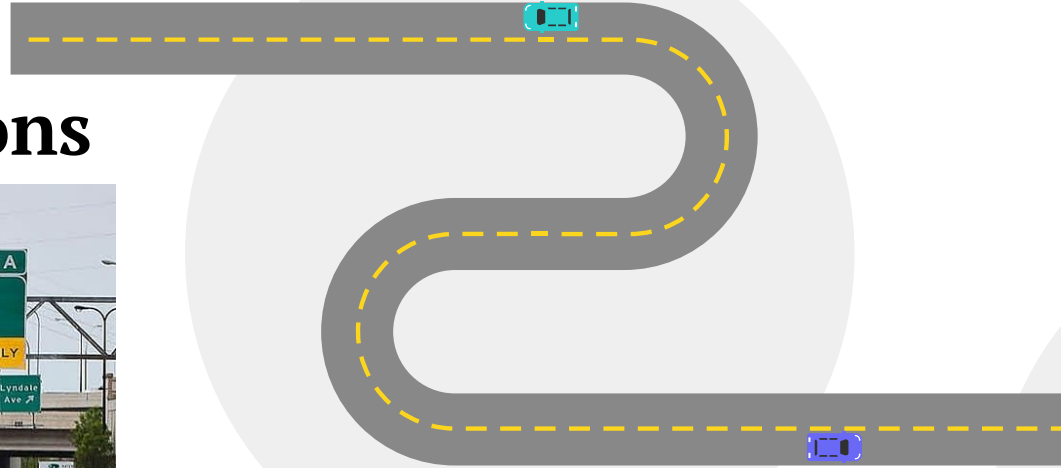


# I-94 Traffic Volume Analysis & Predictions



# About Me

Paul Schulken

Data Scientist  
Civil Engineer



B.S. in Civil Engineering,  
North Carolina State University

8+ Years Experience with  
Government and Private Sector

Enjoys: Basketball, Live Music

<https://github.com/pschulk>

# Agenda

01

**Business  
Understanding**

02

**Data  
Overview**

03

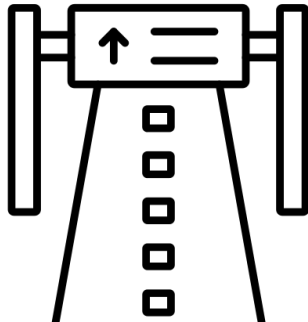
**Modeling &  
Performance**

04

**Findings &  
Recommendations**

05

**Future  
Insights**



The background features a light gray surface with stylized winding roads in dark gray with dashed yellow lines. Three small cars are visible: an orange car on a road in the bottom left, a purple car on a road in the top right, and a small gray car on a road in the top center. Large, light gray circular shapes are also present in the corners.

01

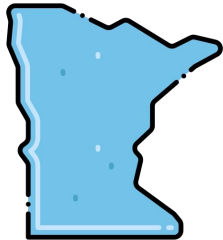
# **Business Understanding**

# Business Understanding



## Stakeholder

Minnesota Department  
Of Transportation (MnDOT)



