Capstone Project -2
Yes Bank Stock Closing Price Prediction

Done By:

Vinit Ladse
Gaurav Bhakte
Pratiksha Kharode

Content

1. Problem Statement

2. Introduction

3. Data Cleaning

4. Exploratory Data Analysis (EDA)

5. Transforming Data

6. Splitting Data

7. Fitting Different Model

8. Cross Validation & Hyperparameter Tuning

9. Conclusion

Problem Statement

- Perform regression analysis using multiple models to predict the closing price of the stock and compare the evaluation metrics for all of them to find the best model.

- Prediction of Yes Bank stock closing price.

- Getting accuracy score of several machine learning model.

<u>Introduction</u>

- Data set - data Yes Bank Stock Prices - contains observations regarding open,close, high and low prices of the yes bank stock from July 2005 - November 2020.

- Date: Monthly observation of stock prices since its inception.

- Open: The price of a stock when stock exchange market open for the day.

- Close: The price of a stock when stock exchange market closed for the day.

- High: The maximum price of a stock attained during given period of time.

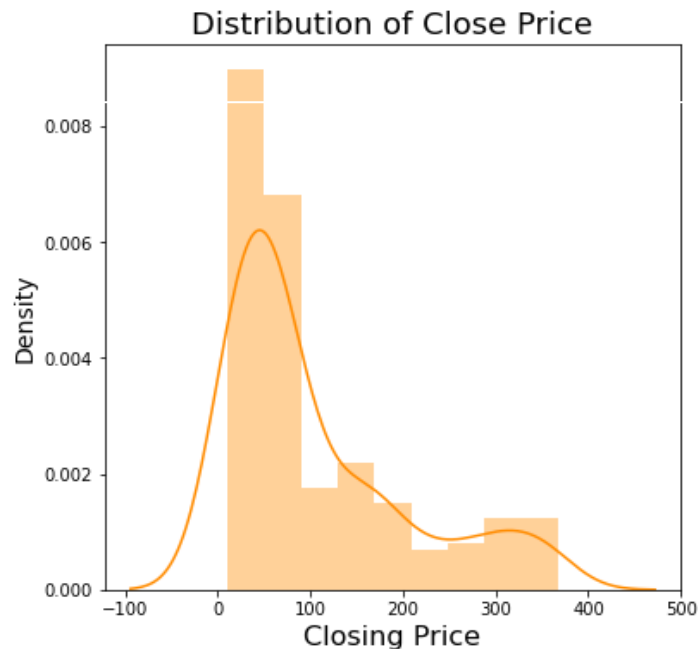- Low: The minimum price of a stock attained during given period of time.

Data Cleaning

- Null Values Treatment

- Duplicated Values Treatment

- Date Format Change (i.e from Jul-05 to 2005-07-01)

- Checking outliers

Exploratory Data Analysis

· Distribution of Closing Price :

· After Log Transformation :

- Distribution of closing price is right skewed.
- We need this distribution to be normal distribution for training algorithm.

