



Group 4

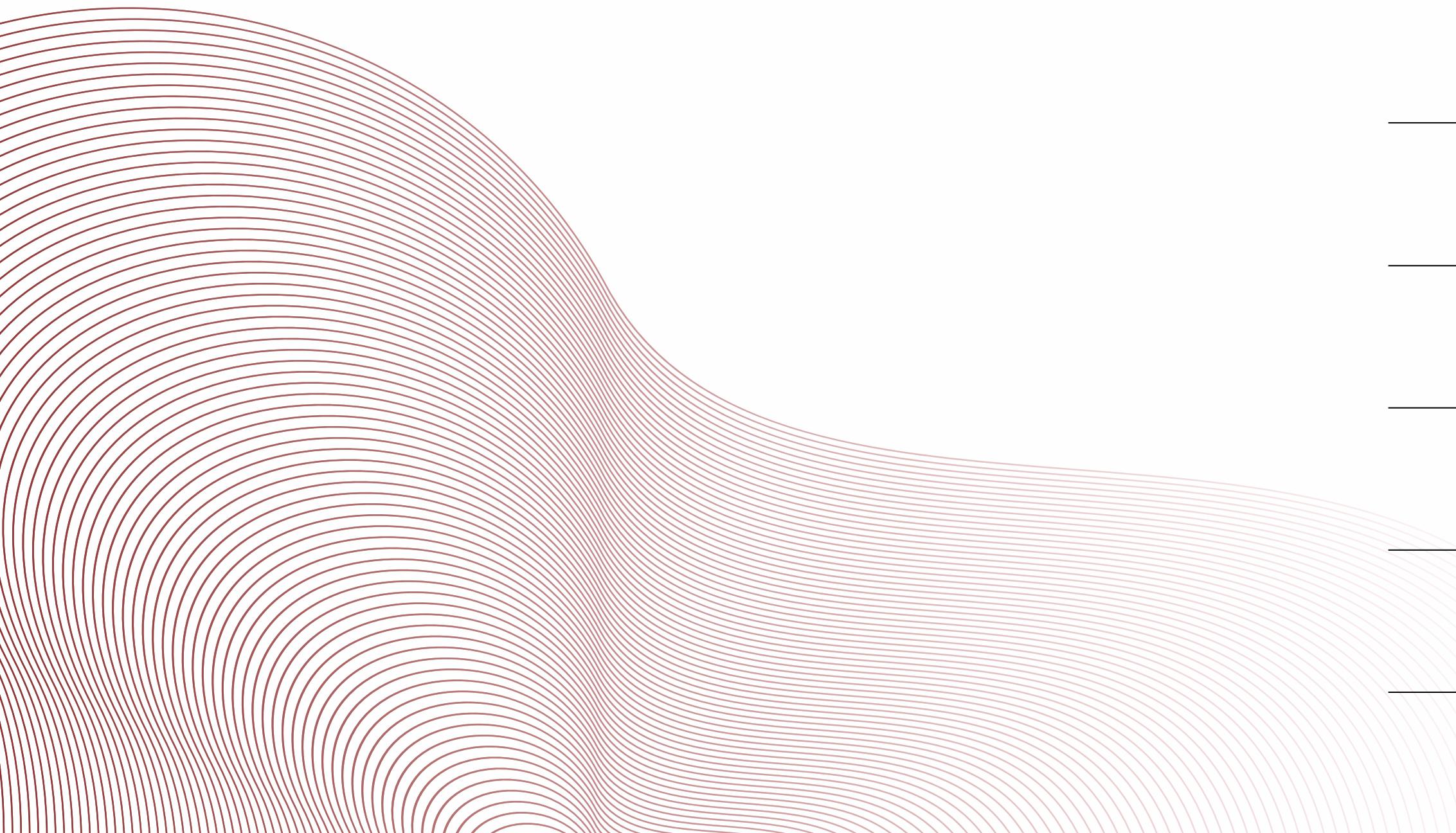
FALL 2023

MAVERICK CAPSTONE PROJECT PRESENTATION

 This is not a Maverik Presentation

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AGENDA



Intro

Business Problem

Approach

EDA

Models

Results