## Business Problem

Identifying Impact of Various  
Features on I-94 Traffic Volume



# Less Visibility, More Traffic

% Cloud Cover Most Important Factor

## 380 Vehicles

25% Increase in Cloud Cover = 9,500 Vehicles

# Big Vegetables, Big Volume

State Fair Produces Above Average Volume



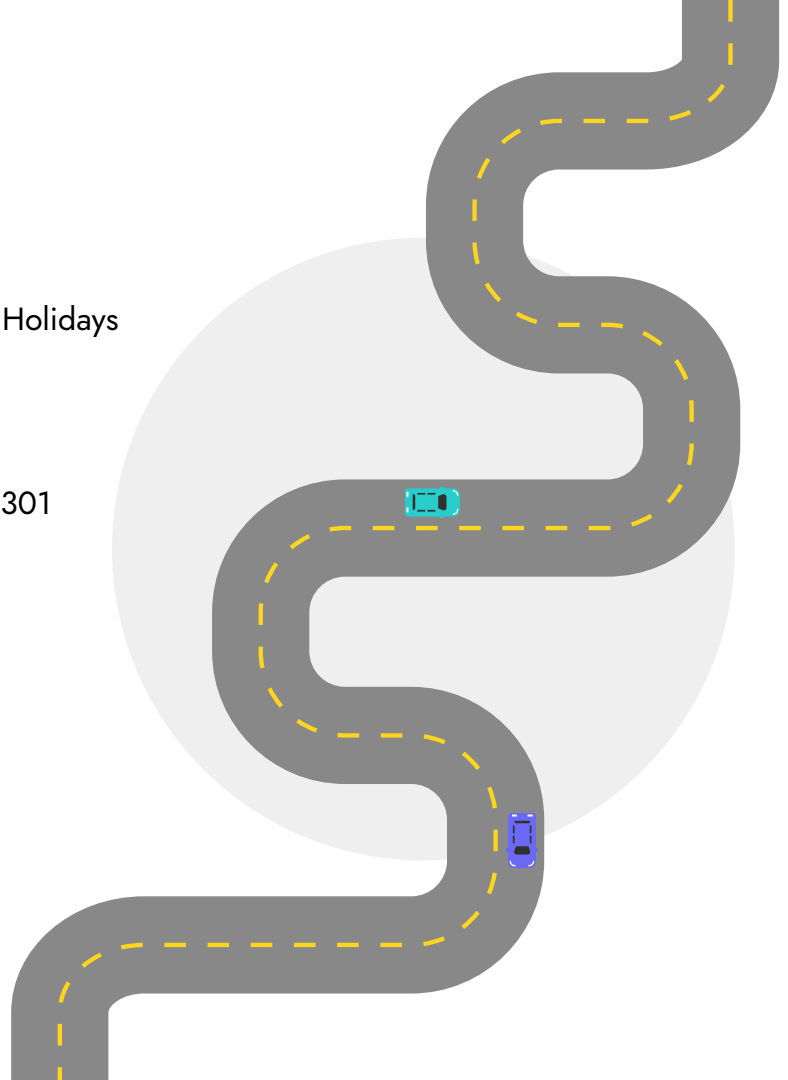
The background features a light gray surface with stylized winding roads in dark gray with yellow dashed center lines. Three small cars are visible: an orange car on a road in the bottom left, a purple car on a road in the top right, and a small gray car on a road in the top center. Large, light gray circular shapes are also present in the corners.

02

# Data Overview

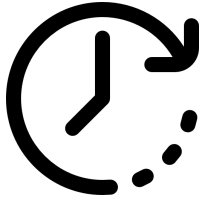
# Data Overview

- Data
  - Hourly I-94 Westbound Traffic Volume, Weather, Holidays
  - 48,024 Entries from Oct. 2012 - Sep. 2018
- Source
  - MnDOT Automatic Traffic Recorder (ATR) Station 301
  - OpenWeatherMap
- Limitations
  - Did not Include Accident/Collision Data
  - Required Modification for Complete Time Series



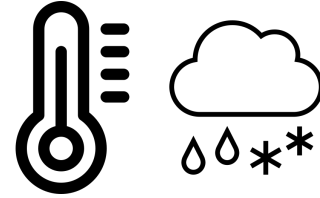


# Data Modifications



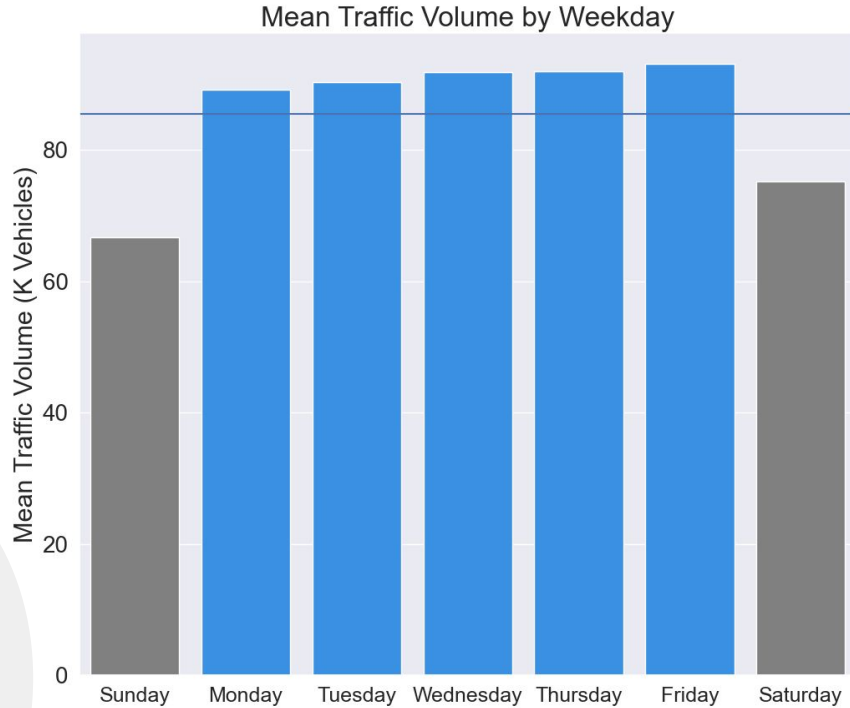
Data Downsampled from  
Hourly to Daily Values

