Predicting Flight Delays in Commercial Aviation

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1 Introduction

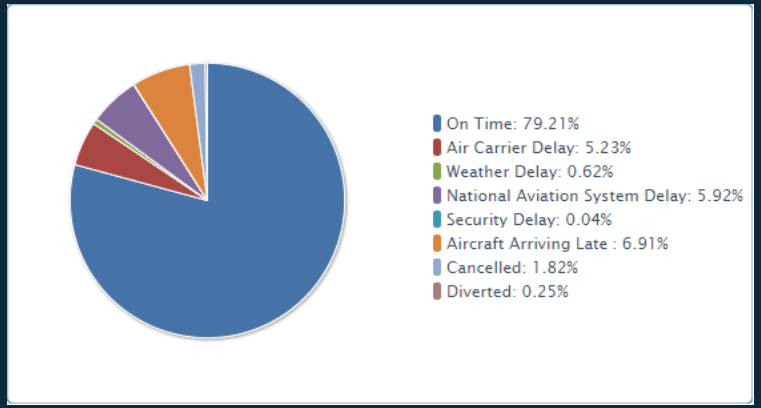
- Economic context
- Causes of Delays
- Roadmap

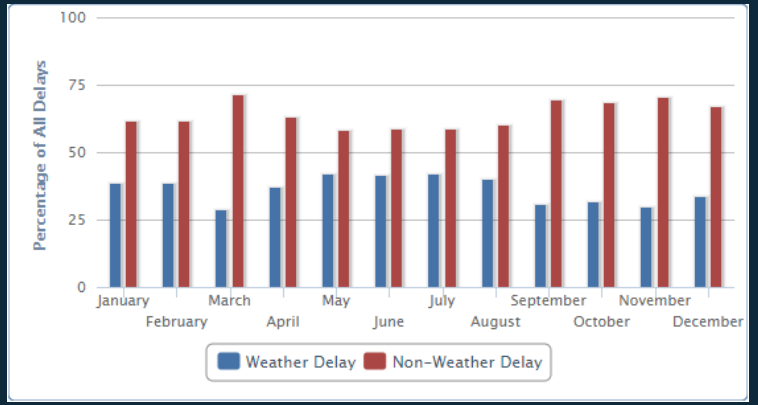
Economic context

	Total cost of delays	Air carriers share
2016	$23.7 billion	$5.6 billion
2019	$33.0 billion	$8.3 billion

A flight is considered to be delayed when it is 15 minutes behind its schedule time – *Federal Aviation Administration (FAA)*

Causes of Delays





- On-time → 80%
- Delayed → 20%

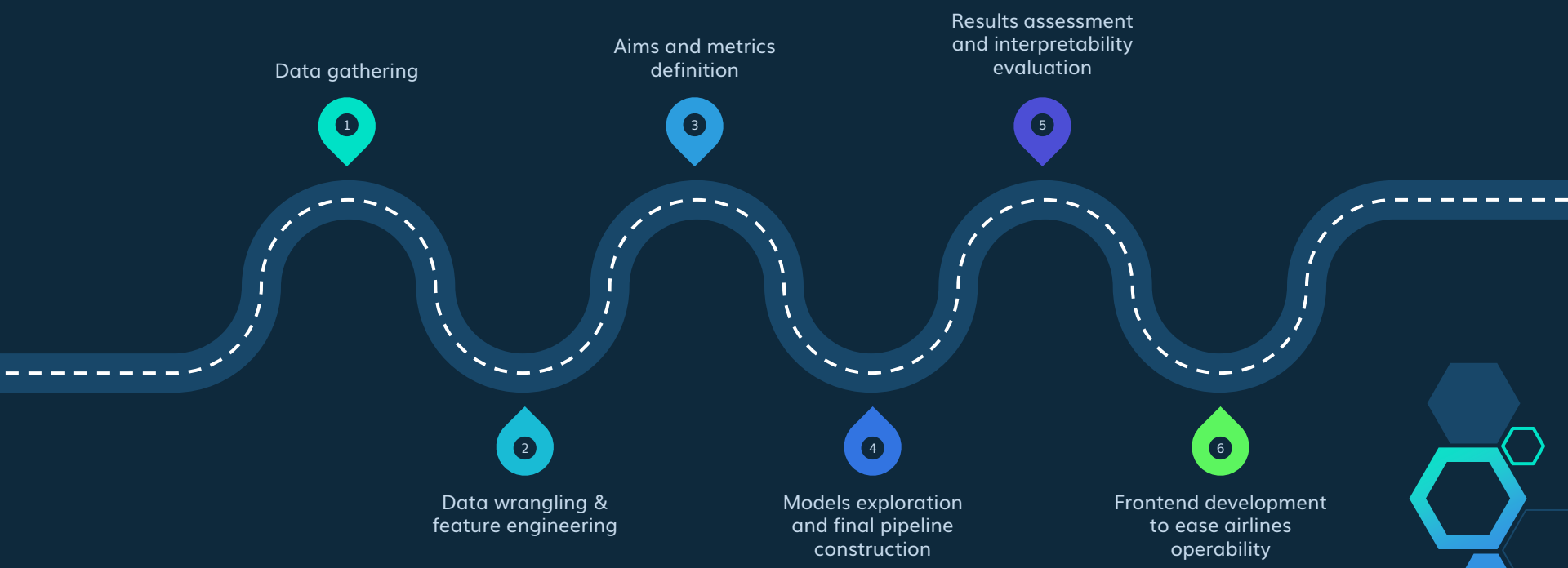
Weather's share of delay:

