The Data Incubator

Project Proposal:
Wait Time Prediction for Airport Taxis at O'Hare International Airport (ORD)

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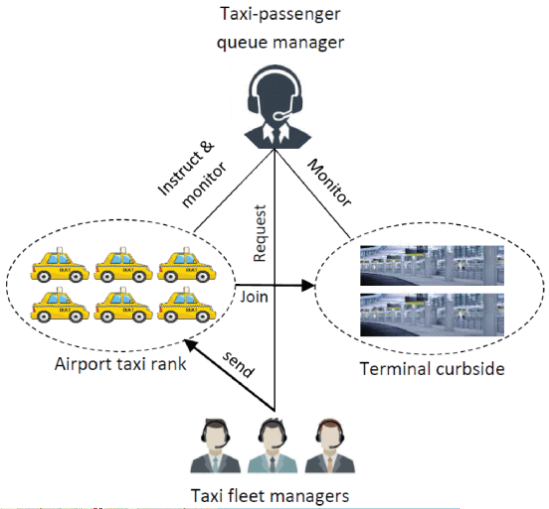
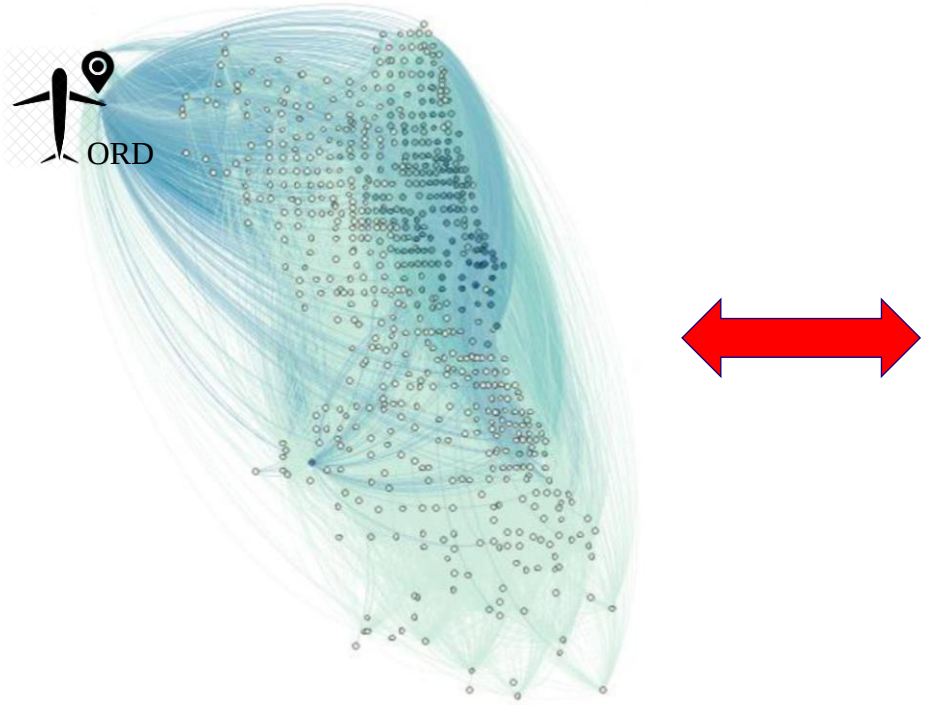
Problem Statement

