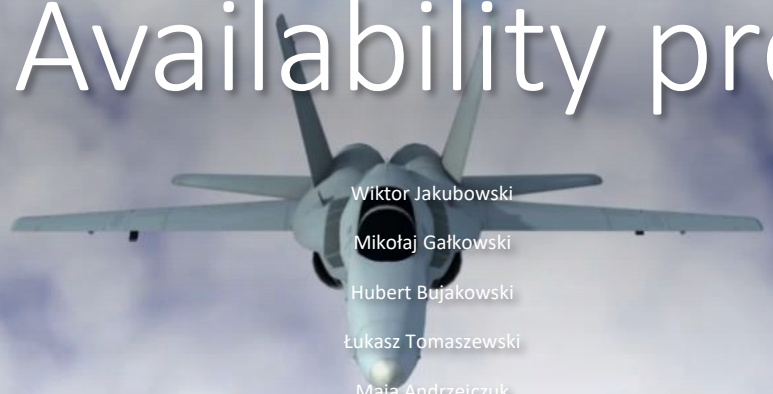
Route Availability prediction



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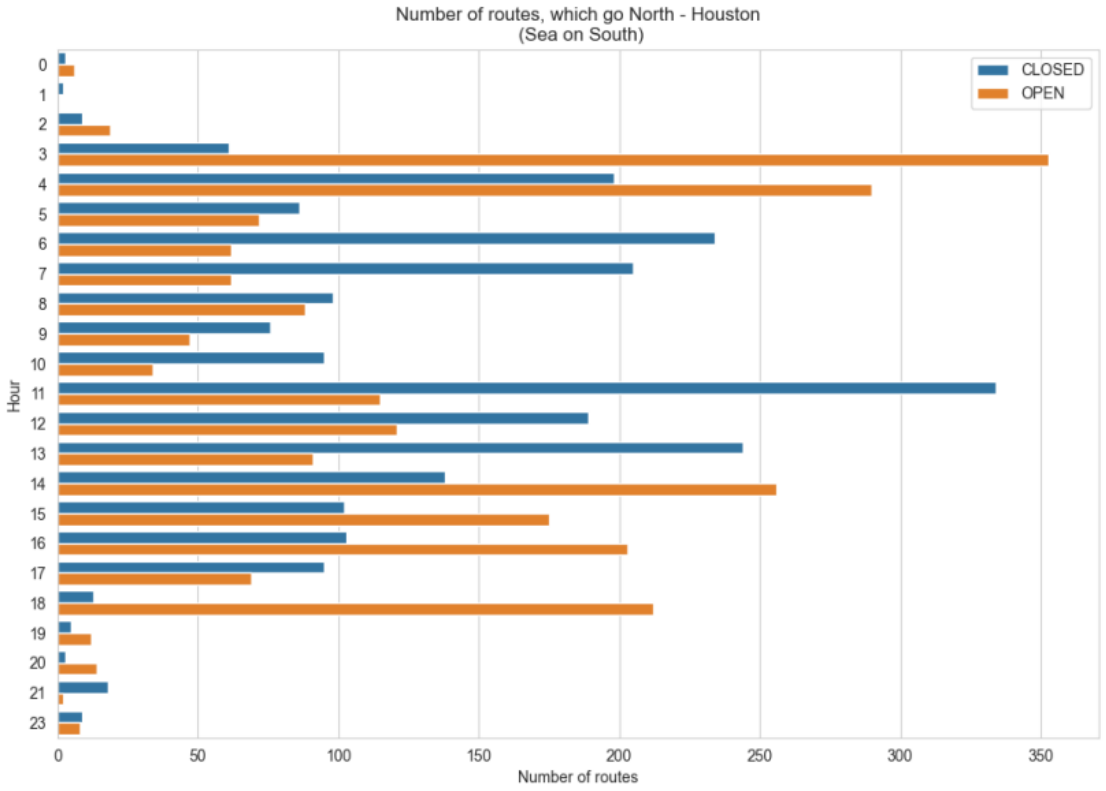
Concept

- Task: route availability prediction
- Data: historical data about meteorological conditions and flight details
- Solution:
  - train **advanced machine learning** model predicting possibility of arrival & departures within given airports
  - create **web application** to visualize routing, possible connections for future flights.
  - presented application can be used by airlines on daily and by consumers for flight information.


