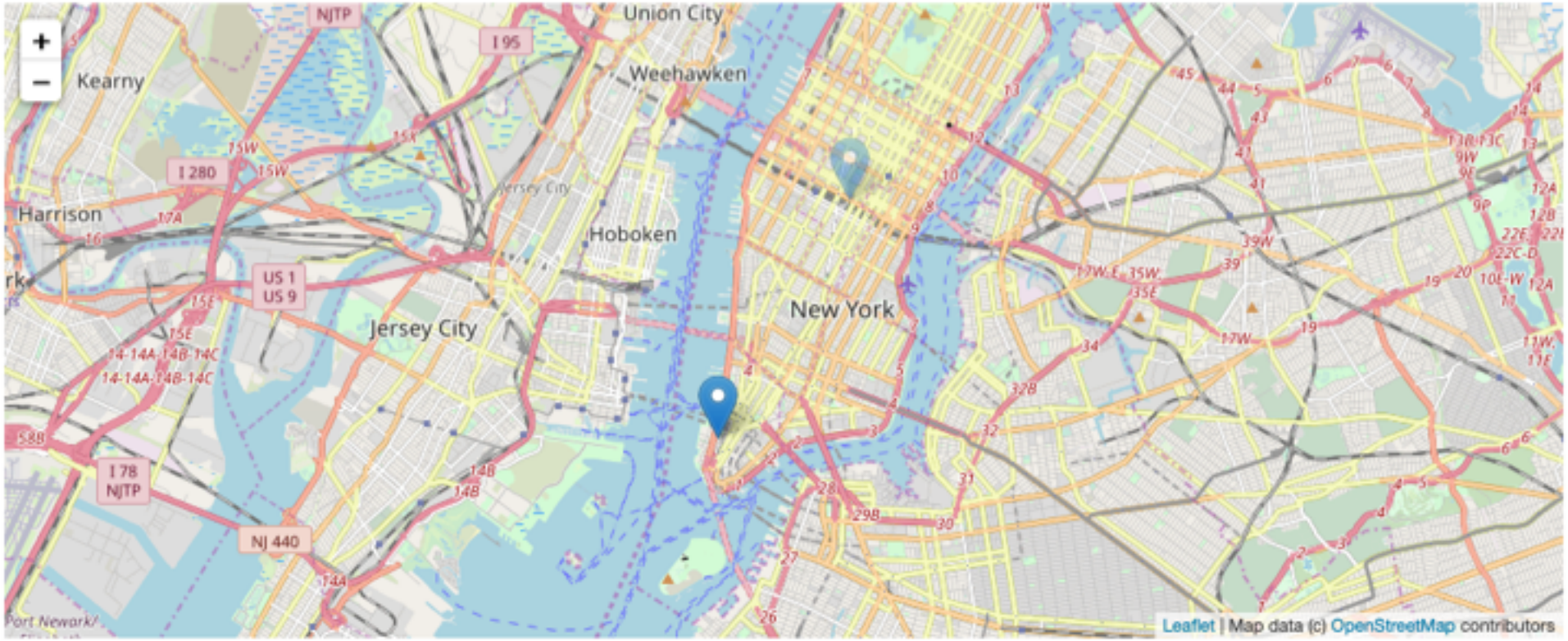
NYC Taxi Trip Prediction - Deploy




```
1  start_loc = "New York Marriott Downtown"
2  end_loc = "Empire State Building"
3
4  predict_trip(start_loc, end_loc)
```

executed in 4.16s, finished 12:03:08 2019-02-08

```
Trip has 4.8 miles and will last 28.0 minutes, with a basic cost od $21.57
[Trip Info]: Trip inside Manhattan; Rate Code: Standard
```



NYC Taxi Trip Prediction - Benchmark

```
Trip has 4.8 miles and will last 28.0 minutes, with a basic cost od $21.57
[Trip Info]: Trip inside Manhattan; Rate Code: Standard
```