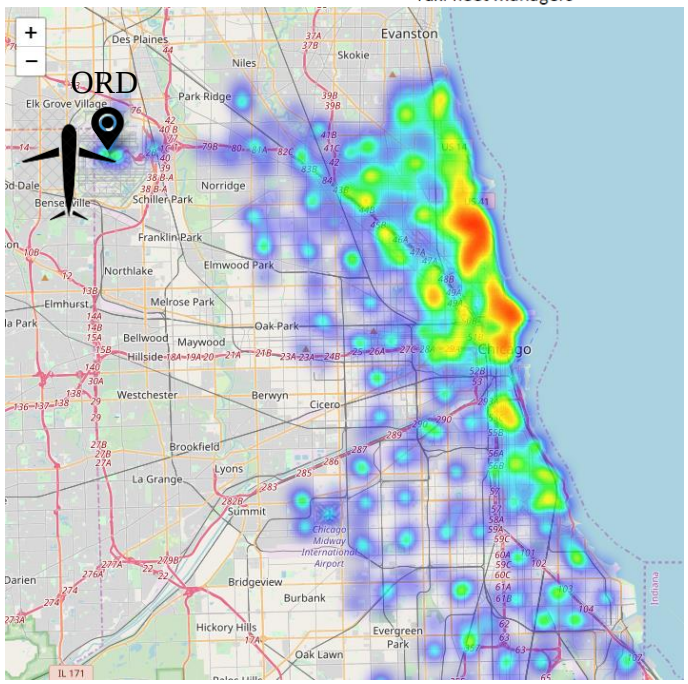
Manual airport taxi demand estimation system



- The human error in manual airport taxi demand estimation causes:
  - Long queues of taxis and traffic congestion.
  - Long queue wait times for the passengers.

- O'Hare International Airport (ORD) is one of the busiest airports in the US, and it is one of the high taxi pickup locations in Chicago. **Therefore, it is essential to develop a ML model that can estimate the taxi queue wait time at ORD.**





