Stock Market Analysis

Reliance Industries

P195 GROUP 4

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ABSTRACT

FORECASTING

Forecasting is a technique that uses historical data as inputs to make informed estimates that are predictive in determining the direction of future trends.
Traders and analysts use forecasts in valuation models, to time trades, and to identify trends.
Forecasts are often predicted on historical data.
Forecasting has applications in a wide range of fields where estimates of future conditions are useful. Depending on the field, accuracy varies significantly.
Investors utilize forecasting to determine if events affecting a company, such as sales expectations, will increase or decrease the price of shares in that company. Forecasting also provides an important benchmark for firms, which need a long-term perspective of operations.

INTRODUCTION

BUSINESS OBJECTIVE

Predict the Reliance Industries Stock price for the next 30 days, i.e. for the month of February. Obtain the open, high, low and close prices from January 2015 to January 2023.

PROJECT ARCHITECTURE

Data Collection → EDA & Data Cleaning → Data Visualization → Model Building → Model Deployment

LIMITATIONS

When the factors that lead to what is being forecast are not known or well understood such as in stock and foreign exchange markets forecasts are often inaccurate or wrong as there is not enough data about everything that affects these markets for the forecasts to be reliable, in addition the outcomes of the forecasts of these markets change the behavior of those involved in the market further reducing forecast accuracy.

DATA COLLECTION

The data was collected from finance.yahoo, business_standard & in.investing sites.

VARIABLE DESCRIPTION

Date : The day an investor places the buy order in the market or an exchange.
Open : Opening prices of a stock for a particular period of time.
High : High price a stock attained for a particular period of time.
Low : Low price a stock attained for a particular period of time.
Close : Closing prices of a stock for a particular period of time.
Adj Close : The closing price after adjustments for all applicable splits and dividend distributions.
Volume : The number of shares traded in a particular stock, index, or other investment over a specific period of time.
No. of Shares : Units of equity ownership in a corporation. (Units of stocks).
No. of Trades : Purchasing and selling stocks or other assets in a certain company.
Change(%) : The difference between the current price and the last trade of the previous day.

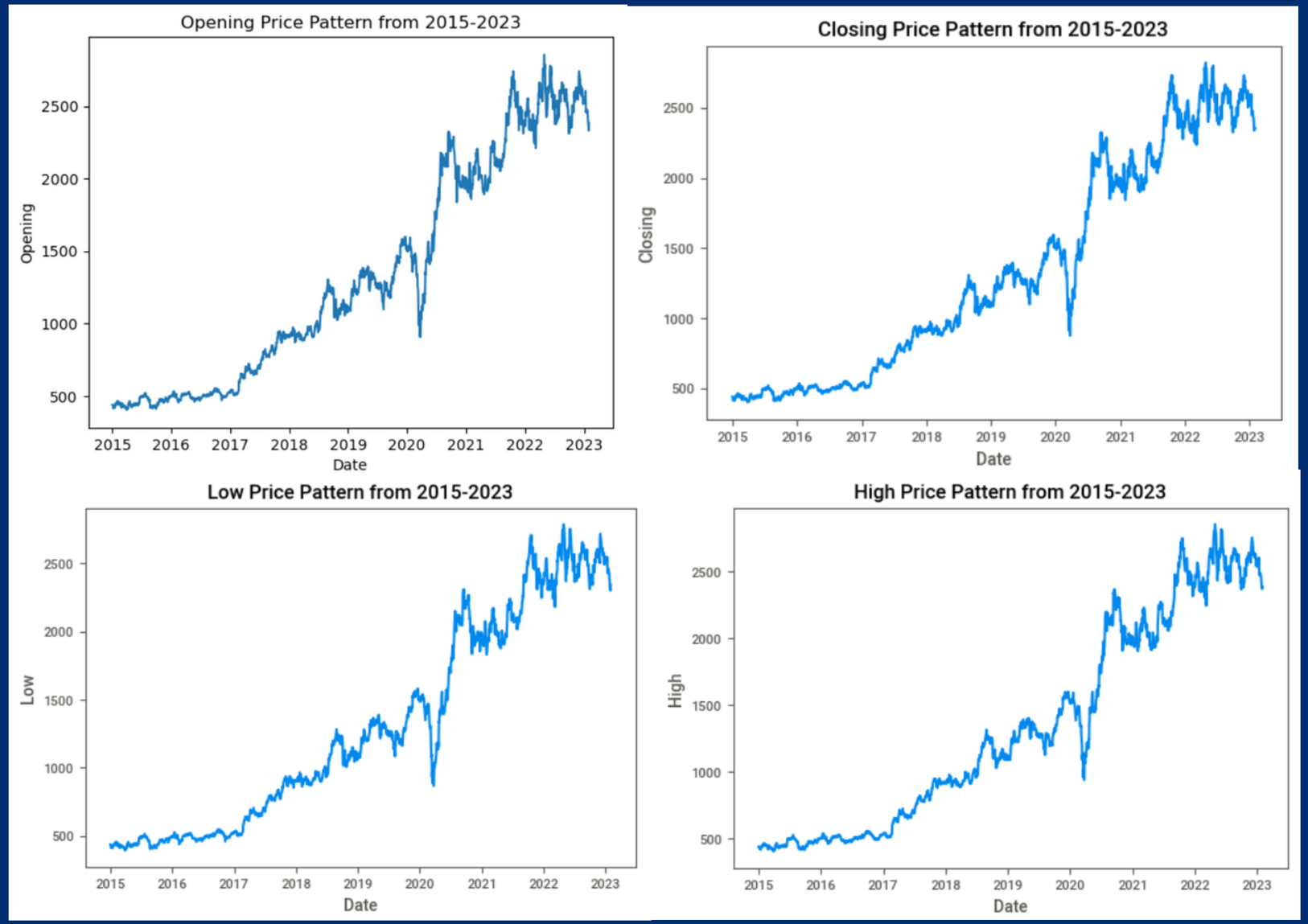
EDA

The main purpose of EDA is to help look at data before making any assumptions. It can help identify obvious errors, as well as better understand patterns within the data, detect outliers or anomalous events, find interesting relations among the variables.

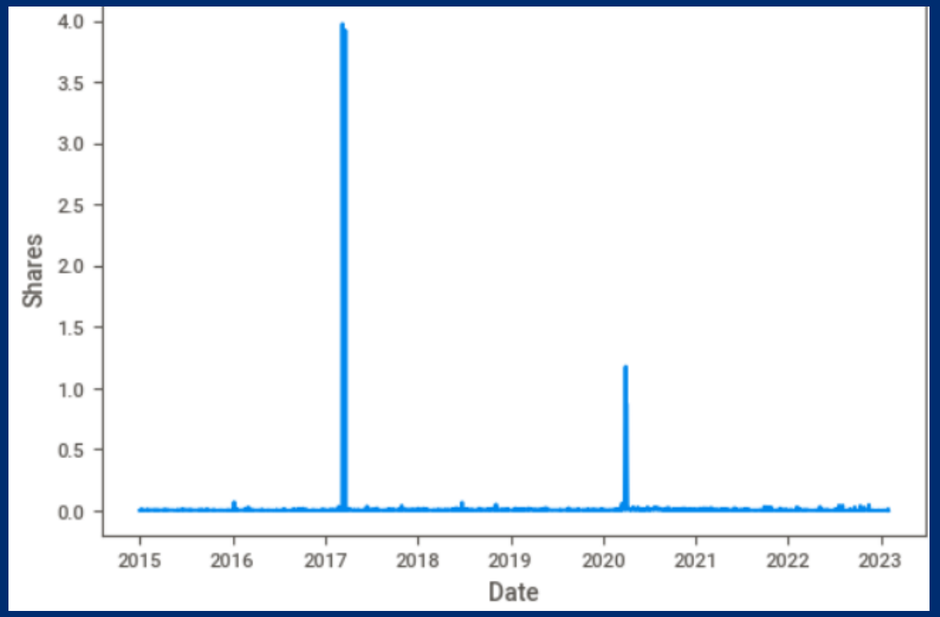
- The shape of the dataset is (1994,10).
- There is a row with null values.
- There are no duplicate values.
- After the data cleaning, i.e. after dropping the null values, the final shape of the dataset is (1993,10).
- From the correlation, open, high, low and close prices are highly positively correlated except the volume.
- info() function is used to print information about the data frame.
- describe() function is used to obtain basic statistical details like mean, standard deviation, percentile, etc.
- Then, Year and Month is extracted using the strftime function.

