

# Wait Time Prediction for Airport Taxis at O'Hare International Airport (ORD)

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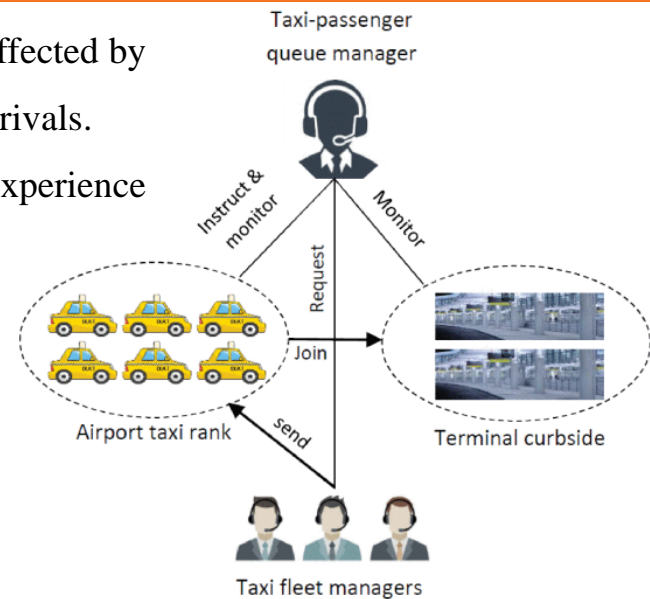
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April 2020

# 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 :

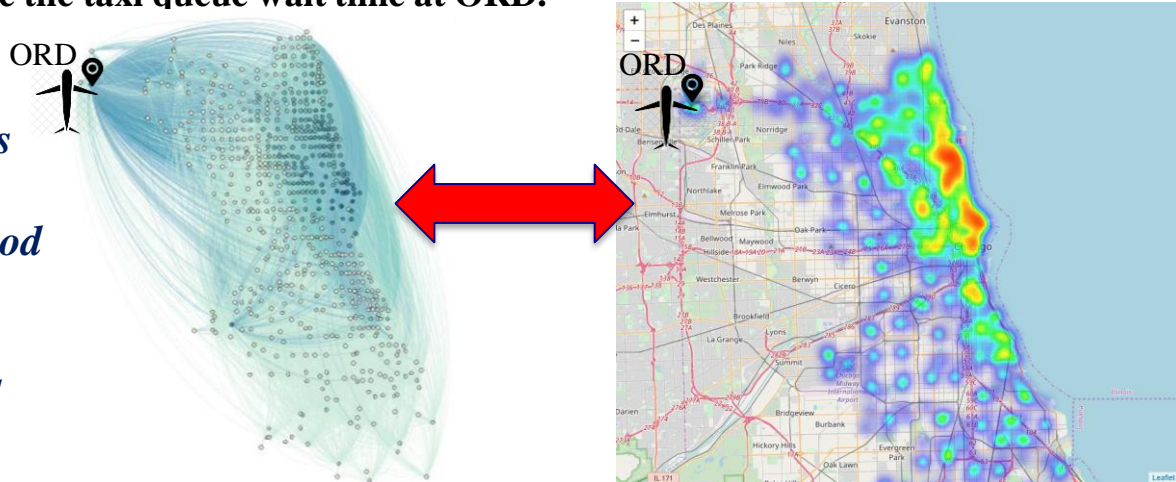
- Long queues of taxis cause traffic congestion.
- Taxi drivers not to make an airport trip.
- Consequently: long queue wait times for the passengers.



- 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.*



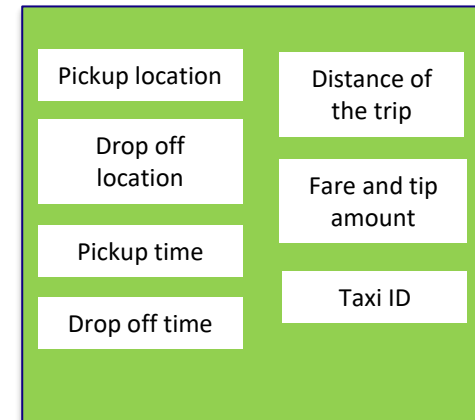
# Dataset Design

➤ To prepare the airport taxi driver queue wait time dataset, we will fuse three real-world datasets: Chicago taxi trip data, the airport data and the weather condition data.