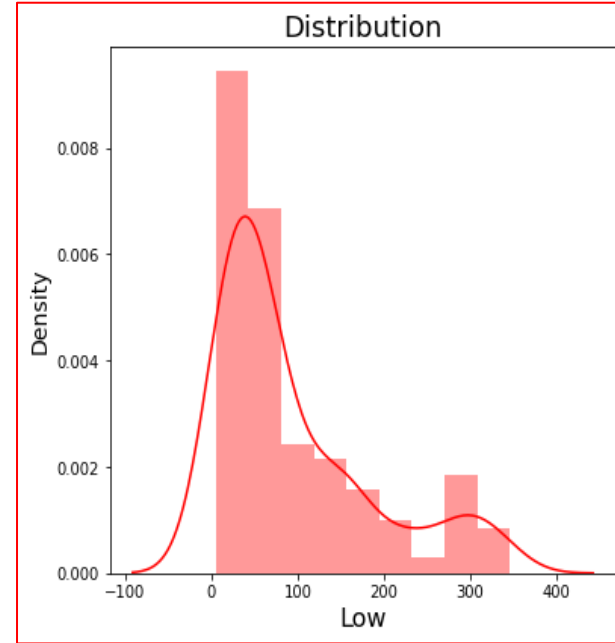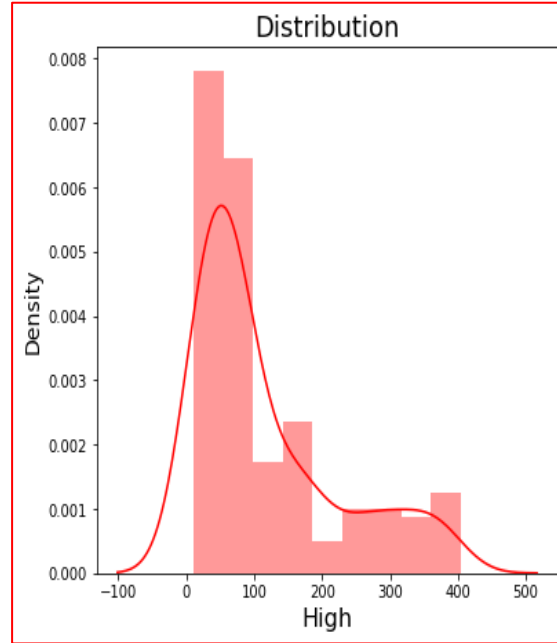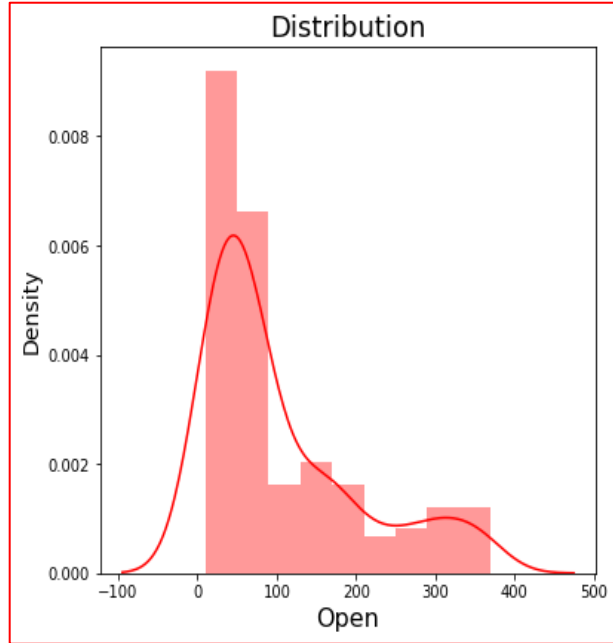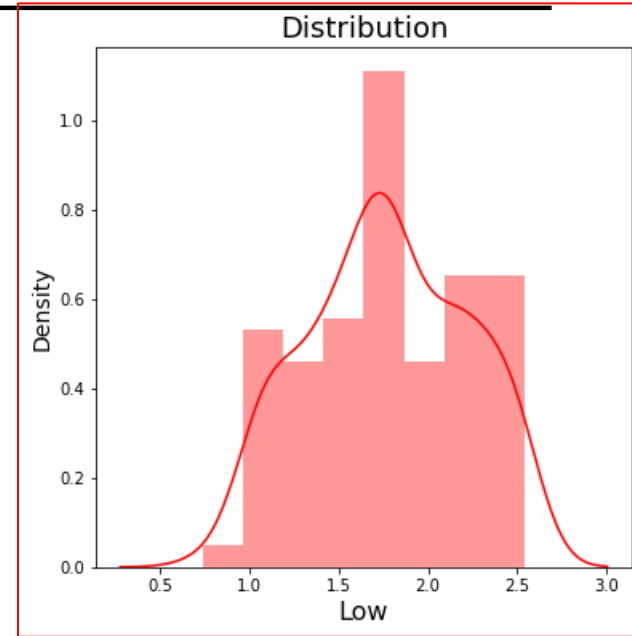