Number of routes, which go North - Houston
(Sea on South)
CLOSED
OPEN
Hour
0
1
2
3
4
5
6
7
8
9
10
11
12
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16
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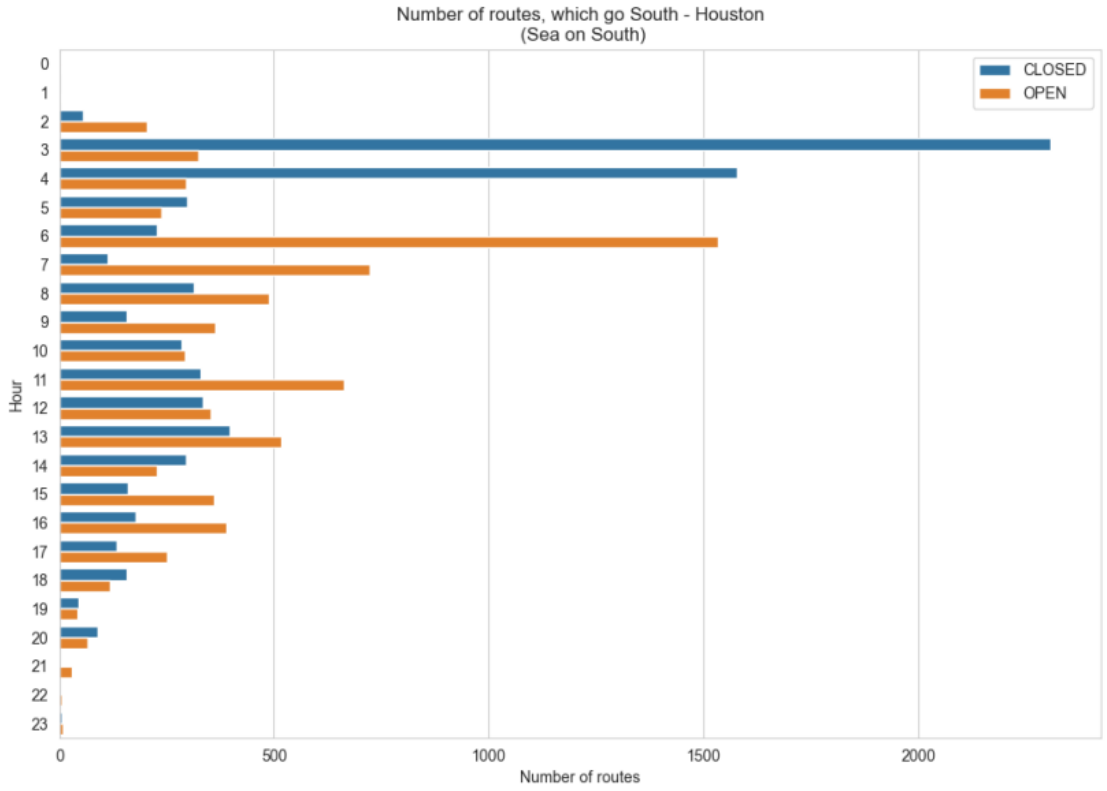
23
0
50
100
150
200
250
300
350
Number of routes


