What's My Flight Status?

Using Flight Data to Predict Flight Delays

By: Andre Layton

Overview:

Objectives:

- ➔ Using machine learning and deep learning algorithms to build a model that will predict flight delays.
- ➔ A flight delay = departing/arriving 15 minutes past the scheduled time. I will focus on **departure delays**.

Process:

- ➔ Employ sampling techniques and advanced classification algorithms to enhance precision.

Results:

- ➔ The deep learning model serves as my best algorithm for predicting flight delays, yielding 57.6% precision.

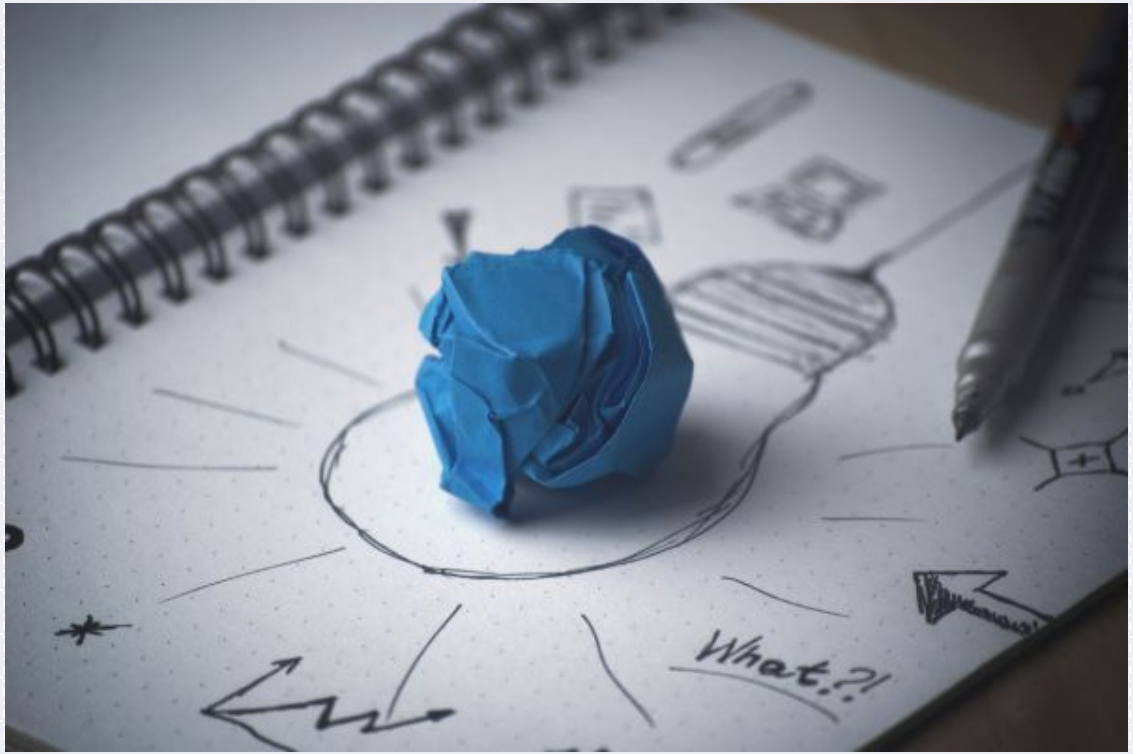
Outline:

01 Business Problem

02 Data & Methods

03 Modeling

04 Conclusions

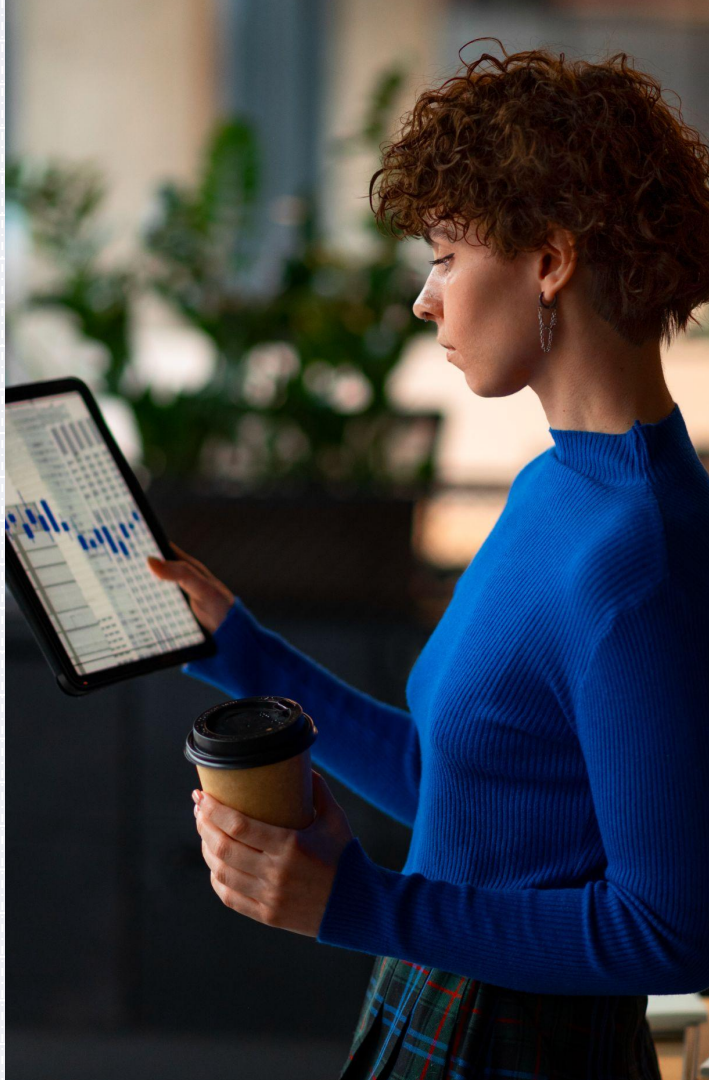


Business Problem:

United Airlines is looking to regain consumer confidence by addressing their flight delays.

- ➔ United Airlines loses approximately $102/minute when facing delays. (Schonland, 2023)

- ➔ Use both machine learning and deep learning to predict delays with highest precision.