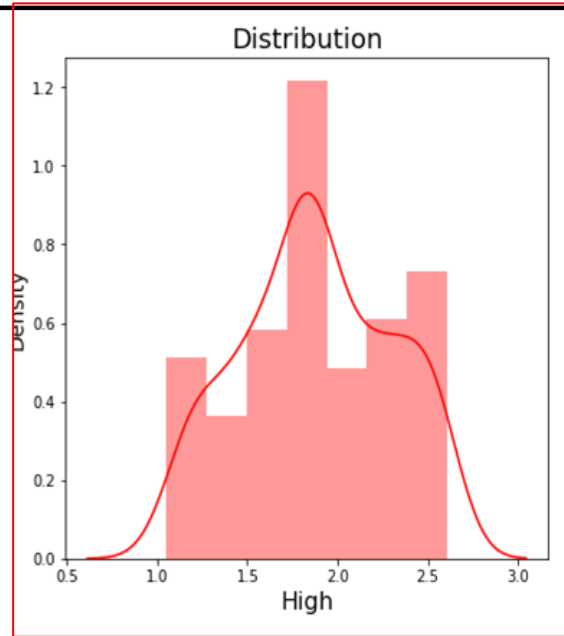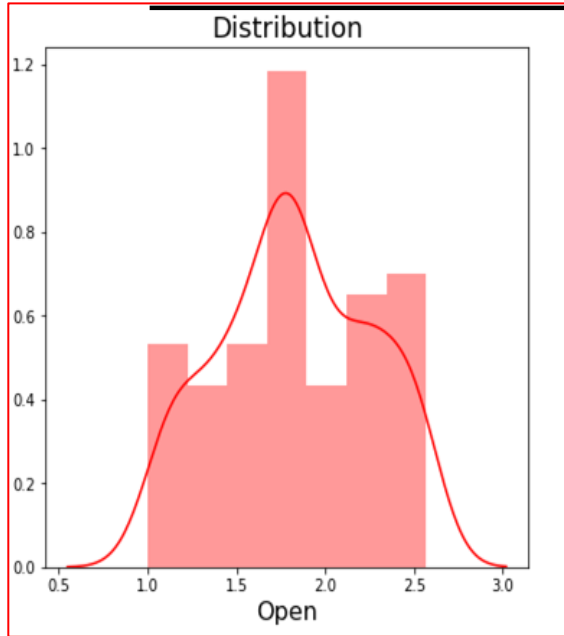- Distribution of closing price is normal distribution.

