Import libraries

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from sklearn.metrics import mean_squared_error
from keras.models import Sequential
from keras.layers import LSTM,Dropout,Dense
from sklearn.preprocessing import MinMaxScaler
from keras.layers import Flatten
```

Read data from csv file

```
data = pd.read_csv('/content/Reliance.csv')
data.head()
```

	Date	Open	High	Low	Close	Adj Close	Volume
0	2015-11-18	463.799988	465.649994	454.975006	456.000000	436.671021	5142766.0
1	2015-11-19	459.450012	469.350006	458.625000	467.375000	447.563873	5569752.0
2	2015-11-20	467.000000	476.399994	462.774994	473.424988	453.357422	5167930.0
3	2015-11-23	475.000000	478.950012	473.100006	476.875000	456.661224	4800026.0
4	2015-11-24	476.500000	485.799988	475.524994	483.850006	463.340515	6768886.0

Drop rows with any null values

```
data.dropna(axis = 0, inplace = True)
```

Check shape of the data

```
del data['Adj Close']
data.shape
```

```
(1232, 6)
```

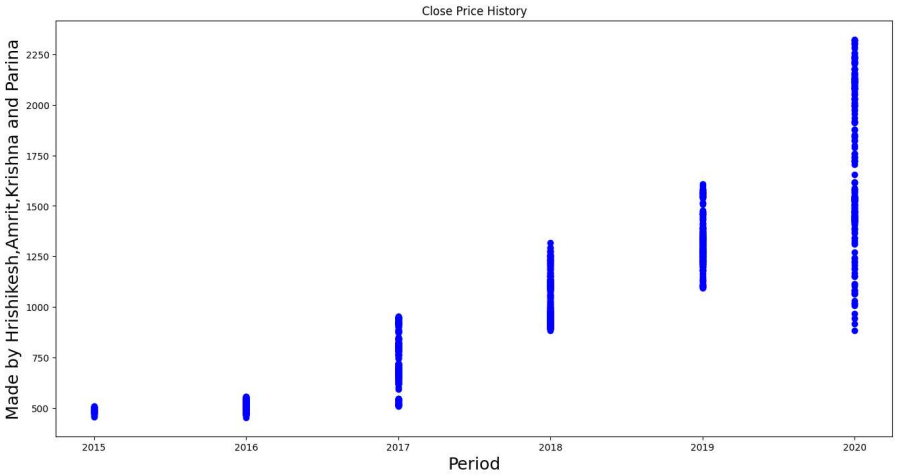
Copy dataset into new dataframe for plots

```
meta = data.copy()
meta['Date'] = pd.to_datetime(meta['Date'], format='%Y-%m-%d')
meta['Year'] = meta['Date'].dt.year
meta.head()
```

	Date	Open	High	Low	Close	Volume	Year
0	2015-11-18	463.799988	465.649994	454.975006	456.000000	5142766.0	2015
1	2015-11-19	459.450012	469.350006	458.625000	467.375000	5569752.0	2015
2	2015-11-20	467.000000	476.399994	462.774994	473.424988	5167930.0	2015
3	2015-11-23	475.000000	478.950012	473.100006	476.875000	4800026.0	2015
4	2015-11-24	476.500000	485.799988	475.524994	483.850006	6768886.0	2015

Scatter plot of Close Price vs Year

```
plt.figure(figsize=(16,8))
plt.title('Close Price History')
plt.scatter(x = meta['Year'], y = meta['Close'], color = 'blue')
plt.xlabel('Period', fontsize=18)
plt.ylabel('Made by Hrishikesh,Amrit,Krishna and Parina', fontsize=18)
plt.show()
```

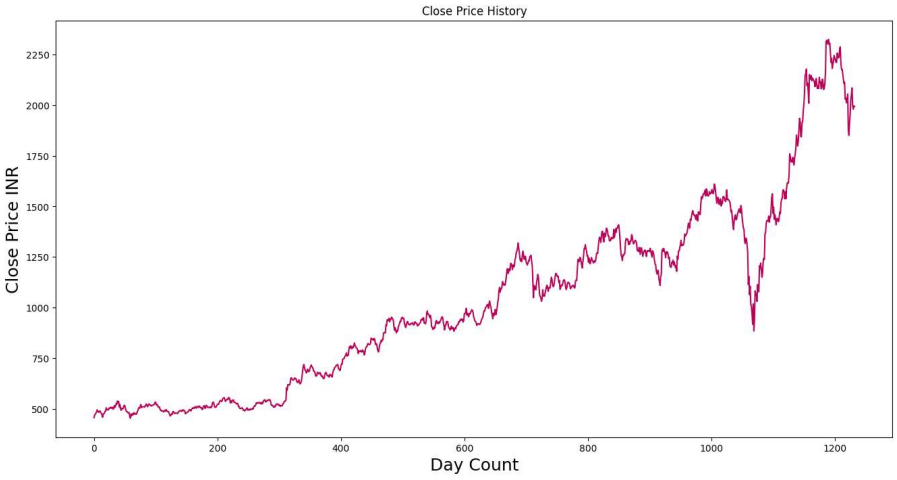


Line plot of Close Price vs Year

