Using ML to Help Seattle Cyclists Cross the Fremont Bridge

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Business Problem

Problem: Improve safety for cyclists traveling across the Fremont Bridge in Seattle, WA.

Goal: Develop machine learning model to predict the number of cyclists depending on the forecasted weather on a given day.

The Data

Cyclist Data:

- Provided by the City of Seattle.
- Counts number of cyclists crossing the Fremont Bridge in both directions.
- Data from 2013-2024.

Weather Data:

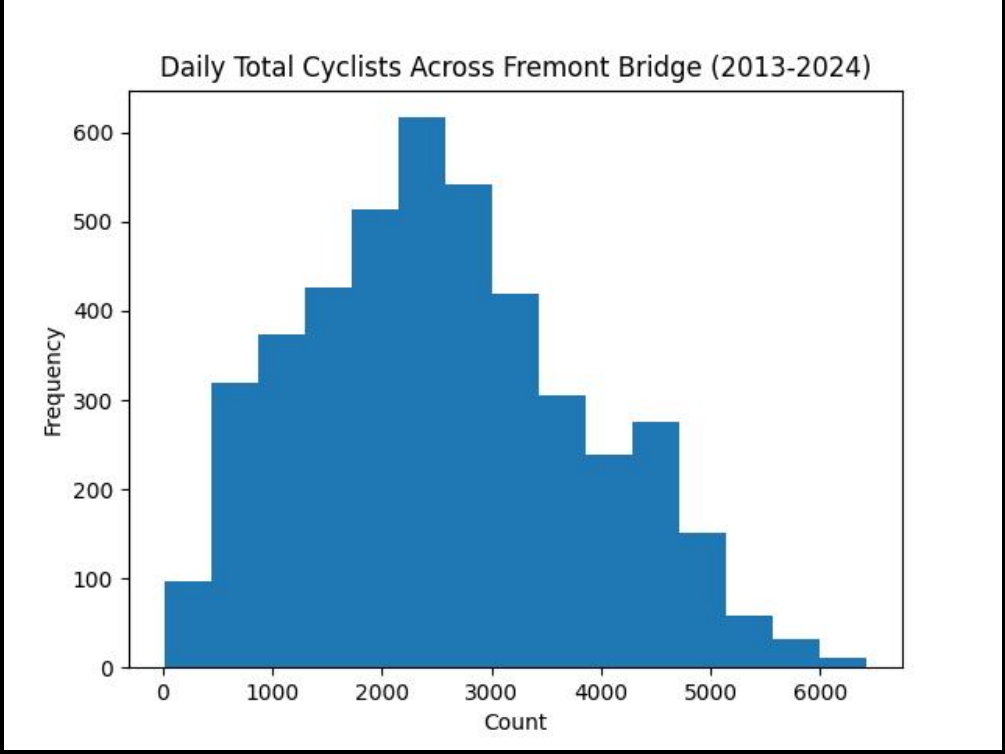
- Seattle daily weather records provided by the National Centers for Environmental Information (NCEI) at NOAA.
- Weather recordings from the Sea-Tac weather station.
- Data recorded since mid 1900’s

Data Preparation

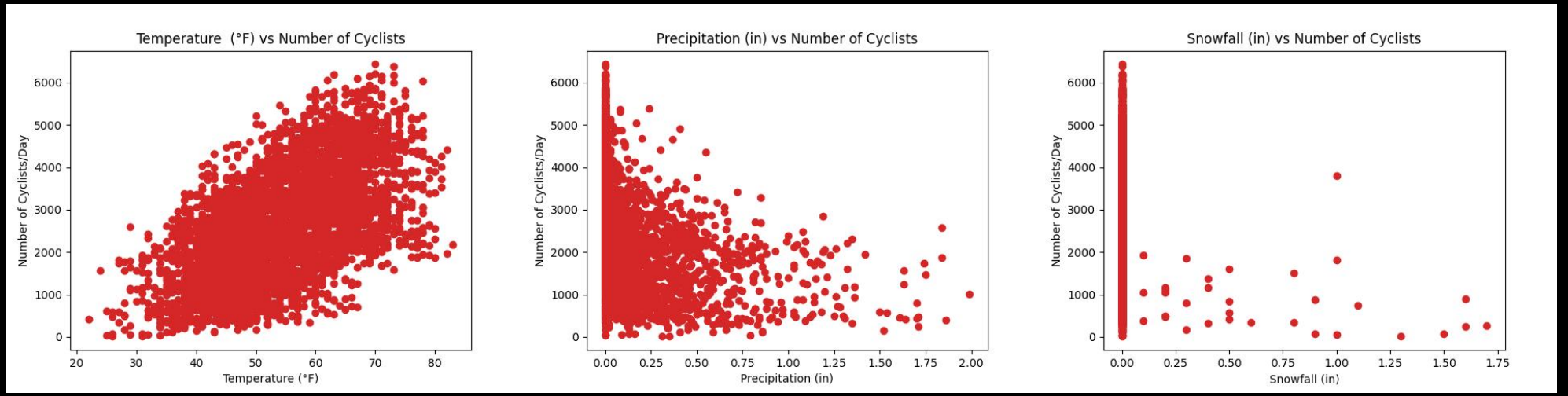
- Convert Bike data from hourly to daily data.

- Select appropriate weather features.
  - Average Temperature
  - Precipitation
  - Snow levels.

Daily Cyclists Histogram



Weather vs Number of Cyclists



Additional Data Exploration

- Average Daily Number of Cyclists on Weekday: 2,960
- Average Daily Number of Cyclists on Weekend: 1,666
- Average Daily Number of Cyclists: 2,592

The Modeling

- Predict number of cyclists
  - Linear Regression Model
  - Random Forest Model
  - XGBoost Model

- Primary Features:
  - Temperature
  - Precipitation
  - Snowfall
  - Weekend or Weekday

- Model Evaluation: RMSE

Final Mode/Conclusions

XGBoost Model performed the best.

Train RMSE: 705.89
Test RMSE: 701.52
Val RMSE: 690.84

The model can *predict* the number of cyclist across the Fremont Bridge based on weather data with an error of approximately 700 cyclists.

The city can use this model to help make decisions to improve cycling traffic and safety.

Limitations

- Weather is not the only factor that affects the number of cyclists
  - School days
  - Public events
  - Holidays, etc.
- Weather station is not near the bridge.

The next steps

- Incorporate additional weather and nonweather features into the model.
- Include more detail by using hourly weather data.
- Consider a time series model such that seasonality can be explored.

Thank you