EDA (Continued)

•Distribution of Open, High & Low Price of a stock :

- Distribution of opening price, high price and low price are also right skewed.
- Log transformation applied to make this distribution normal.
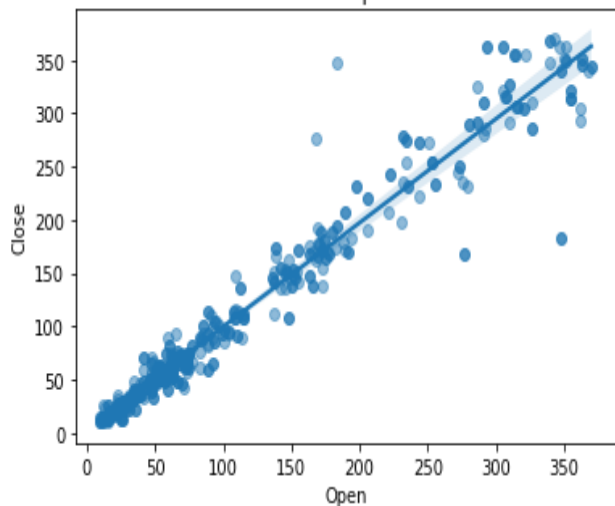
EDA (Continued)

• **Distribution of Open, High & Low Price of a stock after Log Transformation** :
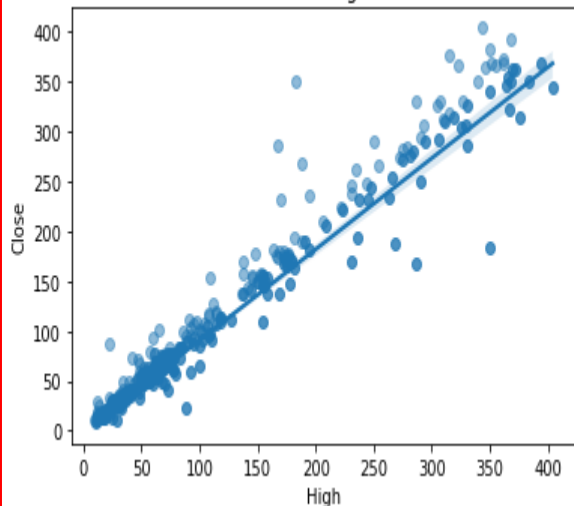

• Distribution of opening price, high price and low price are now normal distribution.
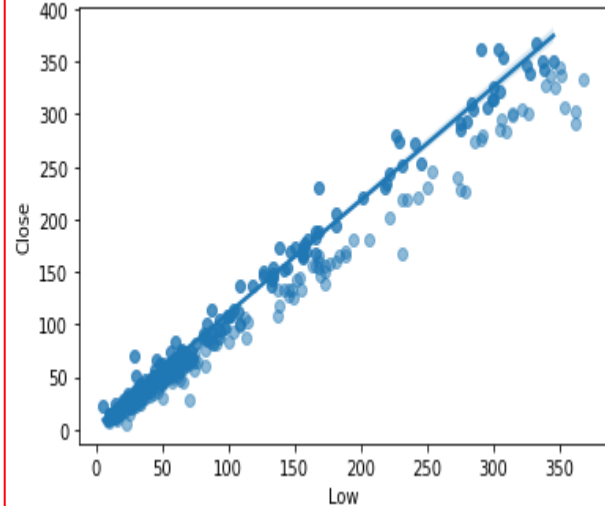
Bivariate Analysis Plots

EDA (Continued)

· **Correlation :**
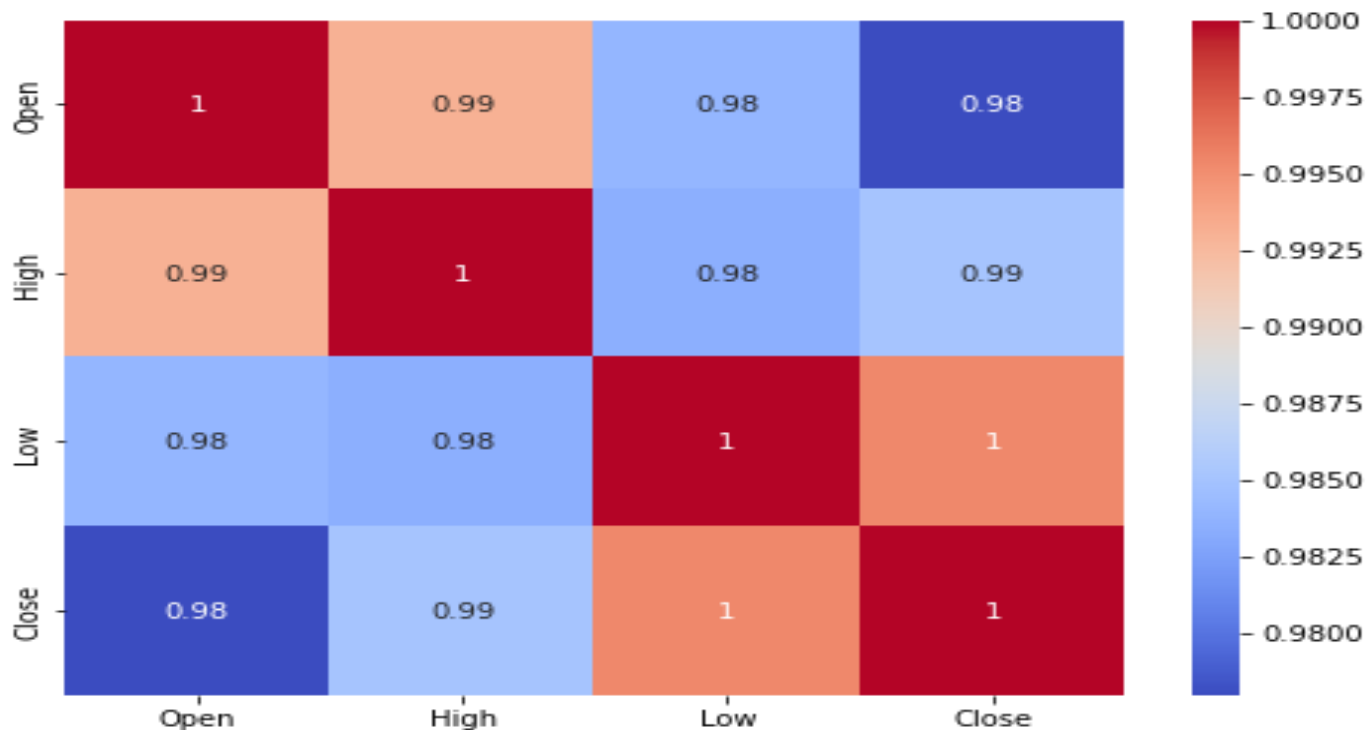
- All the features are strongly correlated with each other.