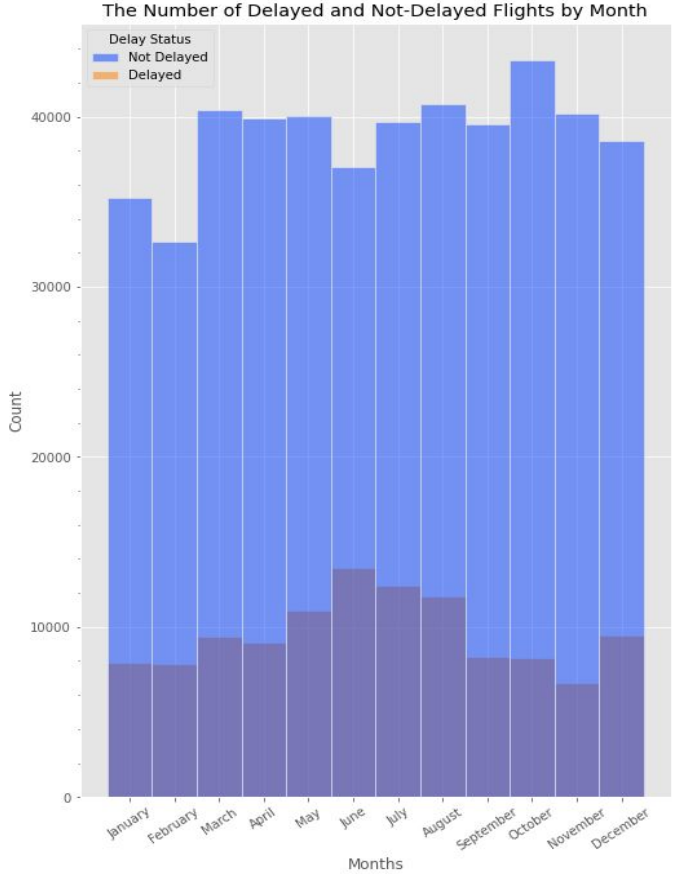


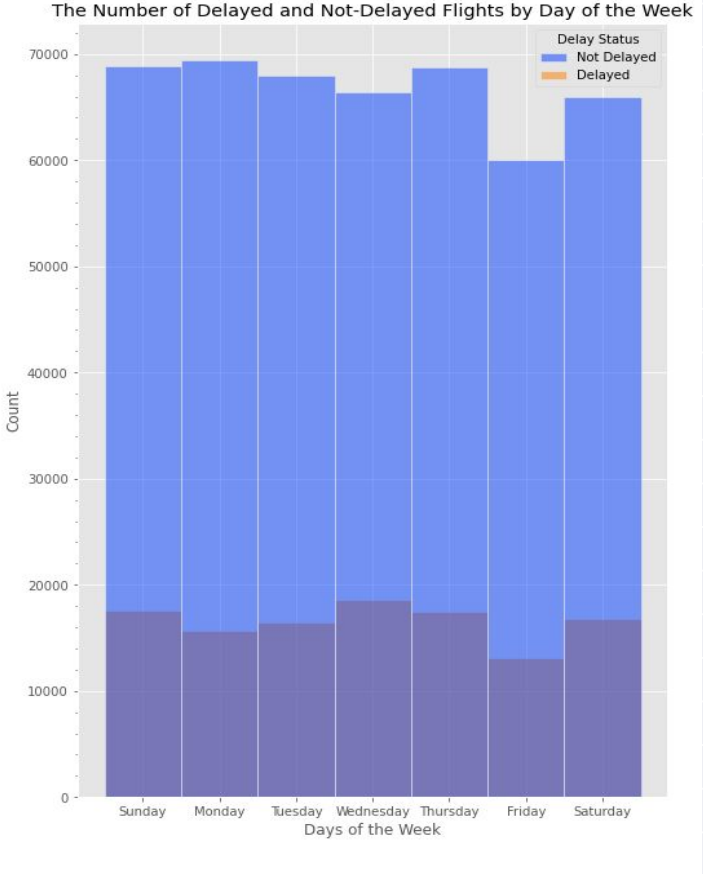
Data & Methods:

The Data:

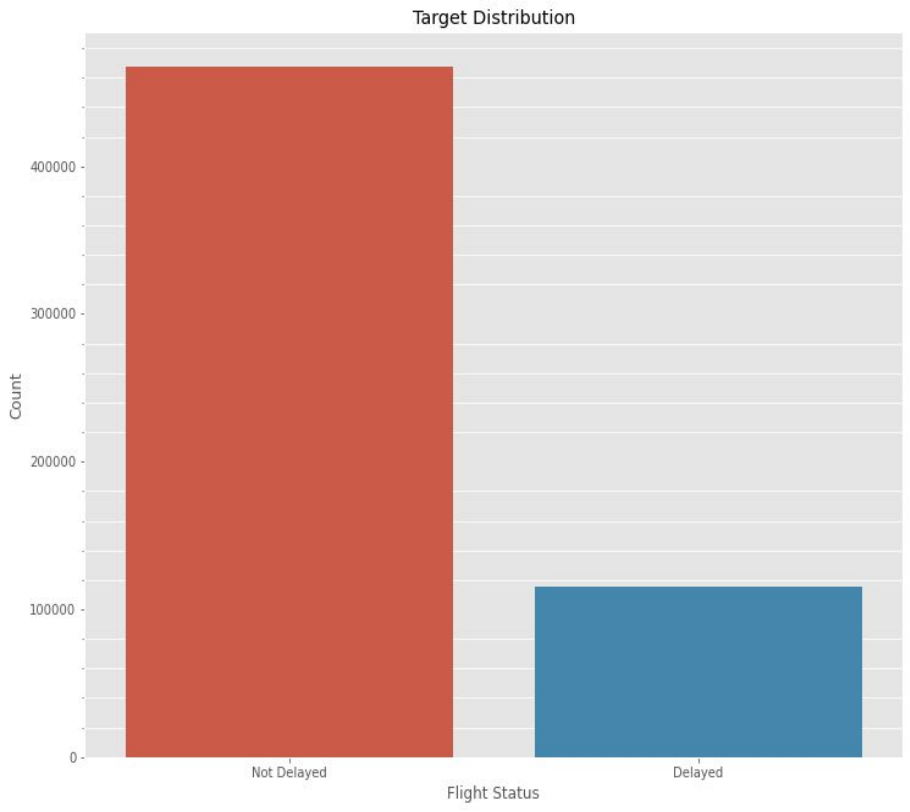
- Contains airline, weather, and airport information from 2019

- Here are two features and their distributions, classified by flight status.





Data & Methods (cont.):



Class Distribution:

- **80. 18%** of United flights were on-time
- **19.82%** of United flights were delayed

Methods:

- Before modeling, I balance the data's target distribution by oversampling.

