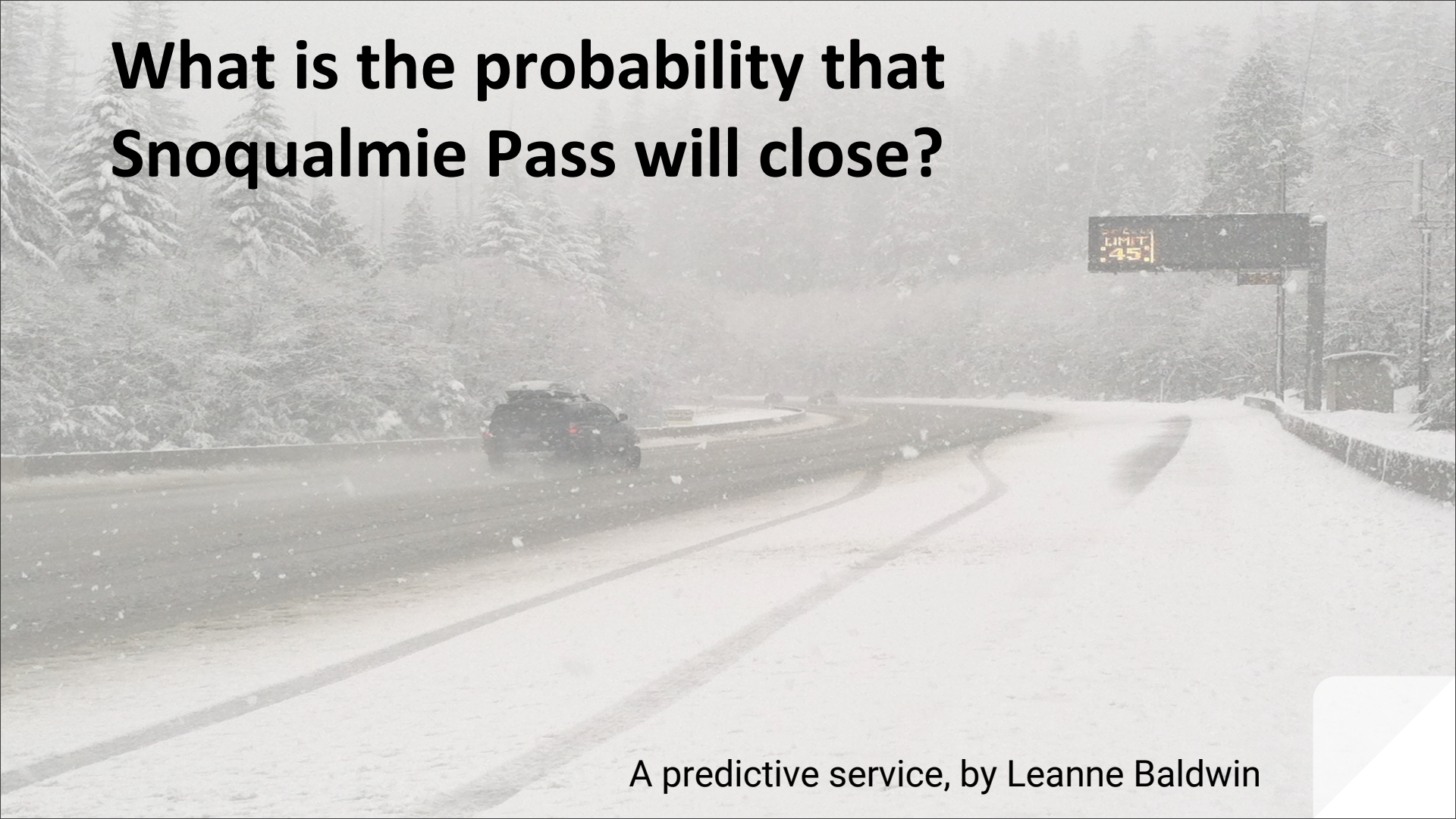
What is the probability that Snoqualmie Pass will close?