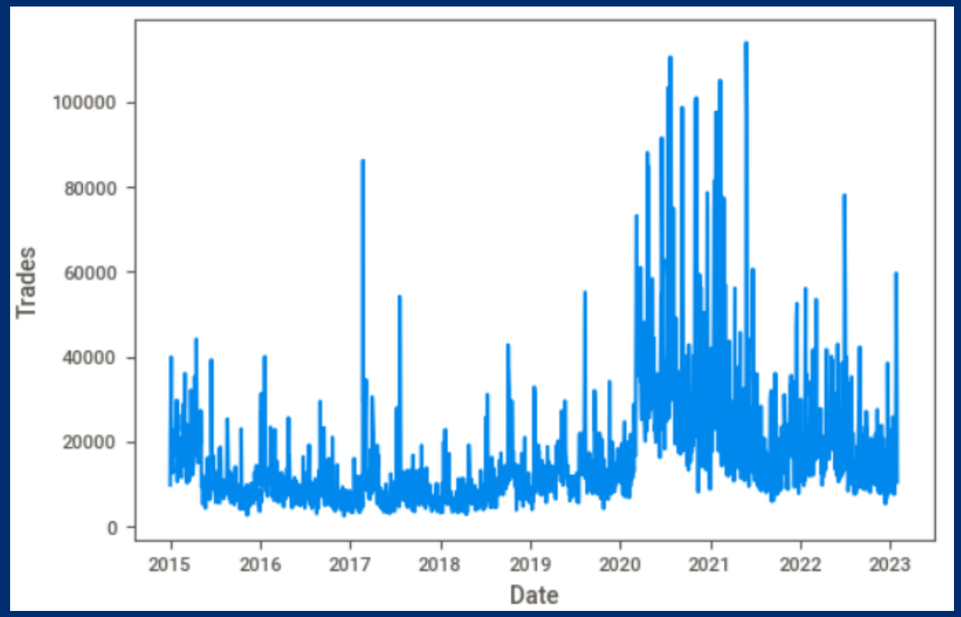
DATA VISUALIZATION

– Open, Close, High & Low Prices Pattern from 2015 to 2023



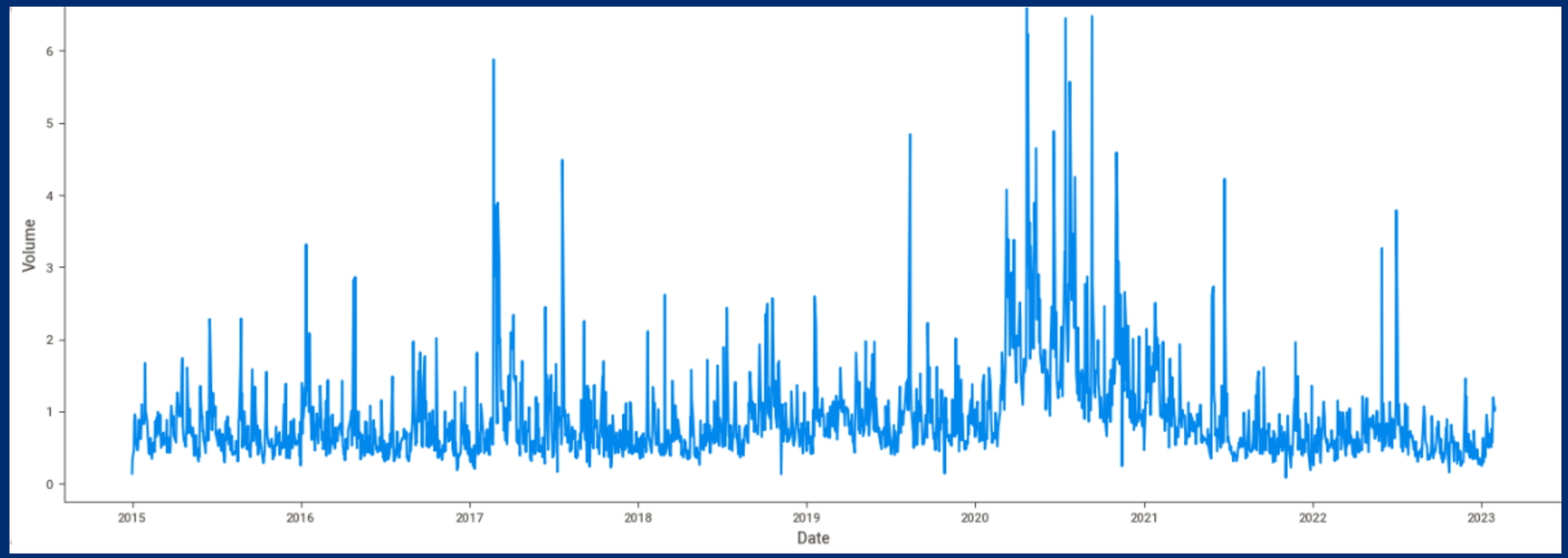
No. of Shares





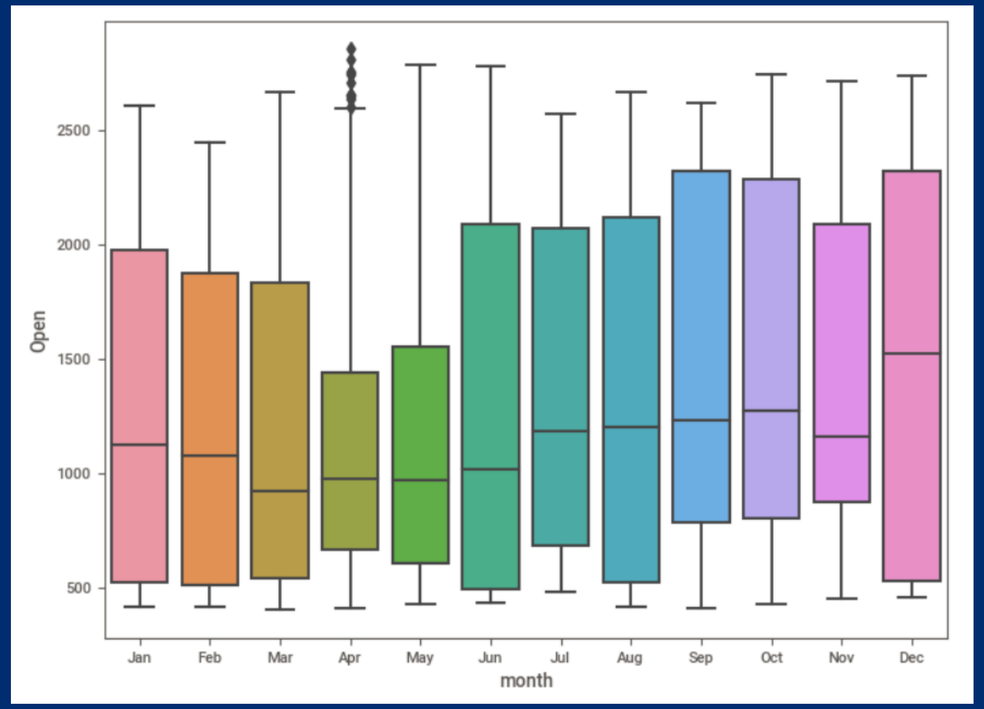
No. of Trades

No. of Volume

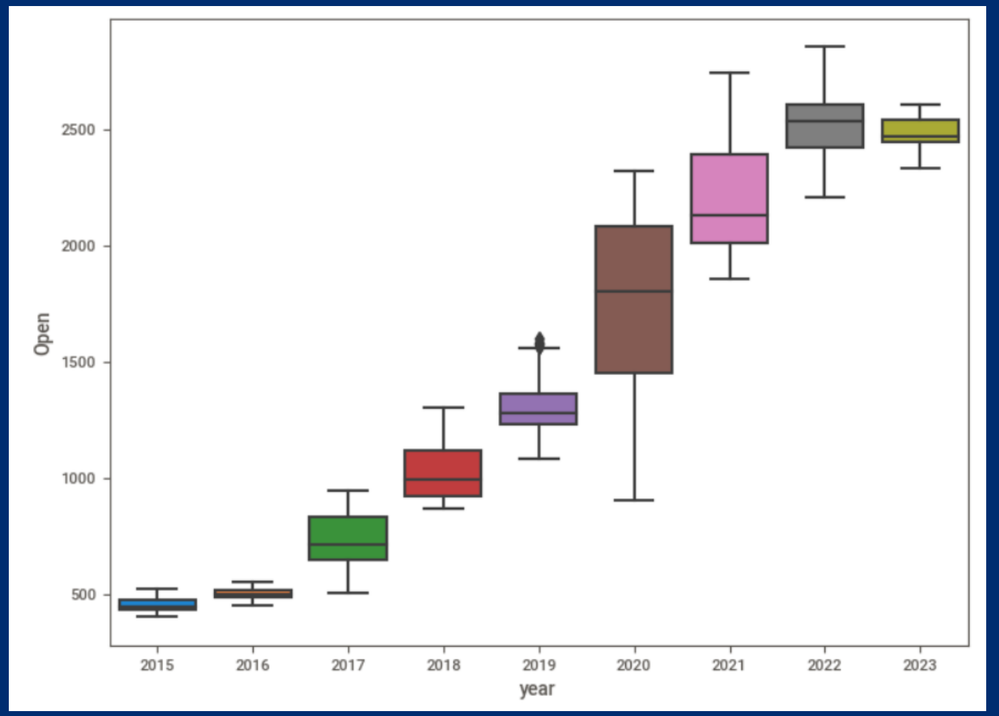


BOXPLOTS

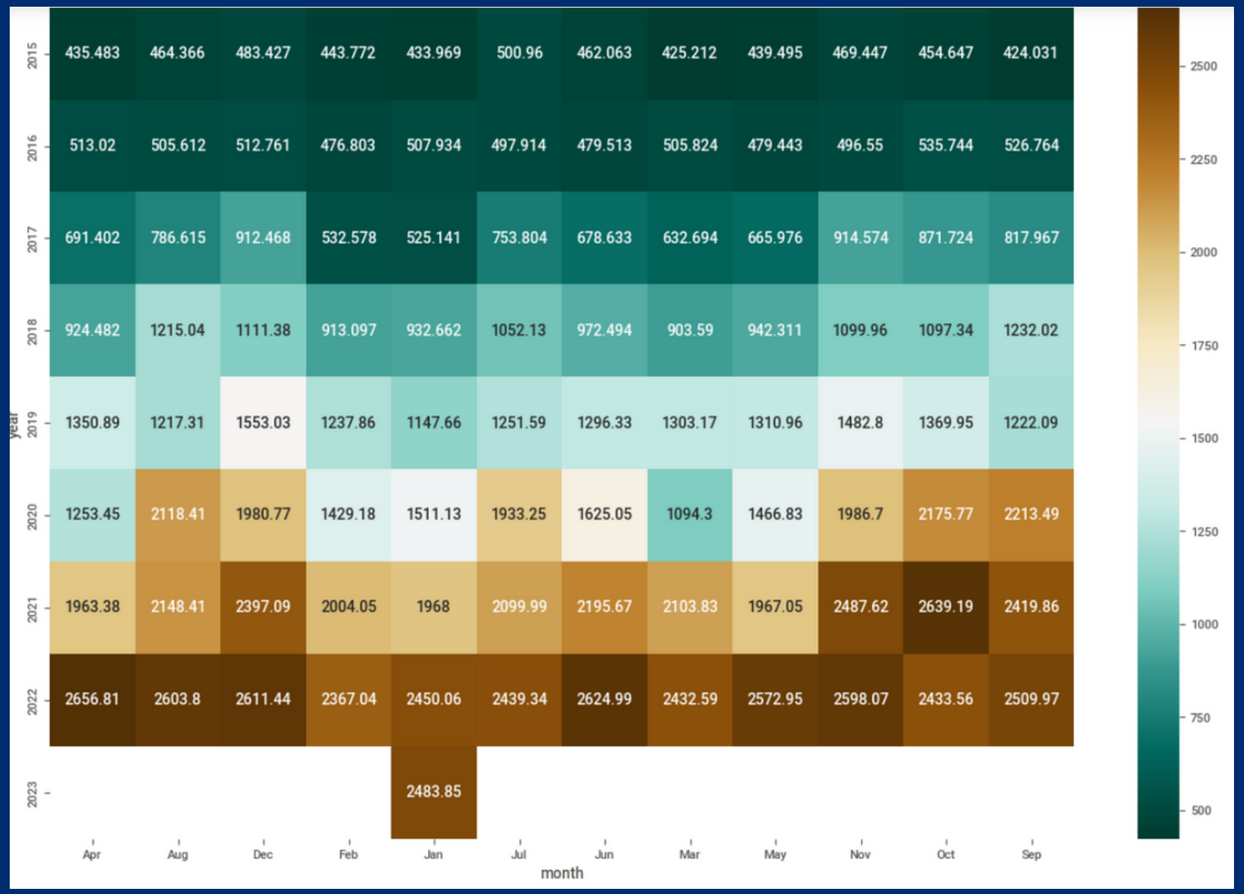
