```
import math
import pandas_datareader as web
import numpy as np
import pandas as pd
from sklearn.preprocessing import MinMaxScaler
from keras.models import Sequential
from keras.layers import Dense, LSTM
import matplotlib.pyplot as plt
from datetime import date
import yfinance as yf
plt.style.use('fivethirtyeight')
```

```
stock = 'HDFCBANK.NS'
start = '2012-01-01'
end = date.today().isoformat()

data = yf.download(stock, start ,end)
data
```

```
[*********************100%%**********************]  1 of 1 completed
```

	Open	High	Low	Close	Adj Close	Volume
Date						
2012-01-02	214.449997	214.899994	209.750000	213.425003	195.259415	3514998
2012-01-03	215.699997	220.449997	215.000000	219.574997	200.885925	3439238
2012-01-04	220.949997	222.475006	215.425003	221.649994	202.784317	4871478
2012-01-05	222.000000	223.350006	220.149994	221.824997	202.944427	3380606
2012-01-06	220.500000	228.574997	219.475006	226.649994	207.358749	3977222
...	...	...	...	...	...	...
2024-02-05	1446.000000	1451.900024	1434.050049	1444.849976	1444.849976	19302523
2024-02-06	1445.550049	1449.699951	1432.599976	1444.099976	1444.099976	20537870
2024-02						

```
close_col = data.filter(['Close'])
dataset = close_col.values

n = math.ceil(len(dataset)*0.8)
```

```
scaler = MinMaxScaler(feature_range=(0,1))
scaled_data = scaler.fit_transform(dataset)

scaled_data
```

```
array([[0.        ],
       [0.00406001],
       [0.00542984],
       ...,
       [0.80310607],
       [0.78534772],
       [0.78571076]])
```

```
train_data = scaled_data[0 : n, :]

x_train = []
y_train = []

for i in range(60, len(train_data)):
  x_train.append(train_data[i-60:i, 0])
  y_train.append(train_data[i,0])
  if i <= 61:
    print(x_train)
    print(y_train)
    print()
```

```
[array([0.        , 0.00406001, 0.00542984, 0.00554537, 0.00873066,
       0.00952287, 0.0108432 , 0.01181693, 0.01313726, 0.01411101,
       0.01110726, 0.0137149 , 0.01817101, 0.01978841, 0.02102622,
       0.01886419, 0.02044858, 0.0209107 , 0.01893021, 0.01723028,
       0.02153785, 0.02320476, 0.02345232, 0.02620851, 0.02668713,
       0.02721526, 0.0269347 , 0.03158884, 0.02992193, 0.0313908 ,
       0.03005398, 0.03505471, 0.03287617, 0.03348682, 0.03472462,
       0.03452658, 0.03508773, 0.03228203, 0.02929477, 0.034213  ,
       0.02978989, 0.02876665, 0.03033454, 0.0277599 , 0.0265881 ,
       0.02931129, 0.03180341, 0.03040056, 0.03219951, 0.03345382,
       0.02771038, 0.02673664, 0.02376591, 0.02592794, 0.02931129,
       0.02554835, 0.02875015, 0.02799095, 0.03036754, 0.02858511])]
[0.027479329554306348]

[array([0.        , 0.00406001, 0.00542984, 0.00554537, 0.00873066,
       0.00952287, 0.0108432 , 0.01181693, 0.01313726, 0.01411101,
       0.01110726, 0.0137149 , 0.01817101, 0.01978841, 0.02102622,
       0.01886419, 0.02044858, 0.0209107 , 0.01893021, 0.01723028,
       0.02153785, 0.02320476, 0.02345232, 0.02620851, 0.02668713,
       0.02721526, 0.0269347 , 0.03158884, 0.02992193, 0.0313908 ,
       0.03005398, 0.03505471, 0.03287617, 0.03348682, 0.03472462,
       0.03452658, 0.03508773, 0.03228203, 0.02929477, 0.034213  ,
       0.02978989, 0.02876665, 0.03033454, 0.0277599 , 0.0265881 ,
       0.02931129, 0.03180341, 0.03040056, 0.03219951, 0.03345382,
       0.02771038, 0.02673664, 0.02376591, 0.02592794, 0.02931129,
       0.02554835, 0.02875015, 0.02799095, 0.03036754, 0.02858511]), array([0.00406001, 0.00542984, 0.00554537, 0.008730
       0.0108432 , 0.01181693, 0.01313726, 0.01411101, 0.01110726,
       0.0137149 , 0.01817101, 0.01978841, 0.02102622, 0.01886419,
       0.02044858, 0.0209107 , 0.01893021, 0.01723028, 0.02153785,
       0.02320476, 0.02345232, 0.02620851, 0.02668713, 0.02721526,
       0.0269347 , 0.03158884, 0.02992193, 0.0313908 , 0.03005398,
       0.03505471, 0.03287617, 0.03348682, 0.03472462, 0.03452658,
       0.03508773, 0.03228203, 0.02929477, 0.034213  , 0.02978989,
       0.02876665, 0.03033454, 0.0277599 , 0.0265881 , 0.02931129,
       0.03180341, 0.03040056, 0.03219951, 0.03345382, 0.02771038,
       0.02673664, 0.02376591, 0.02592794, 0.02931129, 0.02554835,
       0.02875015, 0.02799095, 0.03036754, 0.02858511, 0.02747933])]
[0.027479329554306348, 0.030697619338713567]
```

```
x_train, y_train = np.array(x_train), np.array(y_train)

x_train = np.reshape(x_train, (x_train.shape[0], x_train.shape[1], 1))
x_train.shape, y_train.shape
```

```
    ((2330, 60, 1), (2330,))
```

```
model = Sequential()
model.add(LSTM(50, return_sequences=True, input_shape=(x_train.shape[1], 1)))
model.add(LSTM(50, return_sequences=False))
model.add(Dense(25))
model.add(Dense(1))
```

