

# DEMAND FORECASTING

for

## BIKE RENTALS

CAPSTONE PROJECT  
SONAL KIRAN HANSRA



# PROJECT OVERVIEW



As more and more people take to biking, accurately estimating the demand for bikes on any given day presents a formidable challenge for bike-sharing companies.



Increased bike availability will serve as a catalyst for the growing trend of bicycle commuting, advancing the global movement towards sustainability.

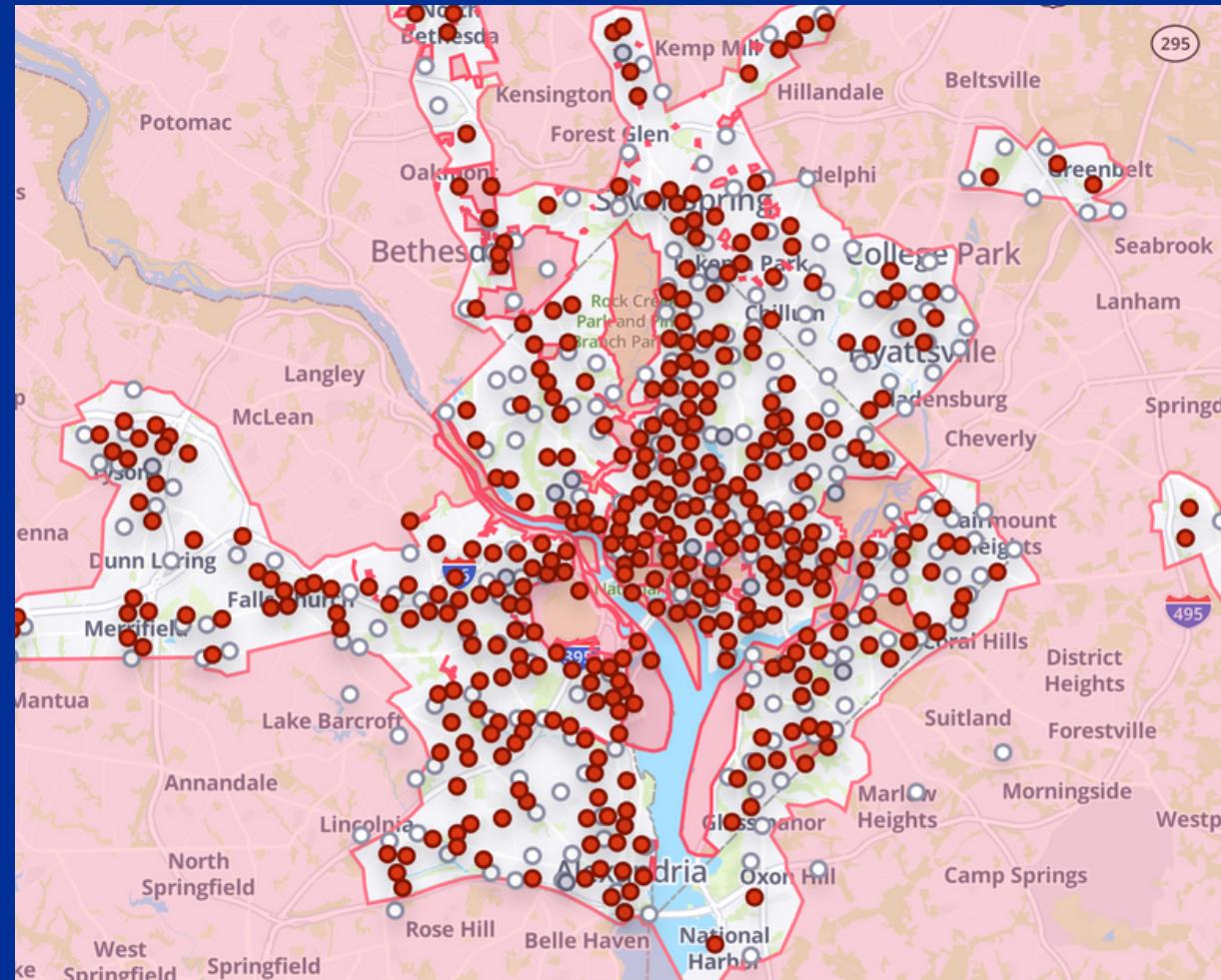
The objective of this project is to leverage machine learning to build demand forecast models that are able to predict bike rental demands at a day level with a reasonable accuracy.



