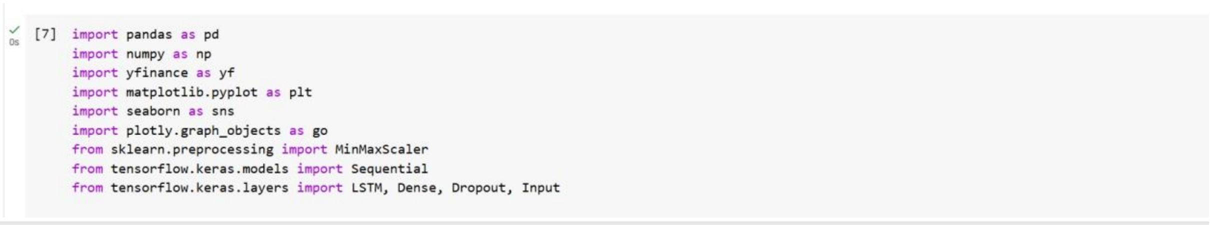
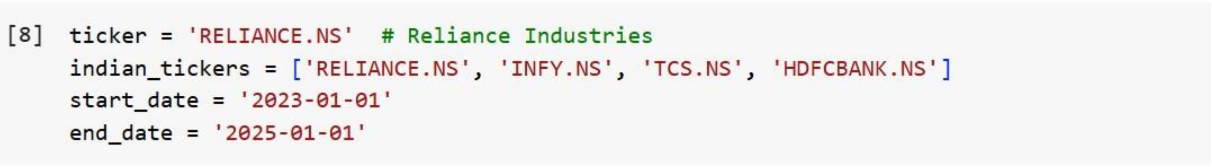
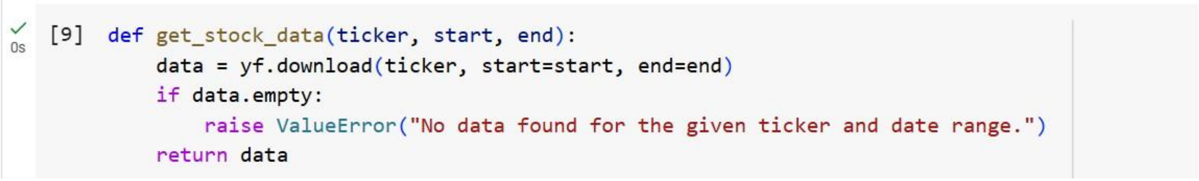
Financial Data Analysis



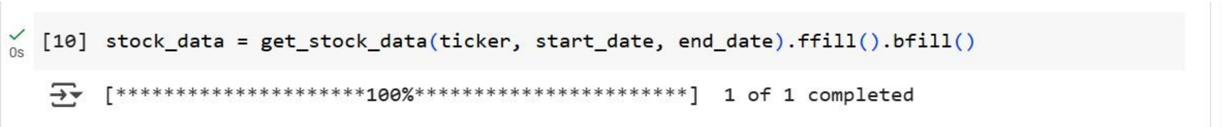
```
[7] import pandas as pd
    import numpy as np
    import yfinance as yf
    import matplotlib.pyplot as plt
    import seaborn as sns
    import plotly.graph_objects as go
    from sklearn.preprocessing import MinMaxScaler
    from tensorflow.keras.models import Sequential
    from tensorflow.keras.layers import LSTM, Dense, Dropout, Input
```



```
[8] ticker = 'RELIANCE.NS'  # Reliance Industries
    indian_tickers = ['RELIANCE.NS', 'INFY.NS', 'TCS.NS', 'HDFCBANK.NS']
    start_date = '2023-01-01'
    end_date = '2025-01-01'
```

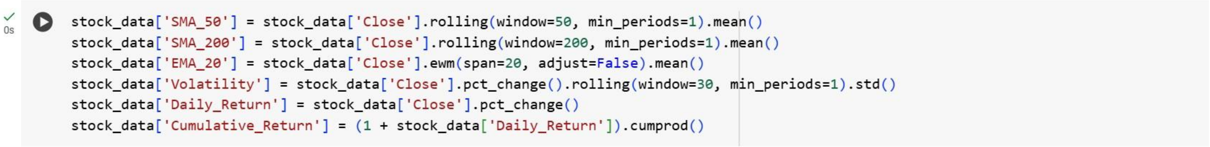


```
[9] def get_stock_data(ticker, start, end):
        data = yf.download(ticker, start=start, end=end)
        if data.empty:
            raise ValueError("No data found for the given ticker and date range.")
        return data
```