```
plt.figure(figsize=(16,8))
plt.title('Close Price History')
plt.plot(meta['Year'],meta['Close'])
plt.xlabel('Period', fontsize=18)
plt.ylabel('Close Price INR', fontsize=18)
plt.show()
```

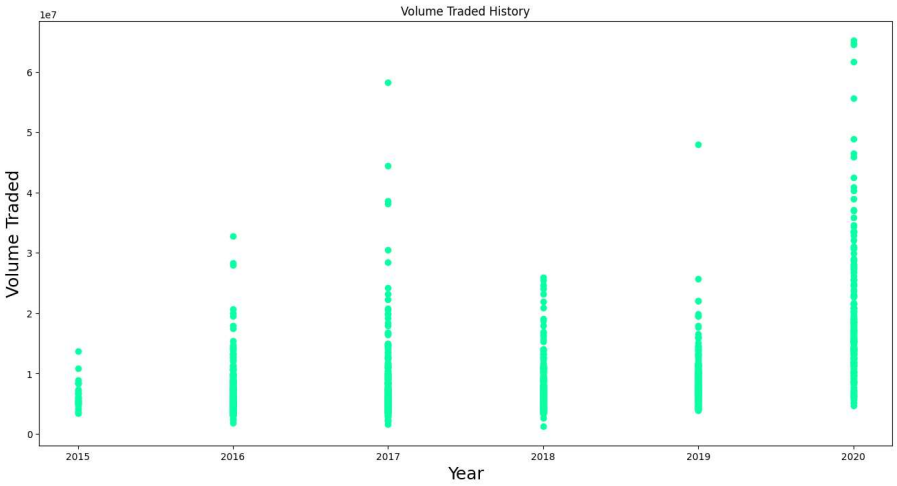
Distribution of Close Price on day basis

```
plt.figure(figsize=(16,8))
plt.title('Close Price History')
plt.plot(meta['Close'], color = '#ba0459')
plt.xlabel('Day Count', fontsize=18)
plt.ylabel('Close Price INR', fontsize=18)
plt.show()
```



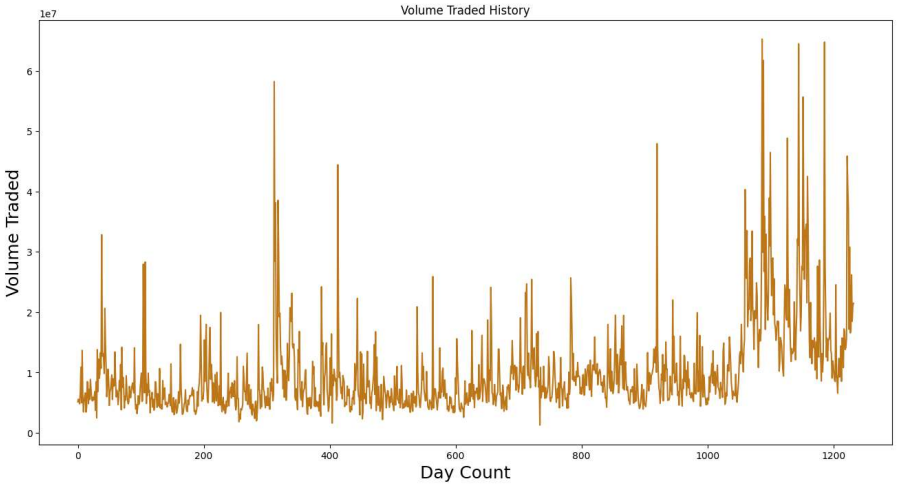
Scatter plot of Volume Traded vs Year