Transformation of Data

- To scale data into a uniform format that would

  allow us to utilize the data in a better way.

- For performing fitting and applying different

  algorithms to it.

- The basic goal was to enforce a level of

  consistency or uniformity to dataset.

Data Transformation
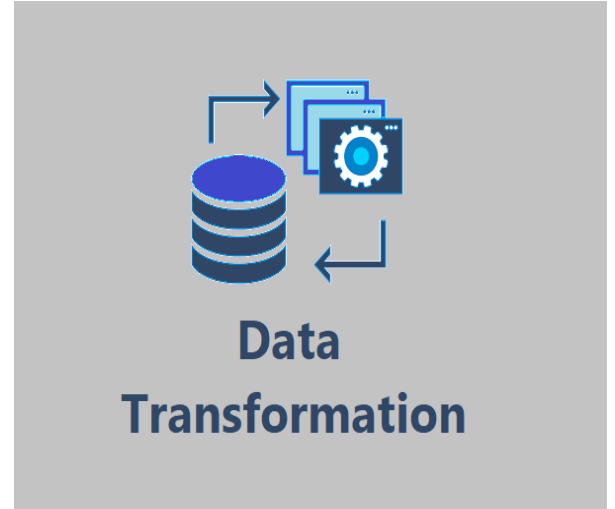
Splitting Data

- Data splits into training dataset and testing dataset.

- Training dataset is for making algorithm learn and train model.

- Test dataset is for testing the performance of train model.

- Here 80% of data taken as training dataset & remaining 20% of dataset used for testing purpose.
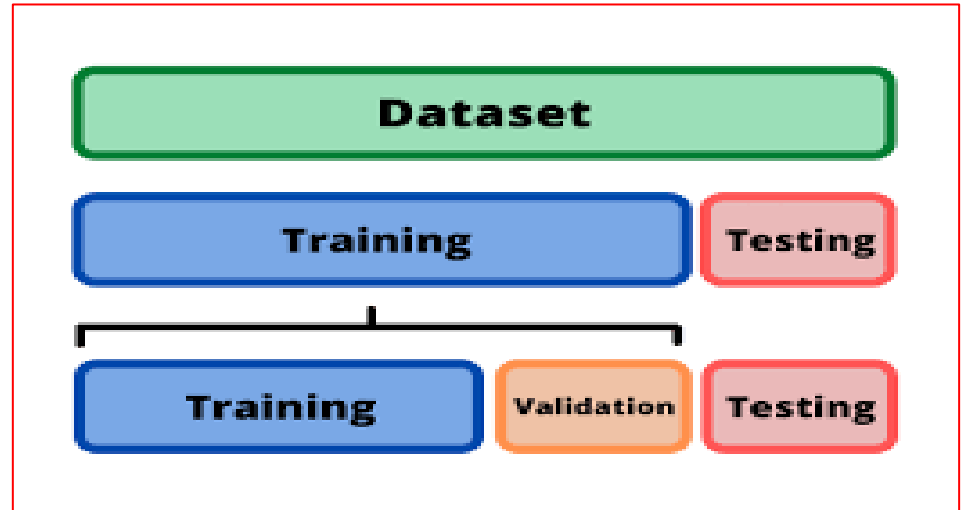
Fitting Different Model

Linear Regression

Linear Regression

• Linear regression is one of the easiest and most popular Machine Learning algorithms.