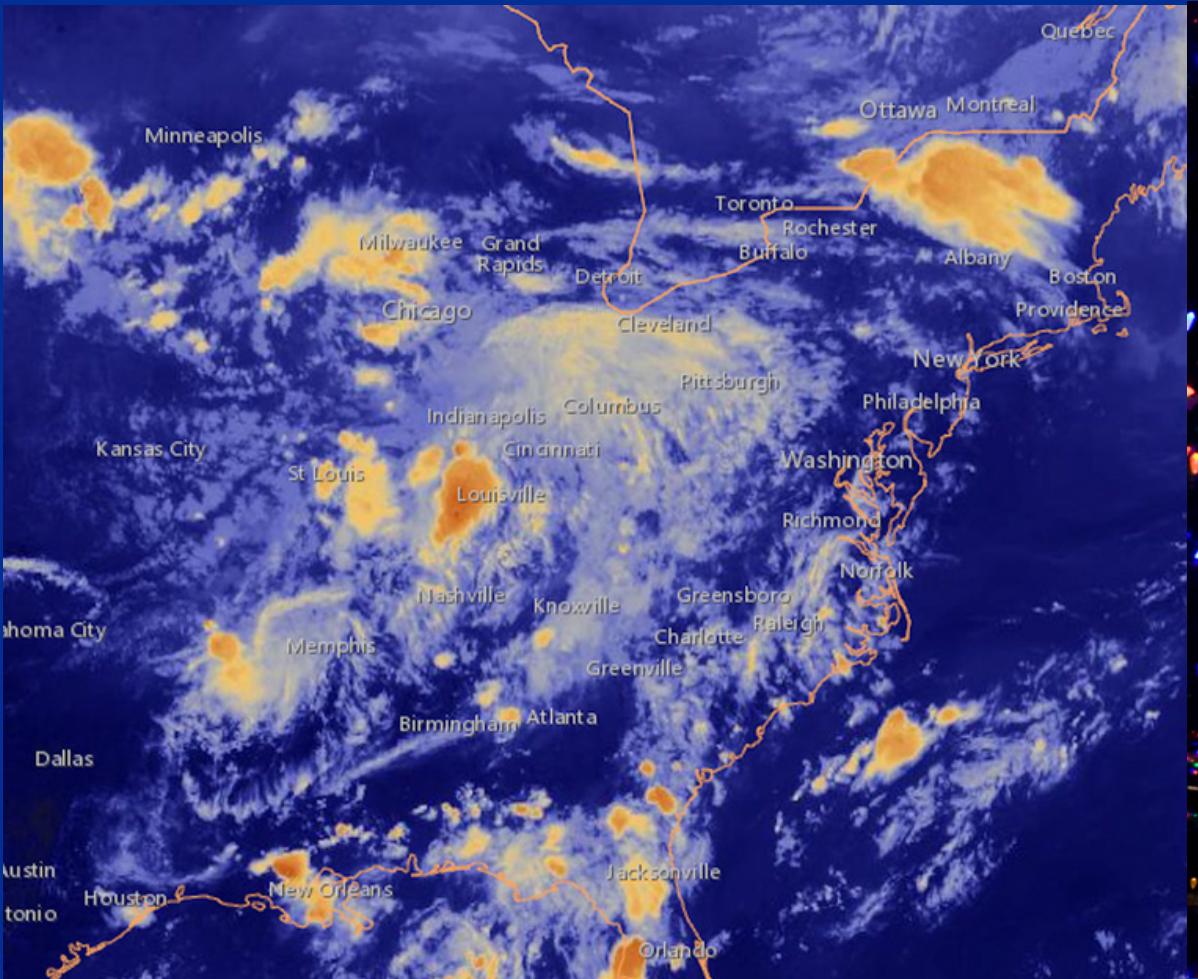
# DATA INTRODUCTION

# **Capital Bikeshare**

## **Washington DC**



# NOAA Weather Data

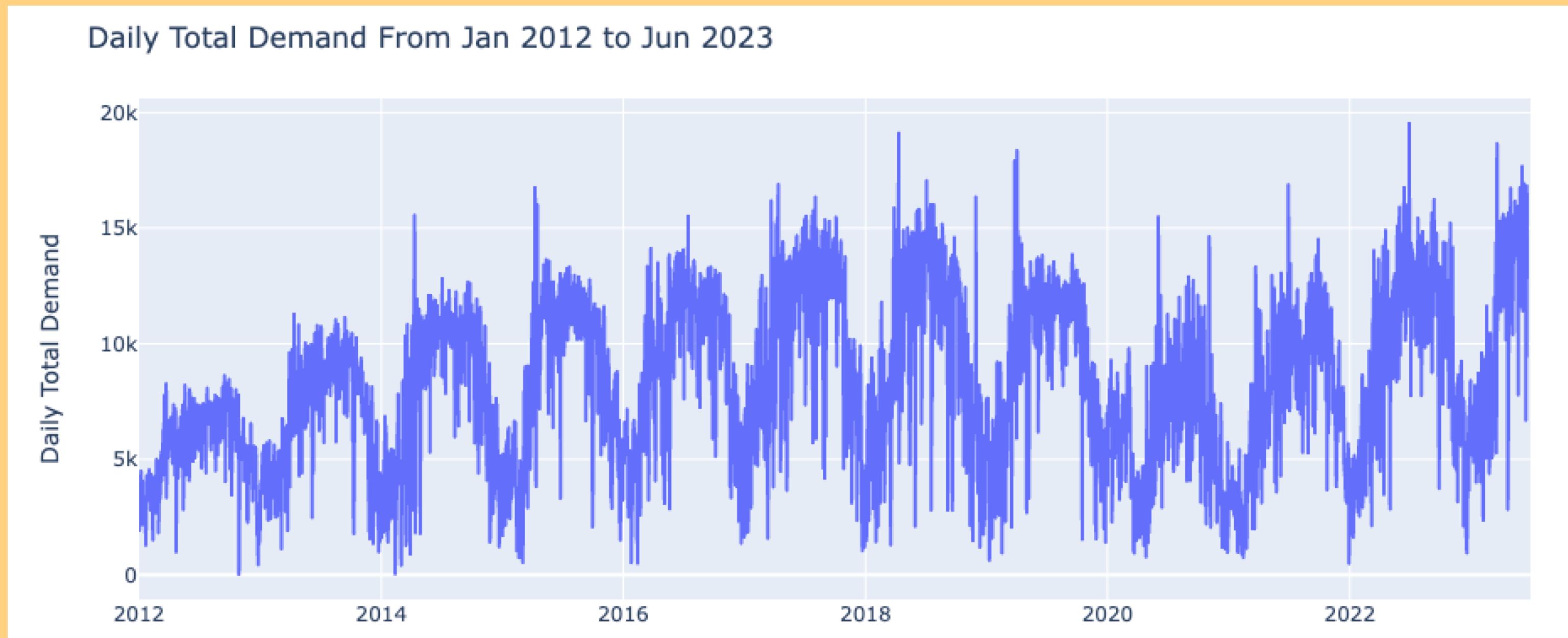


# Holidays & Weekends

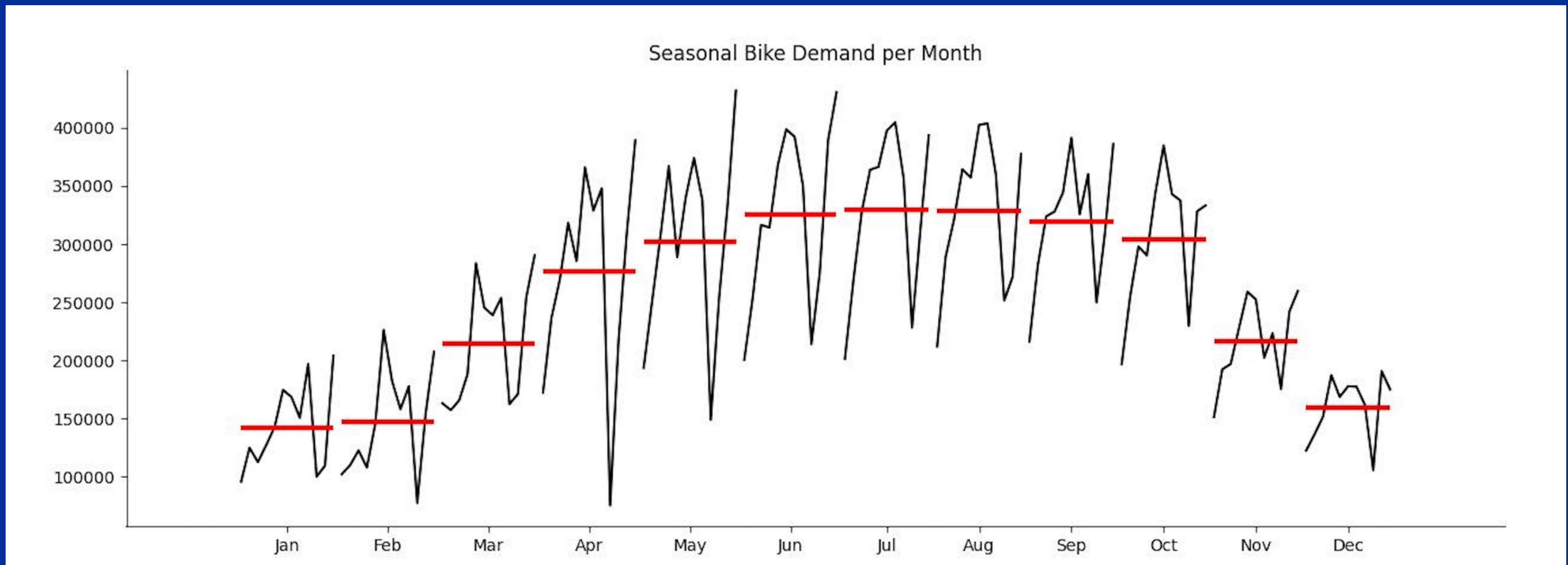


# DATA PREPARATION & EDA

- Addressed missing time series and weather data
- Performed feature engineering - dropped/ merged/ created columns
- Performed time series decomposition to explore trend and seasonality in the data

