

```
In [1]: pip install numpy pandas matplotlib seaborn scikit-learn tensorflow yfinance
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Requirement already satisfied: numpy in c:\users\91893\anaconda3\lib\site-packages (1.26.4)Note: you may need to restart the kernel to use updated packages.

Requirement already satisfied: pandas in c:\users\91893\anaconda3\lib\site-packages (2.2.2)  
Requirement already satisfied: matplotlib in c:\users\91893\anaconda3\lib\site-packages (3.9.2)  
Requirement already satisfied: seaborn in c:\users\91893\anaconda3\lib\site-packages (0.13.2)  
Requirement already satisfied: scikit-learn in c:\users\91893\anaconda3\lib\site-packages (1.5.1)  
Collecting tensorflow

Downloading tensorflow-2.19.0-cp312-cp312-win\_amd64.whl.metadata (4.1 kB)

Collecting yfinance

Downloading yfinance-0.2.65-py2.py3-none-any.whl.metadata (5.8 kB)

Requirement already satisfied: python-dateutil<=2.8.2 in c:\users\91893\anaconda3\lib\site-packages (from pandas) (2.9.0.post0)

Requirement already satisfied: pytz<=2020.1 in c:\users\91893\anaconda3\lib\site-packages (from pandas) (2024.1)

Requirement already satisfied: tzdata<=2022.7 in c:\users\91893\anaconda3\lib\site-packages (from pandas) (2023.3)

Requirement already satisfied: contourpy<=1.0.1 in c:\users\91893\anaconda3\lib\site-packages (from matplotlib) (1.2.0)

Requirement already satisfied: cycler<=0.10 in c:\users\91893\anaconda3\lib\site-packages (from matplotlib) (0.11.0)

Requirement already satisfied: fonttools<=4.22.0 in c:\users\91893\anaconda3\lib\site-packages (from matplotlib) (4.51.0)

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Requirement already satisfied: packaging<=20.0 in c:\users\91893\anaconda3\lib\site-packages (from matplotlib) (24.1)

Requirement already satisfied: pillow<=8 in c:\users\91893\anaconda3\lib\site-packages (from matplotlib) (10.4.0)

Requirement already satisfied: pyparsing<=2.3.1 in c:\users\91893\anaconda3\lib\site-packages (from matplotlib) (3.1.2)

Requirement already satisfied: scipy<=1.6.0 in c:\users\91893\anaconda3\lib\site-packages (from scikit-learn) (1.13.1)

Requirement already satisfied: joblib<=1.2.0 in c:\users\91893\anaconda3\lib\site-packages (from scikit-learn) (1.4.2)

Requirement already satisfied: threadpoolctl<=3.1.0 in c:\users\91893\anaconda3\lib\site-packages (from scikit-learn) (3.5.0)

Collecting absl-py<=1.0.0 (from tensorflow)

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Collecting astunparse<=1.6.0 (from tensorflow)

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Collecting flatbuffers<=24.3.25 (from tensorflow)

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Collecting libclang<=13.0.0 (from tensorflow)

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Collecting opt-einsum<=2.3.2 (from tensorflow)

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Requirement already satisfied: protobuf!=4.21.0,!4.21.1,!4.21.2,!4.21.3,!4.21.4,!4.21.5,<6.0.0dev,>=3.20.3 in c:\users\91893\anaconda3\lib\site-packages (from tensorflow) (4.25.3)

Requirement already satisfied: requests<3,>=2.21.0 in c:\users\91893\anaconda3\lib\site-packages (from tensorflow) (2.32.3)

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Requirement already satisfied: wrapt<=1.11.0 in c:\users\91893\anaconda3\lib\site-packages (from tensorflow) (1.14.1)

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Collecting tensorboard<=2.19.0 (from tensorflow)

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Collecting keras<=3.5.0 (from tensorflow)

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Collecting ml-dtypes<1.0.0,>=0.5.1 (from tensorflow)

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Collecting multitasking<=0.0.7 (from yfinance)

Downloading multitasking-0.0.12.tar.gz (19 kB)

Preparing metadata (setup.py): started

Preparing metadata (setup.py): finished with status 'done'

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Installing build dependencies: started
Installing build dependencies: finished with status 'done'
Getting requirements to build wheel: started
Getting requirements to build wheel: finished with status 'done'
Preparing metadata (pyproject.toml): started
Preparing metadata (pyproject.toml): finished with status 'done'
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Collecting curl_cffi>=0.7 (from yfinance)
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Collecting websockets>=13.0 (from yfinance)
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Requirement already satisfied: soupsieve>1.2 in c:\users\91893\anaconda3\lib\site-packages (from beautifulsoup4>=4.11.1->yfinance) (2.5)
Requirement already satisfied: cffi>=1.12.0 in c:\users\91893\anaconda3\lib\site-packages (from curl_cffi>=0.7->yfinance) (1.17.1)
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Collecting namex (from keras>=3.5.0->tensorflow)
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Collecting optree (from keras>=3.5.0->tensorflow)
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Requirement already satisfied: urllib3<3,>=1.21.1 in c:\users\91893\anaconda3\lib\site-packages (from requests<3,>=2.21.0->tensorflow) (2.2.3)
Requirement already satisfied: markdown>=2.6.8 in c:\users\91893\anaconda3\lib\site-packages (from tensorboard~=2.19.0->tensorflow) (3.4.1)
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Requirement already satisfied: pygments<3.0.0,>=2.13.0 in c:\users\91893\anaconda3\lib\site-packages (from rich->keras>=3.5.0->tensorflow) (2.15.1)
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Downloading websockets-15.0.1-cp312-cp312-win_amd64.whl (176 kB)
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Downloading namex-0.1.0-py3-none-any.whl (5.9 kB)
Downloading optree-0.17.0-cp312-cp312-win_amd64.whl (314 kB)
Building wheels for collected packages: multitasking, peewee
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  Building wheel for multitasking (setup.py): finished with status 'done'
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Successfully built multitasking peewee
Installing collected packages: peewee, namex, multitasking, libclang, flatbuffers, websockets, termcolor, tensorboard-data-server, optree, opt-einsum, ml-dtypes, grpcio, google-pasta, gast, astunparse, absl-py, tensorboard, curl_cffi, yfinance, keras, tensorflow
Successfully installed absl-py-2.3.1 astunparse-1.6.3 curl_cffi-0.12.0 flatbuffers-25.2.10 gast-0.6.0 google-pasta-0.2.0 grpcio-1.74.0 keras-3.11.1 libclang-18.1.1 ml-dtypes-0.5.3 multitasking-0.0.12 namex-0.1.0 opt-einsum-3.4.0 optree-0.17.0 peewee-3.18.2 tensorboard-2.19.0 tensorboard-data-server-0.7.2 tensorflow-2.19.0 termcolor-3.1.0 websockets-15.0.1 yfinance-0.2.65