Seasonality

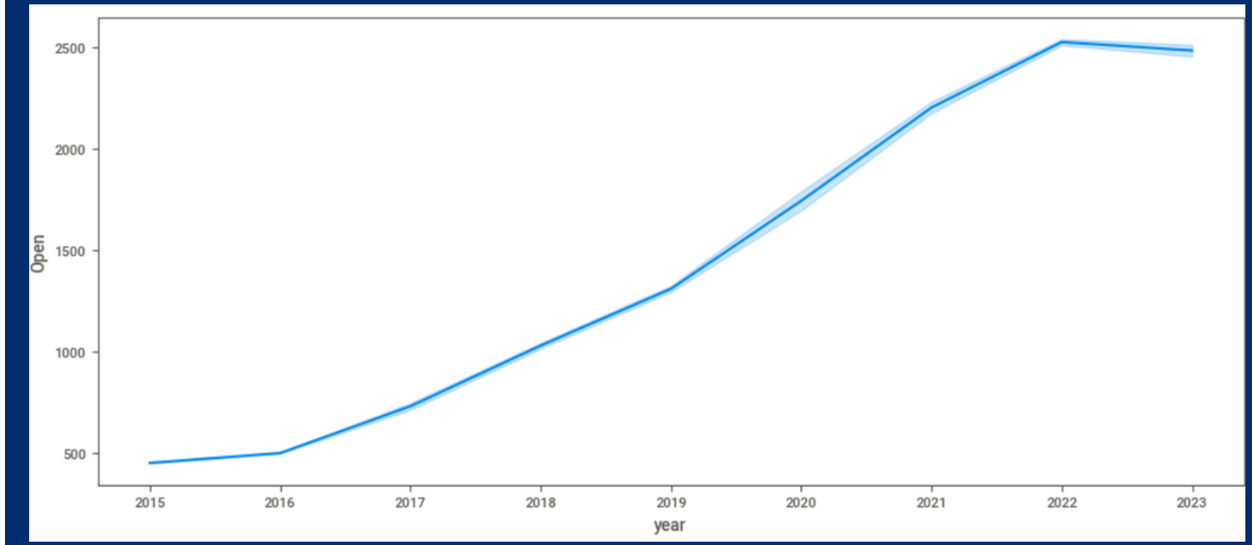


Trend



Heatmap





Level

MODEL BUILDING

Firstly we divided the dataset into train and test data. Where,

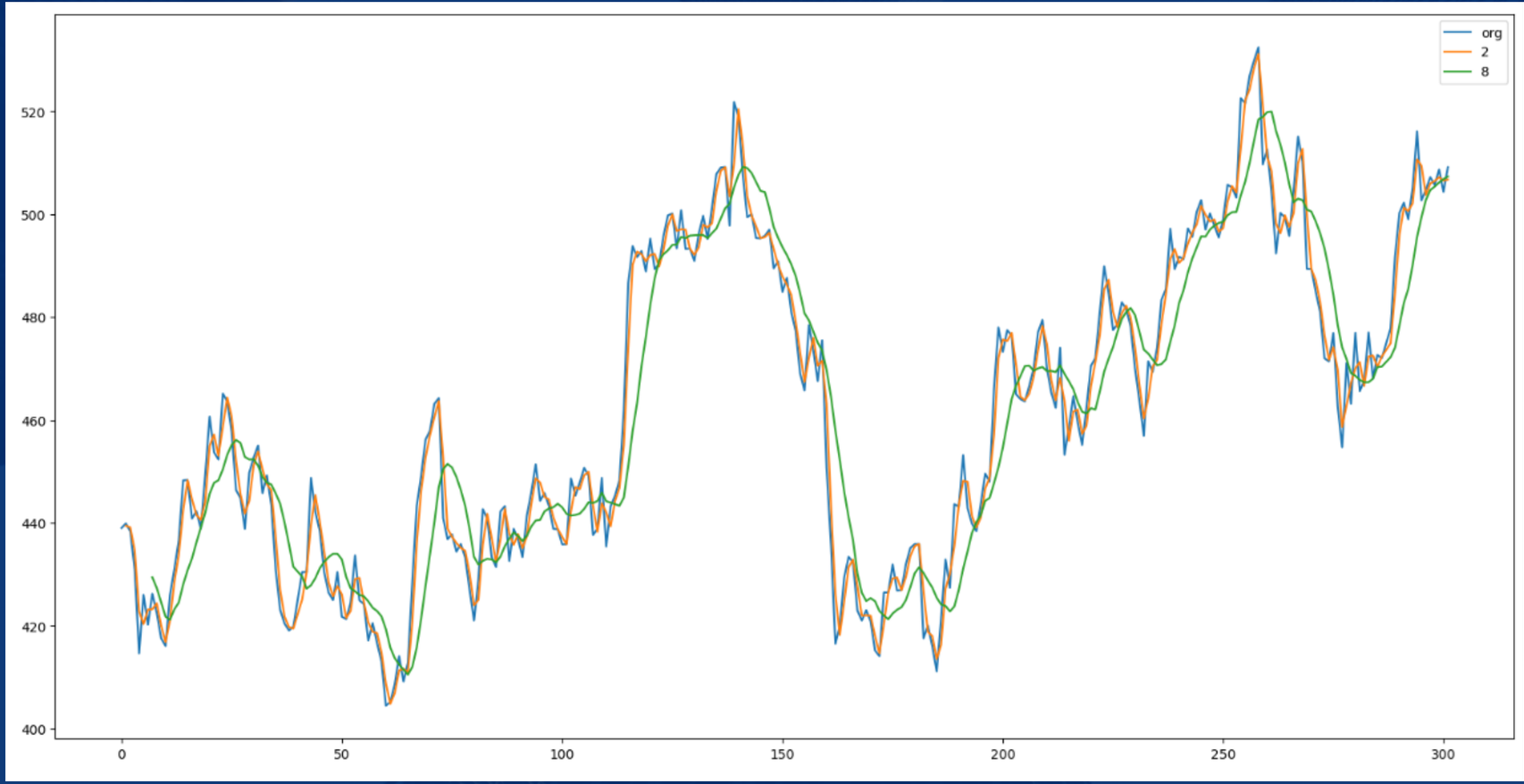
1963 TRAIN

30 TEST

Using matplotlib and statsmodel we plotted the moving average, time series decomposition, ACF & PACF plots.