Incomplete Traffic Volumes  
Replaced with Daily Averages

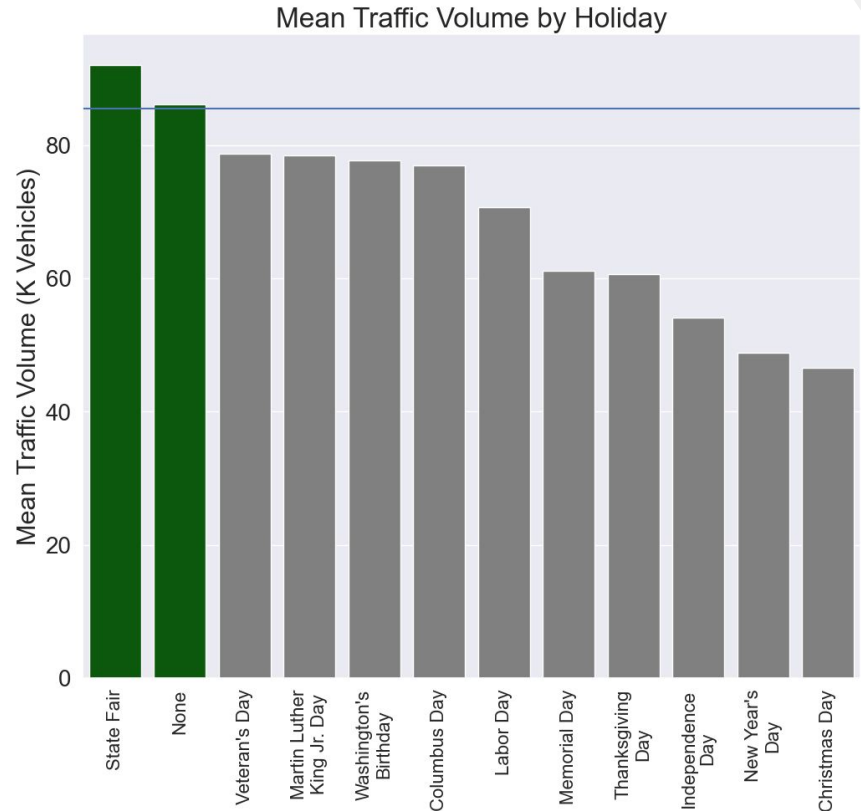


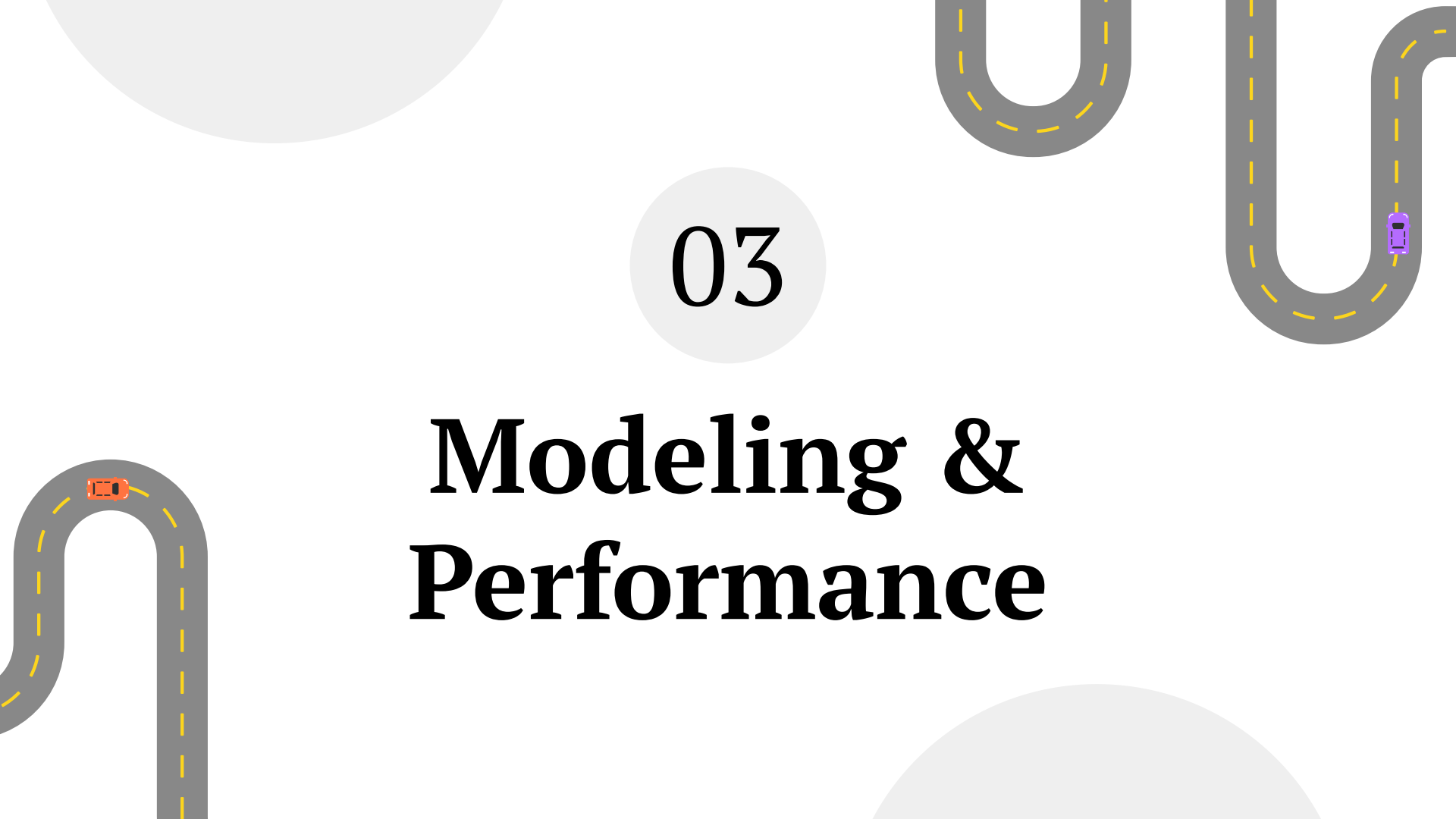
Temperature and Rain/Snow Values  
Replaced with National Oceanic and  
Atmospheric Association (NOAA) Values

