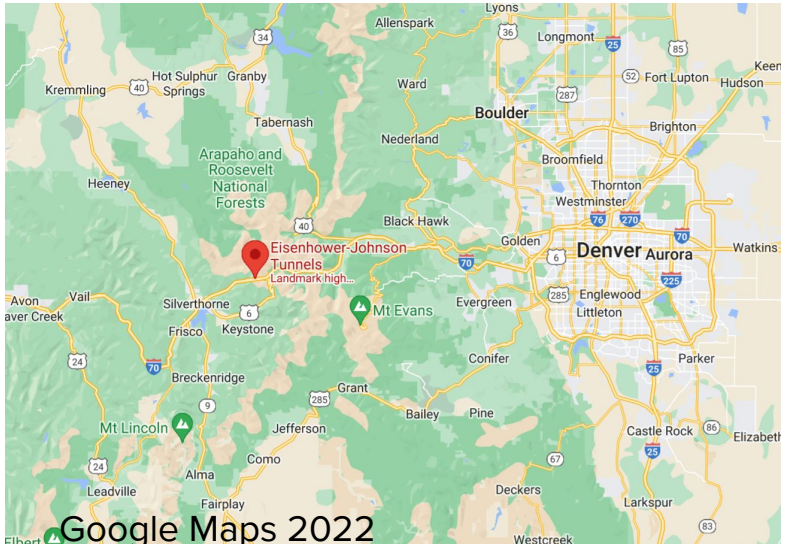
# I-70 Traffic Study

By: Kit Clark

# Orientation

- 1.7 miles long
- Spans the Continental Divide (11,158’)
- Opened 1973 and 1979

[Eisenhower Tunnel - Wikipedia]