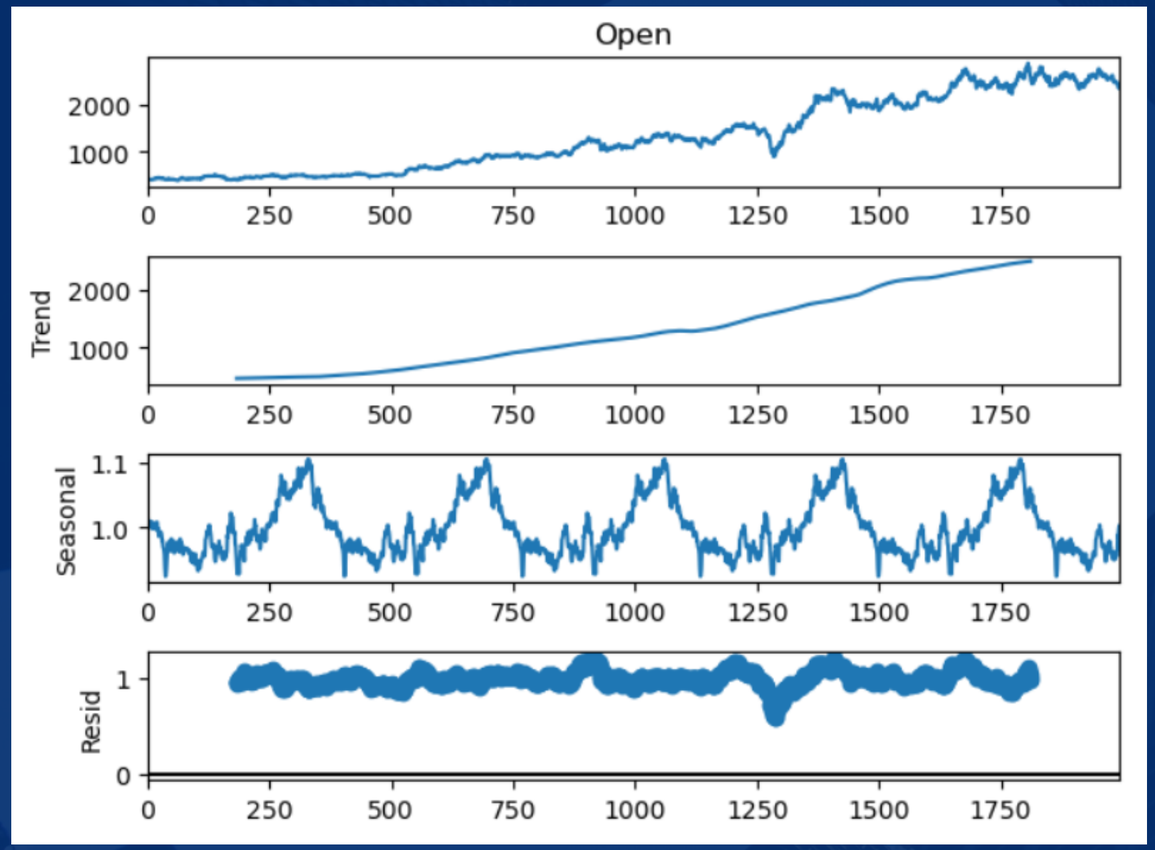
- The running average, also known as moving average or rolling mean, can help filter out the noise and create a smooth curve from time-series data. It can also help highlight different seasonal cycles in the data.
- Time series decomposition is about breaking up a time series into components, most notably: a trend component, a seasonal component and a residual/noise component.
- Autocorrelation function (ACF) and Partial Autocorrelation function (PACF) generally produce plots that are very important in finding the values of p, q and r for Autoregressive (AR) and Moving Average (MA) models.
- An ACF measures and plots the average correlation between data points in time series and previous values of the time series measured for different lag lengths.
- A PACF is similar to an ACF except that each partial correlation controls for any correlation between observations of a shorter lag length.