```

```

In [2]: import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import yfinance as yf
from sklearn.preprocessing import MinMaxScaler
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense, LSTM

```

```

In [3]: stock_symbol = 'AAPL' # Example: Apple Inc.
df = yf.download(stock_symbol, start='2015-01-01', end='2023-12-31')
print(df.head())

```

```

C:\Users\91893\AppData\Local\Temp\ipykernel_32260\724388669.py:2: FutureWarning: YF.download() has changed argument auto_adjust default to True
  df = yf.download(stock_symbol, start='2015-01-01', end='2023-12-31')
[*****100%*****] 1 of 1 completed

```

Price Ticker Date	Close AAPL	High AAPL	Low AAPL	Open AAPL	Volume AAPL
2015-01-02	24.288582	24.757336	23.848707	24.746228	212818400
2015-01-05	23.604334	24.137514	23.417722	24.057537	257142000
2015-01-06	23.606552	23.866477	23.244433	23.668756	263188400
2015-01-07	23.937572	24.037543	23.704305	23.815385	160423600
2015-01-08	24.857307	24.915069	24.148621	24.266367	237458000

```
In [17]: data = df[['Close']]
scaler = MinMaxScaler(feature_range=(0, 1))
scaled_data = scaler.fit_transform(data)
```

```
In [5]: train_size = int(len(scaled_data) * 0.8)
train_data = scaled_data[:train_size]

X_train = []
y_train = []

for i in range(60, len(train_data)):
    X_train.append(train_data[i-60:i])
    y_train.append(train_data[i])

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

```
In [6]: model = Sequential()
model.add(LSTM(units=50, return_sequences=True, input_shape=(60, 1)))
model.add(LSTM(units=50))
model.add(Dense(1))

model.compile(optimizer='adam', loss='mean_squared_error')
model.fit(X_train, y_train, epochs=10, batch_size=32)
```

C:\Users\91893\anaconda3\Lib\site-packages\keras\src\layers\rnn\rnn.py:199: UserWarning: Do not pass an `input\_shape`/`input\_dim` argument to a layer. When using Sequential models, prefer using an `Input(shape)` object as the first layer in the model instead.