38.7%

(of total delay-minutes in 2019)

Source: *On-Time Performance (OTP) [2019], US Bureau of Transportation Statistics*

Roadmap


Data gathering
1
Data wrangling & feature engineering
2
Aims and metrics definition
3
Models exploration and final pipeline construction
4
Results assessment and interpretability evaluation
5
Frontend development to ease airlines operability
6

2

Model and results

- Aims
- Models exploration
- Model pipeline
- Results
- Interpretability

Aims

PREDICTABILITY

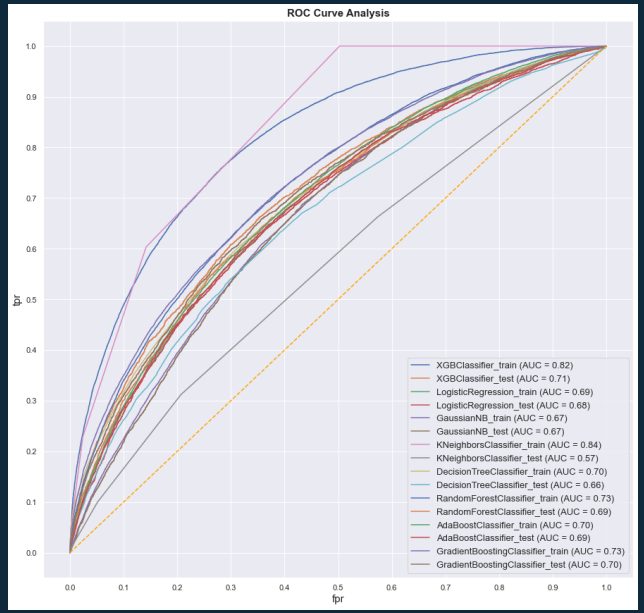
Help airlines predict potential delays in advance so as to minimize costs incurred from unpunctuality

INTERPRETABILITY

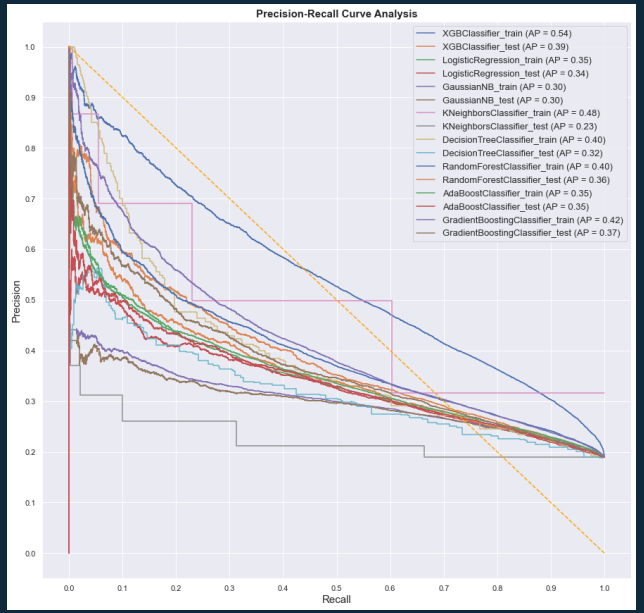
Provide carriers with causality suggestions to better understand the reason behind these delays