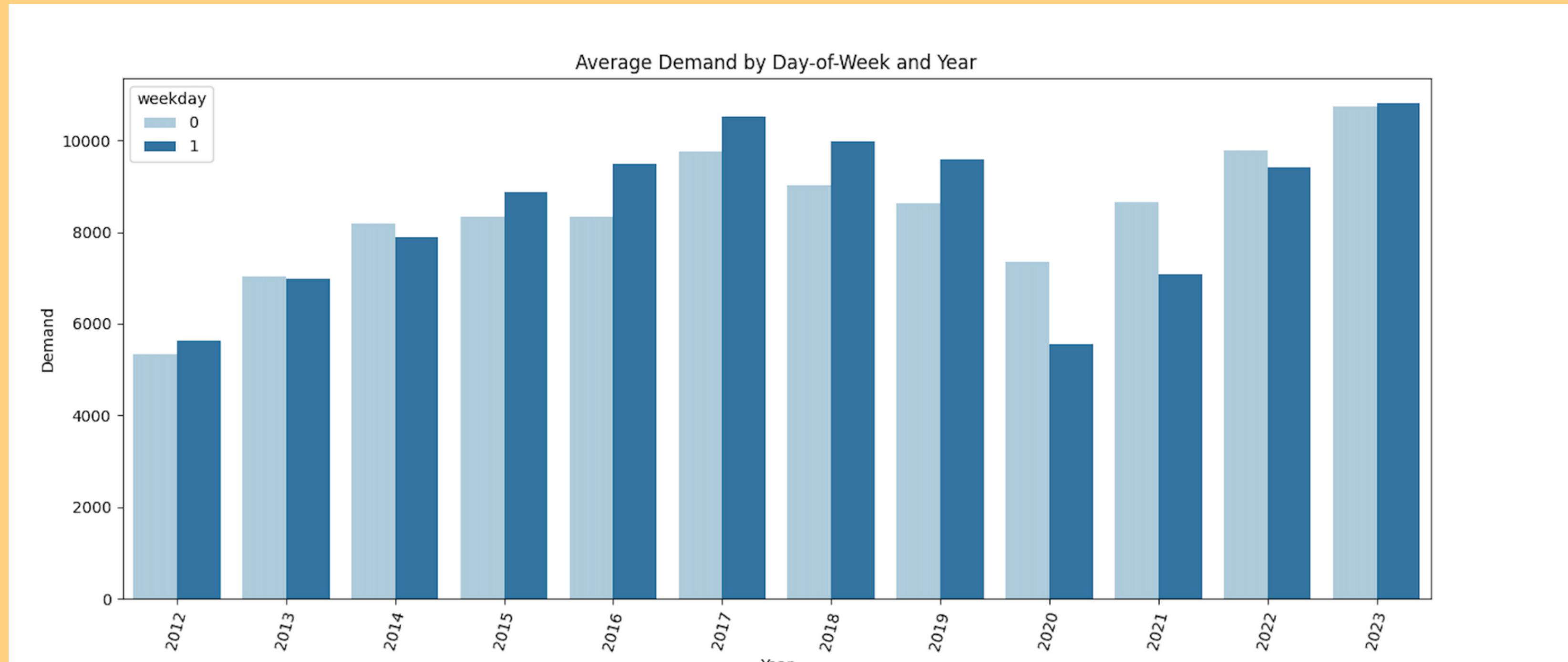


# MONTHLY AVERAGE BIKE DEMAND

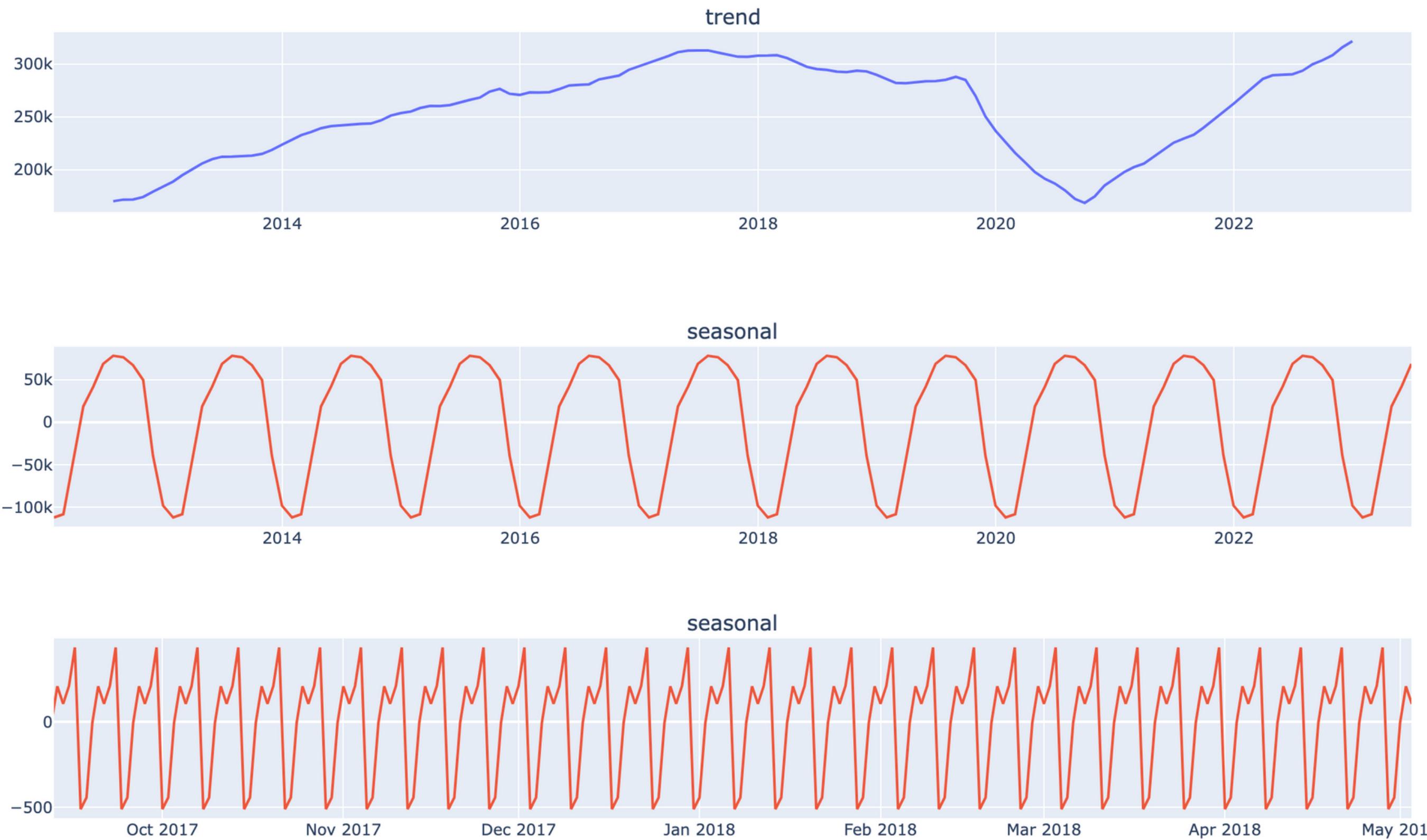


# DAY OF WEEK

# AVERAGE BIKE DEMAND

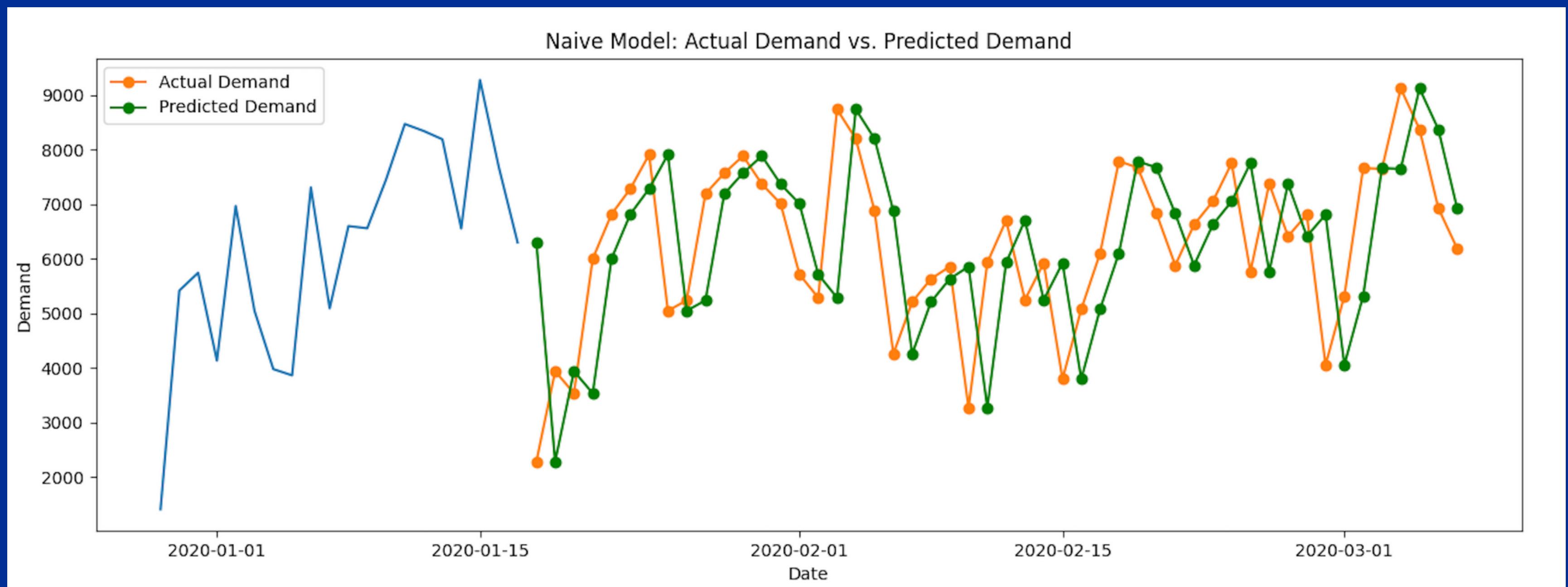