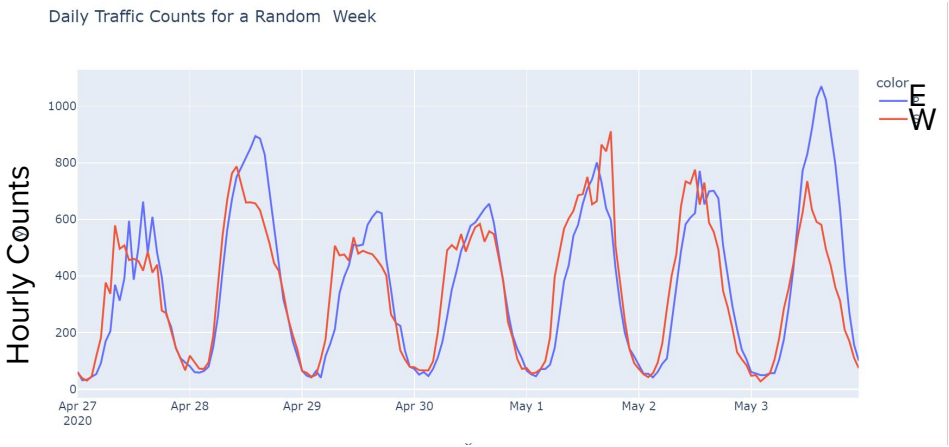
# Objectives

- Load and clean data
- Evaluate trends
- Create time-series models

# Data Sources

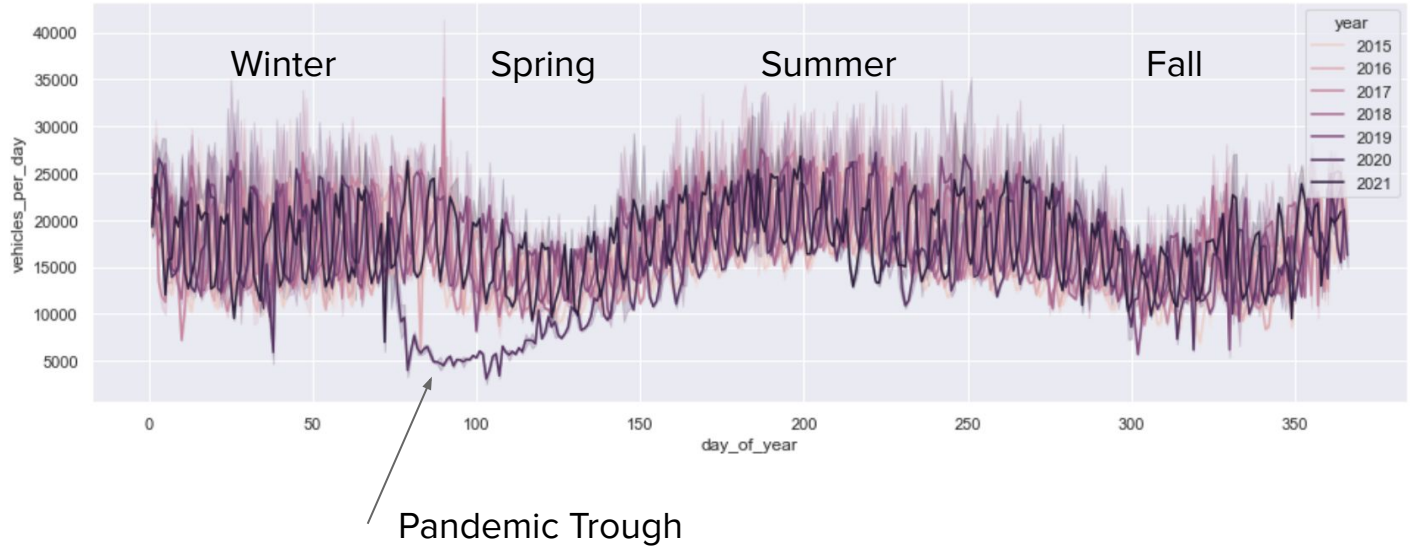
7 Years of Hourly Data (2015-2021

- Colorado Dept of Transit
  - Hourly Traffic Counts
  - **122k** rows **(93% complete)**
- Beaver Creek weather station
  - Temperature, Humidity, Dewpoint, Precipitation
  - **82% complete**