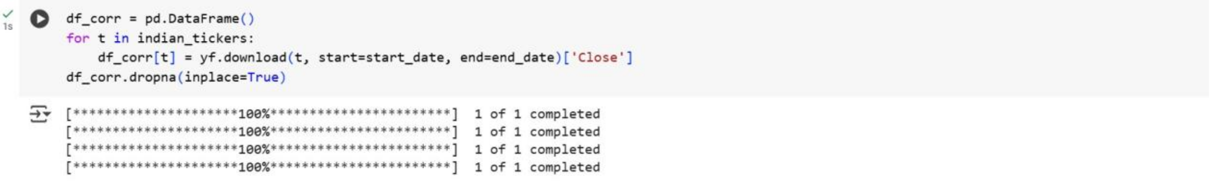


```
[10] stock_data = get_stock_data(ticker, start_date, end_date).ffill().bfill()

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



```
stock_data['SMA_50'] = stock_data['Close'].rolling(window=50, min_periods=1).mean()
stock_data['SMA_200'] = stock_data['Close'].rolling(window=200, min_periods=1).mean()
stock_data['EMA_20'] = stock_data['Close'].ewm(span=20, adjust=False).mean()
stock_data['Volatility'] = stock_data['Close'].pct_change().rolling(window=30, min_periods=1).std()
stock_data['Daily_Return'] = stock_data['Close'].pct_change()
stock_data['Cumulative_Return'] = (1 + stock_data['Daily_Return']).cumprod()
```



```
df_corr = pd.DataFrame()
for t in indian_tickers:
    df_corr[t] = yf.download(t, start=start_date, end=end_date)['Close']
df_corr.dropna(inplace=True)

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```
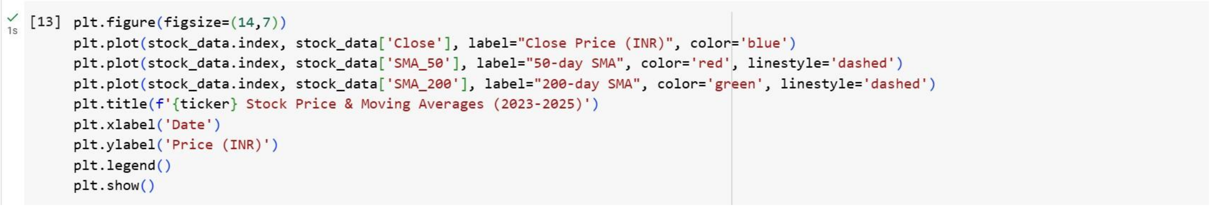
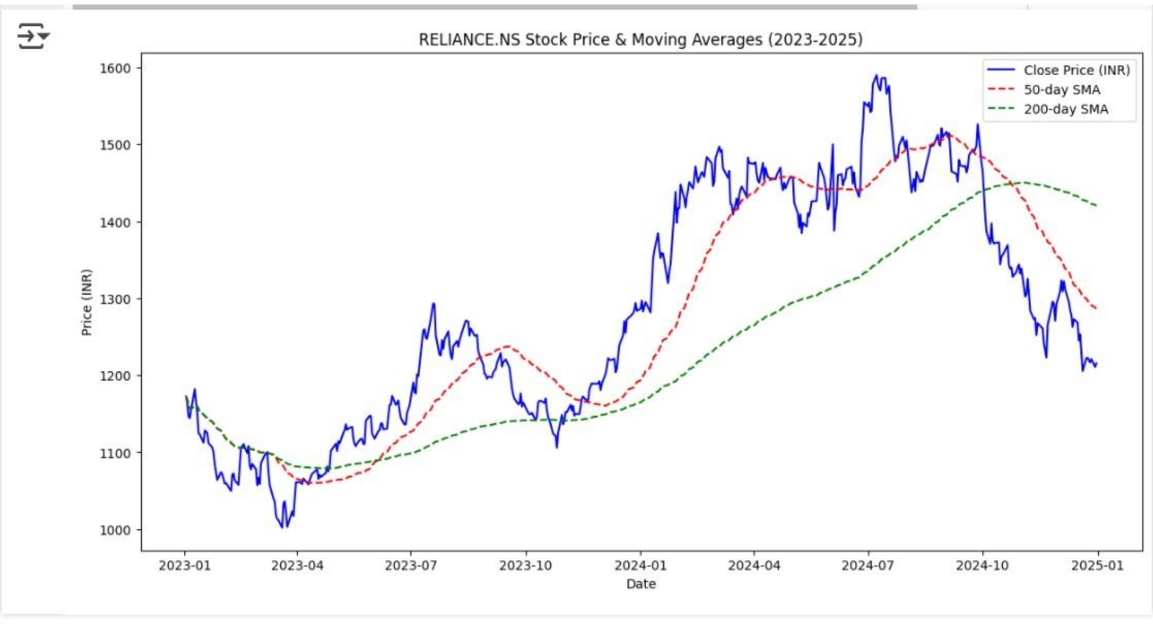



```
[13] plt.figure(figsize=(14,7))
     plt.plot(stock_data.index, stock_data['Close'], label="Close Price (INR)", color='blue')
     plt.plot(stock_data.index, stock_data['SMA_50'], label="50-day SMA", color='red', linestyle='dashed')
     plt.plot(stock_data.index, stock_data['SMA_200'], label="200-day SMA", color='green', linestyle='dashed')
     plt.title(f'{ticker} Stock Price & Moving Averages (2023-2025)')
     plt.xlabel('Date')
     plt.ylabel('Price (INR)')
     plt.legend()
     plt.show()
```