# TIME SERIES DECOMPOSITION



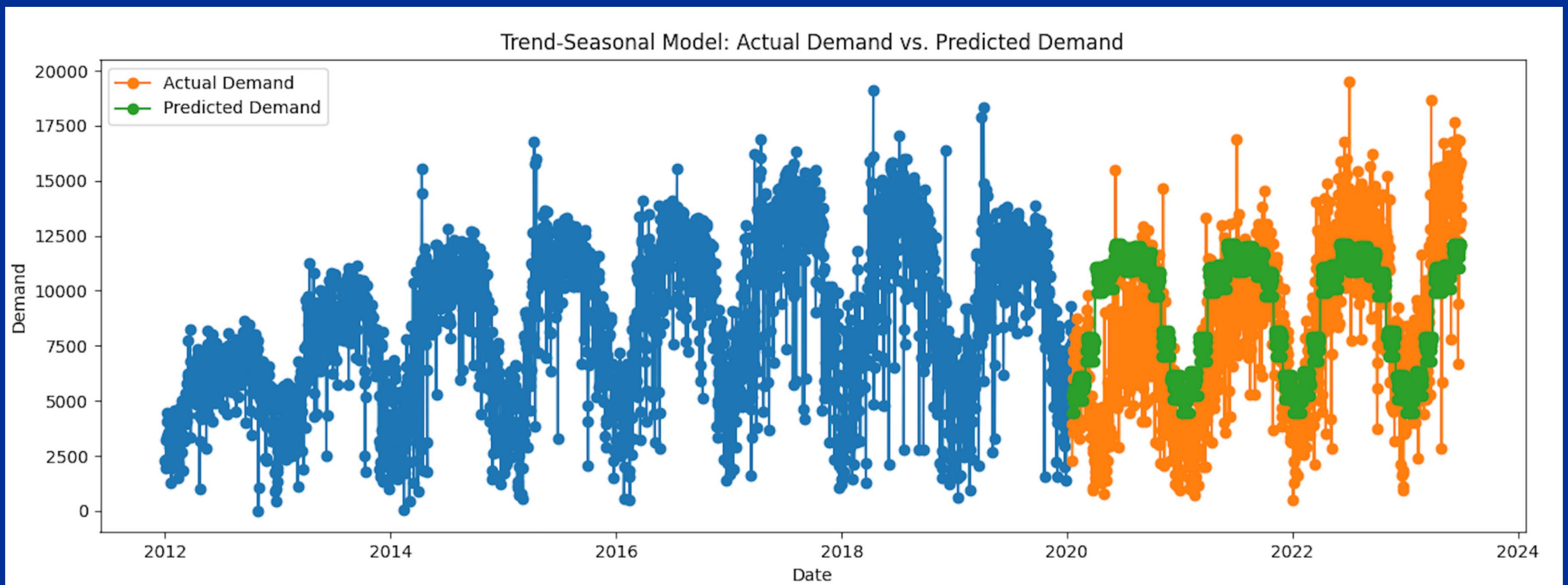
# BASELINE MODELS

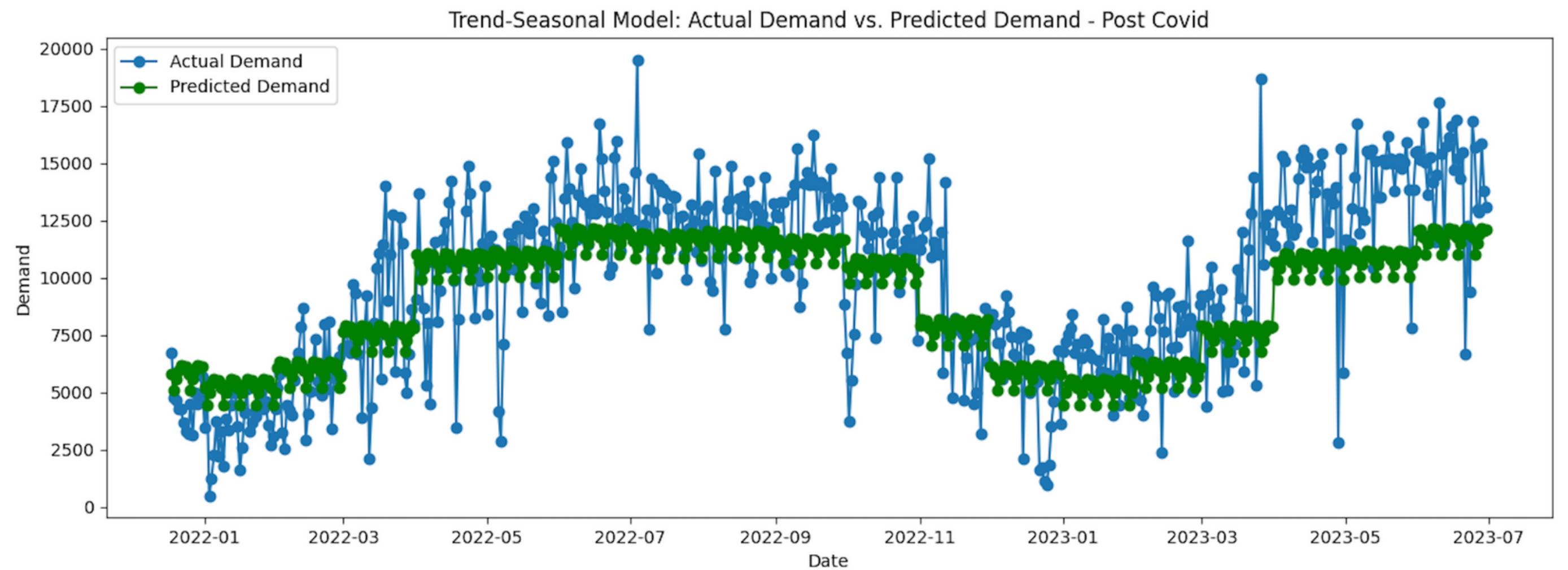
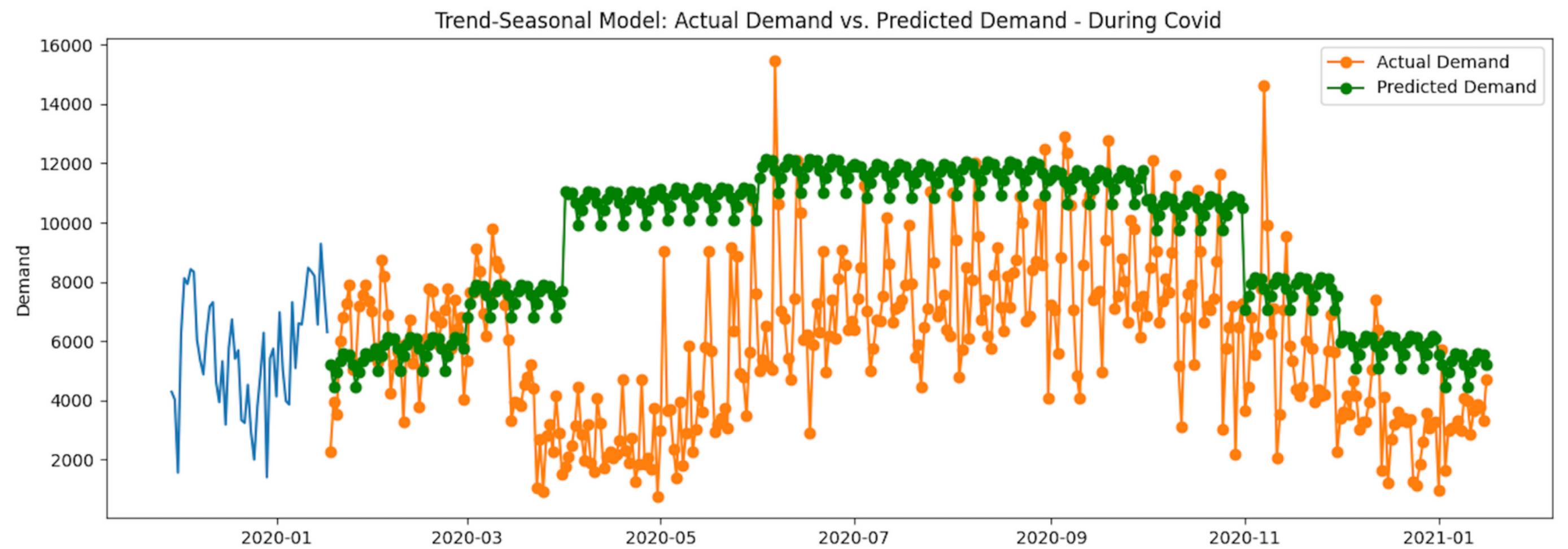
- The first baseline model is a **Naive model**. Since we intend to provide short-term forecasts, our first baseline model will assume that the predicted value at time  $t$  will be equal to the actual value of demand at time  $t-1$ .
  - **MSE = 5,933,717**



# BASELINE MODELS

- In the second baseline model, we extract the **trend and seasonalities** from our training data and use them to forecast demand.
  - **MSE = 11,349,103**





# **NEXT STEPS**

**Try to acquire data related to promotional events**

**Implement XGBoost, SARIMA and RNN-based forecast models**

# THANK YOU!

# QUESTIONS?