Number of routes, which go South - Houston
(Sea on South)
CLOSED
OPEN
Hour
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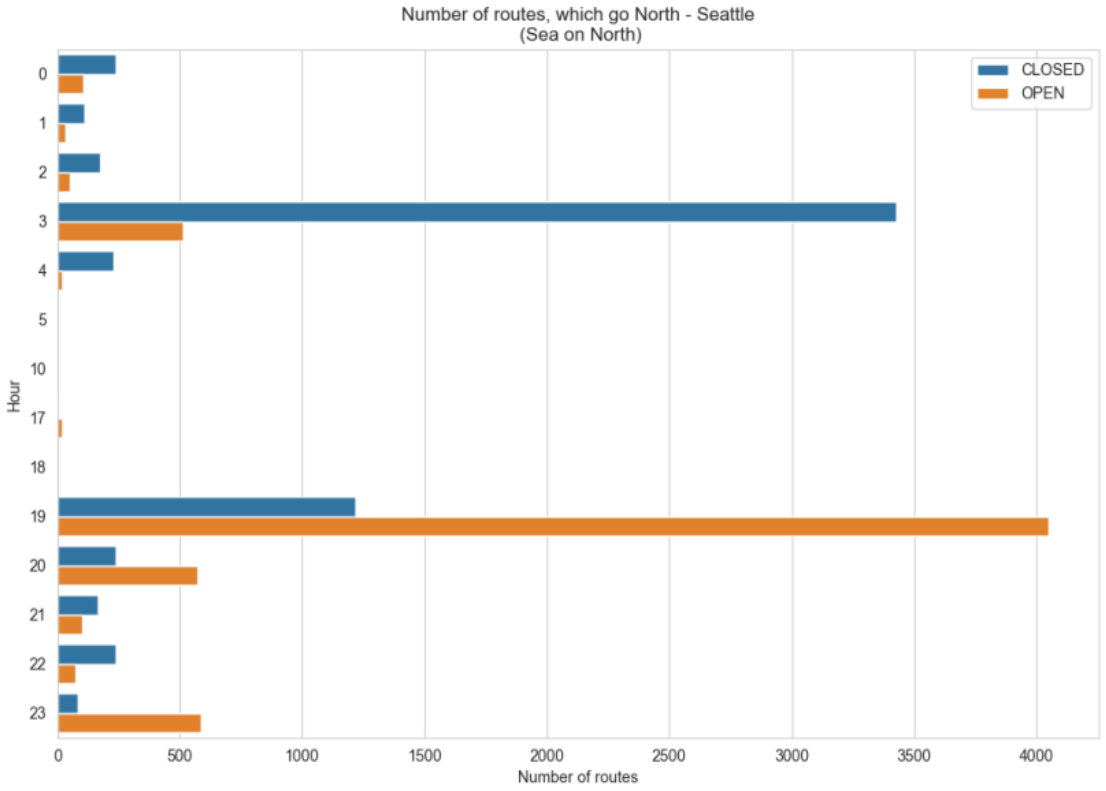
21
22
23
0
500
1000
1500
2000
Number of routes


Number of routes, which go North - Seattle
(Sea on North)
CLOSED
OPEN
Hour
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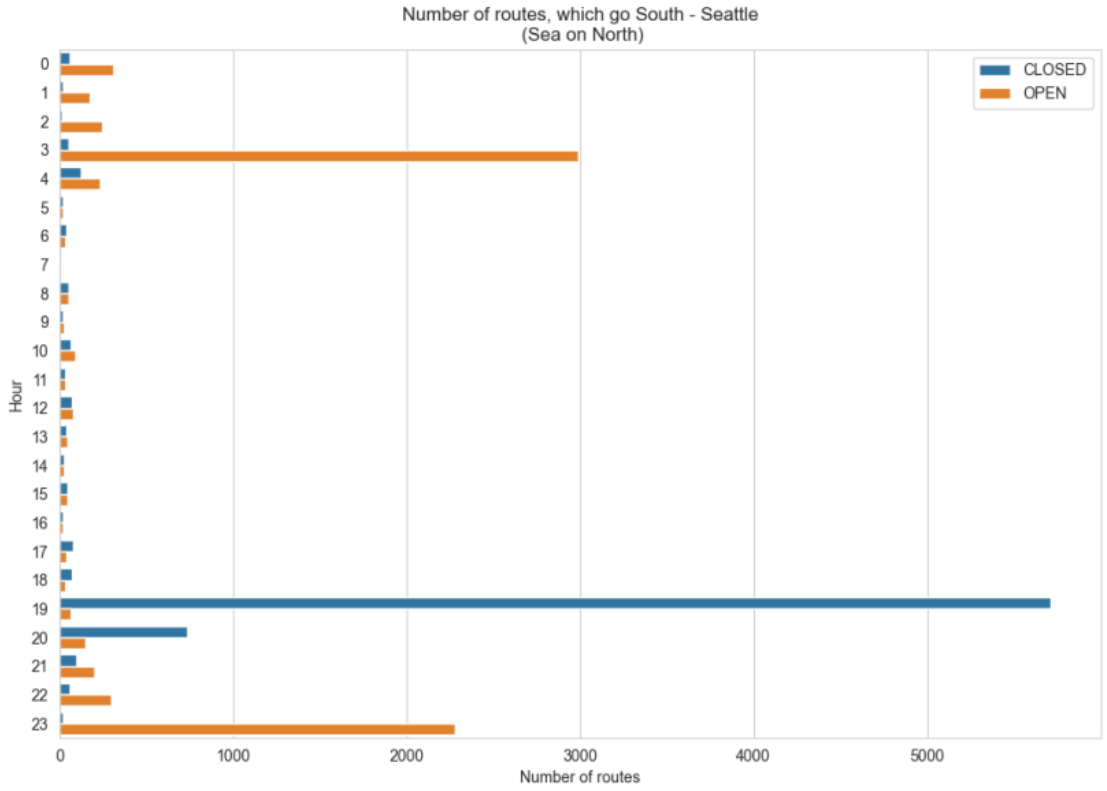
2500
3000
3500
4000
Number of routes