```
plt.figure(figsize=(16,8))
plt.title('Volume Traded History')
plt.scatter(x = meta['Year'], y = meta['Volume'], color = '#0dffa6')
plt.xlabel('Year', fontsize=18)
plt.ylabel('Volume Traded', fontsize=18)
plt.show()
```



Distribution of Volume Traded on day basis

```
plt.figure(figsize=(16,8))
plt.title('Volume Traded History')
plt.plot(meta['Volume'], color = '#bd7719')
plt.xlabel('Day Count', fontsize=18)
plt.ylabel('Volume Traded', fontsize=18)
plt.show()
```



Reset index of original dataframe

```
data.set_index('Date', inplace = True)
data.head()
```

Date	Open	High	Low	Close	Volume
2015-11-18	463.799988	465.649994	454.975006	456.000000	5142766.0
2015-11-19	459.450012	469.350006	458.625000	467.375000	5569752.0
2015-11-20	467.000000	476.399994	462.774994	473.424988	5167930.0
2015-11-23	475.000000	478.950012	473.100006	476.875000	4800026.0
2015-11-24	476.500000	485.799988	475.524994	483.850006	6768886.0

Scale and transform the target and features column using MinMaxScaler

```
scaler = MinMaxScaler()
X = data[['Open', 'Low', 'High', 'Volume']].copy()
y = data['Close'].copy()

X[['Open', 'Low', 'High', 'Volume']] = scaler.fit_transform(X)
y = scaler.fit_transform(y.values.reshape(-1, 1))
```

Function to split dataset into Train and Test dataset

```
def load_data(X, seq_len, train_size=0.8):
    amount_of_features = X.shape[1]
    X_mat = X.values
    sequence_length = seq_len + 1
    datanew = []

    for index in range(len(X_mat) - sequence_length):
        datanew.append(X_mat[index: index + sequence_length])

    datanew = np.array(datanew)
    train_split = int(round(train_size * datanew.shape[0]))
    train_data = datanew[:train_split, :]

    X_train = train_data[:, :-1]
    y_train = train_data[:, -1][:,-1]

    X_test = datanew[train_split:, :-1]
    y_test = datanew[train_split:, -1][:,-1]

    X_train = np.reshape(X_train, (X_train.shape[0], X_train.shape[1], amount_of_features))
    X_test = np.reshape(X_test, (X_test.shape[0], X_test.shape[1], amount_of_features))

    return X_train, y_train, X_test, y_test
```

Initializing the above function with a lookback window of 22

```
window = 22
X['close'] = y
X_train, y_train, X_test, y_test = load_data(X, window)
print(X_train.shape)
print(y_train.shape)
print(X_test.shape)
print(y_test.shape)
```

```
(967, 22, 5)
(967,)
(242, 22, 5)
(242,)
```

Building our LSTM model to make predictions

```
model = Sequential()
model.add(LSTM(128, input_shape= (window, 5), return_sequences = True))
model.add(Dropout(0.2))

model.add(LSTM(128, input_shape = (window, 5), return_sequences=False))
model.add(Dropout(0.2))

model.add(Dense(32))

model.add(Dense(1))

model.compile(optimizer='adam', loss='mean_squared_error')

model.fit(X_train, y_train, batch_size=1, validation_split = 0.1, epochs = 4)
```

```
Epoch 1/4
870/870 [==============================] - 33s 33ms/step - loss: 0.0019 - val_loss: 7.5628e-04
Epoch 2/4
870/870 [==============================] - 27s 31ms/step - loss: 8.8910e-04 - val_loss: 0.0047
Epoch 3/4
870/870 [==============================] - 27s 31ms/step - loss: 8.5124e-04 - val_loss: 3.9691e-04
Epoch 4/4
870/870 [==============================] - 27s 31ms/step - loss: 7.1336e-04 - val_loss: 3.8617e-04
<keras.src.callbacks.History at 0x7c05718d72e0>
```

Check *RMSE* of Train and Test dataset