Models exploration

ROC curve

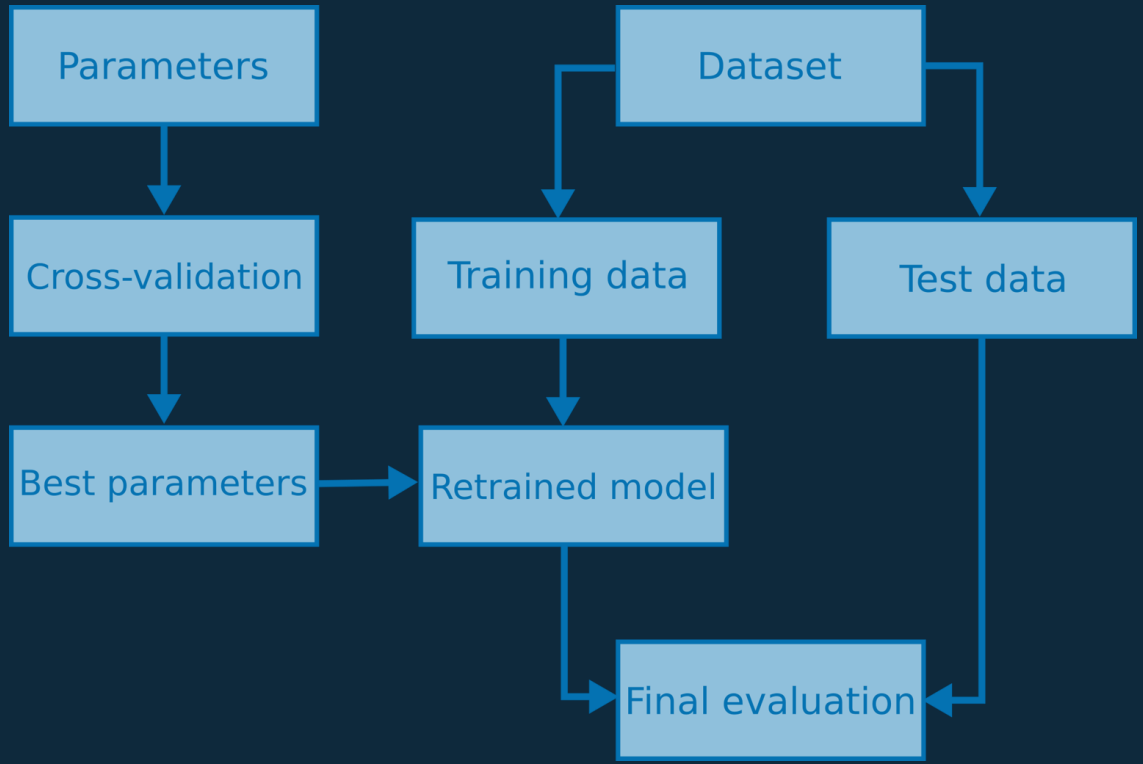


Precision-Recall curve



XGBoost is the winner in terms of results and computation times

Model pipeline



Results

Recall was used as the optimization score

↳ Minimize delayed flights mistakenly predicted as on-time

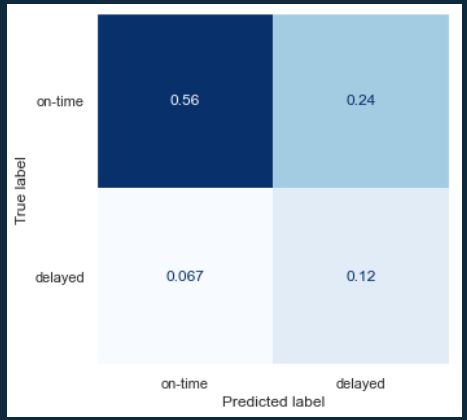
12.3 out of 19%

of delayed flights correctly captured by the model

	precision	recall	f1-score
On-time	0.89	0.70	0.78
Delayed	0.34	0.65	0.44

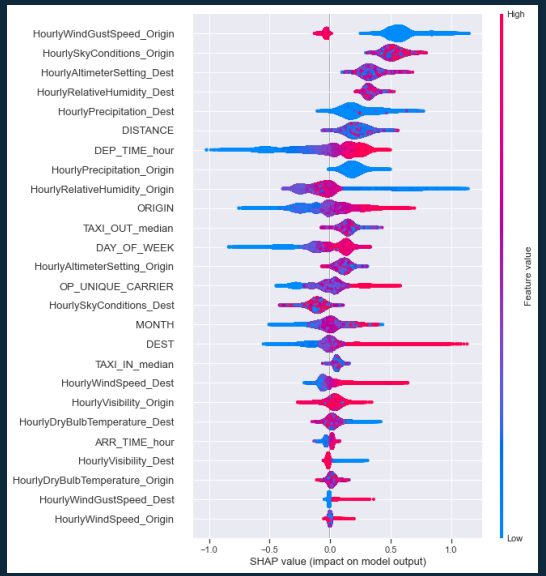
Considering that only 38.7% of total delay minutes in 2019 were related to weather conditions