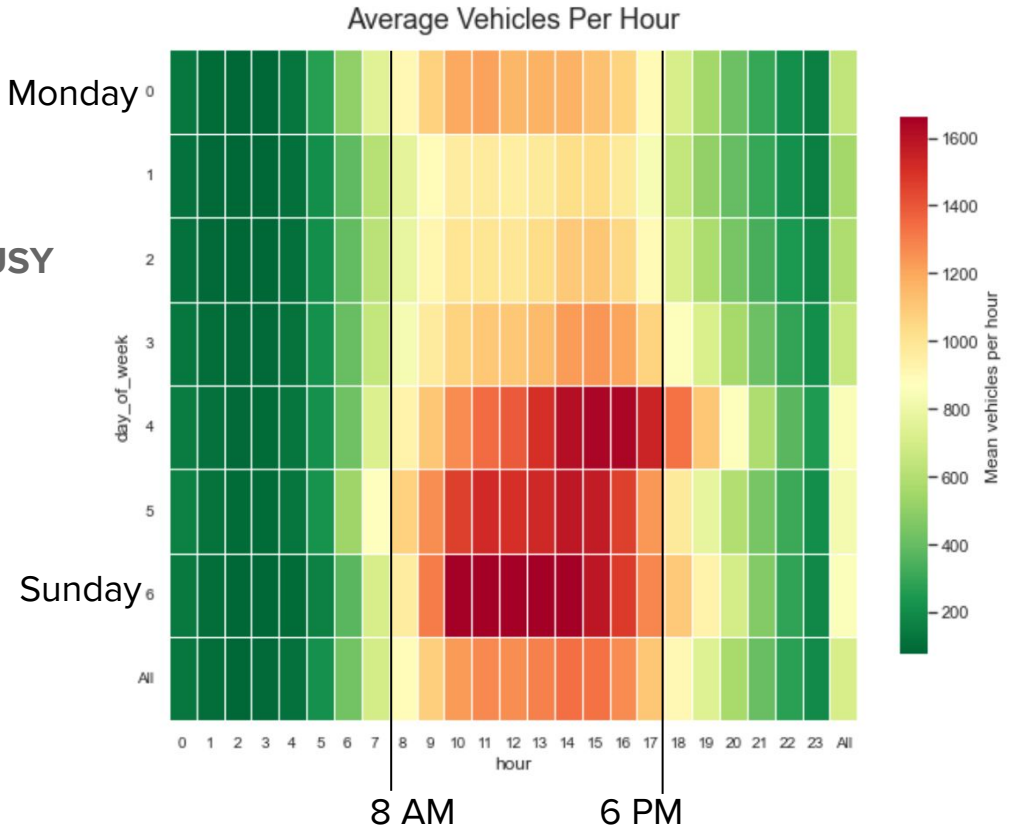
# Cyclicity

- Annual Trends
  - Summer and Winter Highs



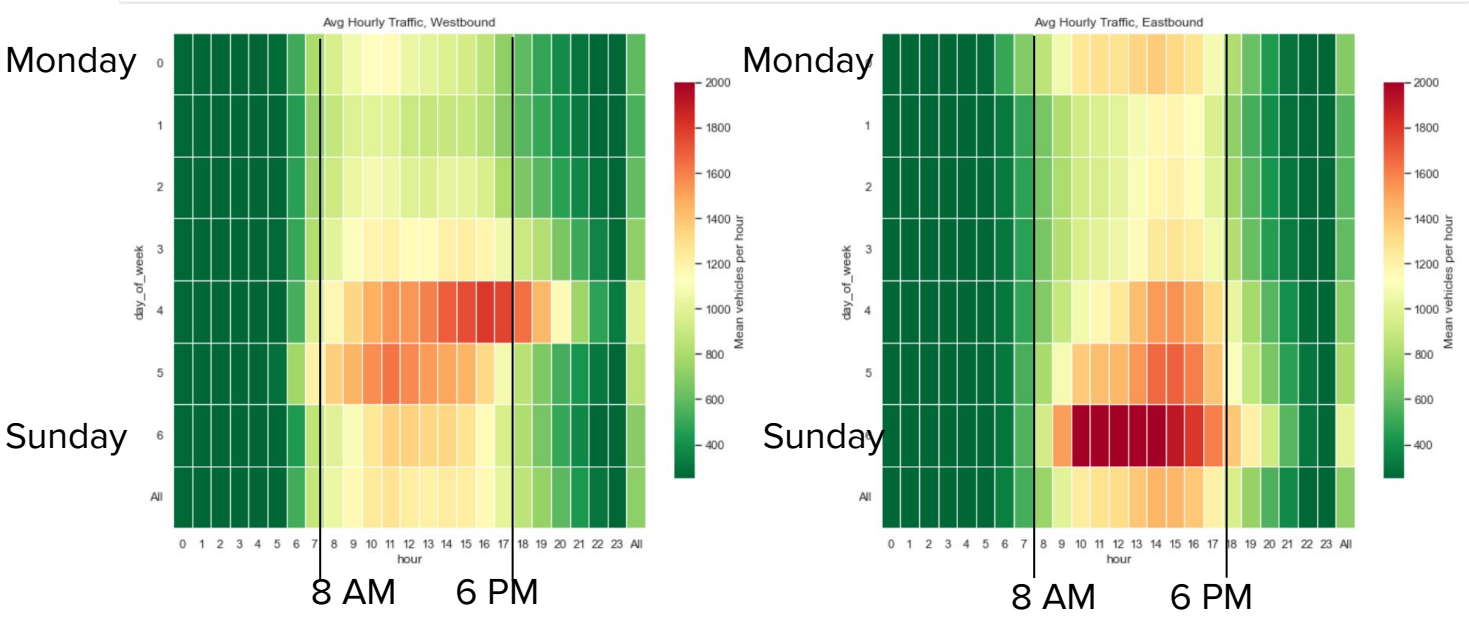
# Cyclicity

- Weekly Trends
  - Daily Average
  - Weekends and Afternoons **ARE BUSY**