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

model.fit(x_train, y_train, batch_size=1, epochs=1)
```

```
    2330/2330 [==============================] - 78s 32ms/step - loss: 0.0011
    <keras.src.callbacks.History at 0x7a28304a8df0>
```

```
test_data = scaled_data[n - 60: , :]
x_test = []
y_test = dataset[n:,:]

for i in range(60, len(test_data)):
  x_test.append(test_data[i-60:i, 0])
```

```
x_test = np.array(x_test)
```

```
x_test = np.reshape(x_test, (x_test.shape[0], x_test.shape[1], 1))
```

```
predictions = model.predict(x_test)
predictions = scaler.inverse_transform(predictions)
```

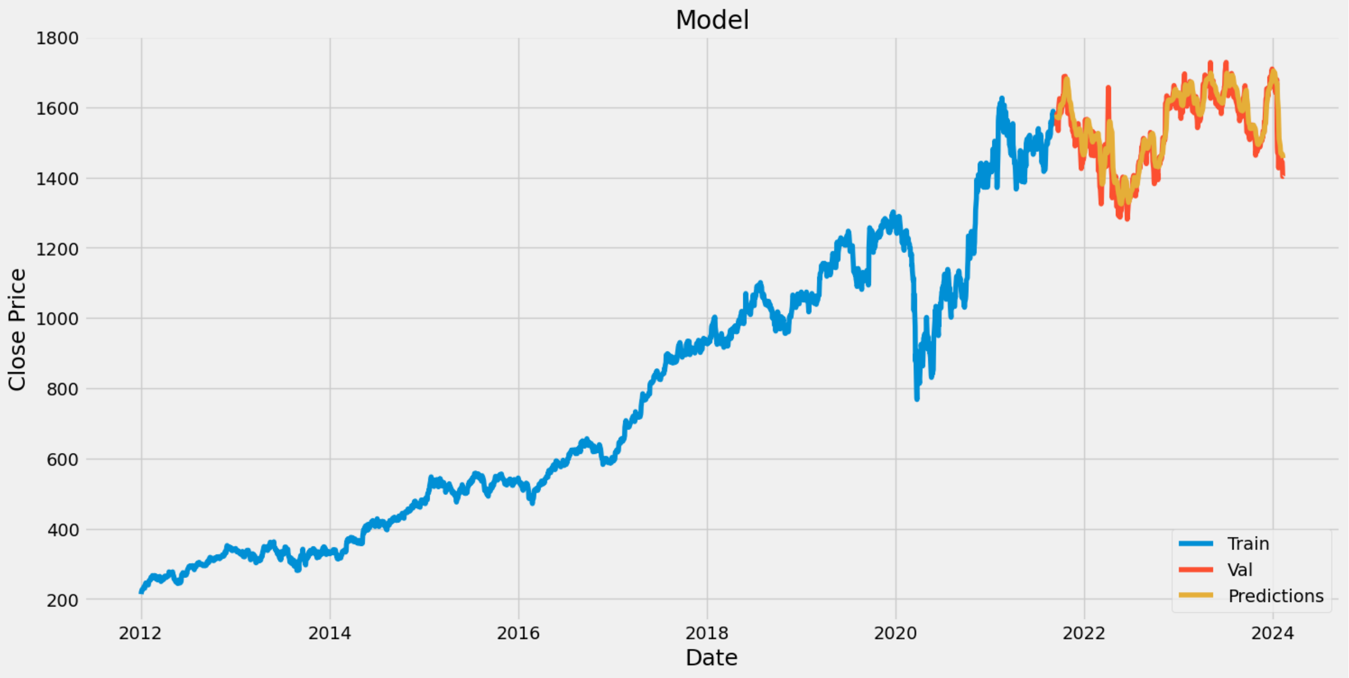
```
    19/19 [==============================] - 1s 16ms/step
```

```
from sklearn.metrics import r2_score

rmse = np.sqrt( np.mean( predictions - y_test )**2 )
r_squared = r2_score(y_test, predictions)

print("RMSE:", rmse)
print("R-squared:", r_squared)
```

```
RMSE: 13.938156153488798
R-squared: 0.8668074056684516
```

```
train = close_col[:n]
valid = close_col[n:]
valid['Predictions'] = predictions
plt.figure(figsize=(16,8))
plt.title('Model')
plt.xlabel('Date', fontsize=18)
plt.ylabel('Close Price', fontsize=18)
plt.plot(train['Close'])
plt.plot(valid[['Close', 'Predictions']])