1. Rahaman, M.S.,et al., 2018. IEEE, 6,74660-74672.

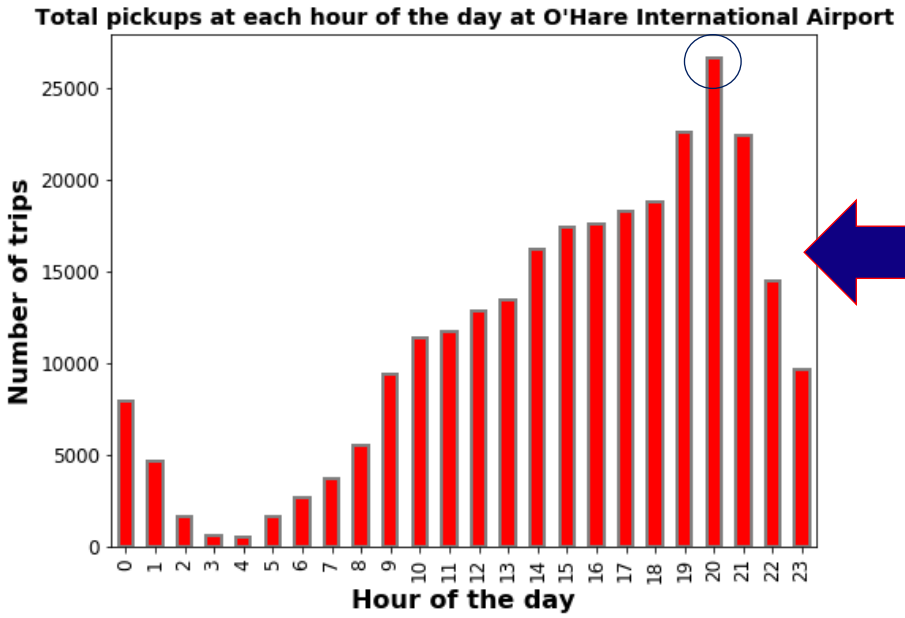
Preliminary Data Analysis

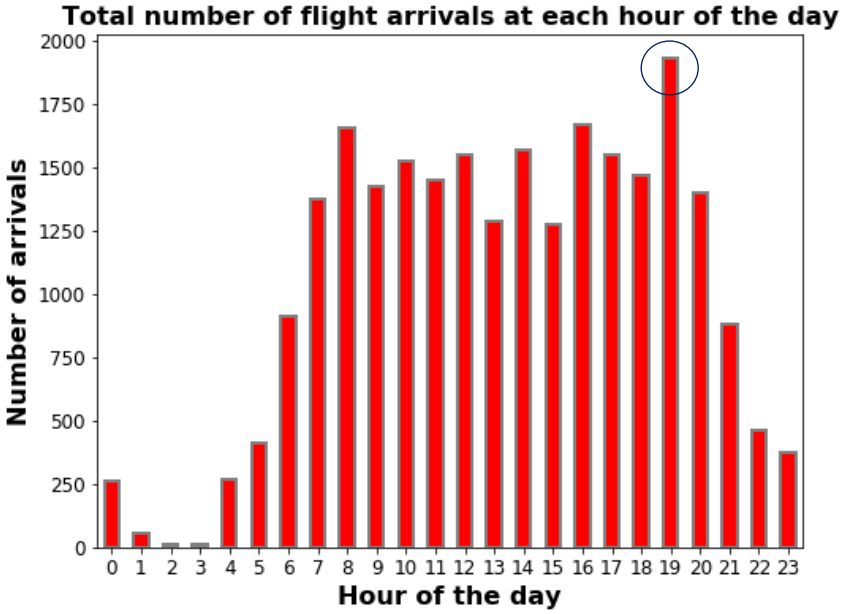
Chicago taxi trip data

- Pickup/ Drop off location
- Pickup/ Drop off time
- Distance of the trip
- Fare and tip amount
- Taxi ID

O'Hare airport flight data

- Number of flights
- Passenger arrivals
- Delay of flights
- Passengers wait time