A predictive service, by Leanne Baldwin

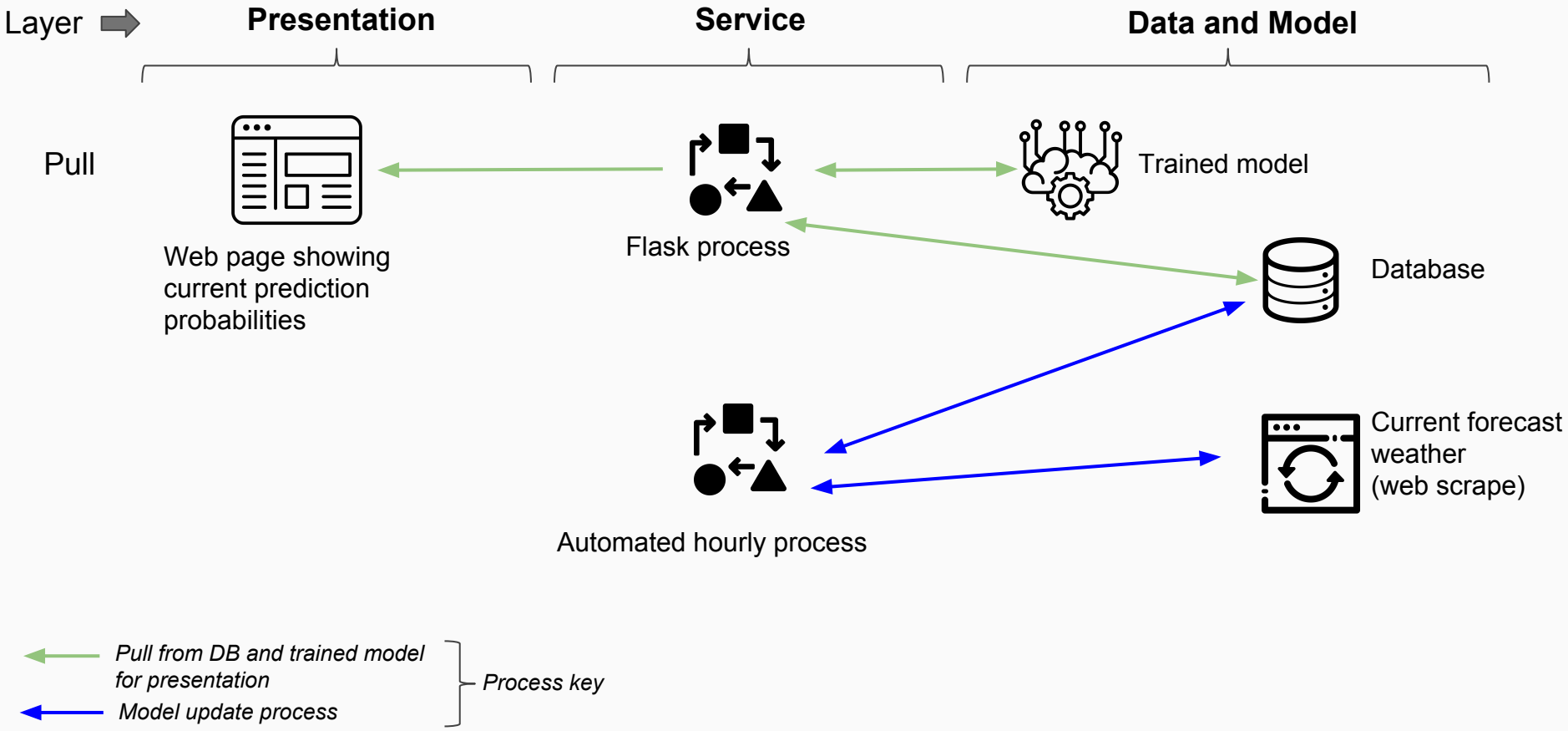
PROBLEM

Snoqualmie Pass drivers need to be better prepared for disruption to their winter travel plans

SOLUTION

A service predicting the probability of Snoqualmie Pass Closure based on historical and weather data

High Level Solution for the Snoqualmie Pass Predictor Service



Data Sources for the Predictive Model

Sources used and descriptions

- Historic weather data from NOAA using the ASOS (Automated Surface Observing Systems) for Stampede Pass
- Snoqualmie Pass closure data requested from WSDOT

Sources reviewed and discounted

- Traffic data from PTR sensors either side of the pass - discounted due to possibility of overfit