Moving Average

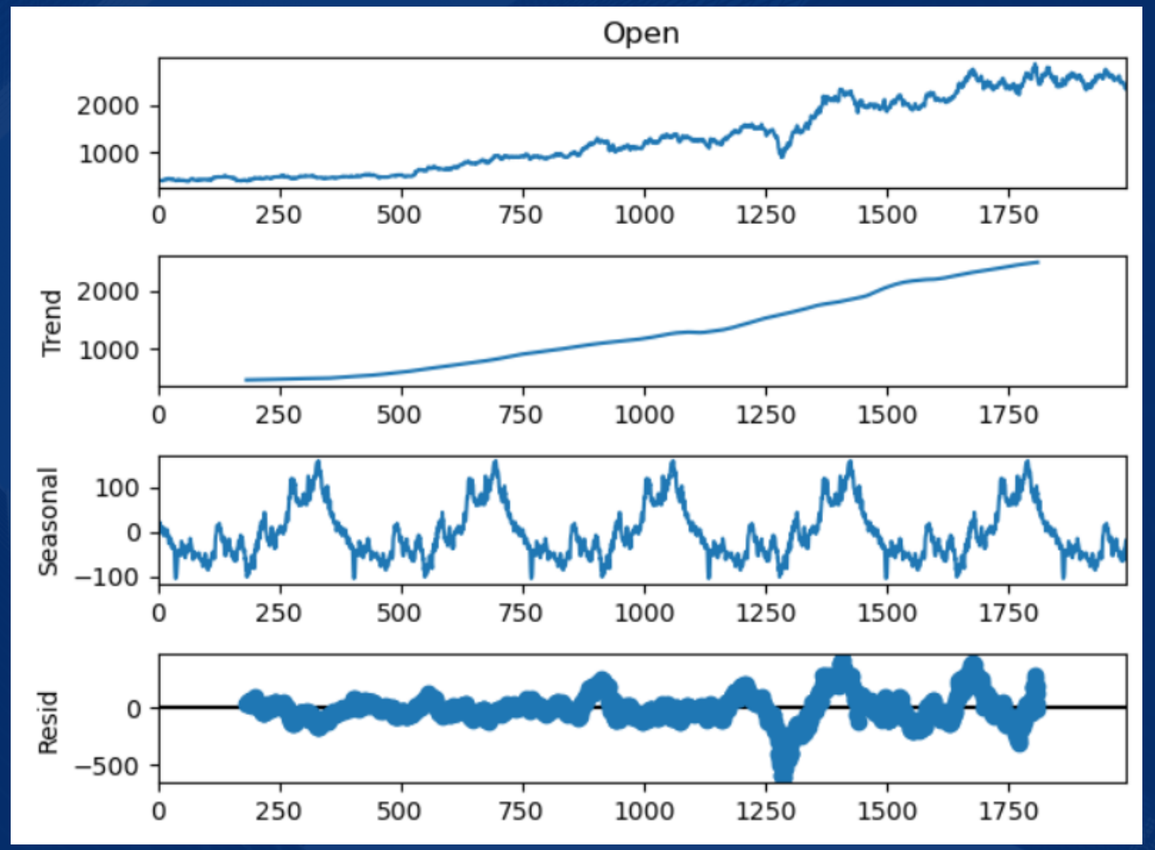


Time Series Decomposition

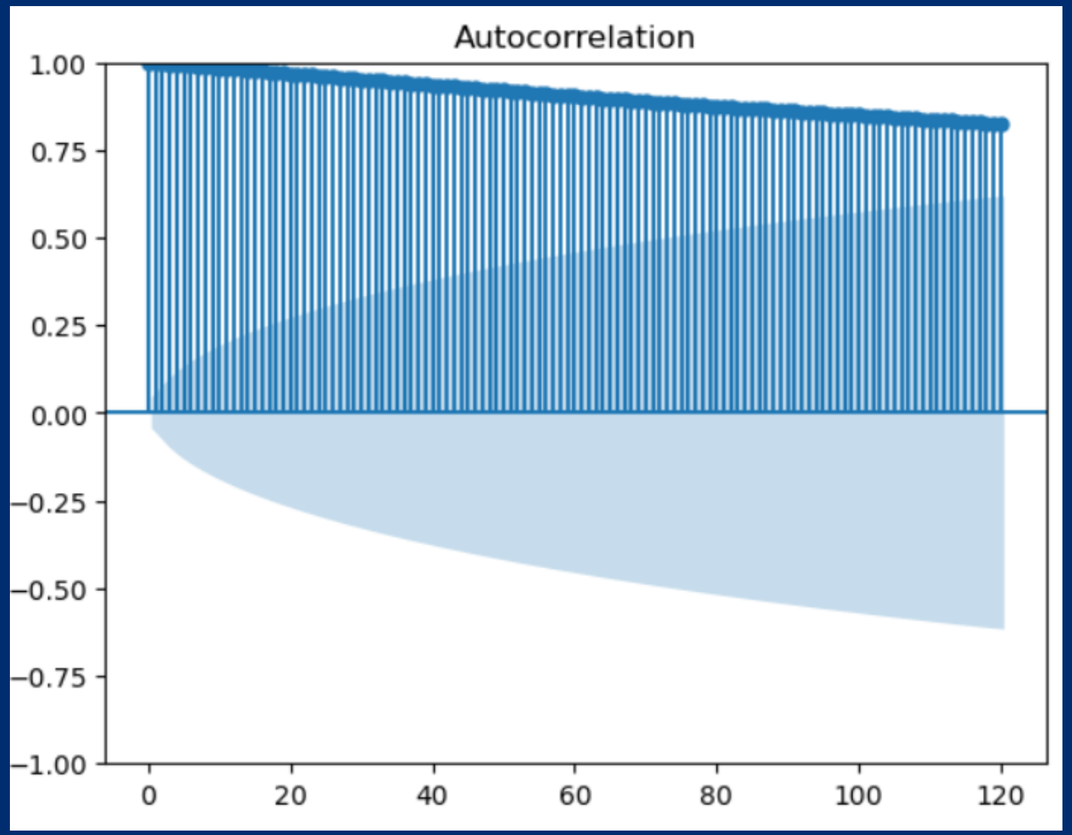
Multiplicative model



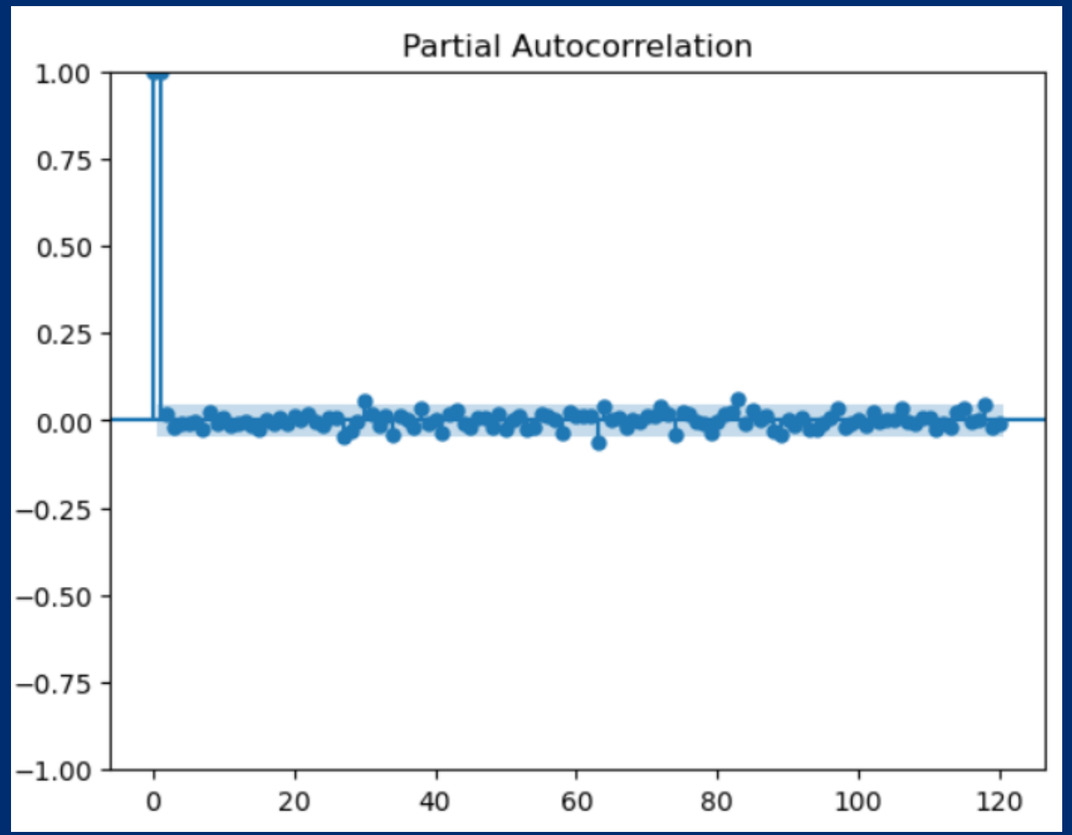
Additive model



ACF Plot



PACF Plot



MAPE

The mean absolute percentage error is the mean or average of the absolute percentage errors of forecasts. Error is defined as actual or observed value minus the forecasted value. Percentage errors are summed without regard to sign to compute MAPE. The closer the MAPE value is to 0 the closer the predictions.

SIMPLE EXPONENTIAL METHOD

Simple Exponential Smoothing is a forecasting method that uses a weighted moving average as the forecast. It is a method for univariate data without a trend or seasonality.

HOLT METHOD