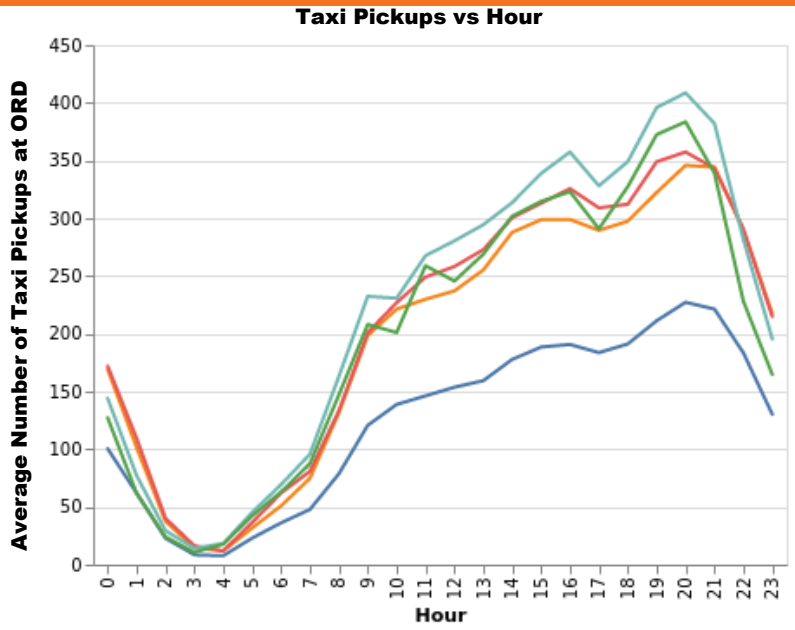


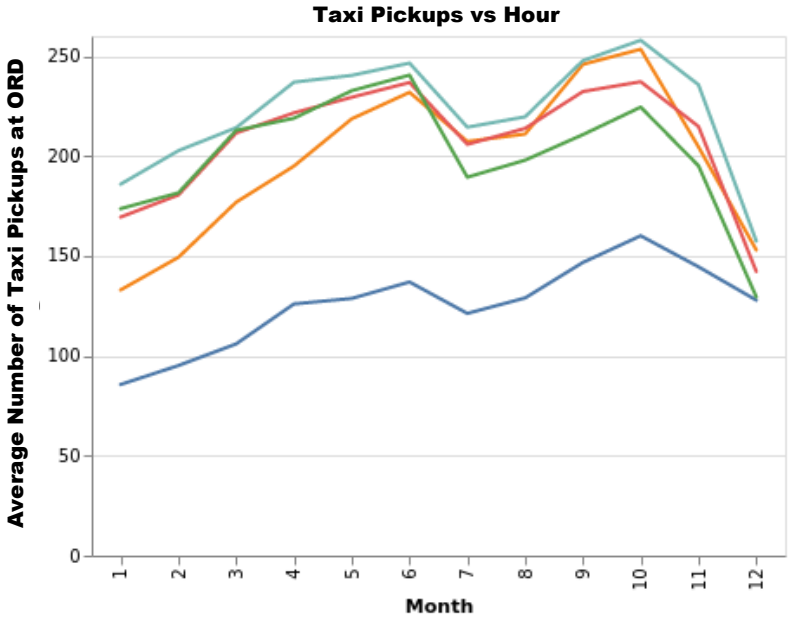
- The maximum number of taxi pickups occurs at 8 p.m. which is related to the maximum number of flight arrivals happens at 7 p.m.

https://data.cityofchicago.org/Transportation/Transportation-Network-Providers-Trips/m6dm-c72p
https://www.transtats.bts.gov/Tables.asp?DB_ID=120

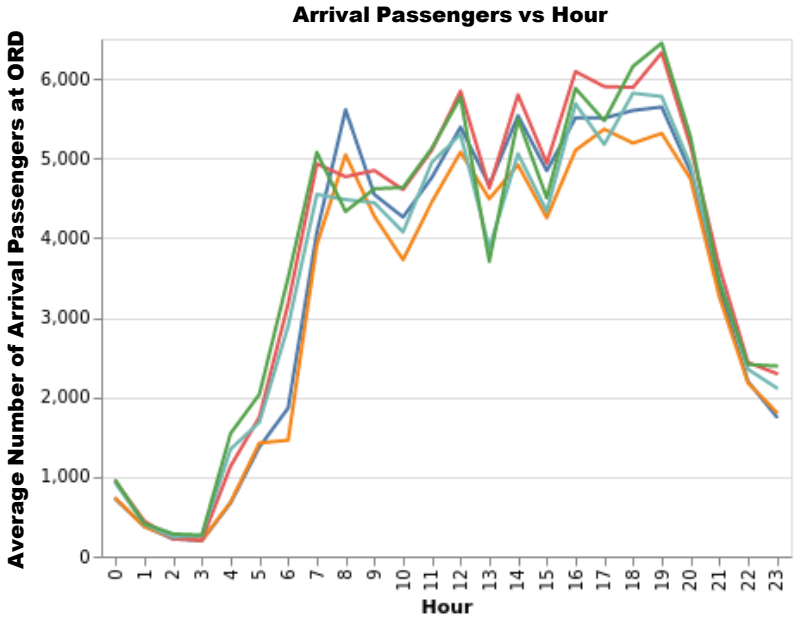
Further Data Analysis after Invitation to Interview

