Flight Arrival Delay Prediction using Machine Learning

Ben Jackany
Data Scientist

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AGENDA

- Introduction and problem statement
- Choice of 2019 data over 2020 for ML Models
- Data Gathering and Preprocessing
- Exploratory Data Analysis
- Machine Learning Models
- Model Evaluation and Selection
- Conclusion and Recommendations

Introduction and problem statement

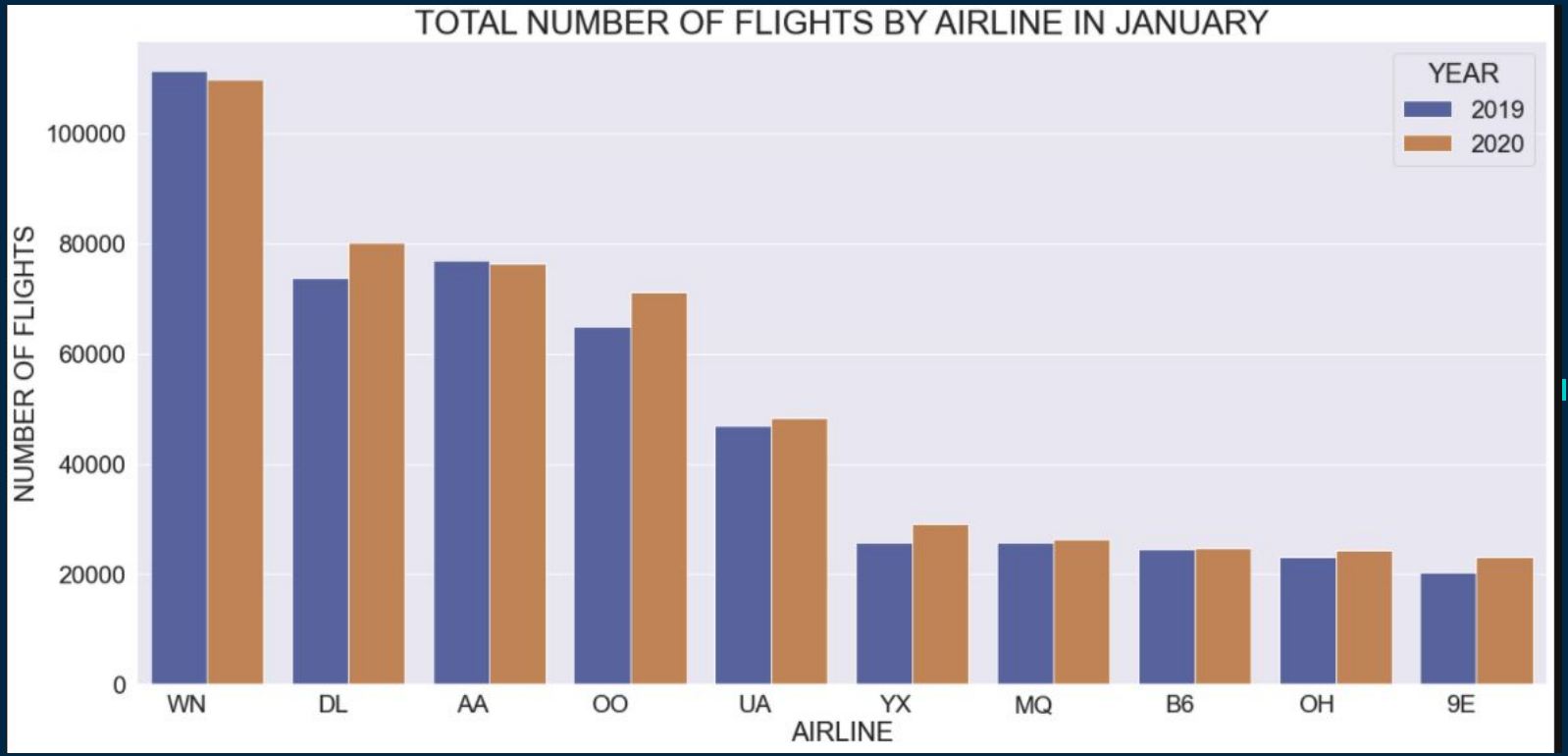
Flight Delays

One in Five flights arrive late at destination

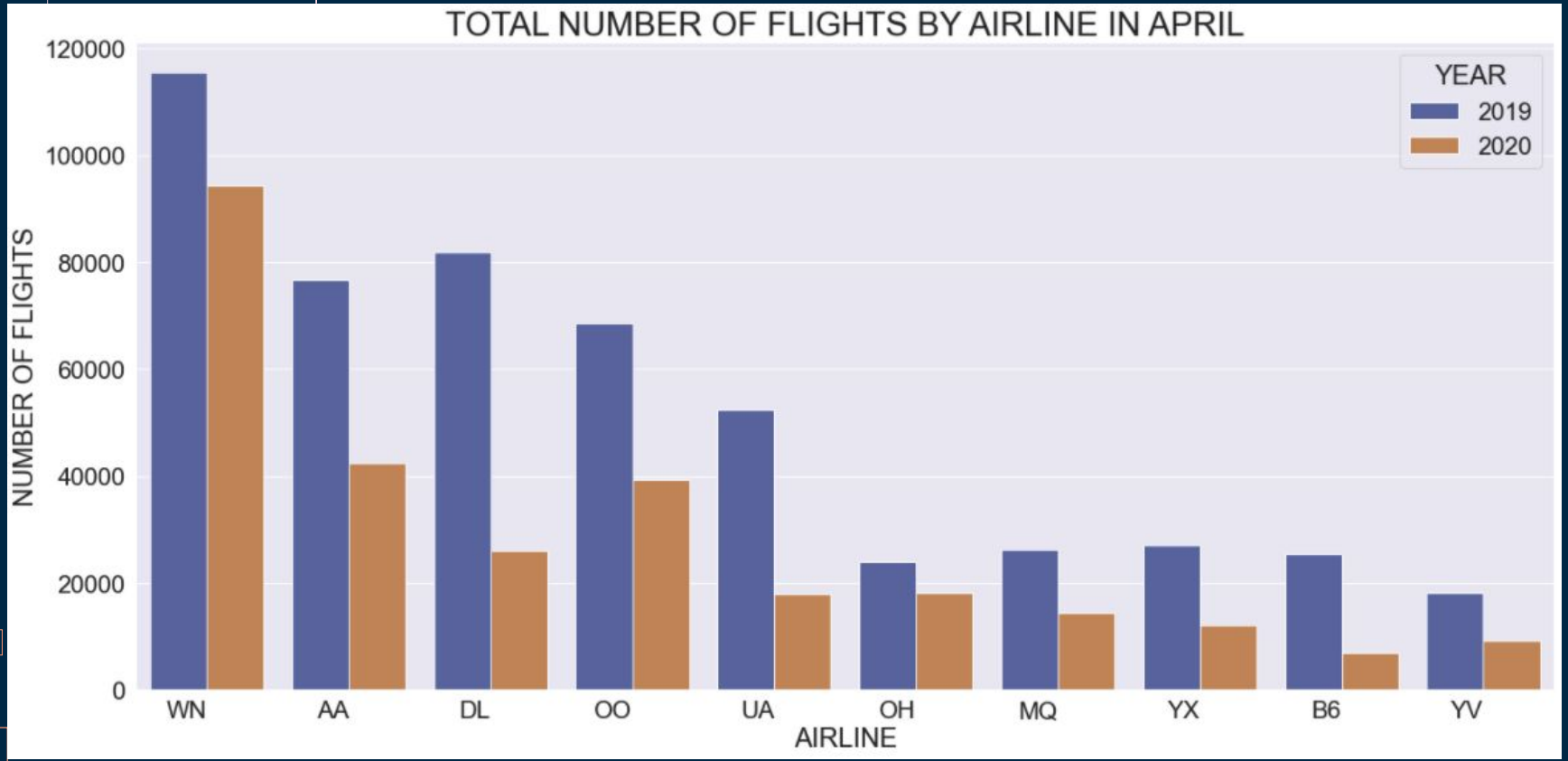
Inconvenience to airlines and passengers