Number of routes, which go South - Seattle
(Sea on North)
CLOSED
OPEN
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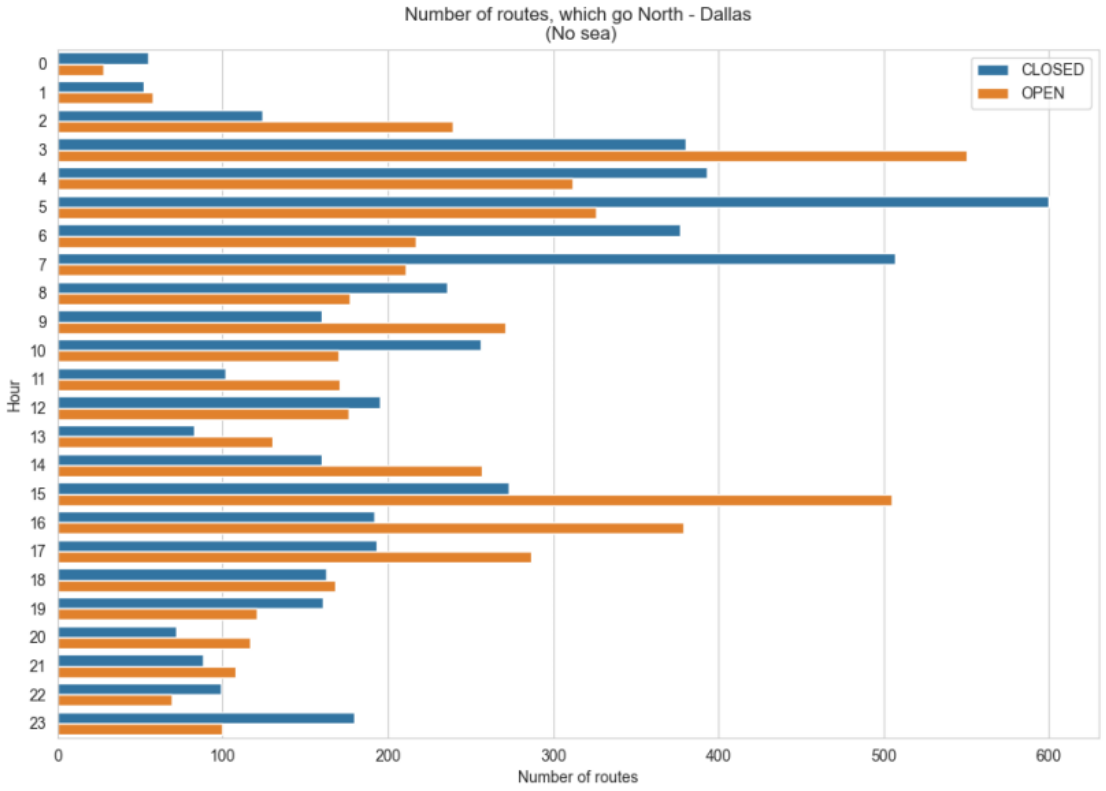
0
1000
2000
3000
4000
5000
Number of routes