↳ That still leaves a lot of room for improvement if airline private data was available

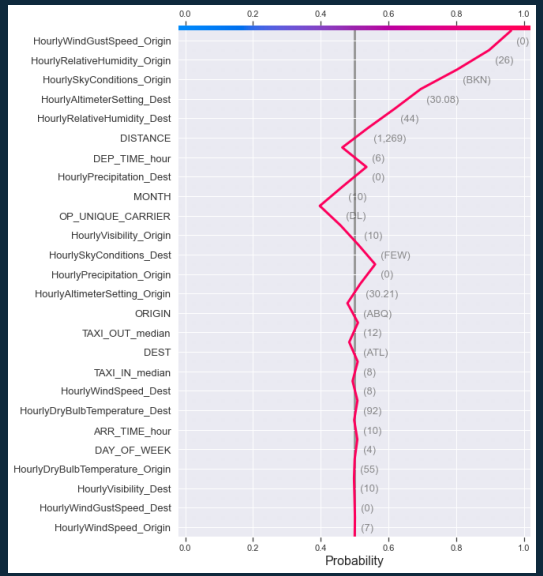


Interpretability

GLOBAL



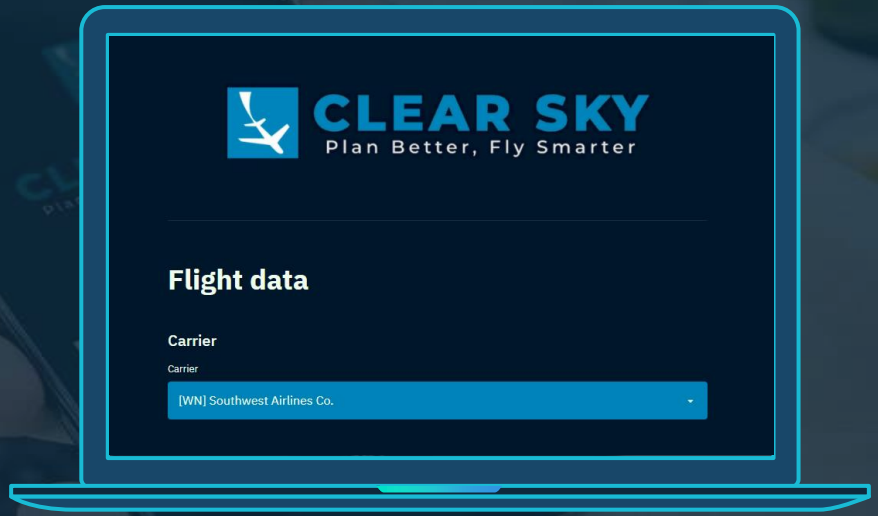
LOCAL



Frontend

Web-based app

- ease airlines workload concerning flight planning operations
  - flight punctuality prediction
  - causality suggestions



Transform the insights into actionable data-driven decisions for your business

Any questions?

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For more information about this project, visit the repo:

https://github.com/malonsol/TFM_KSchool


CLEAR SKY
Plan Better, Fly Smarter