Design a model that predict arrival delay for Delta Airlines

Choice of 2019 Data for ML models



Choice of 2019 Data for ML models



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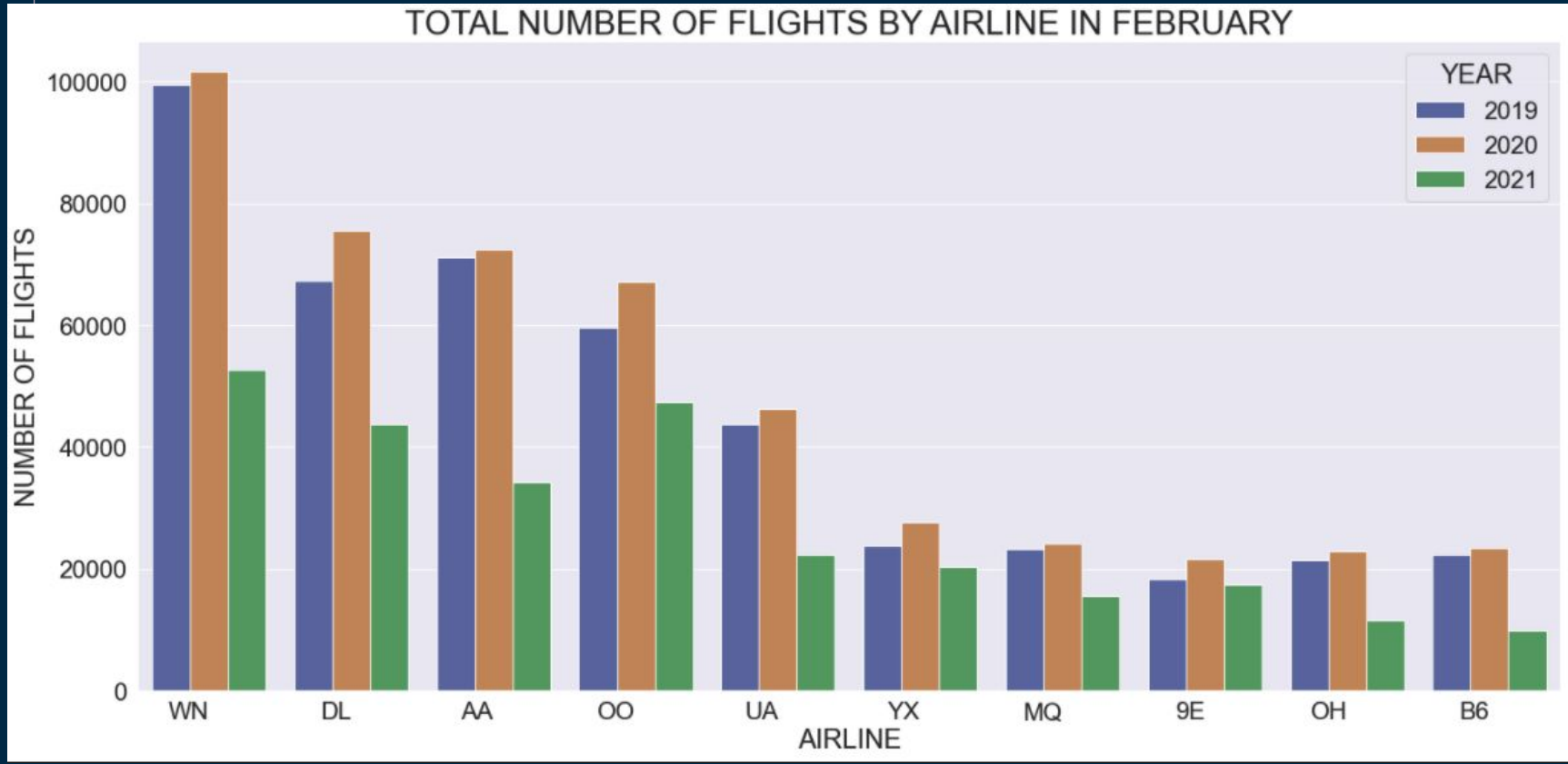