plt.legend(['Train', 'Val', 'Predictions'], loc='lower right')
plt.show()
```

```
<ipython-input-146-d5ff2d27e999>:3: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-
  valid['Predictions'] = predictions
```



```
valid
```

	Close	Predictions
Date		
2021-09-15	1546.800049	1579.048950
2021-09-16	1559.949951	1574.461426
2021-09-17	1582.150024	1572.091187
2021-09-20	1559.849976	1574.006714
2021-09-21	1551.949951	1574.580444
...	...	...
2024-02-05	1444.849976	1467.901733
2024-02-06	1444.099976	1466.819092
2024-02-07	1429.949951	1465.563232
2024-02-08	1403.050049	1462.477783
2024-02-09	1403.599976	1455.371338

597 rows × 2 columns

```
stock1 = 'HDFCBANK.NS'
start1 = '2014-01-01'
end1 = '2024-02-05'

data1 = yf.download(stock1, start1 ,end1)
```

```
    [*********************100%%**********************]  1 of 1 completed
```

```
close_col1 = data1.filter(['Close'])
data1 = close_col1
last_60 = data1[-60:].values
last_60_scaled = scaler.transform(last_60)

X_test = []
X_test.append(last_60_scaled)
X_test = np.array(X_test)
X_test = np.reshape(X_test, (X_test.shape[0], X_test.shape[1], 1))
prediction = model.predict(X_test)
prediction = scaler.inverse_transform(prediction)
print(prediction)
```

```
    1/1 [==============================] - 0s 33ms/step
```