Number of routes, which go North - Dallas
(No sea)
CLOSED
OPEN
Hour
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100
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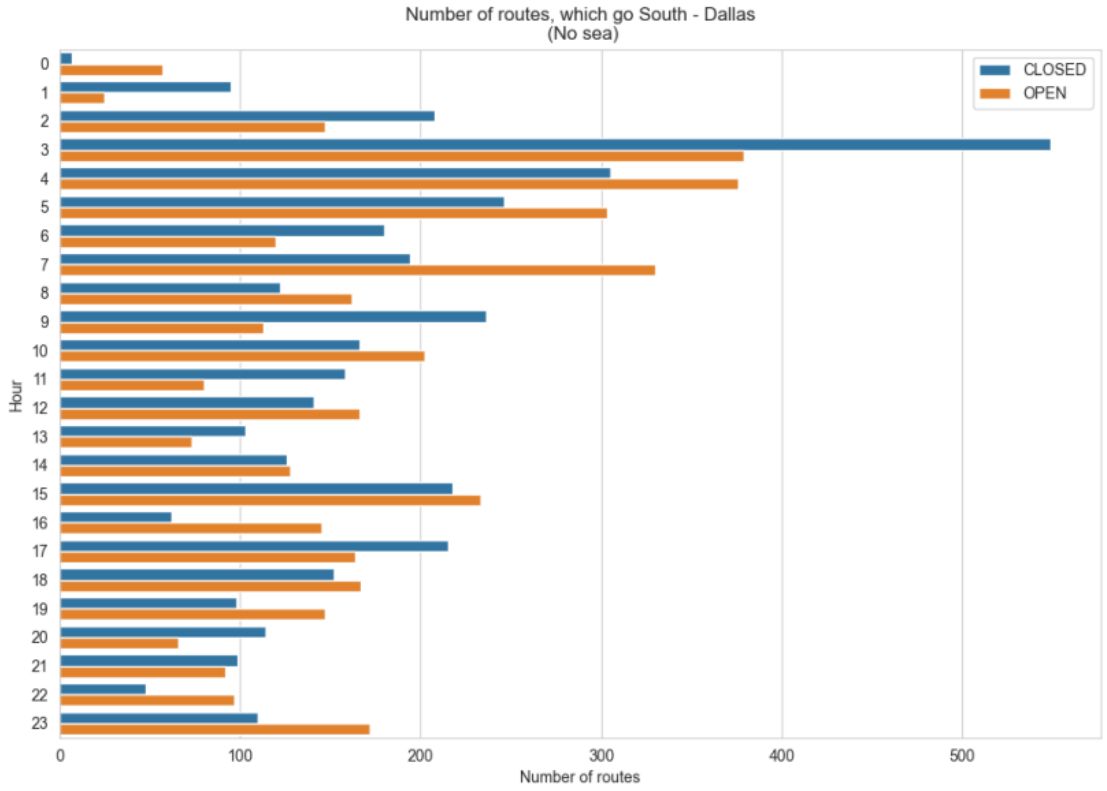
500
600
Number of routes


Number of routes, which go South - Dallas
(No sea)
CLOSED
OPEN
Hour
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200
300
400
500
Number of routes

Preprocessing

- Flights details data:
  - Encoding categorial features (flight status, airport, route type)
  - Dropping unimportant features

- Weather data:
  - Map coordinates to matrix indices
  - Extrapolation of waypoints vector
  - Vincinity analysis of weather in waypoints

Feature engineering

Waypoint informations:

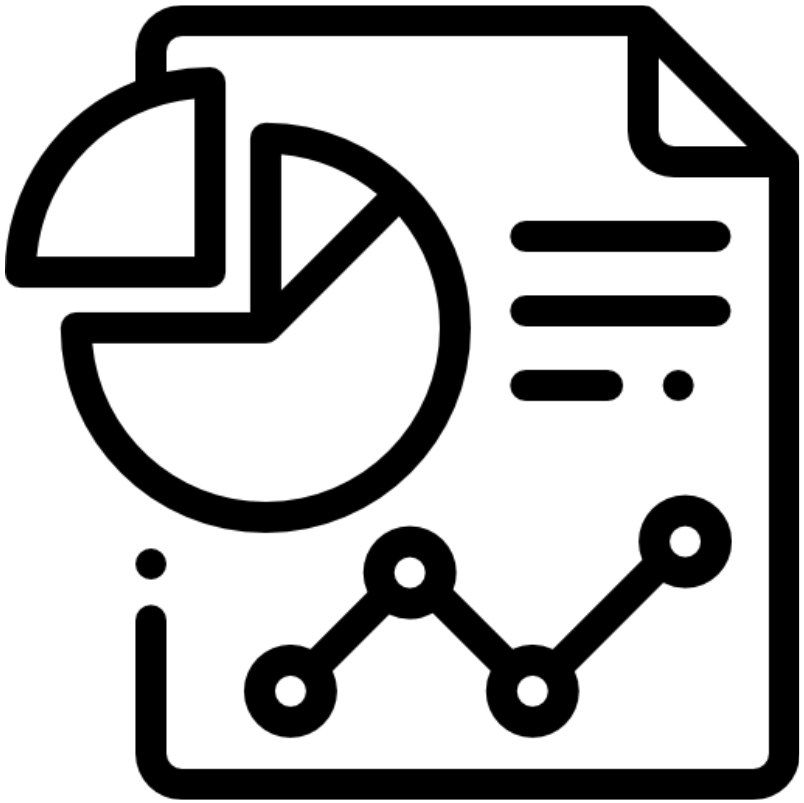
- Flight direction (north/west)
- Distance in kilometers from arrival to destination
- Coverage of waypoints coordinates with current weather conditions along the flight route