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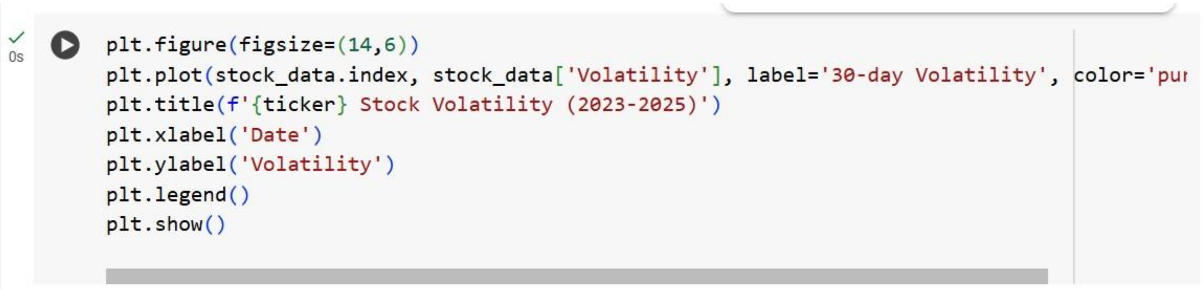
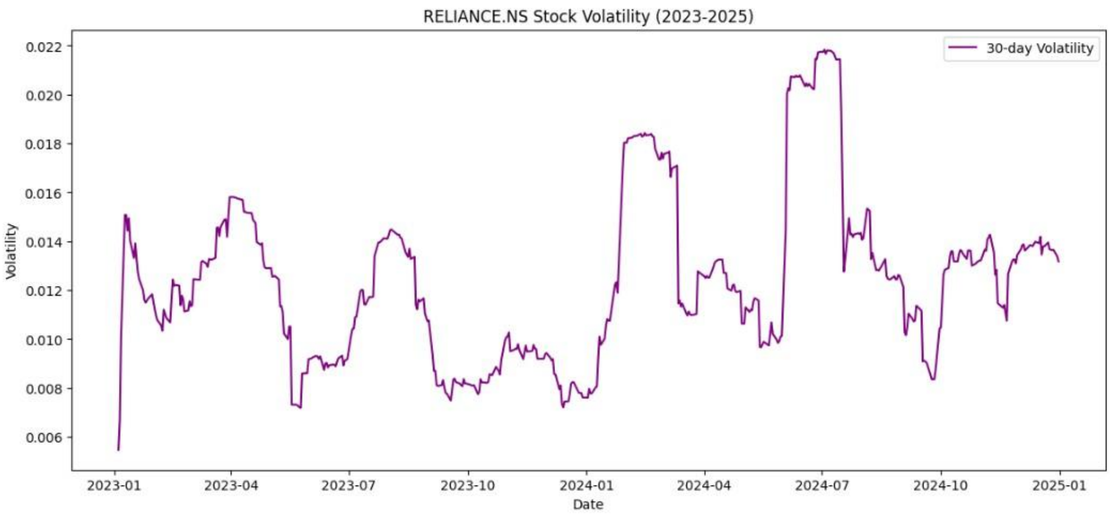
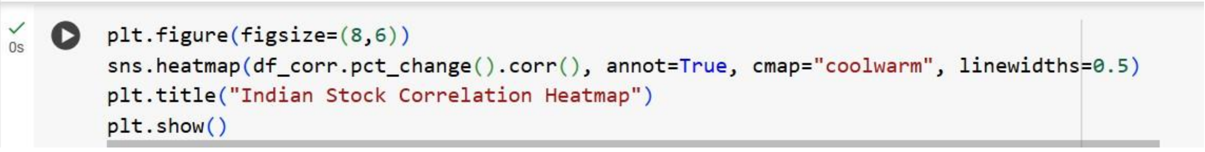
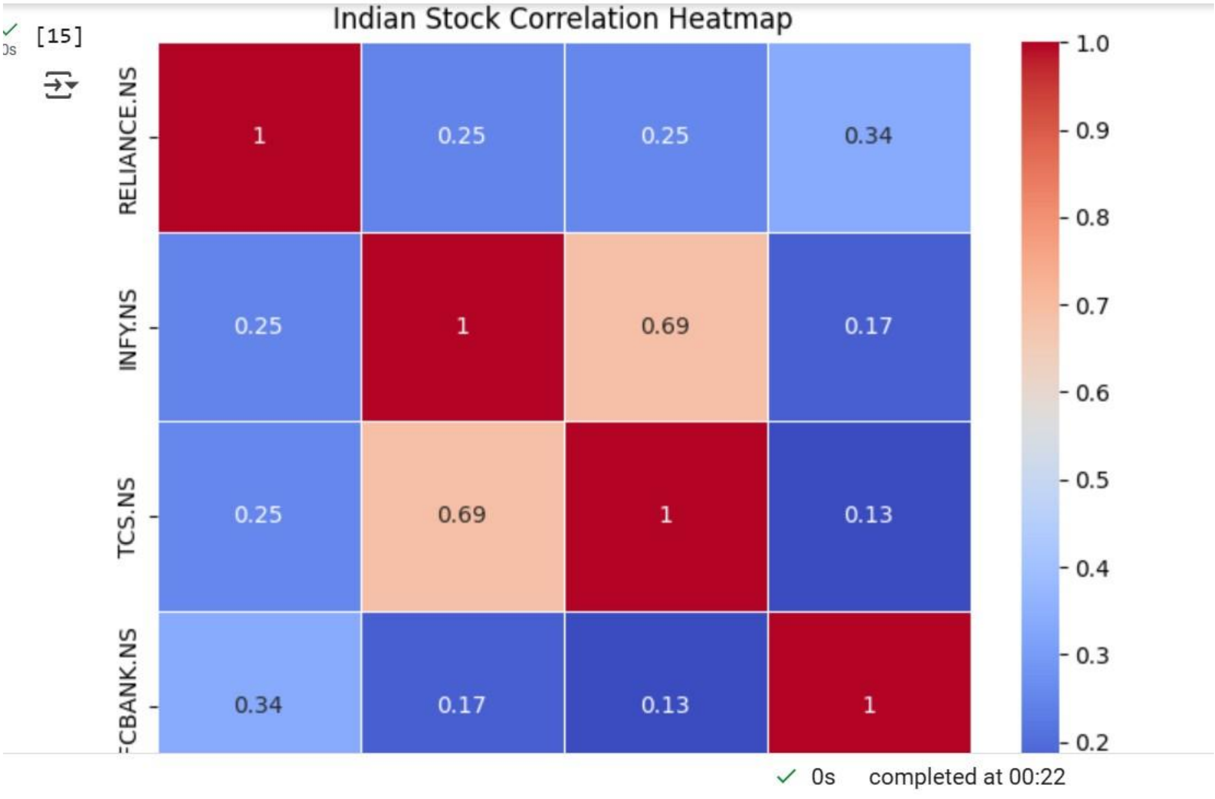


```
plt.figure(figsize=(14,6))
plt.plot(stock_data.index, stock_data['Volatility'], label='30-day Volatility', color='pur
plt.title(f'{ticker} Stock Volatility (2023-2025)')
plt.xlabel('Date')
plt.ylabel('Volatility')
plt.legend()
plt.show()
```