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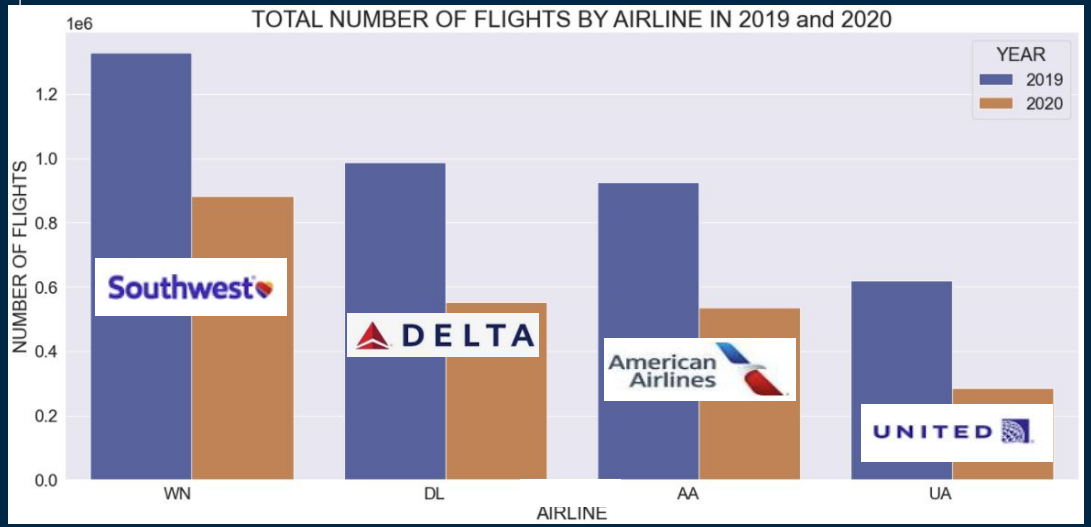
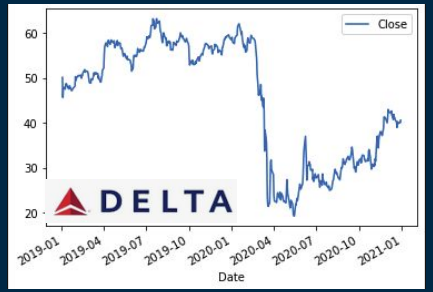
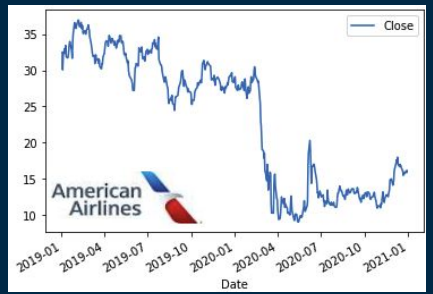






Data Gathering and Preprocessing

Data Source:

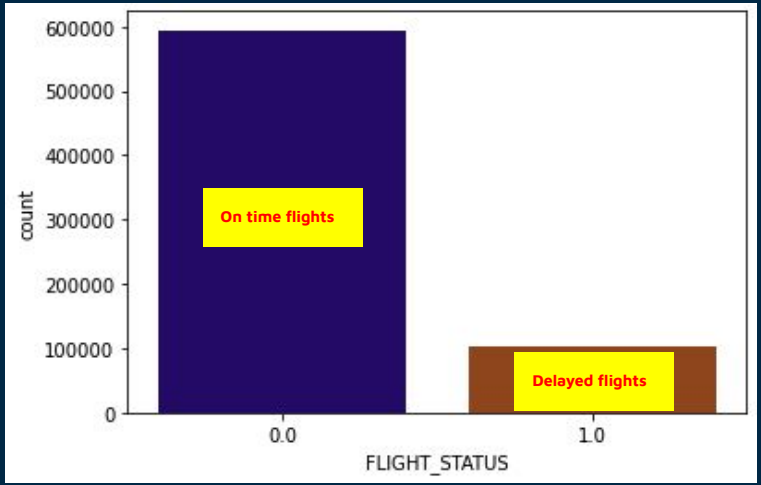
2019-2020 and 2021 Data

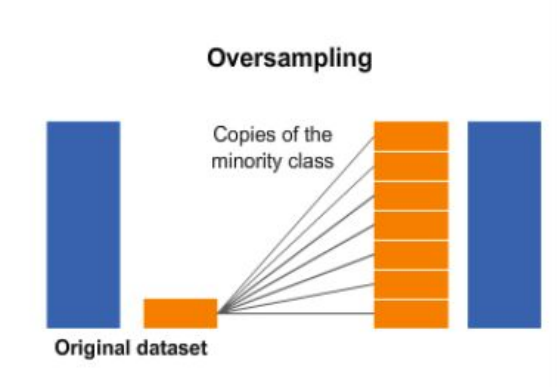
Bureau of Transportation Statistics

- 26 consecutive months of Data collected
- Over 12 million rows
- 17 Airlines
- 346 flight destinations
- 43 features

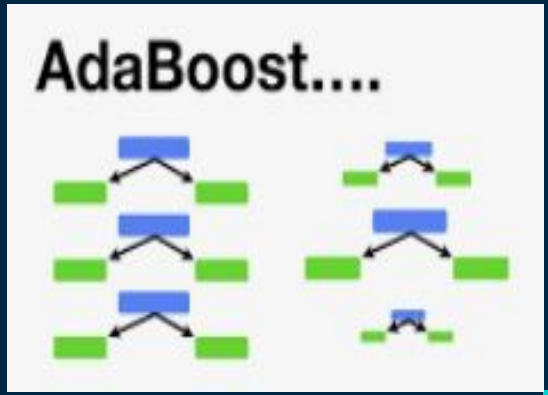
Exploratory Data Analysis

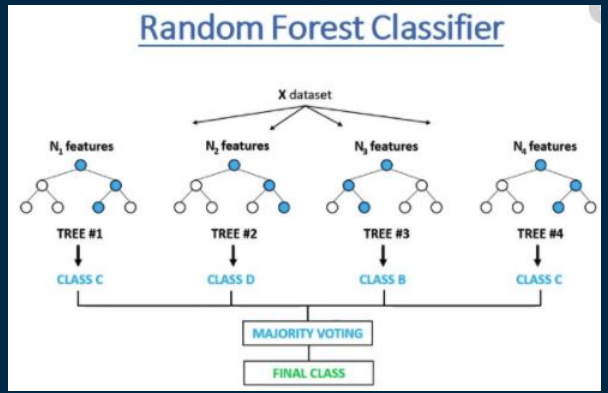
Data Distribution

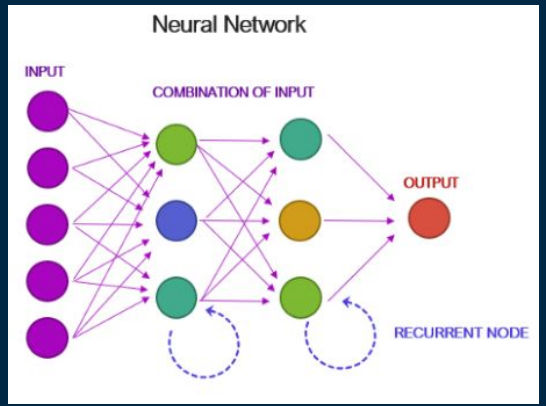




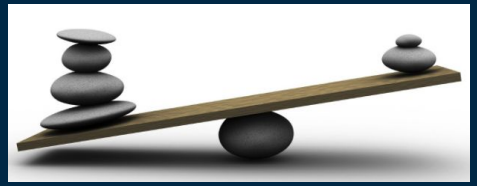
Machine Learning Models Used







Models Evaluation and Selection



Baseline F1-Score = 0.67

Machine Learning Algorithm	Balanced Dataset		
	F1-Score	Precision	Recall
1. Logistic Regression	0.63	0.64	0.62
2. Decision Trees	0.61	0.53	0.72
3. AdaBoost	0.61	0.53	0.72
4. Random Forest	**0.71**	0.67	0.76
5. Neural Networks	**0.71**	0.70	0.72

Conclusions and way forward

Complex and hard-to-predict business

Models performance improvement

Focus on one city destination

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THANK YOU!