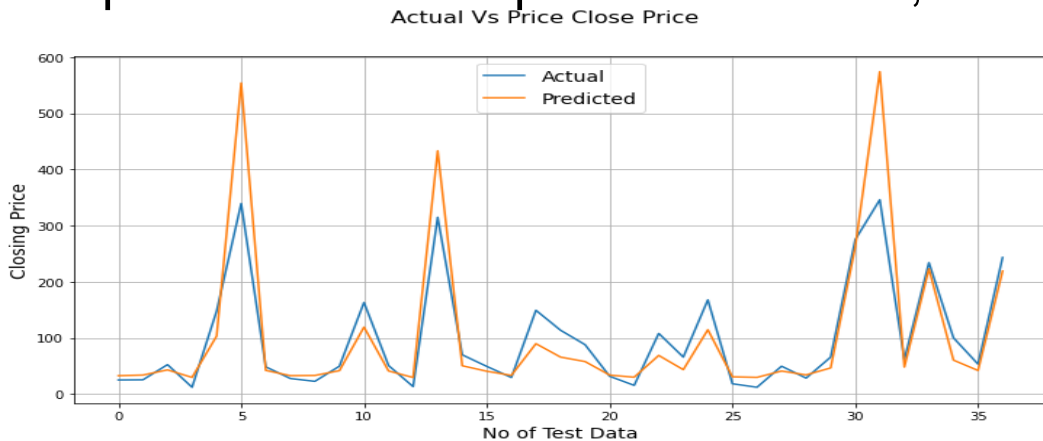• It is a statistical method that is used for predictive analysis.

• Linear regression algorithm shows a linear relationship between a dependent and independent variable; hence it is called as linear regression.

Actual Vs Price Close Price
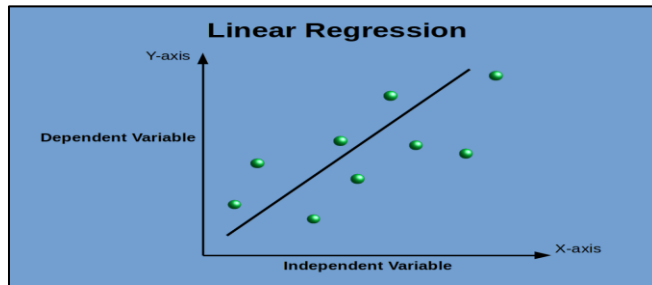
Evaluation Metrics: Linear Regression				
MSE	RMSE	MAE	MAPE	R2
0.0316	0.1777	0.1513	0.0954	0.8226

Lasso Regression

• Lasso: Least Absolute Shrinkage and Selection operator

• It is a regression analysis method that performs both variable selection and regularization in order to enhance the prediction accuracy and interpretability of the resulting statistical model.

• This method performs L1 regularization.
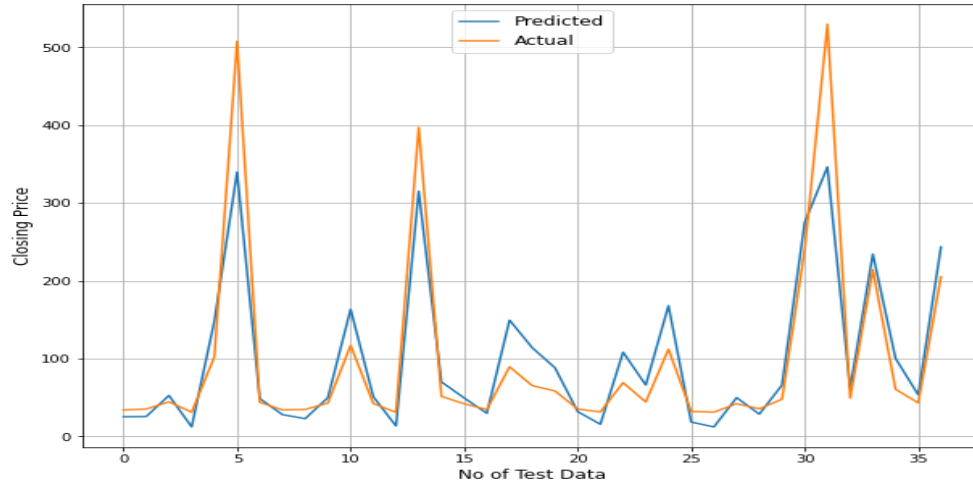
Evaluation Metrics: Lasso Regression				
MSE	RMSE	MAE	MAPE	R2
0.0326	0.1806	0.1535	0.0978	0.8168