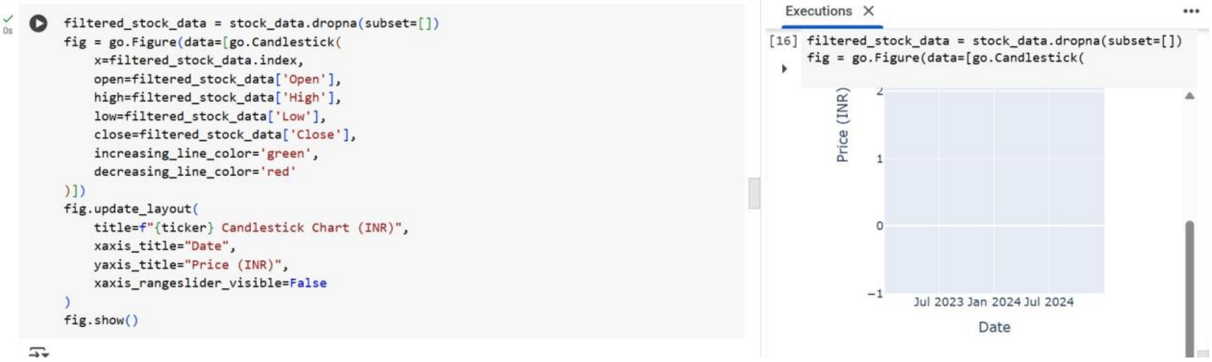




```
plt.figure(figsize=(8,6))
sns.heatmap(df_corr.pct_change().corr(), annot=True, cmap="coolwarm", linewidths=0.5)
plt.title("Indian Stock Correlation Heatmap")
plt.show()
```