# Visualizing Traffic Volume



Mean Daily Traffic Volume = 85,493

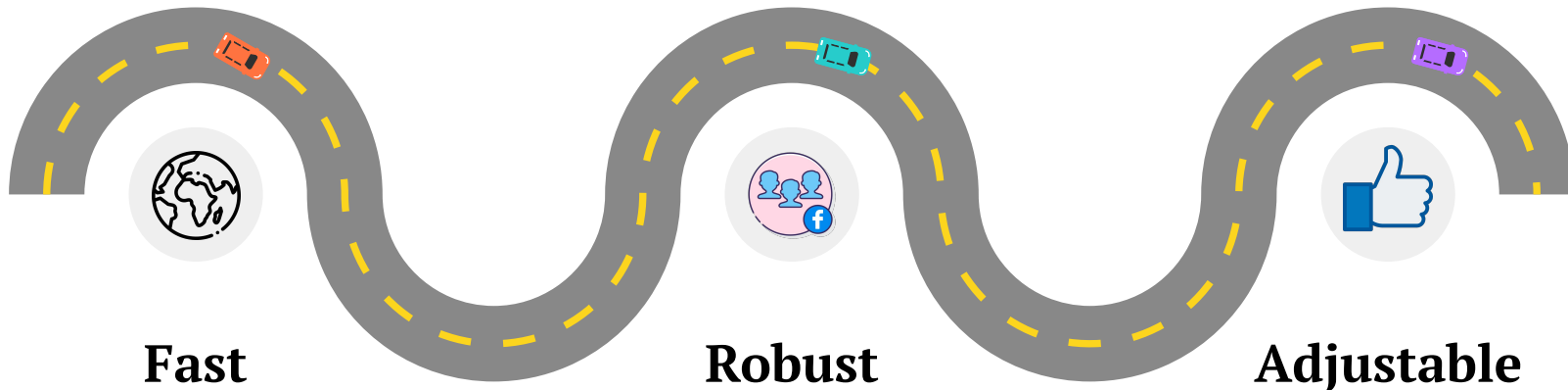


The background features a light gray surface with stylized winding roads in dark gray with dashed yellow lines. Three small cars are visible: an orange car on a road in the bottom left, a purple car on a road in the top right, and a small portion of a third car is visible at the top center. Large, light gray circular shapes are also present in the corners.

03

# Modeling & Performance

# Prophet Model



Open-Source Software  
for General Forecasting Purposes

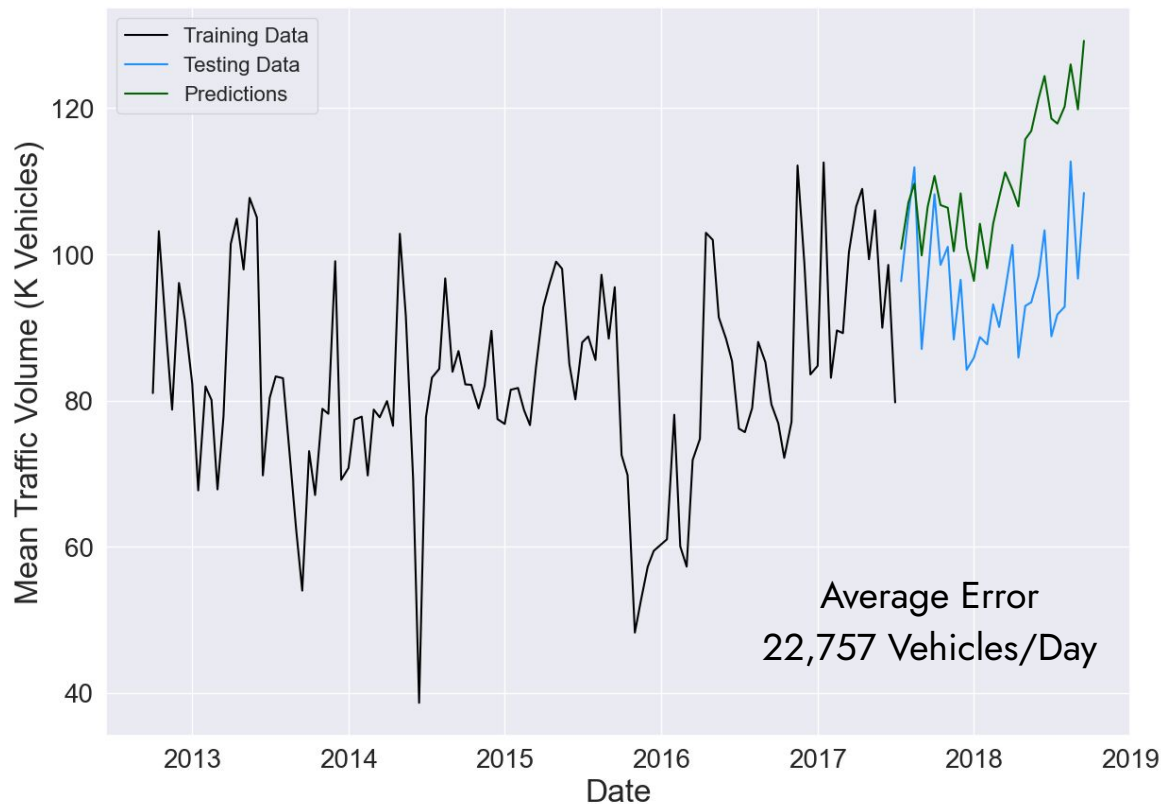
Works with Seasonality,  
Holidays, and Outliers

