Stock_Price_Prediction_with_LSTM

December 23, 2025

[1]:
```
import pandas as pd
import yfinance as yf
import datetime
from datetime import date, timedelta
today = date.today()

d1 = today.strftime("%Y-%m-%d")
end_date = d1
d2 = date.today() - timedelta(days = 5000)
d2 = d2.strftime("%Y-%m-%d")
start_date = d2

data = yf.download('AAPL',
                   start=start_date,
                   end=end_date,
                   progress=False,
                   auto_adjust=False)

if isinstance(data.columns, pd.MultiIndex):
    data.columns = data.columns.droplevel(1)    # remove the "AAPL" under each␣
 ↪column



data["Date"] = data.index
data = data[["Date", "Open", "High", "Low", "Close",
             "Adj Close", "Volume"]]
data.reset_index(drop=True, inplace=True)
```

[2]:
```
data.tail()
```

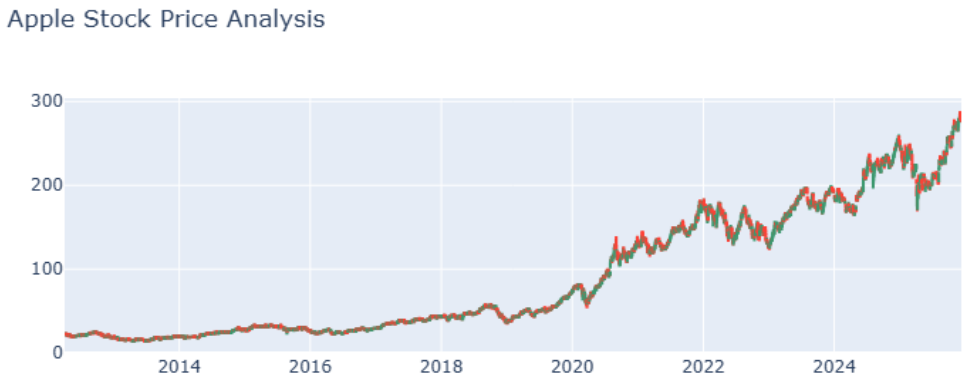
[2]:
```
Price       Date        Open        High         Low       Close   Adj Close  \
3438  2025-12-03  286.200012  288.619995  283.299988  284.149994  284.149994
3439  2025-12-04  284.100006  284.730011  278.589996  280.700012  280.700012
3440  2025-12-05  280.540009  281.140015  278.049988  278.779999  278.779999
3441  2025-12-08  278.130005  279.670013  276.149994  277.890015  277.890015
3442  2025-12-09  278.160004  280.029999  276.920013  277.179993  277.179993

Price    Volume
```

```
3438   43538700
3439   43989100
3440   47265800
3441   38211800
3442   32159900
```

[3]:
```
import plotly.graph_objects as go
figure = go.Figure(data=[go.Candlestick(x=data["Date"],
                                        open=data["Open"],
                                        high=data["High"],
                                        low=data["Low"],
                                        close=data["Close"])])
figure.update_layout(title = "Apple Stock Price Analysis",
                     xaxis_rangeslider_visible=False)

figure.show()
```



[4]:
```
correlation = data.corr()
print(correlation["Close"].sort_values(ascending=False))
```

```
Price
Close        1.000000
Adj Close    0.999962
High         0.999883
Low          0.999879
Open         0.999742
Date         0.930996
Volume      -0.536615
Name: Close, dtype: float64
```

[8]:
```
x = data[["Open", "High", "Low", "Volume"]]
y = data["Close"]
x = x.to_numpy()
y = y.to_numpy()
y = y.reshape(-1, 1)

from sklearn.model_selection import train_test_split
xtrain, xtest, ytrain, ytest = train_test_split(x, y, test_size=0.2,␣
 ↪random_state=42)
```