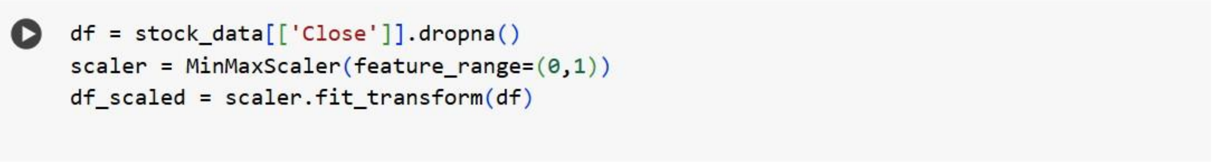


Financial Data Analysis

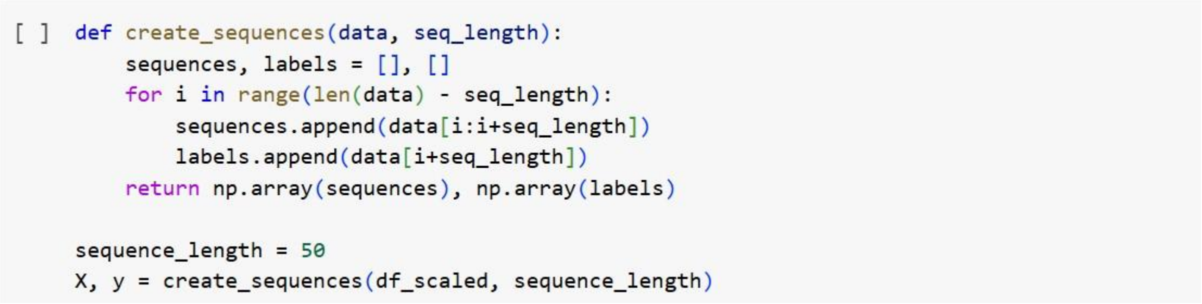


```
filtered_stock_data = stock_data.dropna(subset=[])
fig = go.Figure(data=[go.Candlestick(
    x=filtered_stock_data.index,
    open=filtered_stock_data['Open'],
    high=filtered_stock_data['High'],
    low=filtered_stock_data['Low'],
    close=filtered_stock_data['Close'],
    increasing_line_color='green',
    decreasing_line_color='red'
)])
fig.update_layout(
    title=f"{ticker} Candlestick Chart (INR)",
    xaxis_title="Date",
    yaxis_title="Price (INR)",
    xaxis_rangeslider_visible=False
)
fig.show()
```