VAR Model Demo

Thank you

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About Maverik

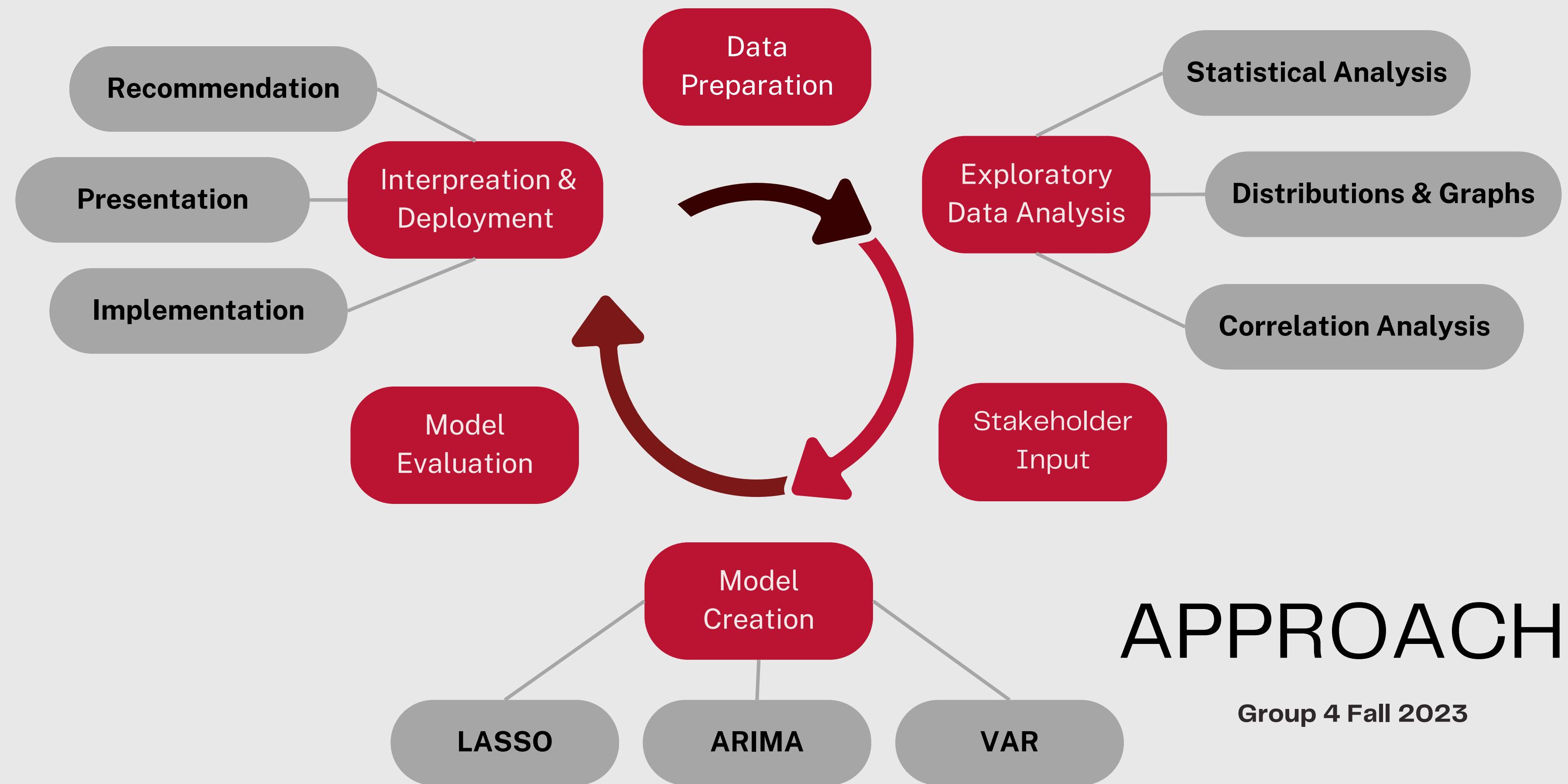
- **Metrics:** Food Sales, Inside Sales, Diesel and Unleaded
- Data was composed by **time series** and **qualitative**