Holt's two-parameter model, also known as linear exponential smoothing, is a popular smoothing model for forecasting data with trend. Holt's model has three separate equations that work together to generate a final forecast. Holt's model uses two parameters, one for the overall smoothing and the other for the trend smoothing equation. The method is also called double exponential smoothing or trend-enhanced exponential smoothing.

HOLTS WINTER EXPONENTIAL SMOOTHING WITH ADDITIVE SEASONALITY AND TREND

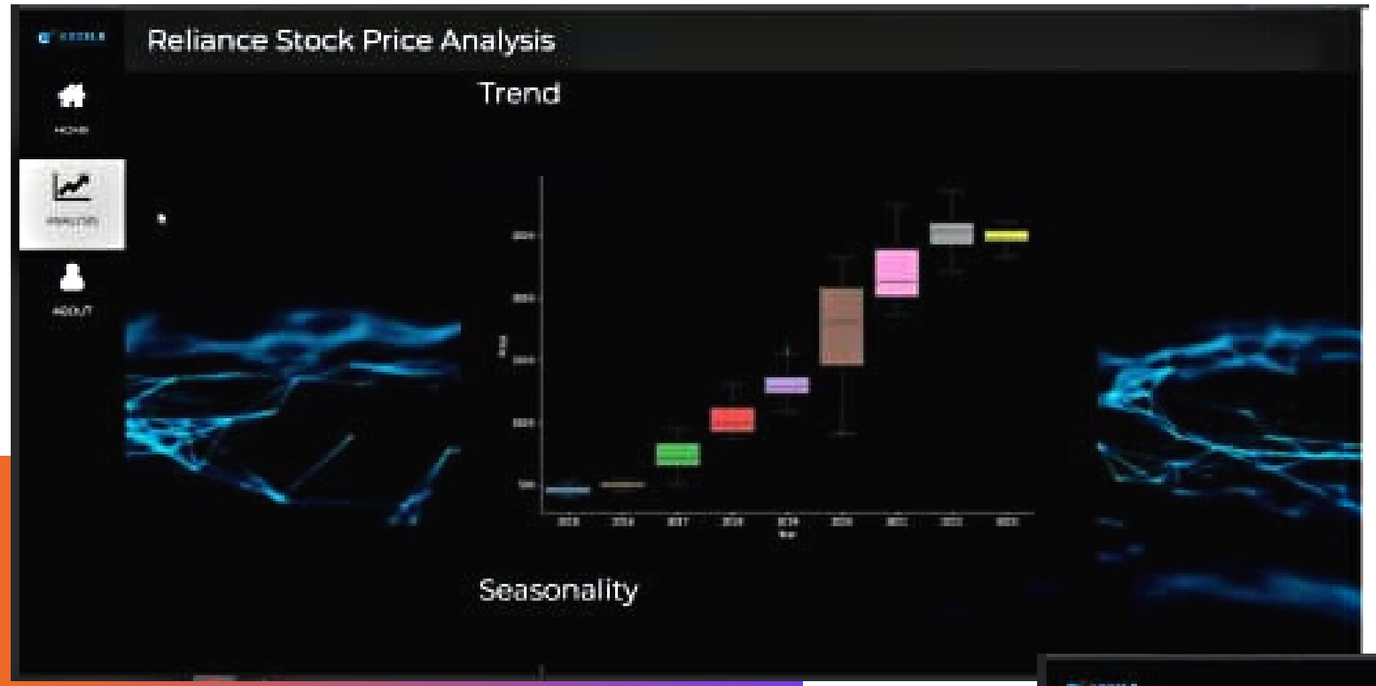
Is an extension of Holt's exponential smoothing that captures seasonality. This method produces exponentially smoothed values for the level of the forecast, the trend of the forecast, and the seasonal adjustment to the forecast. This seasonal additive method adds the seasonality factor to the trended forecast, producing the Holt-Winters' additive forecast. This method is best for data with trend and seasonality that does not increase over time.