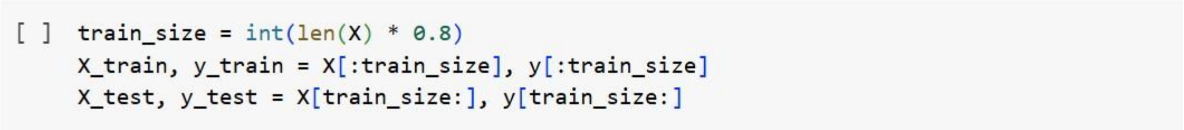
```
[16] filtered_stock_data = stock_data.dropna(subset=[])
     fig = go.Figure(data=[go.Candlestick(
```



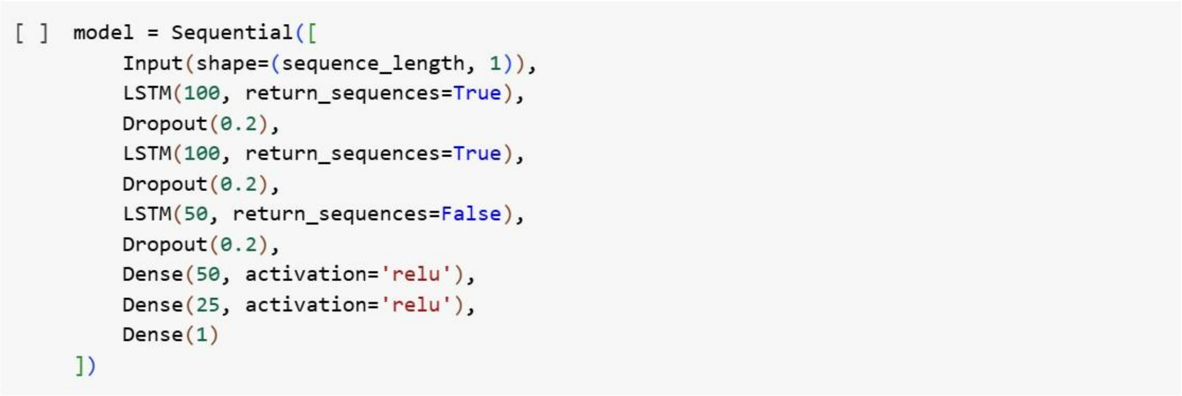
```
df = stock_data[['Close']].dropna()
scaler = MinMaxScaler(feature_range=(0,1))
df_scaled = scaler.fit_transform(df)
```



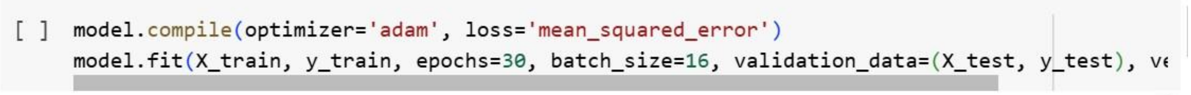
```
[ ] def create_sequences(data, seq_length):
        sequences, labels = [], []
        for i in range(len(data) - seq_length):
            sequences.append(data[i:i+seq_length])
            labels.append(data[i+seq_length])
        return np.array(sequences), np.array(labels)

    sequence_length = 50
    X, y = create_sequences(df_scaled, sequence_length)
```



```
[ ] train_size = int(len(X) * 0.8)
    X_train, y_train = X[:train_size], y[:train_size]
    X_test, y_test = X[train_size:], y[train_size:]
```



```
[ ] model = Sequential([
        Input(shape=(sequence_length, 1)),
        LSTM(100, return_sequences=True),
        Dropout(0.2),
        LSTM(100, return_sequences=True),
        Dropout(0.2),
        LSTM(50, return_sequences=False),
        Dropout(0.2),
        Dense(50, activation='relu'),
        Dense(25, activation='relu'),
        Dense(1)
    ])
```



```
[ ] model.compile(optimizer='adam', loss='mean_squared_error')
    model.fit(X_train, y_train, epochs=30, batch_size=16, validation_data=(X_test, y_test), ve
```