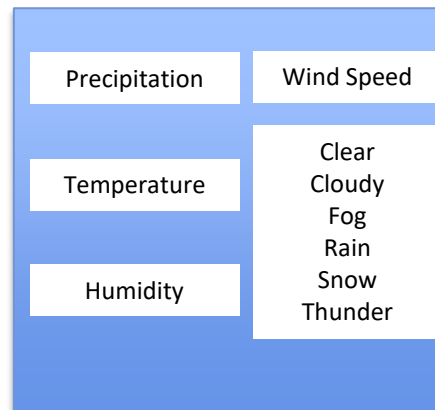
## ORD airport data



## Chicago taxi trip data

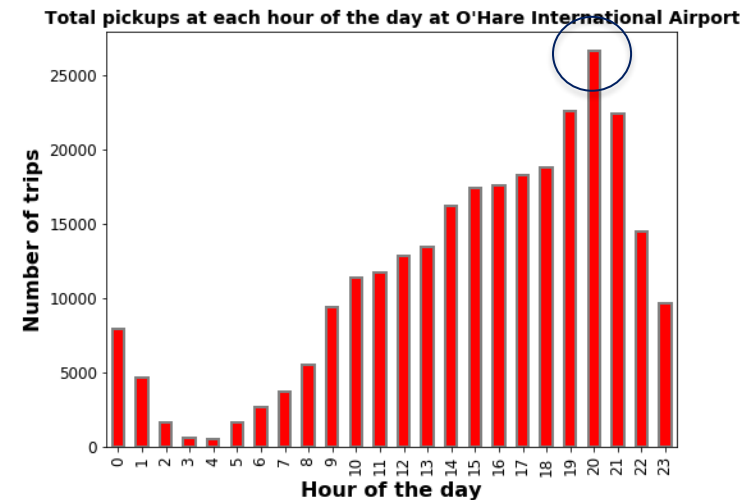
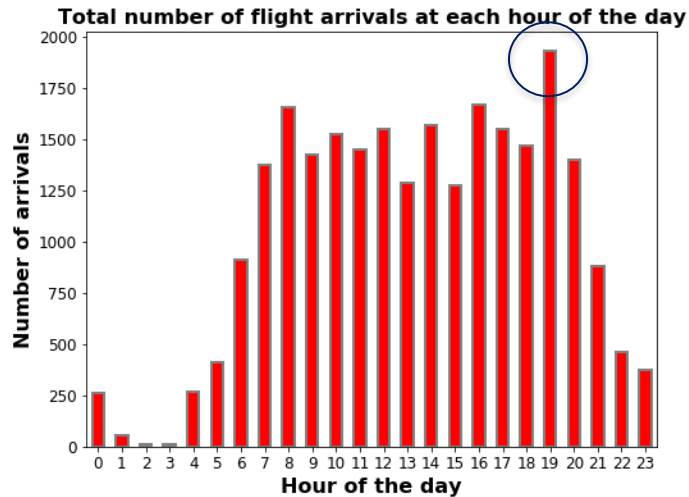