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BUSINESS PROBLEM

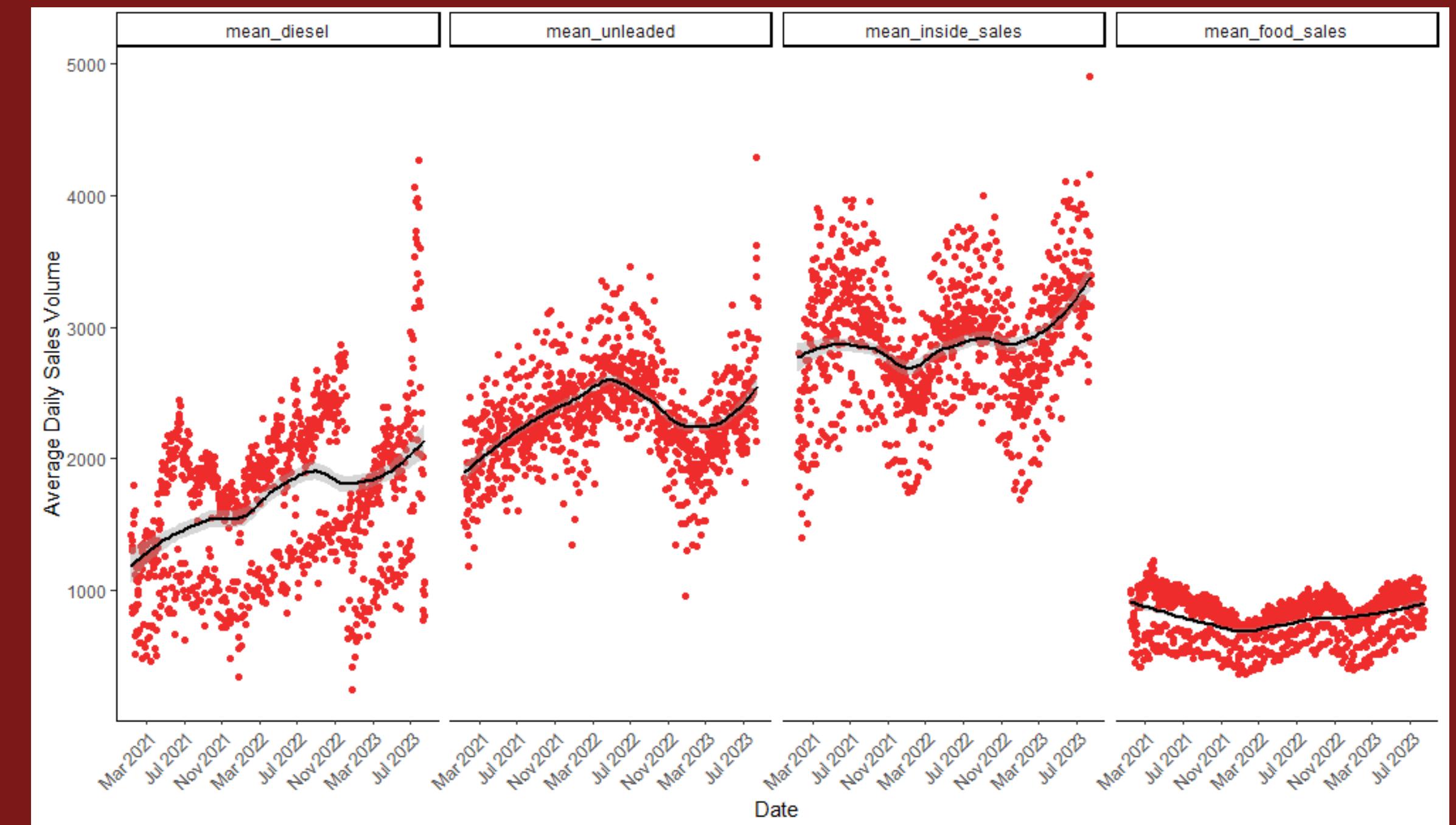
- Maverik faces the unique challenge of **forecasting and evaluating first-year sales** performance expectations for each new location.
- Insufficient historical data, complex sales predictors, varying trends, and market fluctuations **complicate modeling efforts for new stores**
- An **accurate forecasting model** will enable Maverik to improve financial planning, develop strategies, and provide a more **accurate initial ROI documentation**