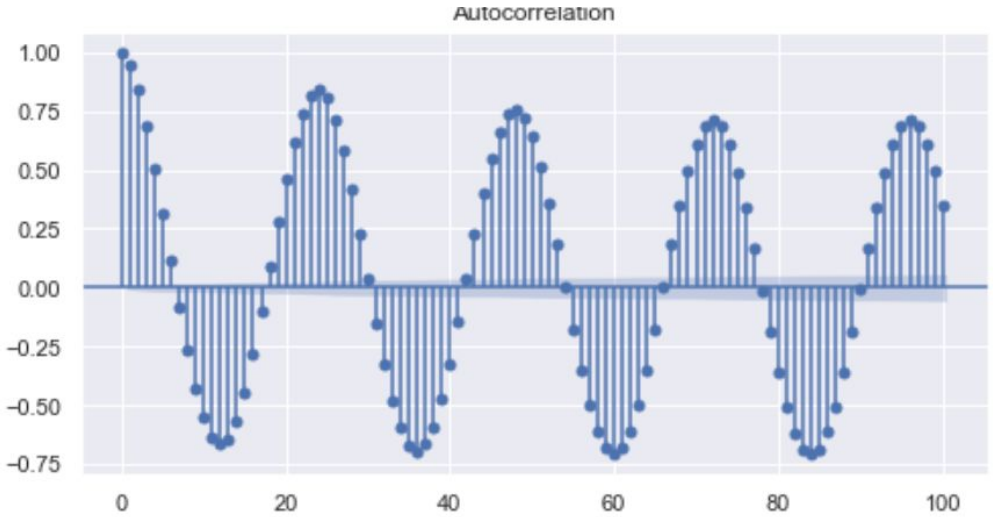
# Cyclicity

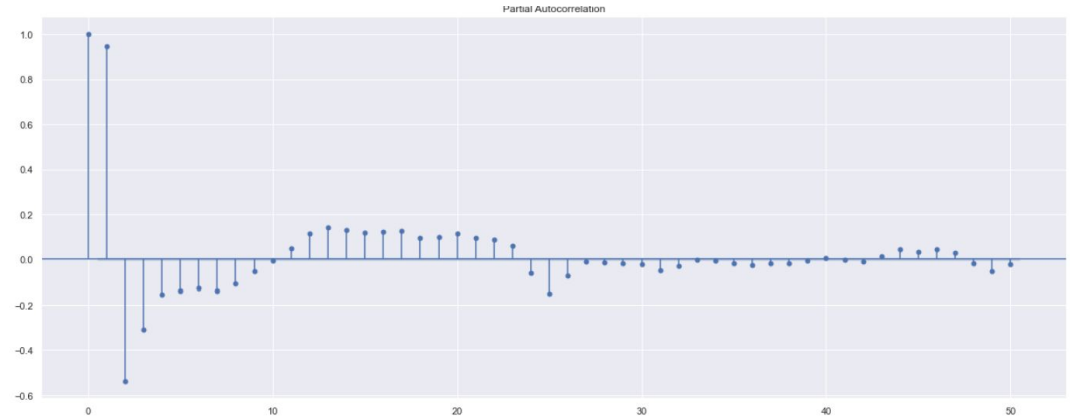
- Directional Trends
  - West first, then east
  - Multi-hour or multi day lag bw directions