```
super().__init__(**kwargs)
Epoch 1/10
55/55 ————— 7s 44ms/step - loss: 0.0091
Epoch 2/10
55/55 ————— 2s 41ms/step - loss: 3.8722e-04
Epoch 3/10
55/55 ————— 2s 40ms/step - loss: 3.5882e-04
Epoch 4/10
55/55 ————— 2s 41ms/step - loss: 3.5244e-04
Epoch 5/10
55/55 ————— 2s 40ms/step - loss: 3.3263e-04
Epoch 6/10
55/55 ————— 3s 40ms/step - loss: 3.0968e-04
Epoch 7/10
55/55 ————— 2s 42ms/step - loss: 3.0817e-04
Epoch 8/10
55/55 ————— 2s 43ms/step - loss: 3.2026e-04
Epoch 9/10
55/55 ————— 2s 41ms/step - loss: 2.6699e-04
Epoch 10/10
55/55 ————— 3s 40ms/step - loss: 2.6695e-04
```

```
Out[6]: <keras.src.callbacks.history.History at 0x2812d12a060>
```

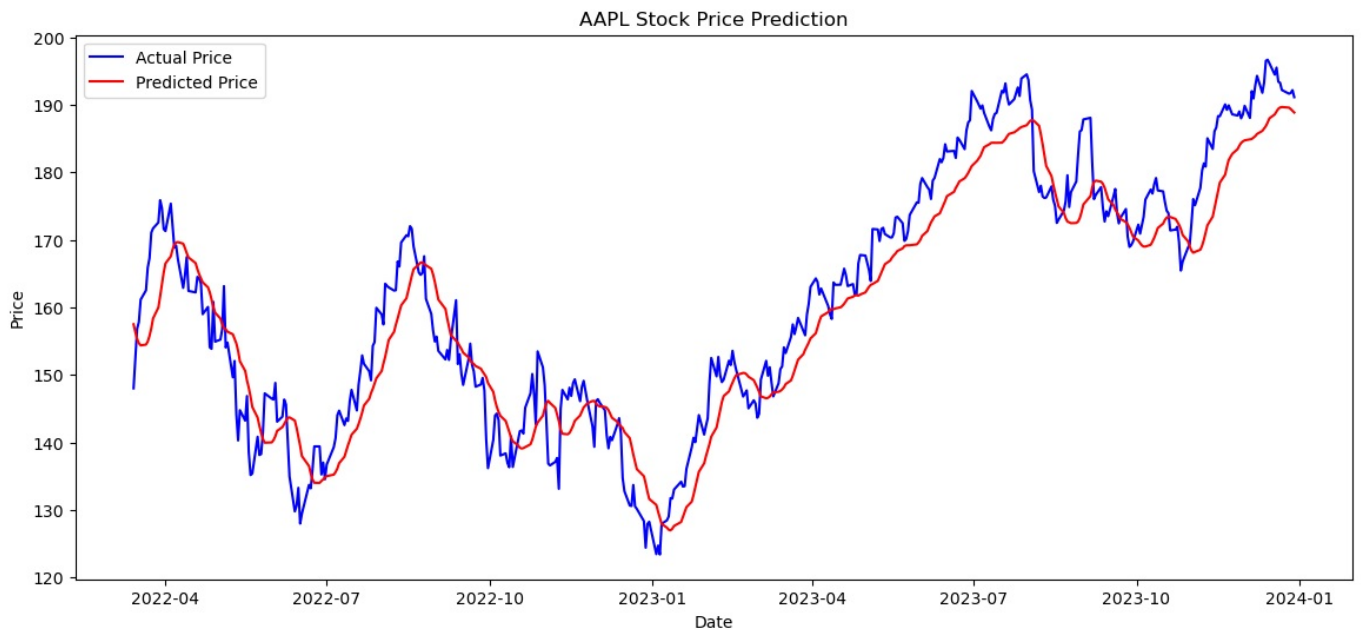
```
In [7]: test_data = scaled_data[train_size - 60:]
X_test = []
y_test = data[train_size:]

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

X_test = np.array(X_test)
predicted_prices = model.predict(X_test)
predicted_prices = scaler.inverse_transform(predicted_prices)

15/15 ————— 1s 46ms/step
```

```
In [8]: plt.figure(figsize=(14,6))
plt.plot(data.index[train_size:], y_test, color='blue', label='Actual Price')
plt.plot(data.index[train_size:], predicted_prices, color='red', label='Predicted Price')
plt.title(f'{stock_symbol} Stock Price Prediction')
plt.xlabel('Date')
plt.ylabel('Price')
plt.legend()
plt.show()
```