HOLTS WINTER EXPONENTIAL SMOOTHING WITH MULTIPLICATIVE SEASONALITY AND TREND

Is similar to the Holt-Winters' additive method. Holt-Winters' Multiplicative method also calculates exponentially smoothed values for level, trend, and seasonal adjustment to the forecast. This seasonal multiplicative method multiplies the trended forecast by the seasonality, producing the Holt-Winters' multiplicative forecast. This method is best for data with trend and with seasonality that increases over time.

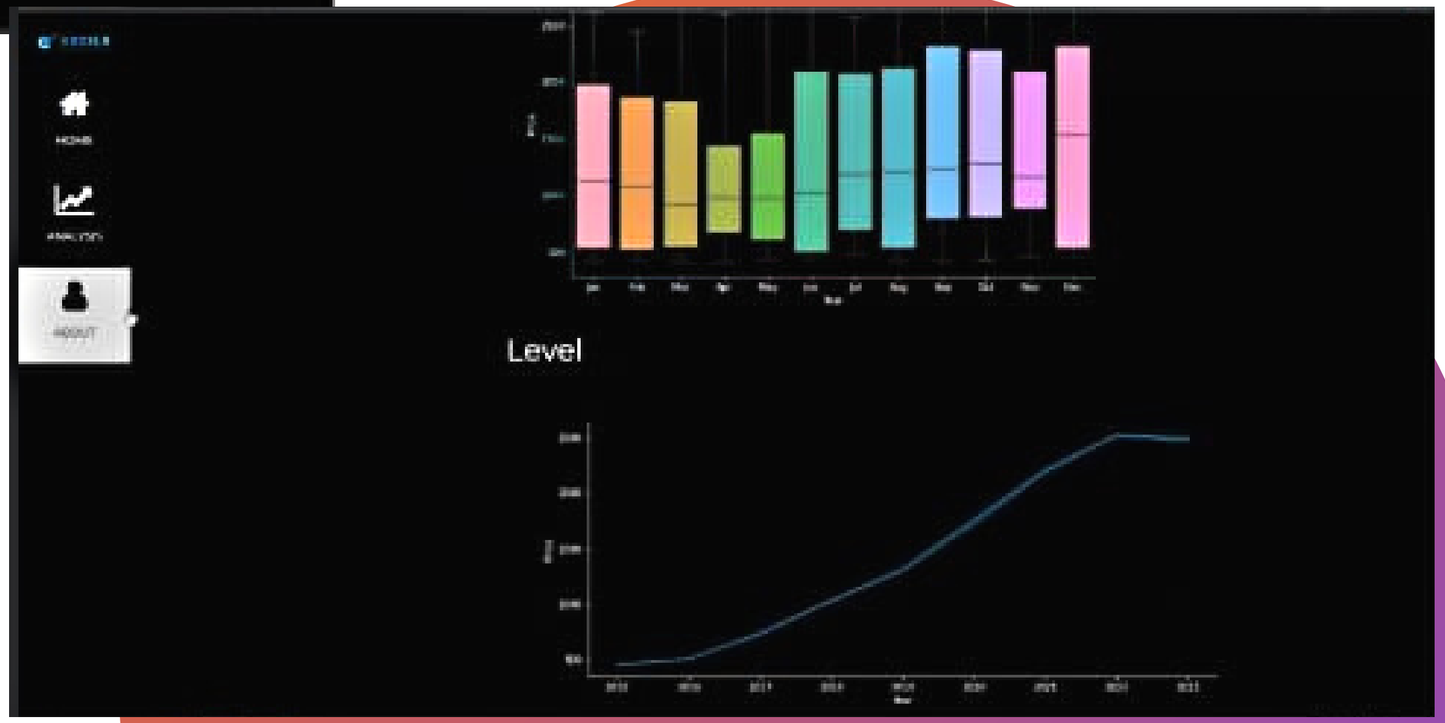
Evaluation

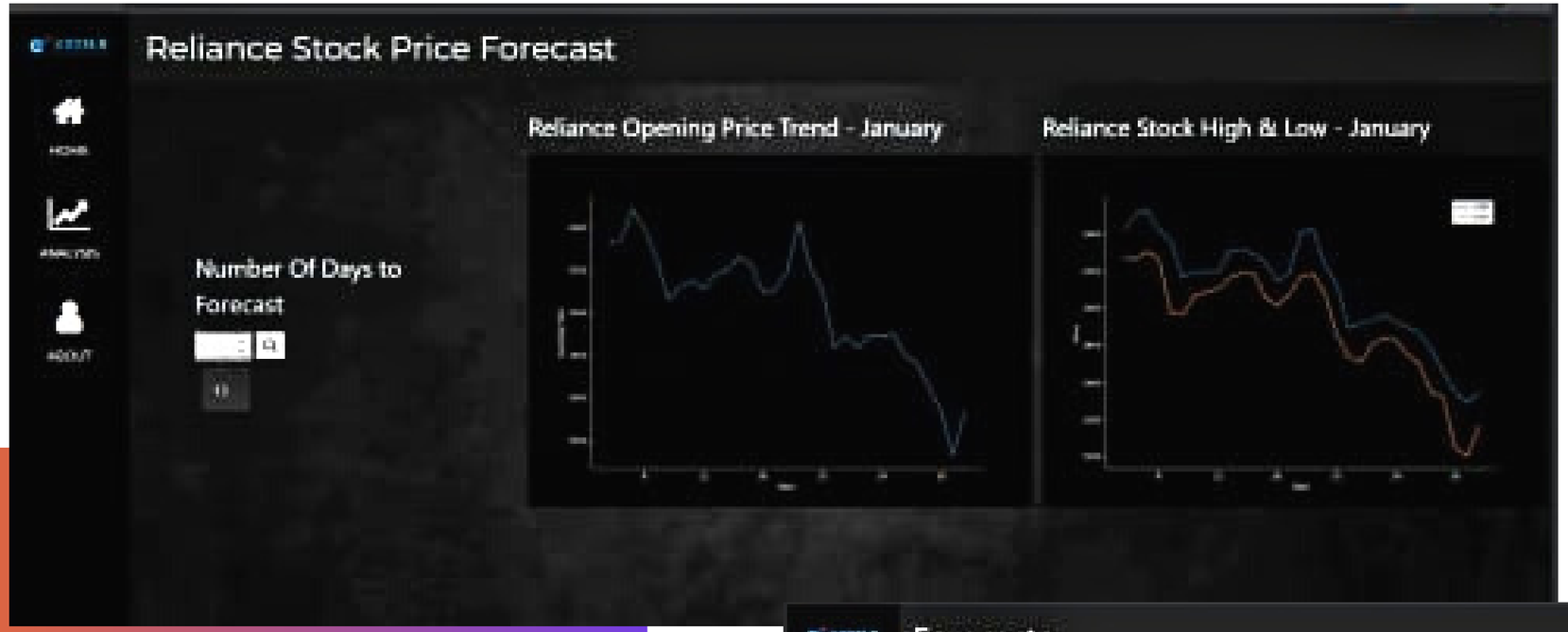
It can be observed that the MAPE value of Holt Method for Close, High and Low are nearer to 0, than the other methods. And the MAPE value of Holts winter exponential smoothing with multiplicative seasonality and additive trend for Open is nearer to 0. So we choose the respective methods for forecasting.