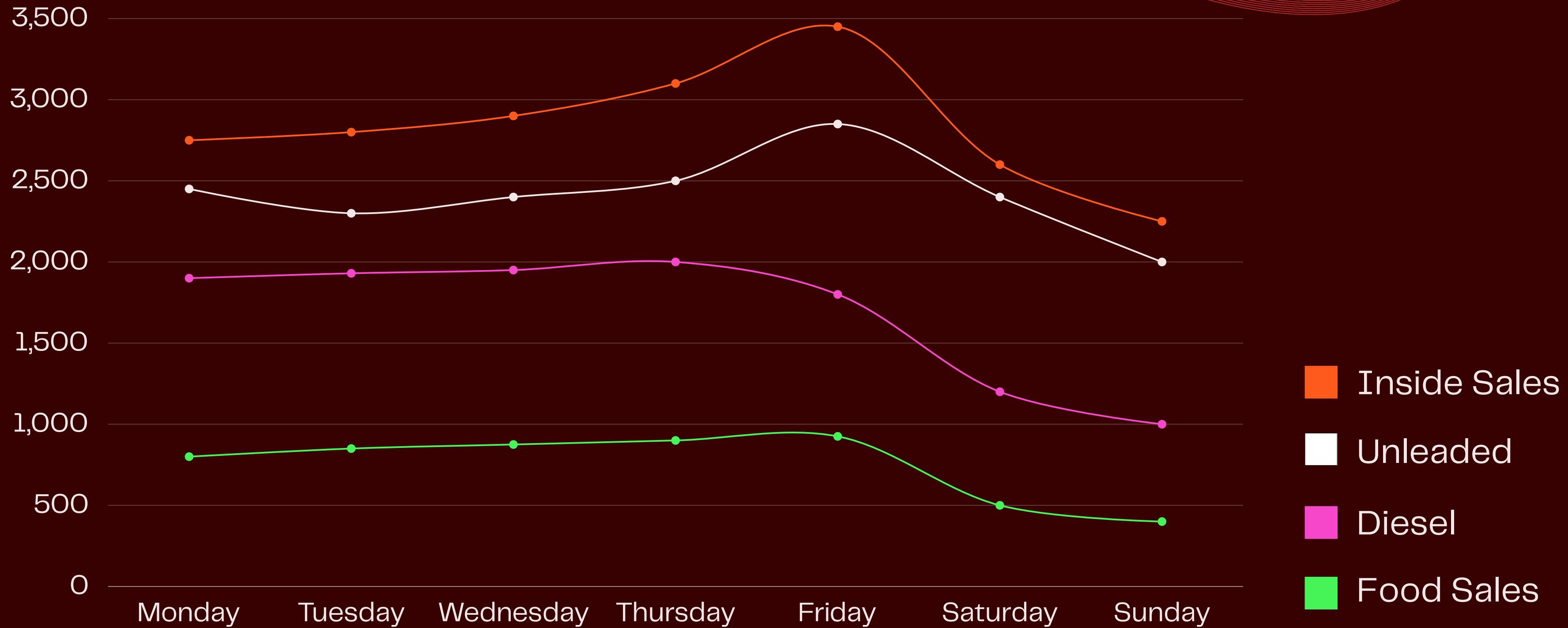
Exploratory Data Analysis

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Sales By Target Variable Category