- Final dataset: **701,026** United flights analyzed (gained 263,822 observations from sampling).

Modeling:

Evaluation:

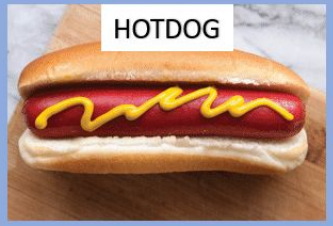
➔ Models were evaluated on precision and the number of false positive predictions.

True negative

False positive

False negative

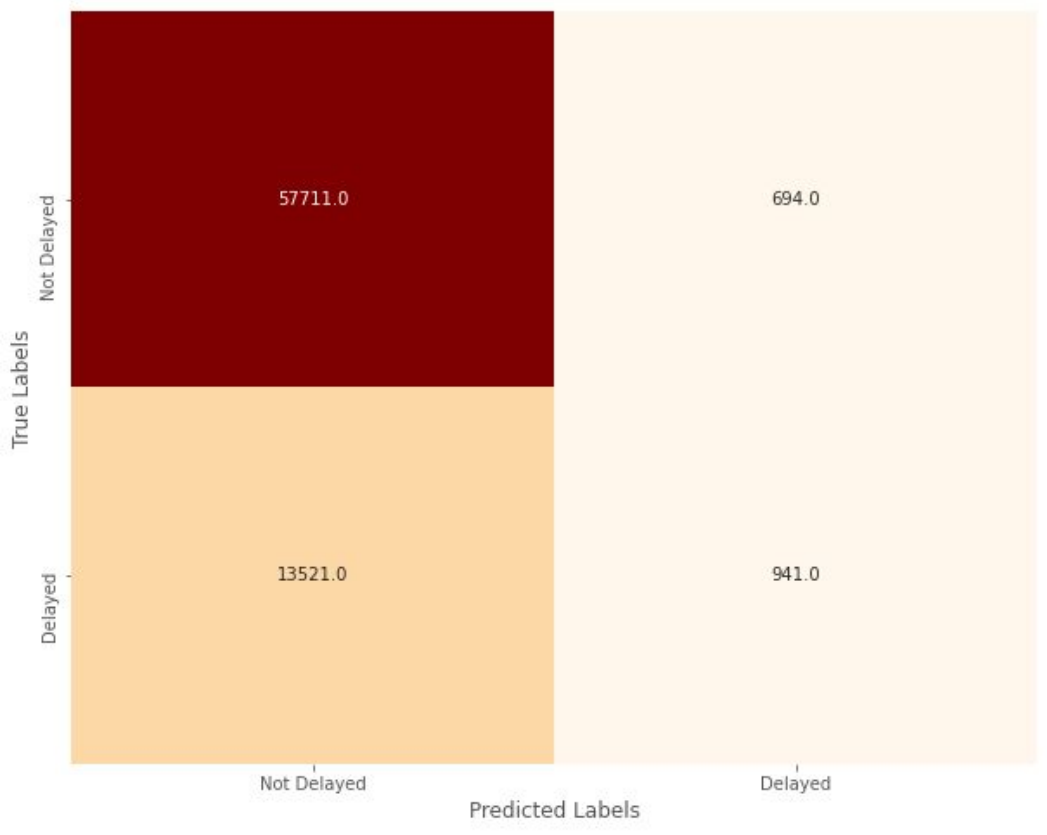
True positive



Modeling Results:

- ➔ The deep learning algorithm (final model) is 57.6% precise.
  - ➔ Baseline model (Random Forests) was 50.0% precise.

- ➔ Out of 72,867 predictions, the model had 694 false positive cases (the baseline had 2,936).



Conclusions:

1. The deep learning algorithms performed better than the machine learning algorithms.

2. The model is 57.6% precise when testing and classifying flights as delayed or not delayed.

Limitations & Further Work:

- ➔ Computational constraints
- ➔ Imbalanced classes in data
- ➔ Deeper neural network model
- ➔ Work with different metrics.

Works Cited:

Schonland, A. (2023, February 13). *The value of time for an airline | AirInsight*.

https://airinsight.com/the-value-of-time-for-an-airline/

Thank You!

Do you have any questions? Contact me!

Email: alaygt6@gmail.com
GitHub: @therookiescientist-andre
LinkedIn: linkedin.com/in/ak-layton/