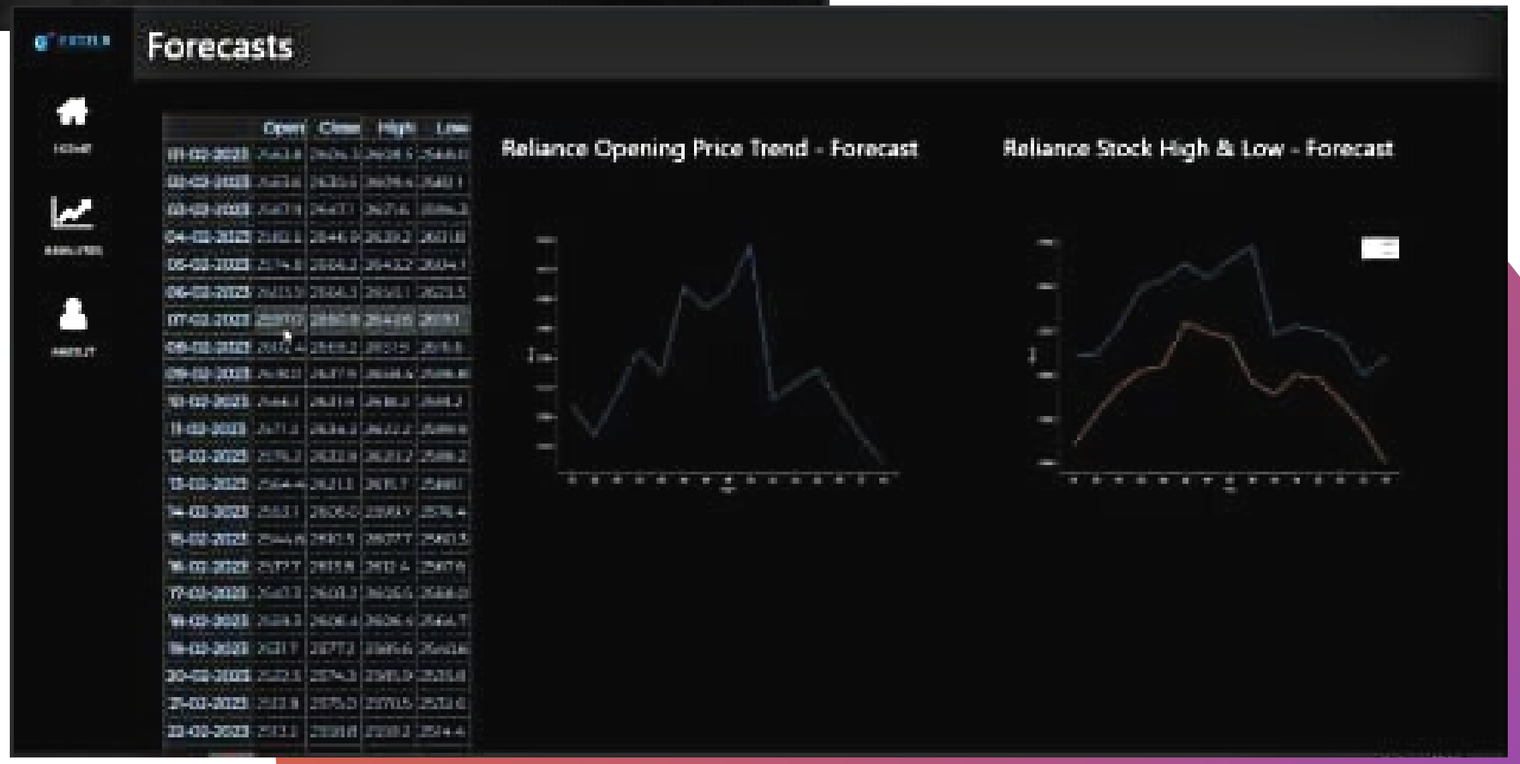


MODEL DEPLOYMENT

Using Flask




Reliance Stock Price Forecast
Reliance Opening Price Trend - January
Reliance Stock High & Low - January
Number Of Days to Forecast


Forecasts
Open
Close
High
Low
Reliance Opening Price Trend - Forecast
Reliance Stock High & Low - Forecast

RESULT

				Low
01-02-2023	2560.43	2545.56	2578.55	2544.97
02-02-2023	2555.50	2563.37	2587.53	2547.09
03-02-2023	2578.00	2590.80	2612.69	2560.83
04-02-2023	2587.59	2579.99	2613.04	2566.00
05-02-2023	2583.48	2551.52	2605.37	2550.04
06-02-2023	2560.61	2558.70	2601.18	2552.23
07-02-2023	2580.14	2580.41	2609.84	2563.52
08-02-2023	2595.33	2585.35	2615.31	2571.49
09-02-2023	2599.42	2584.88	2616.86	2574.89
10-02-2023	2593.69	2587.17	2630.00	2579.85
11-02-2023	2601.66	2634.13	2659.95	2597.28
12-02-2023	2642.86	2633.70	2670.44	2620.58
13-02-2023	2646.12	2649.22	2684.32	2640.90
14-02-2023	2658.75	2644.07	2689.97	2638.99
15-02-2023	2659.63	2651.49	2697.68	2640.81
16-02-2023	2673.04	2668.82	2703.06	2648.92
17-02-2023	2688.79	2673.02	2711.52	2643.53
18-02-2023	2698.90	2667.88	2721.76	2658.58
19-02-2023	2672.12	2673.93	2710.83	2649.15
20-02-2023	2687.52	2697.04	2738.18	2687.07
21-02-2023	2711.15	2679.29	2739.24	2678.81
22-02-2023	2682.08	2680.25	2739.85	2678.68
23-02-2023	2680.90	2640.55	2743.57	2642.67
24-02-2023	2629.26	2603.79	2668.93	2588.67
25-02-2023	2586.28	2603.07	2667.30	2587.81

Thank You