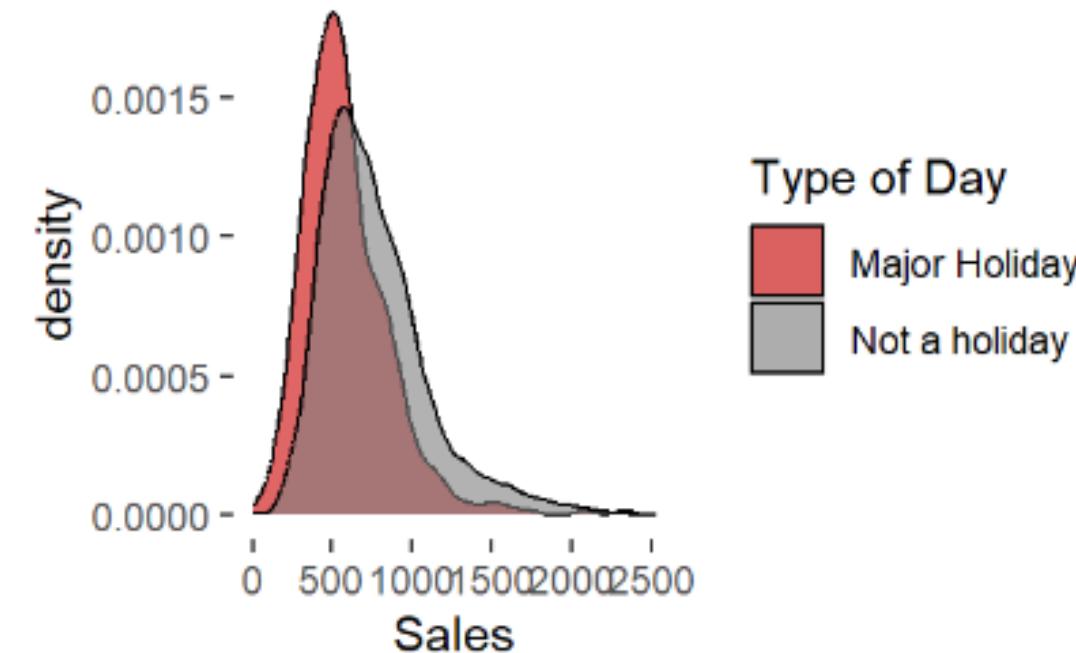
Sales Variation By Day Of The Week



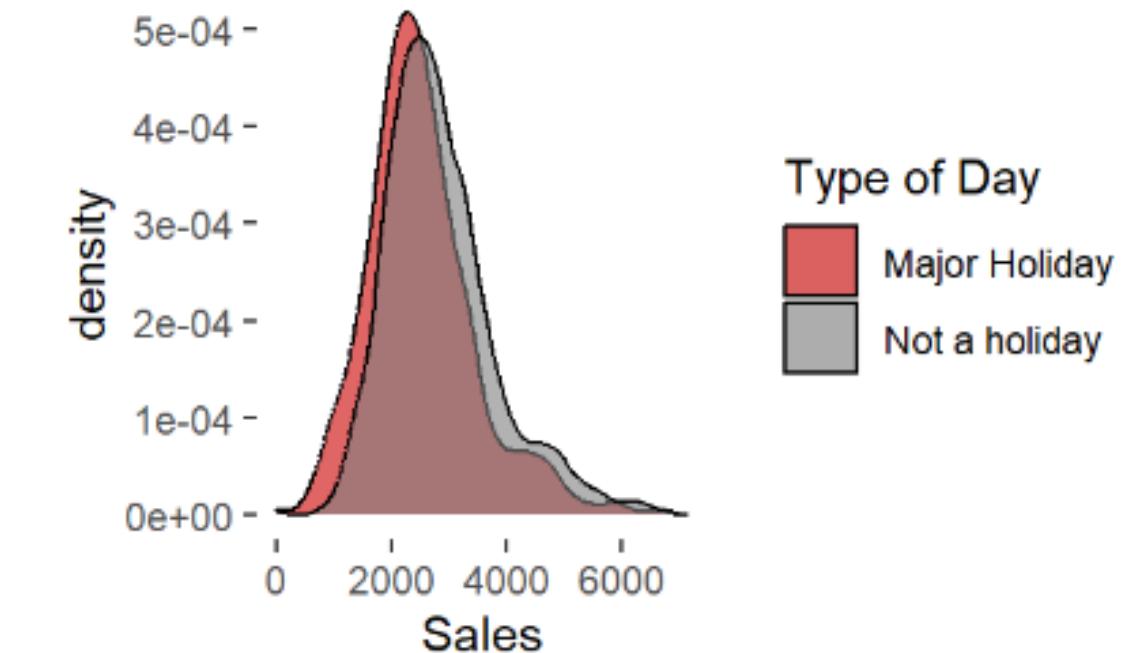
Holidays

Distributions for the four different metrics for Major Holidays Vs Non Major Holiday days. Major holidays may negatively affect business at Maverik, at least on the actual day of the holiday.