Ability to Tune Based on  
Domain Knowledge

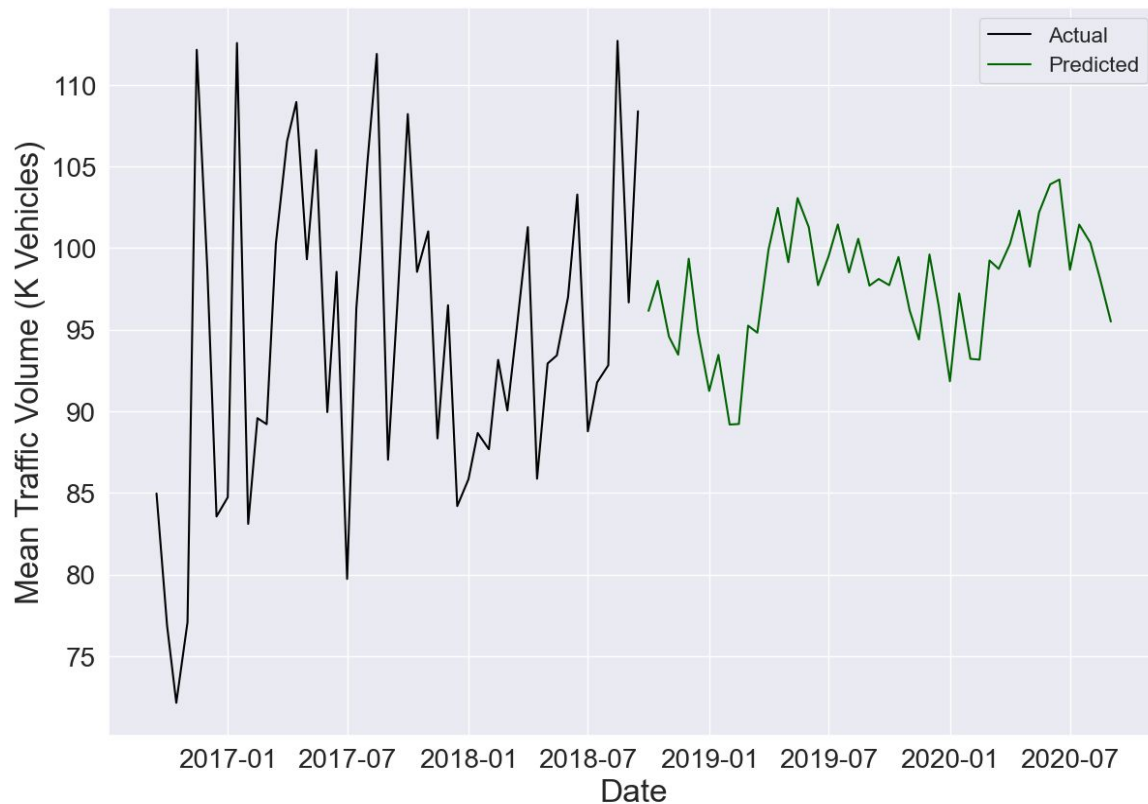
You can trust us  
with your data.