```
In [19]: import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import yfinance as yf
from sklearn.preprocessing import MinMaxScaler
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense, LSTM
```

```
In [21]: # Download data for IRCTC from Yahoo Finance
df = yf.download('IRCTC.NS', start='2018-01-01', end='2025-07-31')
print(df.head())
```

C:\Users\91893\AppData\Local\Temp\ipykernel\_32260\2904914961.py:2: FutureWarning: YF.download() has changed argument auto\_adjust default to True

```
df = yf.download('IRCTC.NS', start='2018-01-01', end='2025-07-31')
[*****100%*****] 1 of 1 completed
```

Price Ticker Date	Close IRCTC.NS	High IRCTC.NS	Low IRCTC.NS	Open IRCTC.NS	Volume IRCTC.NS
2019-10-14	140.021606	143.109673	120.252150	120.444551	226353035
2019-10-15	137.212524	143.802334	133.922427	141.608936	52650205
2019-10-16	134.807465	138.722867	134.345686	137.376049	17381530
2019-10-17	139.357803	141.031718	132.210008	134.701644	25164650
2019-10-18	149.911179	151.979510	137.770523	139.492528	48666150

```
In [25]: print(df.columns)

MultiIndex([( 'Close', 'IRCTC.NS'),
( 'High', 'IRCTC.NS'),
( 'Low', 'IRCTC.NS'),
( 'Open', 'IRCTC.NS'),
( 'Volume', 'IRCTC.NS')],
names=['Price', 'Ticker'])
```

```
In [27]: # This extracts the 'Close' price for IRCTC from the multi-level columns
data = df['Close']['IRCTC.NS'].to_frame()
```

```
In [29]: print(data.head())
```

```
IRCTC.NS
Date
2019-10-14    140.021606
2019-10-15    137.212524
2019-10-16    134.807465
2019-10-17    139.357803
2019-10-18    149.911179
```

```
In [31]: # Extract 'Close' price from MultiIndex
data = df['Close']['IRCTC.NS'].to_frame().dropna()

# Convert to NumPy array
dataset = data.values

# Normalize between 0 and 1
scaler = MinMaxScaler(feature_range=(0, 1))
scaled_data = scaler.fit_transform(dataset)
```

```
In [35]: # Define how much of the data to use for training (e.g., 80%)
training_data_len = int(len(scaled_data) * 0.8)
```

```
In [37]: # Step 5: Define training size
training_data_len = int(len(scaled_data) * 0.8)

# Step 6: Create training data
train_data = scaled_data[0:training_data_len]

X_train = []
y_train = []

for i in range(60, len(train_data)):
    X_train.append(train_data[i-60:i, 0]) # last 60 values
    y_train.append(train_data[i, 0])      # 61st value

# Convert to numpy arrays
X_train, y_train = np.array(X_train), np.array(y_train)

# Reshape for LSTM input: (samples, time steps, features)
X_train = X_train.reshape((X_train.shape[0], X_train.shape[1], 1))
```

```
In [39]: model = Sequential()
model.add(LSTM(units=50, return_sequences=True, input_shape=(X_train.shape[1], 1)))
model.add(LSTM(units=50))
model.add(Dense(1)) # Output layer

model.compile(optimizer='adam', loss='mean_squared_error')
model.fit(X_train, y_train, batch_size=32, epochs=10)
```

C:\Users\91893\anaconda3\Lib\site-packages\keras\src\layers\rnn\rnn.py:199: UserWarning: Do not pass an `input\_shape`/'input\_dim` argument to a layer. When using Sequential models, prefer using an `Input(shape)` object as the first layer in the model instead.

```
super().__init__(**kwargs)
```

```
Epoch 1/10
35/35 ————— 8s 56ms/step - loss: 0.0333
Epoch 2/10
35/35 ————— 3s 72ms/step - loss: 0.0019
Epoch 3/10
35/35 ————— 3s 70ms/step - loss: 0.0015
Epoch 4/10
35/35 ————— 2s 69ms/step - loss: 0.0015
Epoch 5/10
35/35 ————— 2s 66ms/step - loss: 0.0014
Epoch 6/10
35/35 ————— 3s 70ms/step - loss: 0.0014
Epoch 7/10
35/35 ————— 2s 63ms/step - loss: 0.0013
Epoch 8/10
35/35 ————— 2s 67ms/step - loss: 0.0013
Epoch 9/10
35/35 ————— 2s 65ms/step - loss: 0.0012
Epoch 10/10
35/35 ————— 3s 71ms/step - loss: 0.0012
```