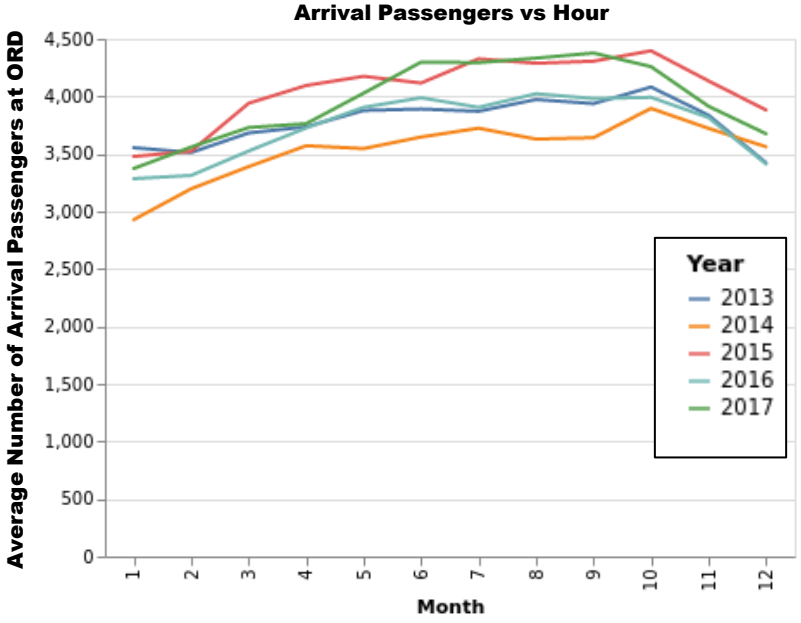
Chicago taxi trip data





ORD flight data

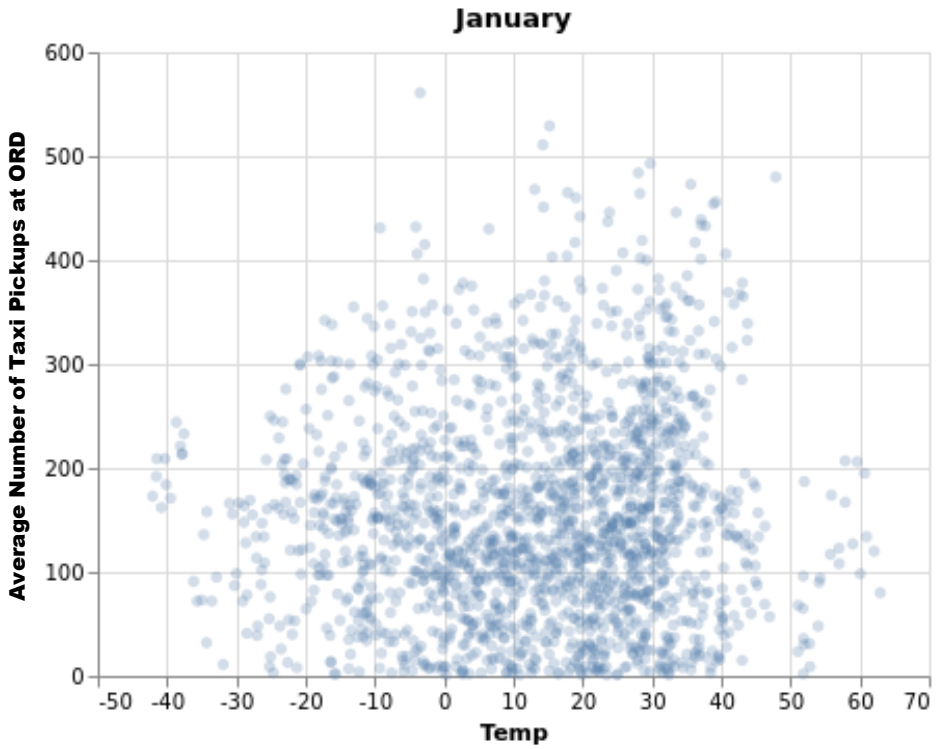


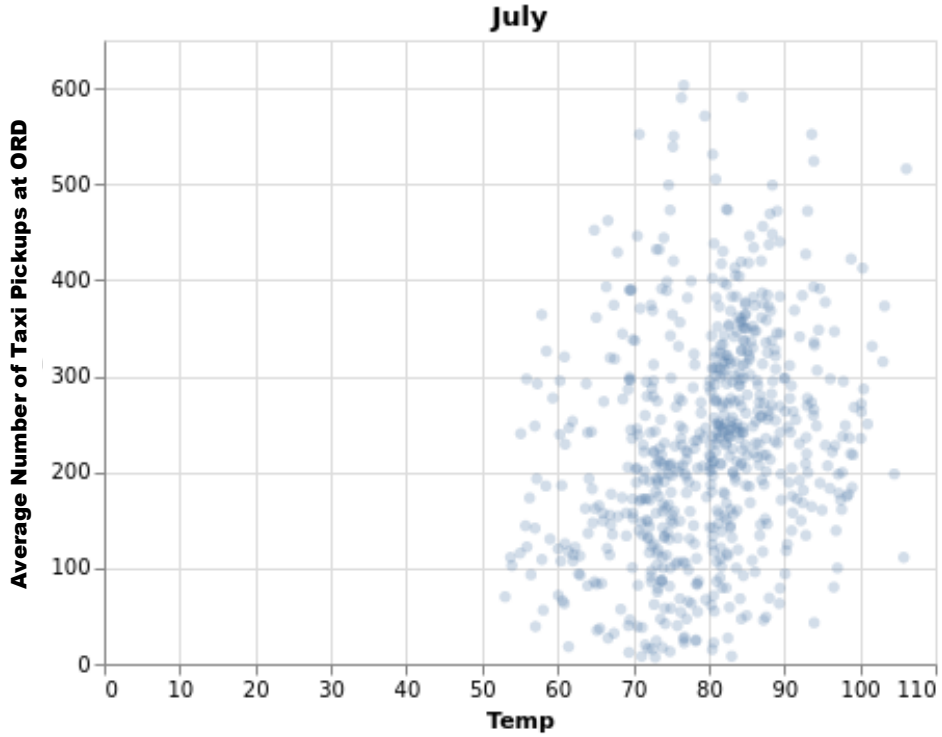


Further Data Analysis after Invitation to Interview

Weather data

Temperature	Precipitation	Clear Cloudy Fog Rain Snow
Wind Speed	Humidity	



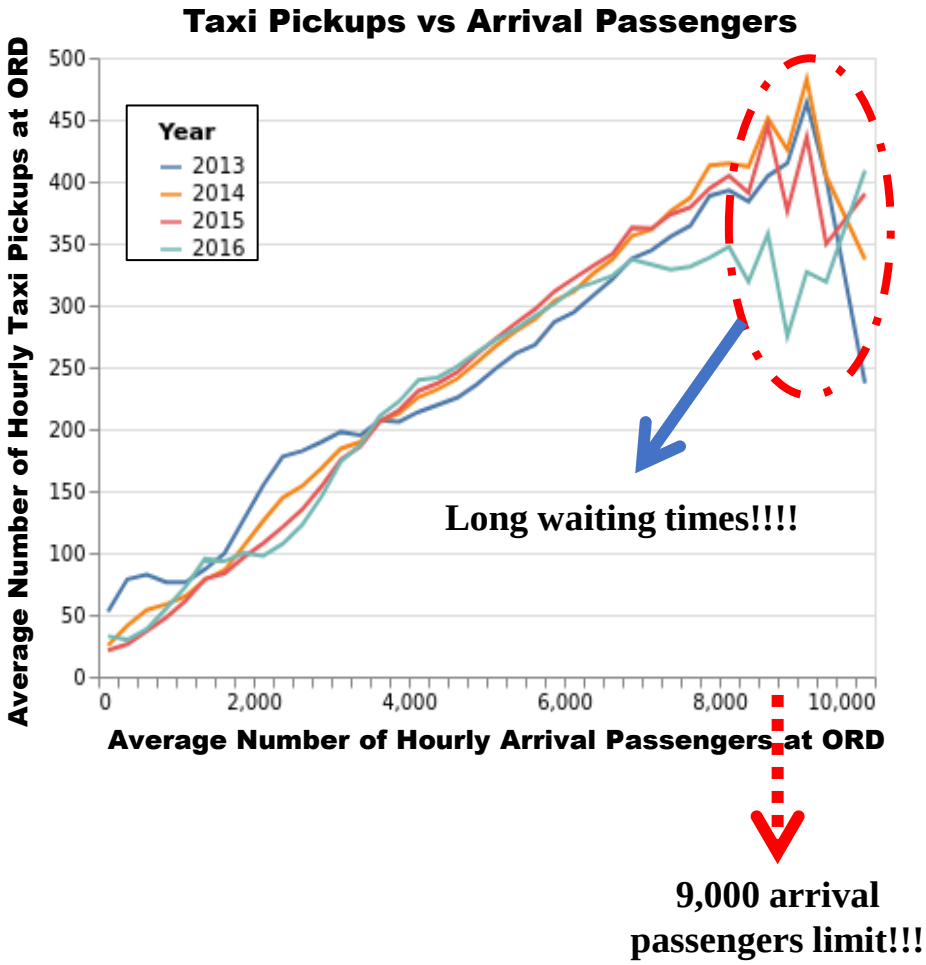