Ridge Regression

• Ridge regression is a model tuning method that is used to analyses any data that suffers from multicollinearity.

• When the issue of multicollinearity occurs, least-squares are unbiased, and variances are large, this results in predicted values to be far away from the actual values.

• This method performs L2 regularization.

Actual Vs Predicted Value
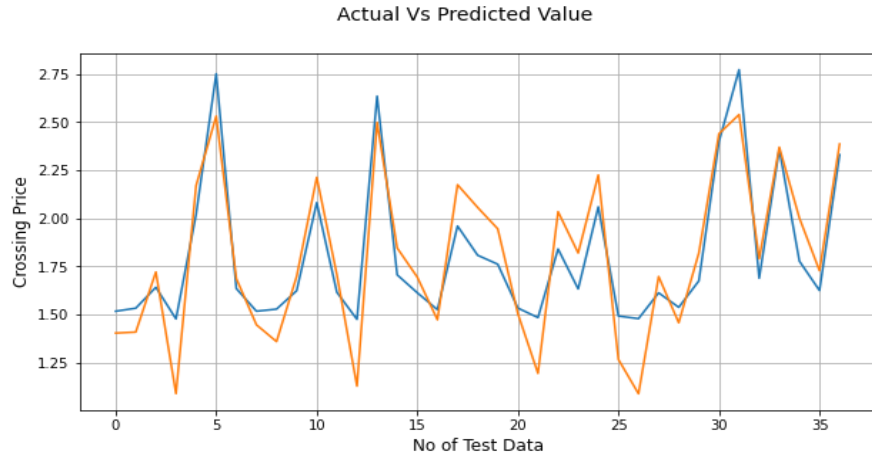
Evaluation Metrics: Ridge Regression

MSE	RMSE	MAE	MAPE	R2
0.0321	0.1791	0.1522	0.0959	0.8197

Elastic Net

• Elastic net is a popular type of regularized linear regression that combines two popular penalties,specifically the L1 and L2 penalty functions.
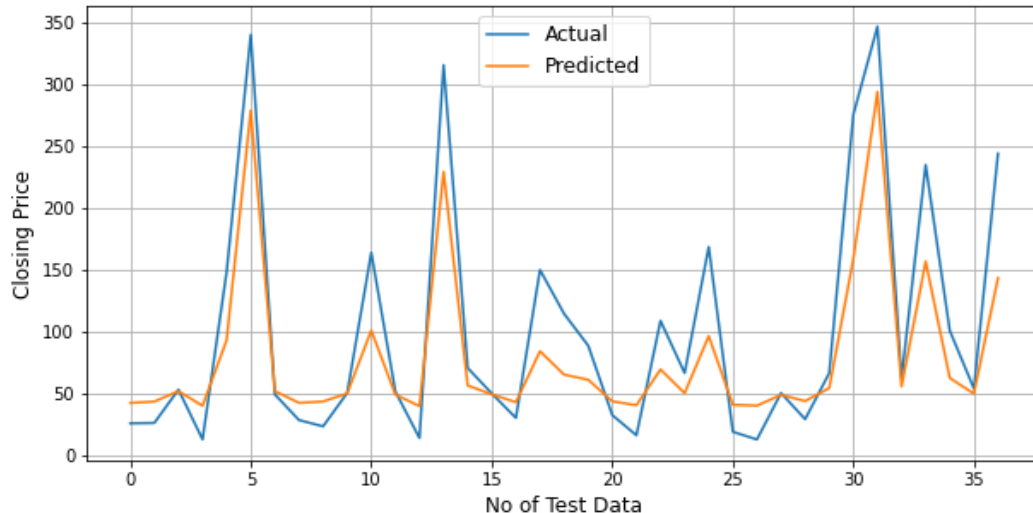
• Elastic Net is an extension of linear regression that adds regularization penalties to the loss function during training.