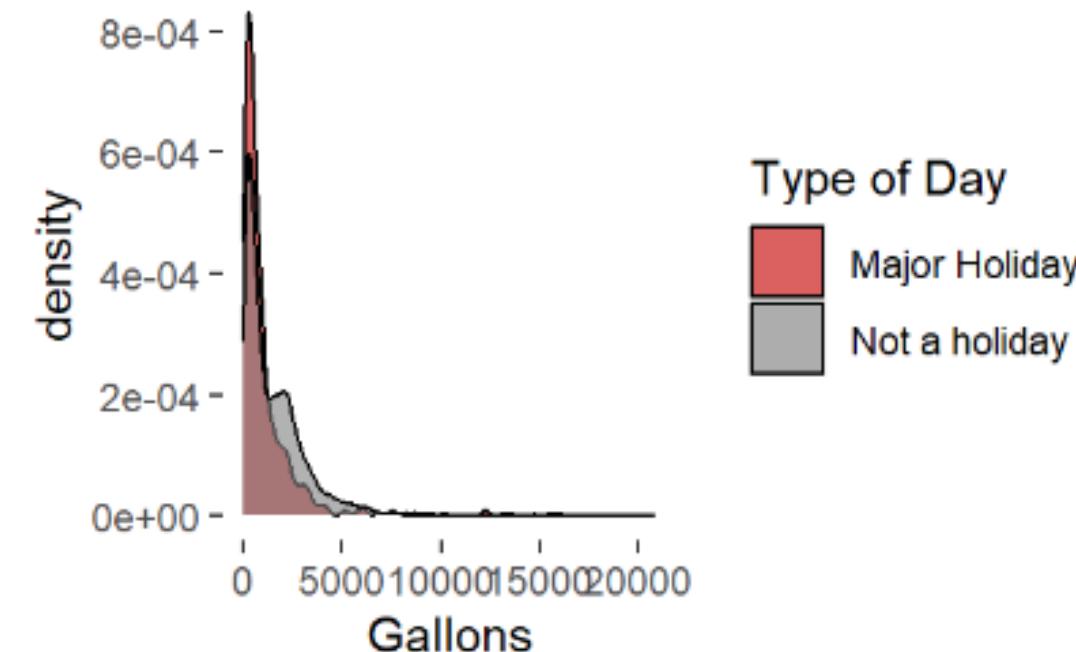
Food Service Sales Distributions



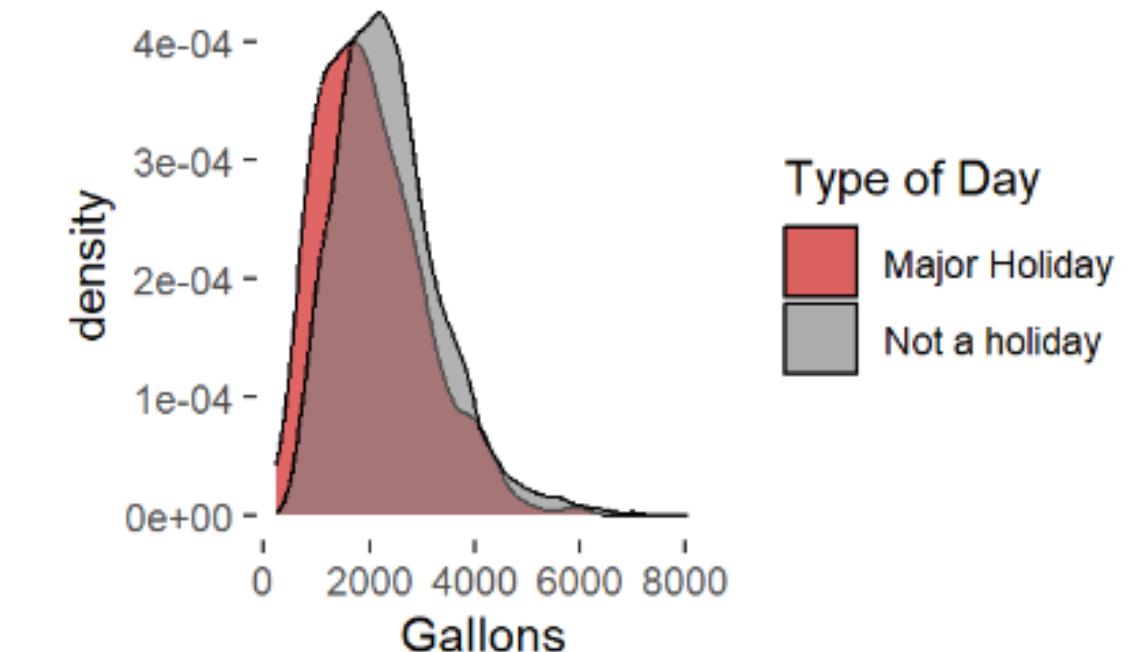
Inside Sales Distributions



Diesel Gallons Sold Distributions

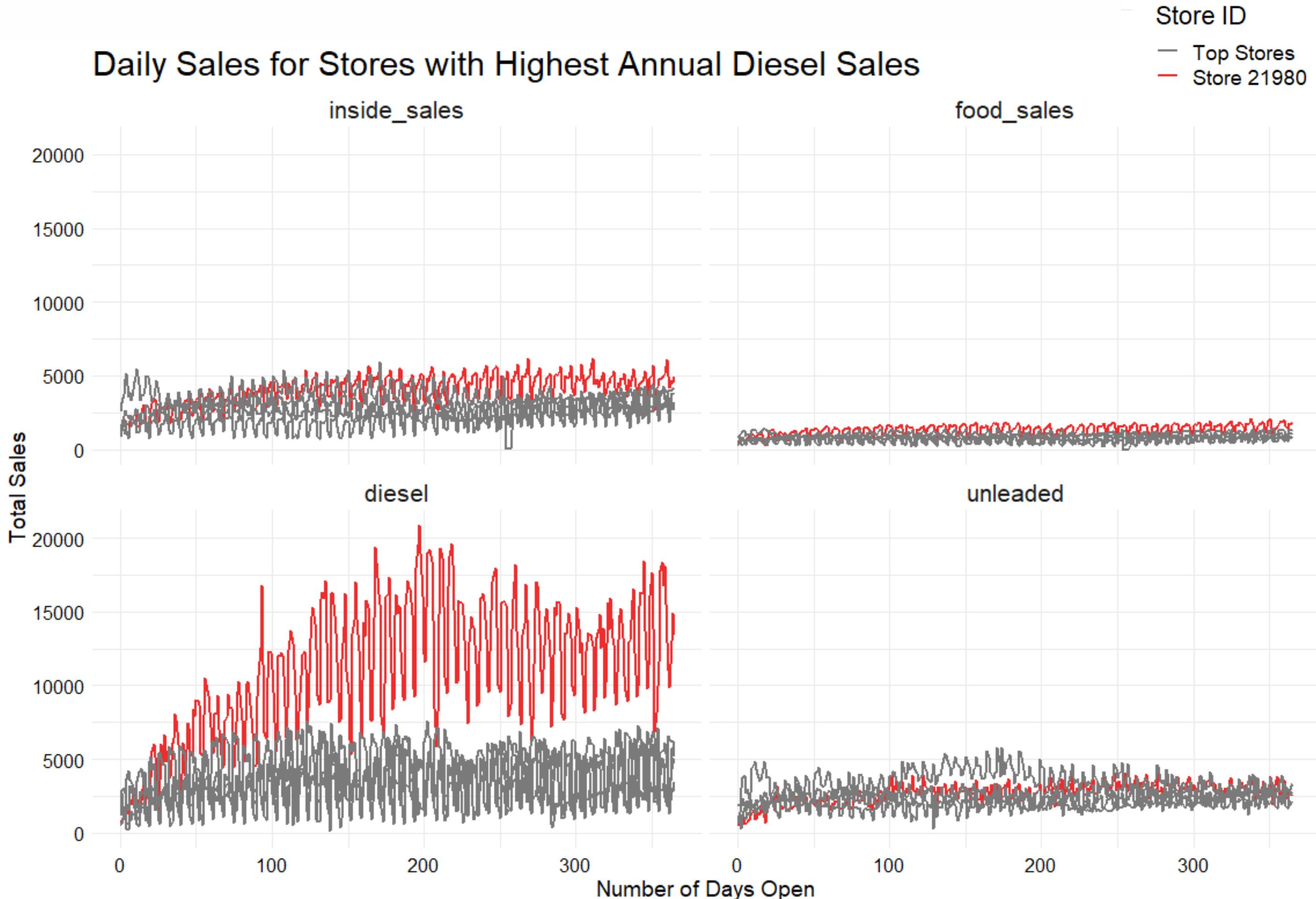


Unleaded Gallons Sold Distributions



DAILY SALES

Selected Stores



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LASSO