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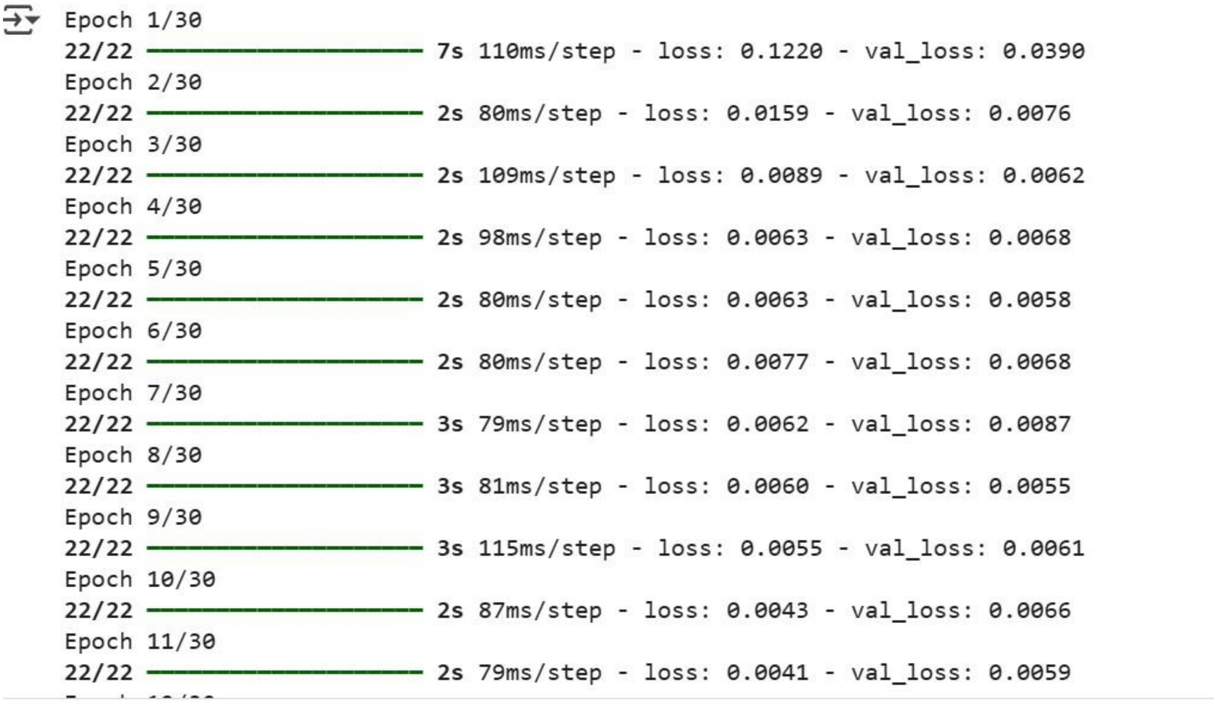
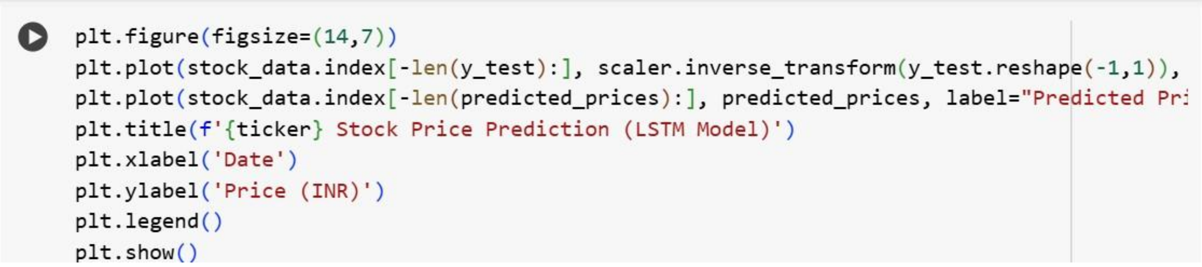
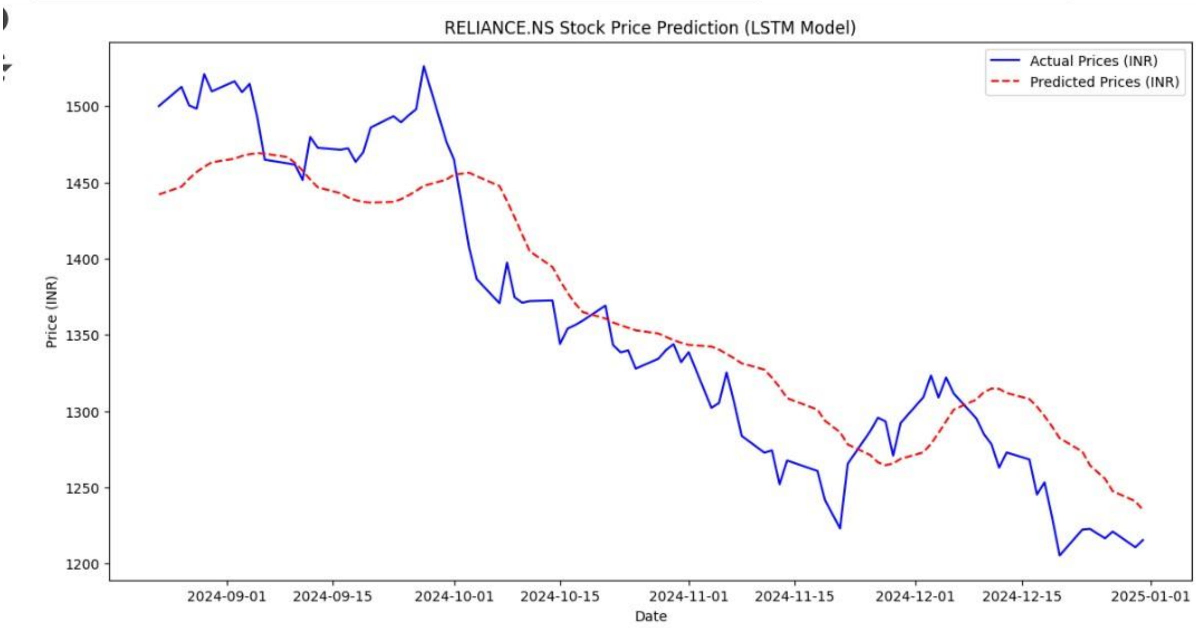


```
Epoch 1/30
22/22 ━━━━━━━━━━━━━━━━━━━━ 7s 110ms/step - loss: 0.1220 - val_loss: 0.0390
Epoch 2/30
22/22 ━━━━━━━━━━━━━━━━━━━━ 2s 80ms/step - loss: 0.0159 - val_loss: 0.0076
Epoch 3/30
22/22 ━━━━━━━━━━━━━━━━━━━━ 2s 109ms/step - loss: 0.0089 - val_loss: 0.0062
Epoch 4/30
22/22 ━━━━━━━━━━━━━━━━━━━━ 2s 98ms/step - loss: 0.0063 - val_loss: 0.0068
Epoch 5/30
22/22 ━━━━━━━━━━━━━━━━━━━━ 2s 80ms/step - loss: 0.0063 - val_loss: 0.0058
Epoch 6/30
22/22 ━━━━━━━━━━━━━━━━━━━━ 2s 80ms/step - loss: 0.0077 - val_loss: 0.0068
Epoch 7/30
22/22 ━━━━━━━━━━━━━━━━━━━━ 3s 79ms/step - loss: 0.0062 - val_loss: 0.0087
Epoch 8/30
22/22 ━━━━━━━━━━━━━━━━━━━━ 3s 81ms/step - loss: 0.0060 - val_loss: 0.0055
Epoch 9/30
22/22 ━━━━━━━━━━━━━━━━━━━━ 3s 115ms/step - loss: 0.0055 - val_loss: 0.0061
Epoch 10/30
22/22 ━━━━━━━━━━━━━━━━━━━━ 2s 87ms/step - loss: 0.0043 - val_loss: 0.0066
Epoch 11/30
22/22 ━━━━━━━━━━━━━━━━━━━━ 2s 79ms/step - loss: 0.0041 - val_loss: 0.0059
```



```
plt.figure(figsize=(14,7))
plt.plot(stock_data.index[-len(y_test):], scaler.inverse_transform(y_test.reshape(-1,1)),
plt.plot(stock_data.index[-len(predicted_prices):], predicted_prices, label="Predicted Pri
plt.title(f'{ticker} Stock Price Prediction (LSTM Model)')
plt.xlabel('Date')
plt.ylabel('Price (INR)')
plt.legend()
plt.show()
```


RELIANCE.NS Stock Price Prediction (LSTM Model)
Actual Prices (INR)
Predicted Prices (INR)
Price (INR)
Date