Actual Vs. Predicted Close Price: Elastic Net

Evaluation Metrics: Elastic Net

MSE	RMSE	MAE	MAPE	R2
0.051	0.226	0.182	0.118	0.714

Cross Validation & Hyperparameter Tuning

• It is a resampling procedure used to evaluate machine learning models on a limited data sample.

• Basically, Cross Validation is a technique using which Model is evaluated on the dataset on which it is not trained that is it can be a test data or can be another set as per availability or feasibility.

• Tuning the hyperparameters of respective algorithms is necessary for getting better accuracy and to avoid overfitting.
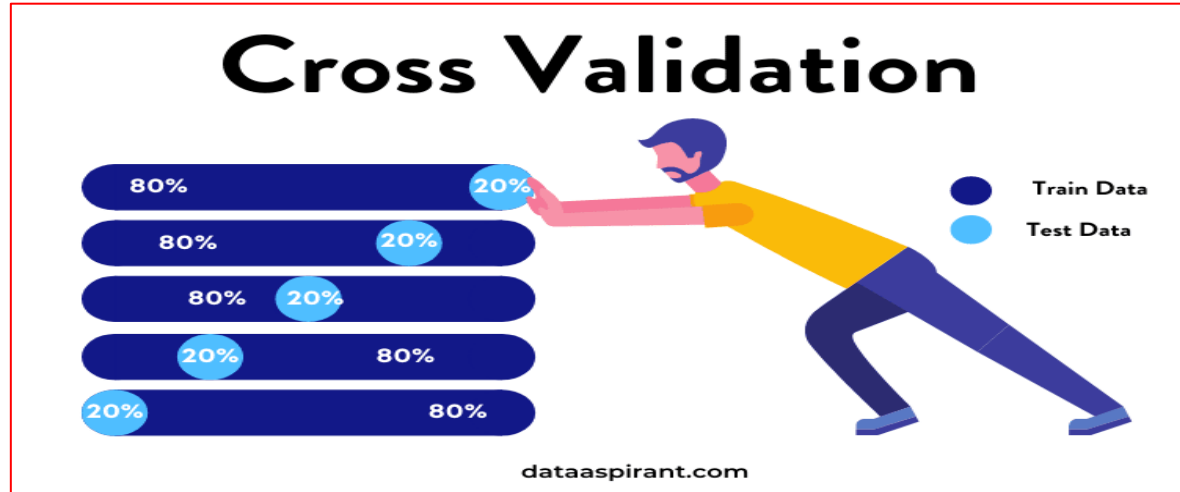
• Cross Validation & Hyperparameter tuning on Lasso Regression

Evaluation Metrics :- CV & tuning on Lasso Regression				
MSE	RMSE	MAE	MAPE	R2
0.032	0.1789	0.1522	0.0961	0.8202

• Cross Validation & Hyperparameter tuning on Ridge Regression

Evaluation Metrics: CV & tuning on Ridge Regression				
MSE	RMSE	MAE	MAPE	R2
0.0327	0.1808	0.1534	0.0971	0.8164

• Cross Validation & Hyperparameter tuning on Elastic Net

Evaluation Metrics: CV & tuning on Elastic Net				
MSE	RMSE	MAE	MAPE	R2
0.032	0.1789	0.1522	0.0961	0.8202

Conclusion

1. We got a maximum accuracy score of 82%.

2. Target variable is highly dependent on input variables.

3. Linear, lasso and ridge regression show almost same R squared values.

4. Whereas elastic net model shows lowest R squared value and high MSE, RMSE, MAE & MAPE values.

5. Close, Open and high price of stock are strongly correlated with each other.

THANK YOU