# Train/Test Split



# Predictions for 10/2018 - 09/2020

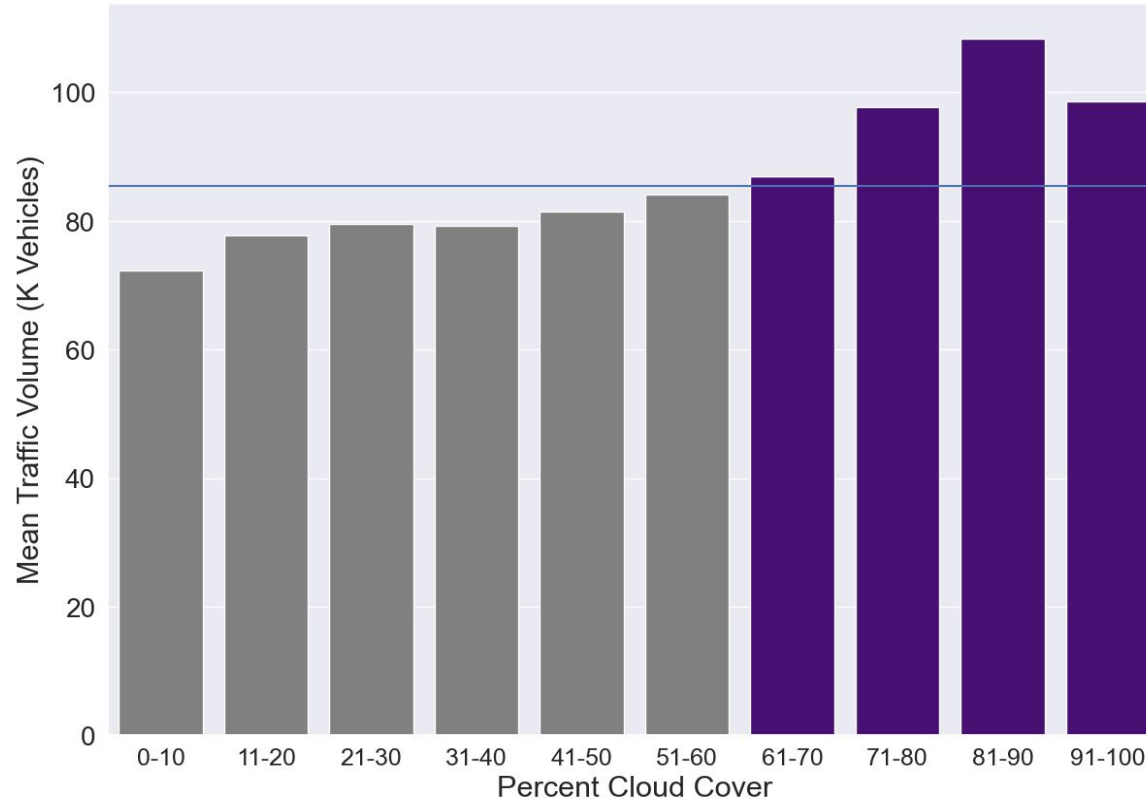


The background features a light gray surface with stylized winding roads in dark gray with yellow dashed center lines. Three small cars are visible: an orange car on the bottom left road, a purple car on the top right road, and a small blue car on the top left road. Large, light gray circular shapes are also present in the corners.

04

# **Findings & Recommendations**

# Purple Rain Percent Cloud Cover



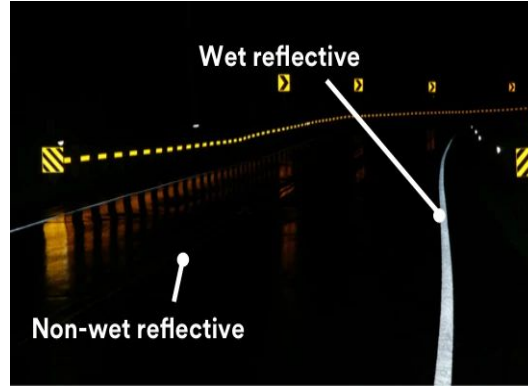


# Recommendations



## Lighting

Installation of  
High-Mast Lighting



## Reflectivity

Inspection of Reflectors,  
Markings, and Signage



## Public Transit

Promote Alternative Options  
For High-Volume Events



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05

# **Future Insights**

# Future Insights



The diagram features a central circle with the text 'Future Insights'. Surrounding this is a thick grey border with a dashed yellow line, resembling a road. Five circular icons are placed along this border. Starting from the top-left and moving clockwise, the icons are: a car crash, a suitcase and airplane, a train, two cars, and a single car. Each icon is accompanied by a text label. The labels for the first four icons are 'Collision Data', 'Expanded Holidays', 'Impact of Light Rail', and 'Complete Traffic Counts' respectively. The fifth icon, a single car, does not have a label.

**Collision  
Data**

**Expanded  
Holidays**

**Impact of  
Light Rail**

**Complete Traffic  
Counts**

# Thank You

Paul Schulken

<https://github.com/pschulken>

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