https://mesonet.agron.iastate.edu/ASOS/

Further Data Analysis after Invitation to Interview

➢Using random forest to predict hourly taxi rides (pickups) at O'Hare airport based on features such as: year, month, day of the month, daily hour, temperature, and number of arrival passengers.

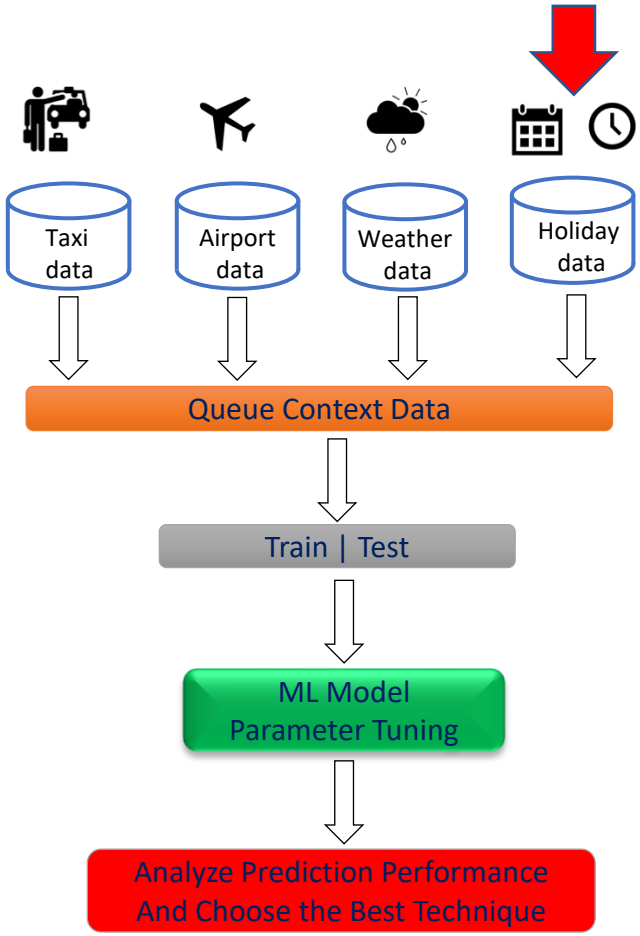
- Number of estimators:100
- Train-test split: 80-20%
- 5 Fold Cross-validation
- RMSE=4
- ***R^2 (Test score): =0.68***



Future Work

- The following ML models will be investigated:
  - Random Forest
  - Linear Regression

- Development of an interactive app for users :



	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
Data wrangling/Analysis								
ML model development								
HTML platform								
Testing/Report								