```
trainPredict = model.predict(X_train)
testPredict = model.predict(X_test)

trainPredict = scaler.inverse_transform(trainPredict)
trainY = scaler.inverse_transform([y_train])
testPredict = scaler.inverse_transform(testPredict)
testY = scaler.inverse_transform([y_test])

trainScore = np.sqrt(mean_squared_error(trainY[0], trainPredict[:,0]))
print('Train Score: %.2f RMSE' % (trainScore))

testScore = np.sqrt(mean_squared_error(testY[0], testPredict[:,0]))
print('Test Score: %.2f RMSE' % (testScore))
```

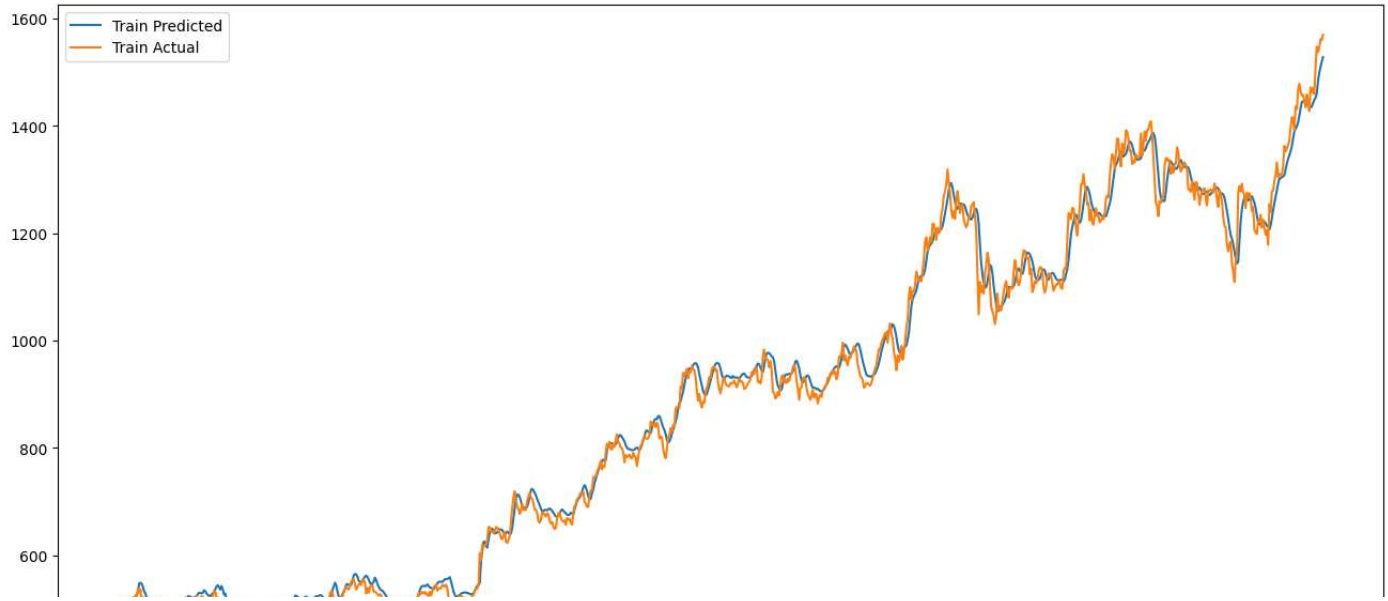
```
31/31 [==============================] - 2s 22ms/step
8/8 [==============================] - 0s 20ms/step
Train Score: 25.15 RMSE
Test Score: 93.70 RMSE
```

```
plot_predicted = testPredict.copy()
plot_predicted = plot_predicted.reshape(242, 1)
plot_actual = testY.copy()
plot_actual = plot_actual.reshape(242, 1)

plot_predicted_train = trainPredict.copy()
plot_predicted_train = plot_predicted_train.reshape(967, 1)
plot_actual_train = trainY.copy()
plot_actual_train = plot_actual_train.reshape(967, 1)
```

Predictions on Train dataset

```
plt.figure(figsize = (16,8))
plt.plot(pd.DataFrame(plot_predicted_train), label='Train Predicted')
plt.plot(pd.DataFrame(plot_actual_train), label='Train Actual')
plt.legend(loc='best')
plt.show()
```



Predictions on Test dataset

```
plt.figure(figsize = (16,8))
plt.plot(pd.DataFrame(plot_predicted), label='Test Predicted')
plt.plot(pd.DataFrame(plot_actual), label='Test Actual')
plt.legend(loc='best')
plt.show()
```