Creation of a **loop** in which previous sales metrics would be added as a **lag historical data for prediction.**

VAR

We trained the model on the **mean values by each observed day**, using the **80% training set**.

ARIMA

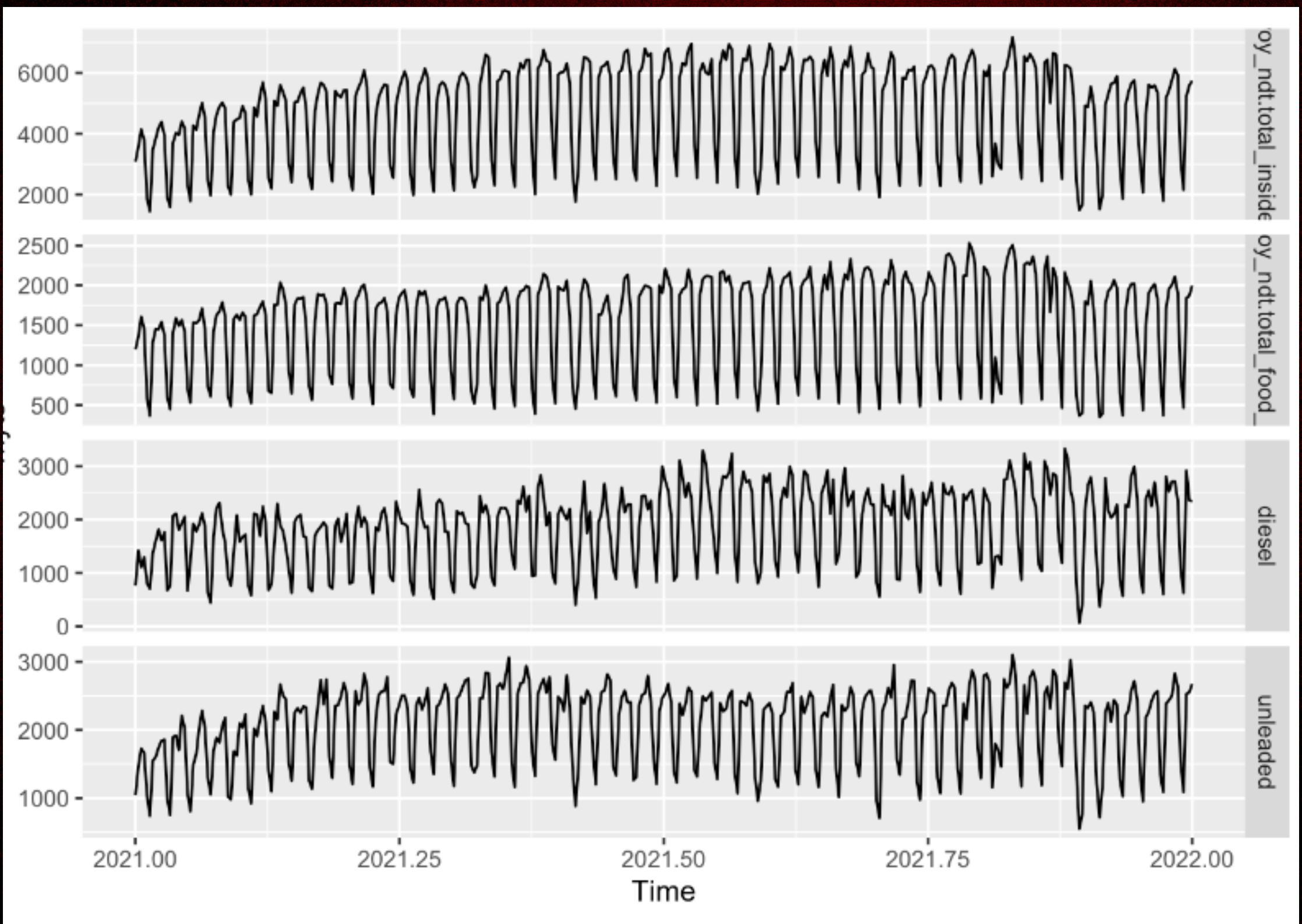
Creation of a model capable of **incorporating lagged time effects, qualitative factors, and detect seasonality trends.**