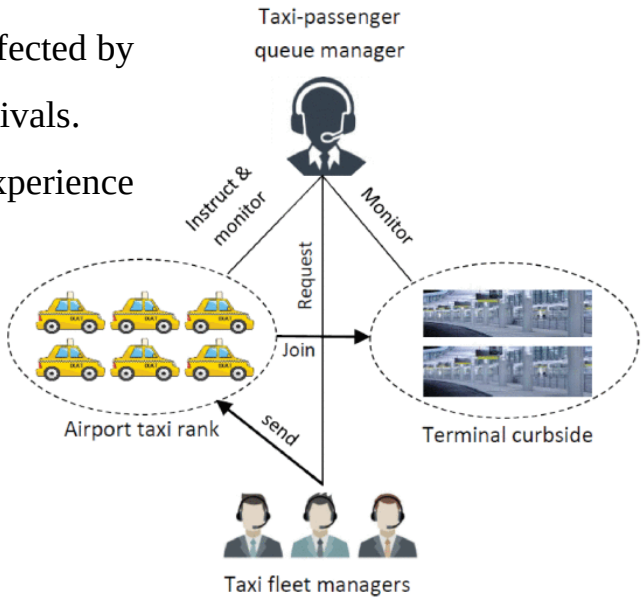
Thank You For Your Attention

Introduction & Problem Statement

➢Taxi queue wait time prediction at airport is a challenging task which is highly affected by many heterogeneous contexts including the dynamic of taxis, weather and flight arrivals.

➢The human error in manual taxi demand estimation causes taxi drivers to experience unexpected wait times at the airport taxi rank, also :

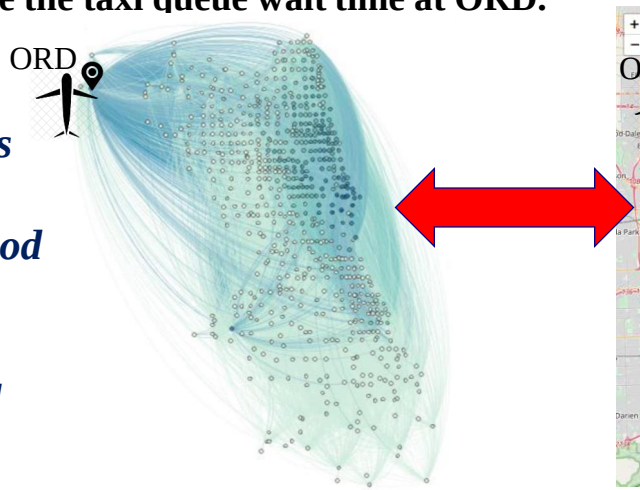
- Long queues of taxis cause traffic congestion.
- Taxi drivers not to make an airport trip.
- Consequently: long queue wait times for the passengers.

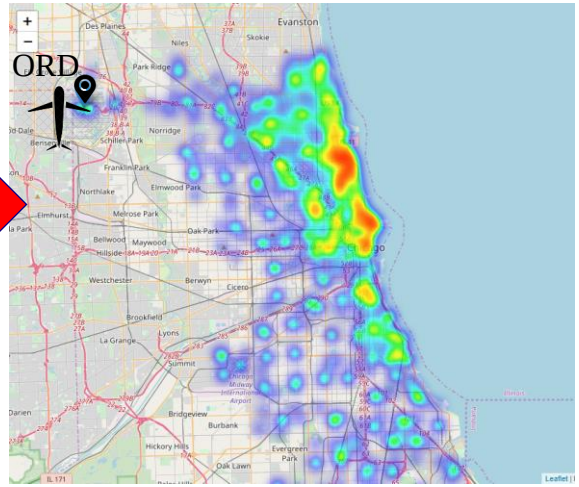


➢ORD is one of the busiest airports in the US, and it is one of the high taxi pickup locations in Chicago. **Therefore, it is essential to develop a model that can estimate the taxi queue wait time at ORD.**

Aims :

- ***The factors that impact the wait times will be detected and analyzed.***
- ***Develop a ML based regression method to predict taxi queue wait time by considering contextual features, e.g. time, weather, flight information and taxi trips.***





1. Rahaman, M.S.,et al., 2018. IEEE, 6,74660-74672.
2. Chen, Y., et al., 2018. Trans Res Rec, 2672(48),.127-138.
3. Wang, L., et al., 2019.. J Trans Eng, Part A: Systems, 145(7), 04019026.

Applications of the Developed Method

- This study provides a queue context prediction model which can be applied to not only airports but also:
- Shopping malls
- Ferry platforms
- Hospital wait times
- Dynamic bus arrival time