[9]:
```
from keras.models import Sequential
from keras.layers import Dense, LSTM
model = Sequential()
model.add(LSTM(128, return_sequences=True, input_shape=(xtrain.shape[1], 1)))
model.add(LSTM(64, return_sequences=False))
model.add(Dense(25))
model.add(Dense(1))
model.summary()
```

```
C:\Users\USER\miniconda3\envs\ds4b\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.
```

Model: "sequential_1"

Layer (type)	Output Shape	Param #
lstm_2 (LSTM)	(None, 4, 128)	66,560
lstm_3 (LSTM)	(None, 64)	49,408
dense_2 (Dense)	(None, 25)	1,625
dense_3 (Dense)	(None, 1)	26

Total params: 117,619 (459.45 KB)

Trainable params: 117,619 (459.45 KB)

Non-trainable params: 0 (0.00 B)

[10]:
```
model.compile(optimizer = 'adam', loss = 'mean_squared_error')
model.fit(xtrain, ytrain, batch_size=1, epochs=30)
```

```
Epoch 1/30
2754/2754             19s 5ms/step -
loss: 814.3448
Epoch 2/30
2754/2754             14s 5ms/step -
loss: 35.8546
Epoch 3/30
2754/2754             17s 6ms/step -
loss: 25.2978
Epoch 4/30
2754/2754             14s 5ms/step -
loss: 29.6929
Epoch 5/30
2754/2754             14s 5ms/step -
loss: 28.9478
Epoch 6/30
2754/2754             14s 5ms/step -
loss: 17.3286
Epoch 7/30
2754/2754             14s 5ms/step -
loss: 21.8877
Epoch 8/30
2754/2754             13s 5ms/step -
loss: 24.7098
Epoch 9/30
2754/2754             13s 5ms/step -
loss: 33.0237
Epoch 10/30
2754/2754             13s 5ms/step -
loss: 20.2515
Epoch 11/30
2754/2754             15s 5ms/step -
loss: 17.3166
Epoch 12/30
2754/2754             17s 6ms/step -
loss: 17.7041
Epoch 13/30
2754/2754             19s 6ms/step -
loss: 15.9583
Epoch 14/30
2754/2754             16s 6ms/step -
loss: 20.1685
Epoch 15/30
```

```
2754/2754            20s 6ms/step -
loss: 17.2247
Epoch 16/30
2754/2754            14s 5ms/step -
loss: 15.5883
Epoch 17/30
2754/2754            17s 6ms/step -
loss: 13.0713
Epoch 18/30
2754/2754            21s 8ms/step -
loss: 12.6680
Epoch 19/30
2754/2754            16s 6ms/step -
loss: 11.4840
Epoch 20/30
2754/2754            16s 6ms/step -
loss: 10.8552
Epoch 21/30
2754/2754            15s 6ms/step -
loss: 10.8389
Epoch 22/30
2754/2754            18s 6ms/step -
loss: 10.8241
Epoch 23/30
2754/2754            19s 6ms/step -
loss: 11.9095
Epoch 24/30
2754/2754            13s 5ms/step -
loss: 9.7985
Epoch 25/30
2754/2754            15s 5ms/step -
loss: 10.5313
Epoch 26/30
2754/2754            13s 5ms/step -
loss: 11.1838
Epoch 27/30
2754/2754            13s 5ms/step -
loss: 12.1805
Epoch 28/30
2754/2754            13s 5ms/step -
loss: 7.9077
Epoch 29/30
2754/2754            16s 6ms/step -
loss: 9.5558
Epoch 30/30
2754/2754            26s 9ms/step -
loss: 8.4473
```

[10]:
```
<keras.src.callbacks.history.History at 0x23e4d0244d0>
```

[11]:
```
import numpy as np
#features = [Open, High, Low, Adj Close, Volume]
features = np.array([[177.089996, 180.419998, 177.070007, 74919600]])
model.predict(features)
```

```
1/1             1s 696ms/step
```

[11]:
```
array([[177.4095]], dtype=float32)
```

[ ]:
```

```