```
Out[39]: <keras.src.callbacks.history.History at 0x28135944110>
```

```
In [41]: test_data = scaled_data[training_data_len - 60:]
X_test = []
y_test = dataset[training_data_len:]

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))
```

```
In [43]: predictions = model.predict(X_test)
predictions = scaler.inverse_transform(predictions) # Undo scaling

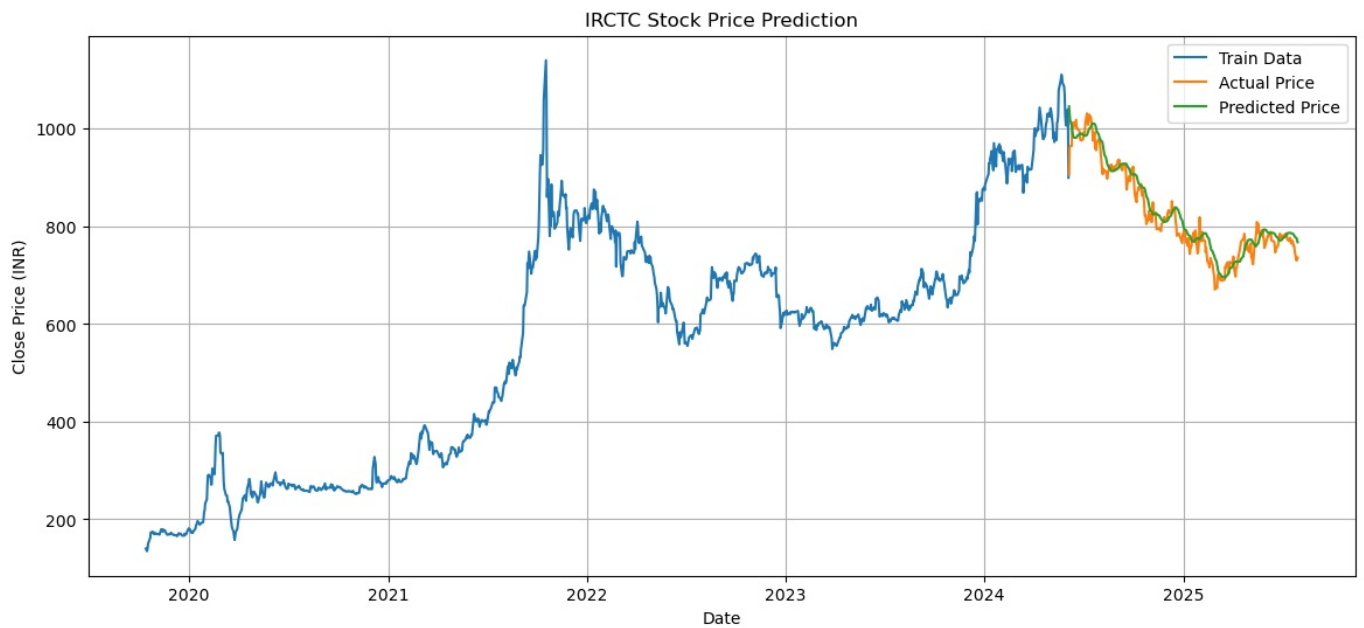
9/9 ————— 1s 24ms/step
```

```
In [51]: # Convert Close price for IRCTC to single-column DataFrame and rename it
data = df['Close']['IRCTC.NS'].to_frame().dropna()
data.columns = ['Close'] # Rename the column explicitly
```

```
In [53]: # Train-valid split
train = data[:training_data_len].copy()
valid = data[training_data_len:].copy()

# Add predictions
valid['Predictions'] = predictions
```

```
# Plotting
plt.figure(figsize=(14,6))
plt.title('IRCTC Stock Price Prediction')
plt.xlabel('Date')
plt.ylabel('Close Price (INR)')
plt.plot(train.index, train['Close'], label='Train Data')
plt.plot(valid.index, valid['Close'], label='Actual Price')
plt.plot(valid.index, valid['Predictions'], label='Predicted Price')
plt.legend()
plt.grid()
plt.show()
```



```
In [55]: # Predict the next day price
last_60_days = data[-60:].values
last_60_scaled = scaler.transform(last_60_days)

X_future = np.reshape(last_60_scaled, (1, 60, 1))
future_price = model.predict(X_future)
future_price = scaler.inverse_transform(future_price)
print(f"Predicted price for next day: ₹{future_price[0][0]:.2f}")
```

1/1 ————— 1s 773ms/step  
Predicted price for next day: ₹763.52

In [ ]:

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