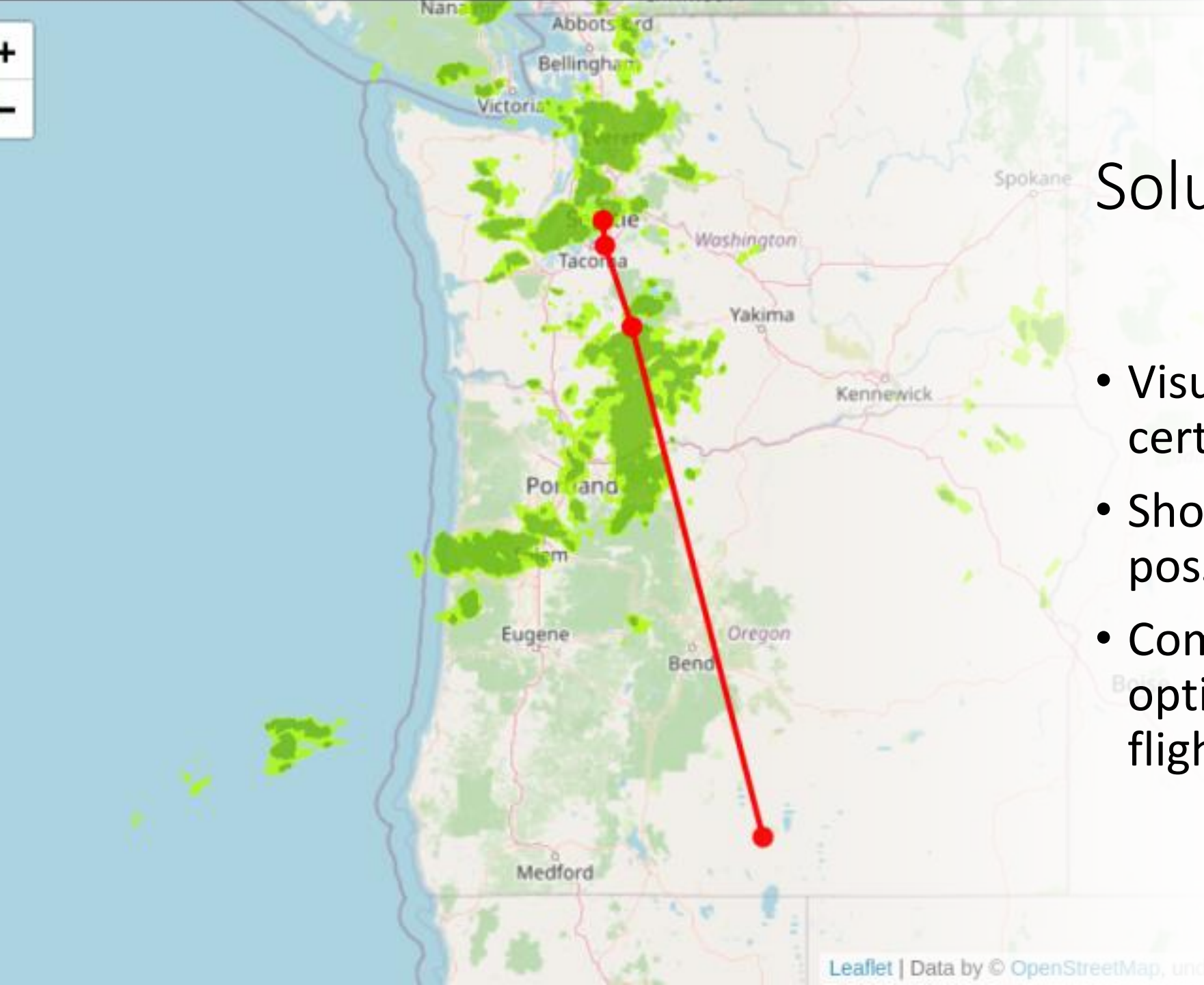
Flights details data:

- extracting the day of the week from the date

Results

- Used algorithm – LightGBM
- Optimized parameters included learning rate, number of estimators etc.
- Final model f1 score was 0.73 on independent dataset
- Model used in application in order to predict value of a customer's desired flight





Solution

- Visualizing the trace of certain flight
- Show if given route is possible
- Compare departure options depending on flight time and day