## Weather data



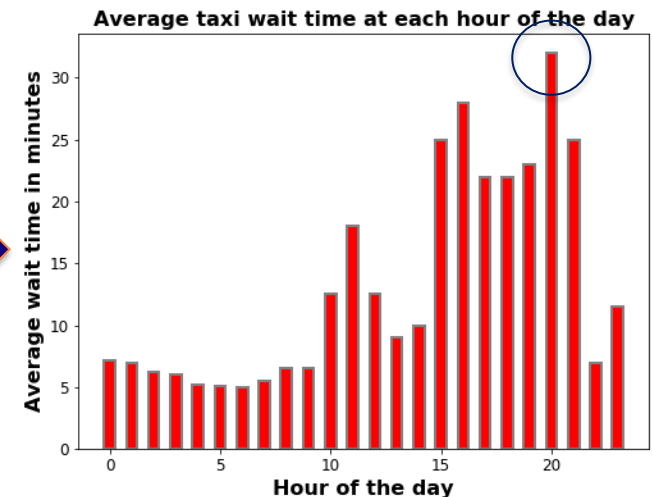
# Preliminary Data Analysis

- The maximum number of taxi pickups and highest queue wait time happen at 8 p.m. which is related to the maximum number of flight arrivals at O'Hare International Airport occurring at 7 p.m.



```

/* ti and tj are the start and end time of the time window
Input: an hourly time window of a day (ti, tj), Ax[]
Output: Hourly average taxi queue wait time τ
Initialize: trip_count=0;
Procedure hourly Average Taxi Queue Wait Times(Ax[],ti, tj)
for each tx ∈ Ax[] do
    if ti < tx.Trip_end_dateTimes() < tj then
        if minLat < tx.Next_Trip_start_lat() < maxLat and
           minLong < tx.Next_Trip_start_long() < maxLong then
            Tarr ← tx.Trip_end_dateTime();
            Tdep ← tx.Next_trip_start_dateTime();
            w ← Tarr - Tdep; // taxi queue wait time
            trip_count++;
        end if
    end if
end for
Return τ ← sum(w)/trip_count;
end procedure
    
```



# Future Work

➤ The following ML models will be investigated:

- XGBoost (XGB)
- k-NN
- Deep Learning

➤ Development of an interactive platform for users :

Wait Time Prediction for O'Hare International Airport Taxis

**Weather Data**

Temperature (°F)

Precipitation (%)

Wind Speed (%)

**Flight Data**

Delay of Flights (in minutes)

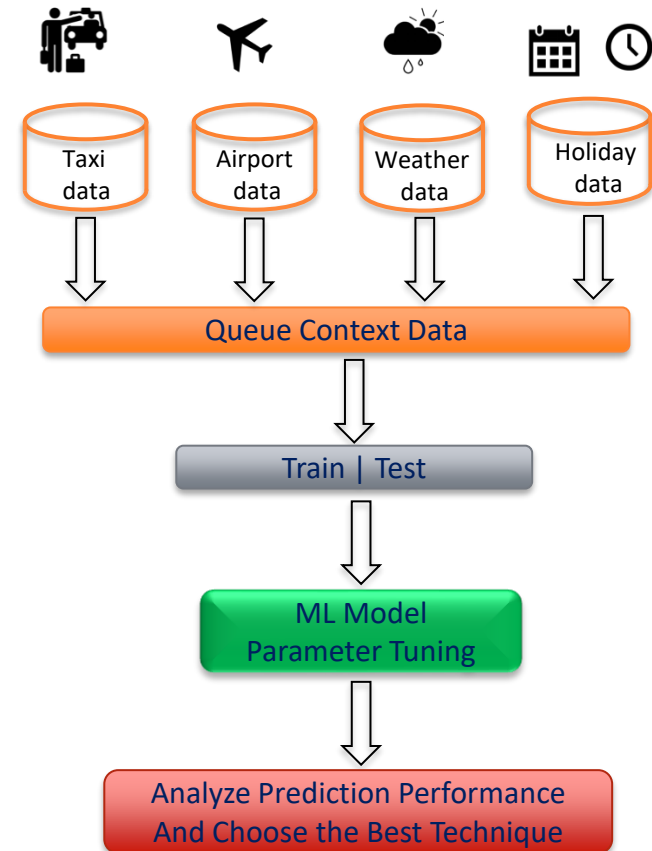
Arrival Time (enter single digit number)

Passengers Wait Time (enter single digit number)

**Time**

Hour of the day

Date (mm/dd/yyyy)



	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								

# 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

Thank You For Your Attention