Data Preparation

Data Cleaning

- Cleaned historical weather data
- Cleaned past Snoqualmie Pass closure data

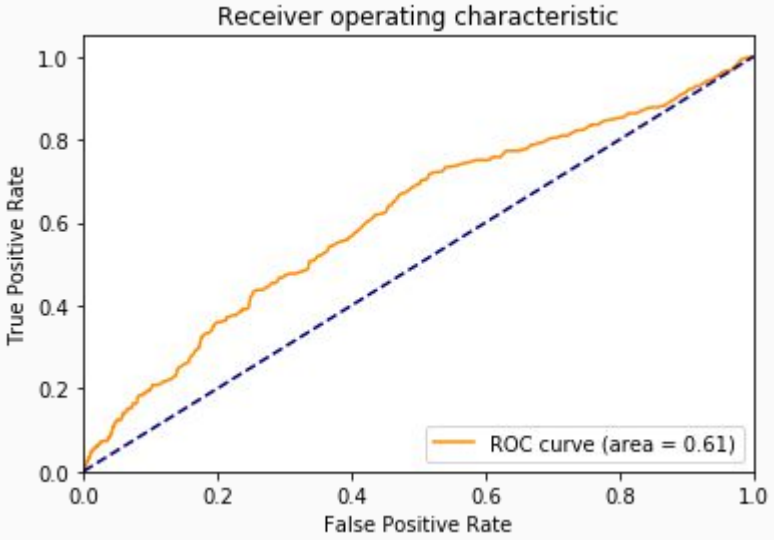
Data Combining

- Combined the data to feed into training the models

Baseline model

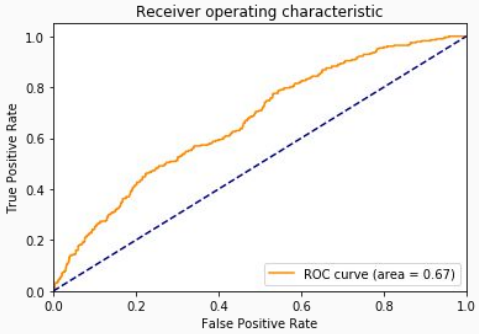
Logistic Regression Model

- Logistic regression to fit first baseline model
- Basic data used: temperature, 1s/0s for: precipitation, overcast, poor-visibility, windy



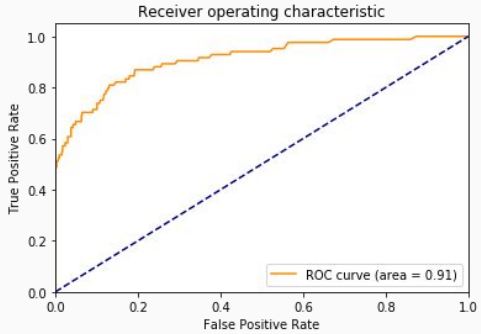
Improving on the baseline prediction model

Logistic Regression



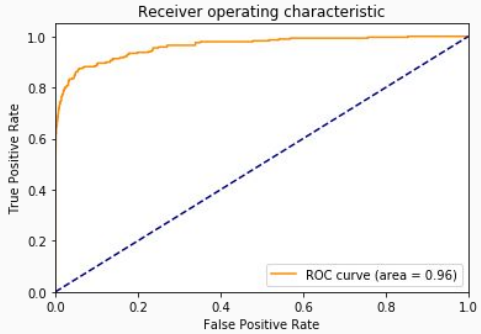
- **Uses winter months only**
- Improved roc curve

Random forest



- **Uses aggregated daily data**
- Inc year, month, day and get_dummies for day of week
- Improved roc curve

Gradient boosting



- **Uses hourly data**
- Inc year, month, day and get_dummies for day of week
- Improved roc curve

Model improvement in roc curve

Model Tuning and Pickling

Final Model

- Random Forest Model with aggregate daily data.
- Used RandomizedSearchCV to choose the best parameters for model:
    - Max-depth - 40

Pipeline

- Created a Featurizer to use to transform the data ready to put through the model.
- Created Pipeline with Featurizer and Model, fit it and pickled the pipeline for use in web app.

Scrape forecast weather data

Python Files

- Function using BeautifulSoup to scrape 15 day forecast weather data for Snoqualmie Pass from weather.com.
- Functions to clean and prepare the data to be able to get probability predictions from model.

Routine process

- Created an hourly routine process to scrape the 15 day forecast and put it in Mongo database.

Next steps

1. Partial dependence plots to get a clearer picture on the results of Gradient Boosting Model.
2. Research potential sources for incoming weather data to give an hourly granularity.
3. Move to hourly granularity for at least the next 3 days.
4. Expand to other frequently used mountain passes.

Thank you

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