MODELING

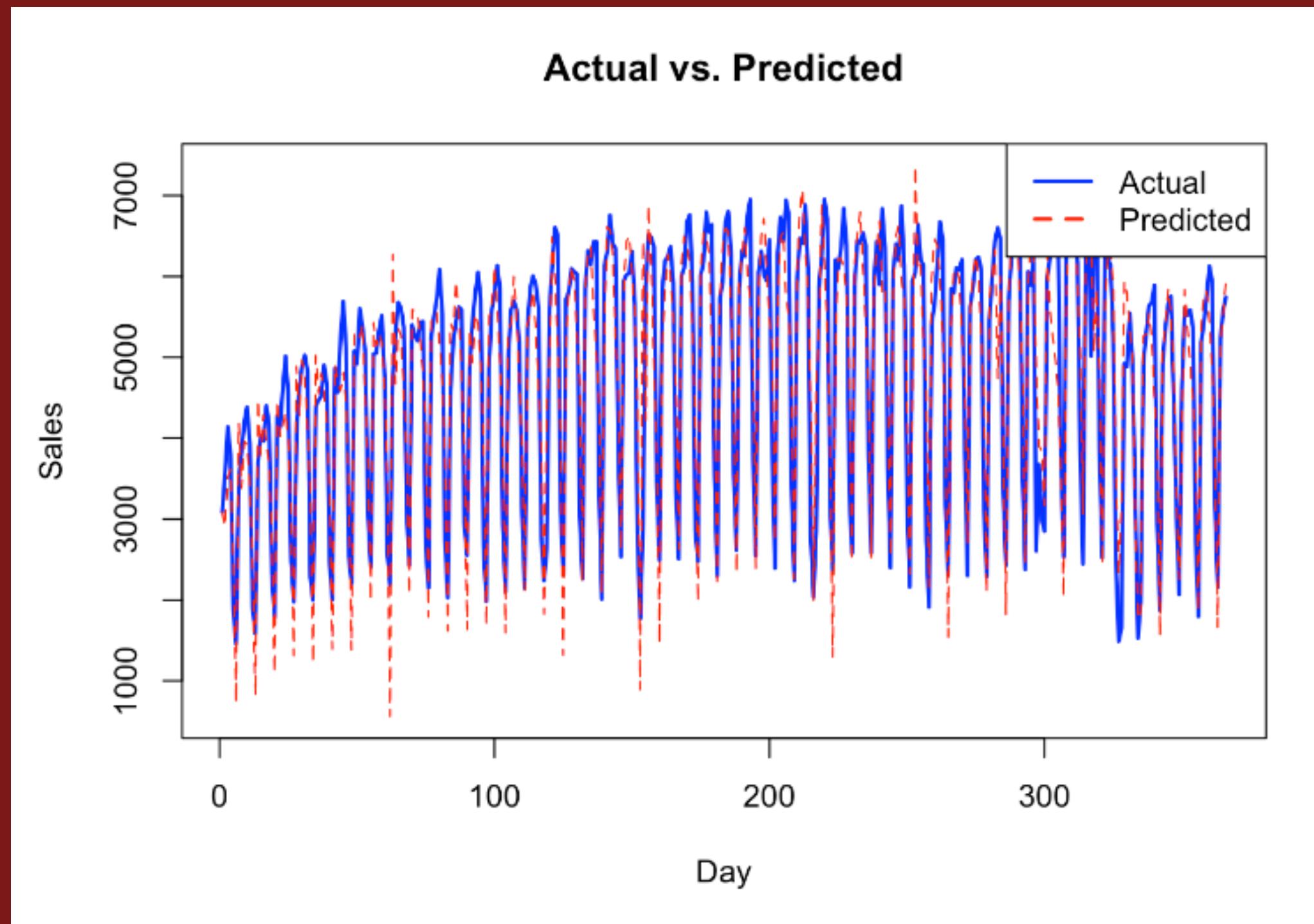
Different Models Implemented

DATA

The Nature of the Data
presented in the Dataset
and How it Impacts
Model Creation



ARIMA



Actual Vs Predicted Results

The limitations of the dataset nature made the creation of a singular ARIMA model on all the available information difficult. Instead each store had to be treated as a singular time series object for Arima to succeed.

RMSE Between Models

Metric	ARIMA RMSE	VAR RMSE	Benchmark RMSE
Merch two week pred rmse	1220149	306819	268521
Merch three week pred rmse	1196306	291722	243858
Food two week pred rmse	316649	115923	68860
Food three week pred rmse	310470	110660	66252
Unleaded two week pred rmse	759050	198680	302827
Unleaded three week pred rmse	734270	202672	259909
Diesel two week pred rmse	447000	1309861	558546
Diesel three week pred rmse	445735	1288705	482976

Application

Vector Autoregressive Model Demo

https://h52d0s-karson-eilers.shinyapps.io/mav_app_final/

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Thank You