# Correlations

- Correlation between a value and its lags



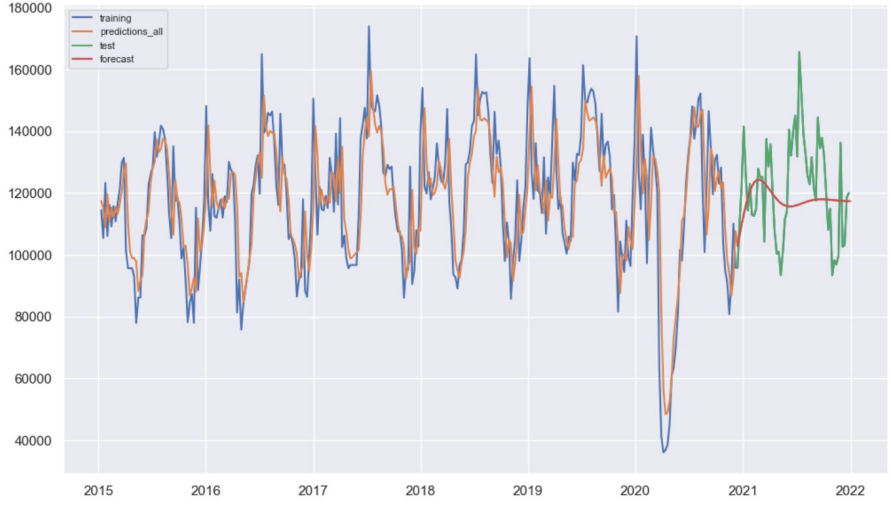



# Modelling (What didn't Work)

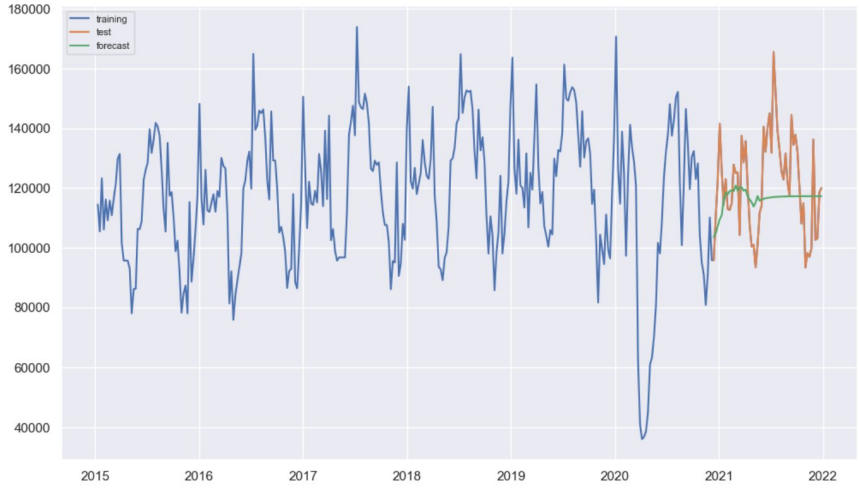
Statistical methods

- ARIMA
- SARIMA (seasonal ARIMA)

ARIMA



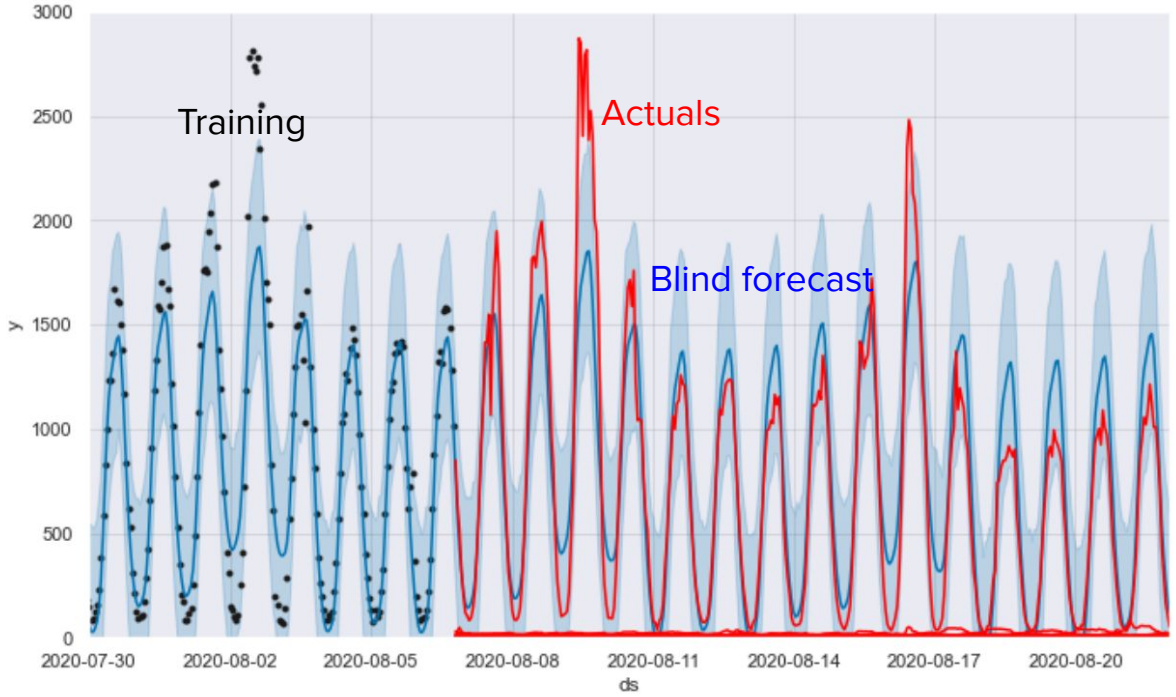

SARIMA



# Modelling (What Worked)

Prophet Model

RMSE 322 cars per hour



# Modelling (What Worked)

## Model Components

- No trend
- Weekly cyclicity
- Season cyclicity
- Daily cyclicity

- Model components match observations in the data very well.

```
prophet_hourly.plot_components(prophet_hourly_forecast);
```

# Future Work

1) update weather data source to include 2021

2) Incorporate weather data into the traffic predictions

3) Tune Prophet hyperparameters to better fit the training data

4) Add a feature or break-point for 2020 to mark the pandemic as non-representative.

5) Experiment with chaining east and west bound traffic models

6) Experiment with other modeling algorithms including LSTM or Random Forest

7) Negative predictions are nonsensical. Consider transforming data to a square rt or standardization.

# Other Documentation

https://github.com/GeoClark/traffic_study