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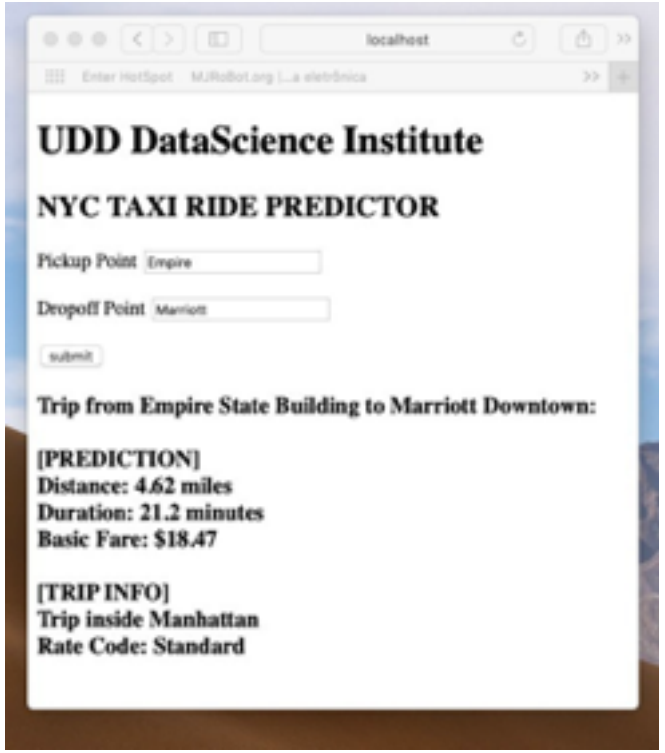
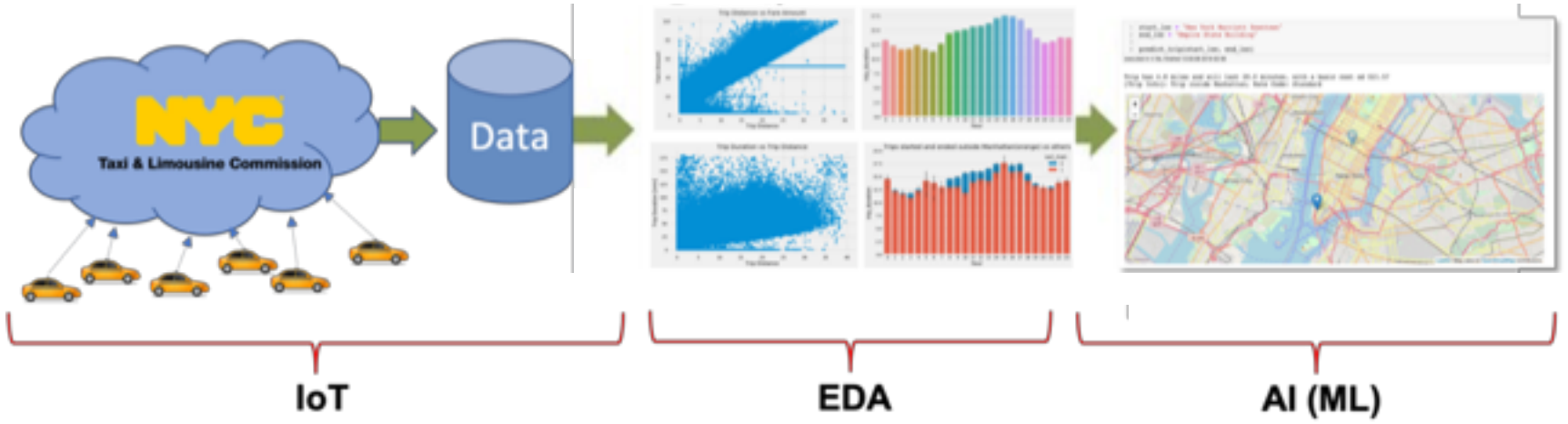
Future Works

- New Datasets
  - New Historical Random Samples for each months
- City time Travel at Rush Hour
  - Average traffic speed per hour
  - Number of cabs per hour
- Pickup Demand
  - Specific demand in small zones
- Other ML modes
  - ARIMA
  - Nested Model

- An App
  - Work on a App to be used on mobiles and dektop



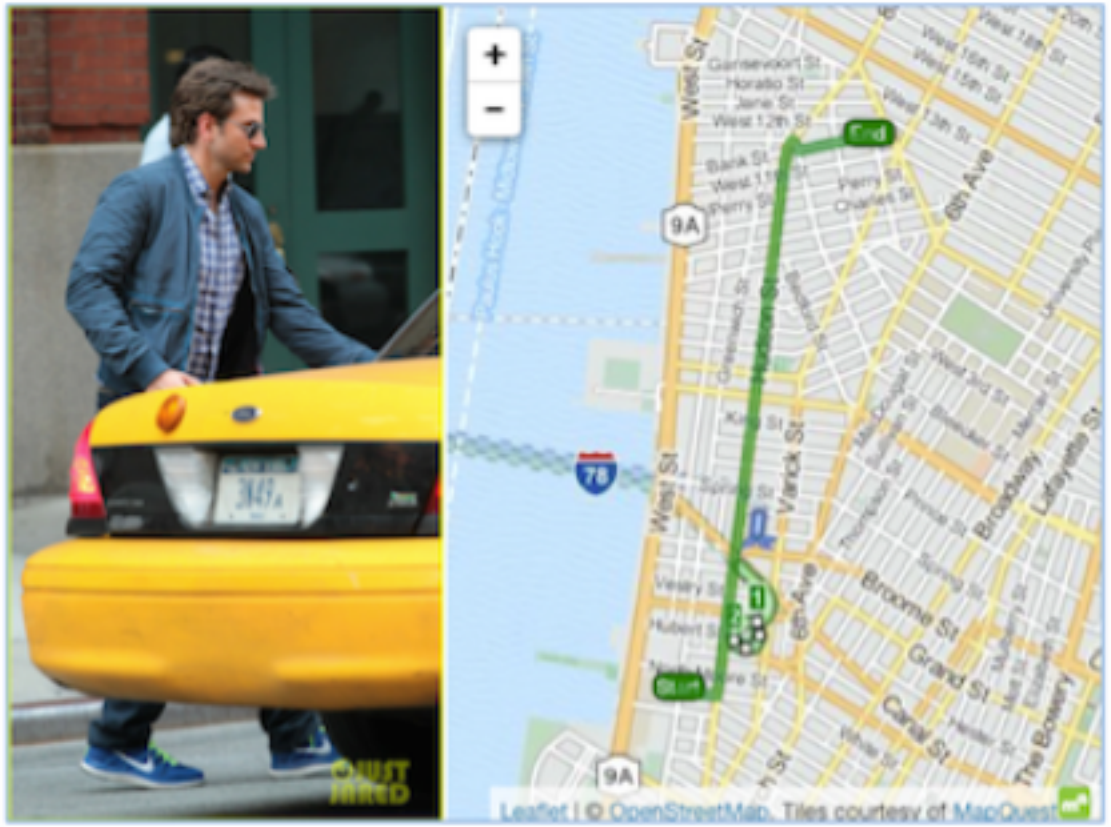
Data Science Environment



https://github.com/Mjrovai/UDD_Master_Data_Science/tree/master/AML-NYC_TAXI_TRIP_PREDICTION

Issue - Violating privacy

Stalking celebrities



A few innocent nights at the gentlemen's club

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The End

Briceño, Heriberto
Rovai, Marcelo
Sacasa, Manuel