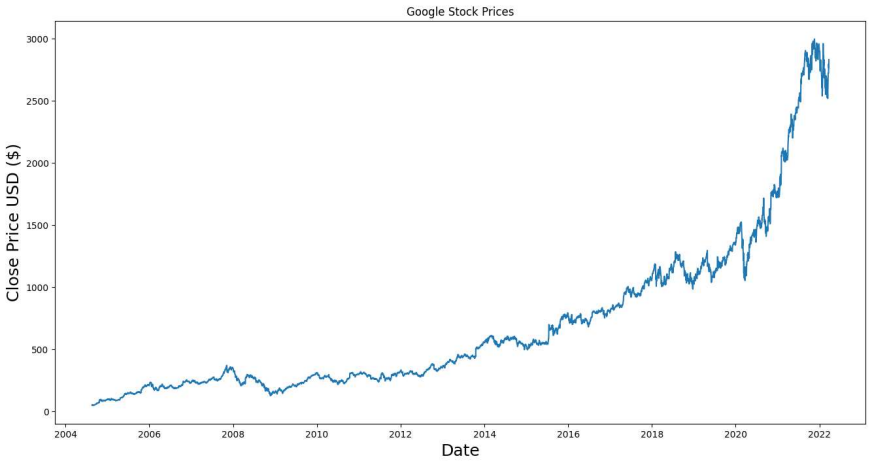
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
from sklearn.preprocessing import MinMaxScaler
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense, LSTM, Dropout


# load the dataset
df = pd.read_csv('/content/GOOGL.csv', index_col='Date', parse_dates=['Date'])
df = df[['Close']]
df.head()
```

Date	Close
2004-08-19	50.220219
2004-08-20	54.209209
2004-08-23	54.754753
2004-08-24	52.487488
2004-08-25	53.053055

Next steps: Generate code with df View recommended plots

```
# visualize the dataset
plt.figure(figsize=(16,8))
plt.title('Google Stock Prices')
plt.plot(df['Close'])
plt.xlabel('Date', fontsize=18)
plt.ylabel('Close Price USD ($)', fontsize=18)
plt.show()
```




```
# preprocess the data
scaler = MinMaxScaler(feature_range=(0,1))
scaled_data = scaler.fit_transform(df['Close'].values.reshape(-1,1))
```

```
# split the data into training and testing sets
training_data_len = int(np.ceil(len(scaled_data) * 0.8))
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])
    y_train.append(train_data[i, 0])

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))


# define the RNN architecture
model = Sequential()
model.add(LSTM(50, return_sequences=True, input_shape=(x_train.shape[1], 1)))
model.add(Dropout(0.2))
model.add(LSTM(50, return_sequences=True))
model.add(Dropout(0.2))
model.add(LSTM(50))
model.add(Dropout(0.2))
model.add(Dense(1))


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

# train the model
model.fit(x_train, y_train, epochs=25, batch_size=32)
```

```
Epoch 1/25
109/109 [==============================] - 21s 101ms/step - loss: 0.0012
Epoch 2/25
109/109 [==============================] - 9s 85ms/step - loss: 3.0130e-04
Epoch 3/25
109/109 [==============================] - 10s 90ms/step - loss: 2.5178e-04
Epoch 4/25
109/109 [==============================] - 10s 89ms/step - loss: 2.4137e-04
Epoch 5/25
109/109 [==============================] - 10s 89ms/step - loss: 2.1998e-04
Epoch 6/25
109/109 [==============================] - 9s 78ms/step - loss: 2.0911e-04
Epoch 7/25
109/109 [==============================] - 10s 89ms/step - loss: 1.7484e-04
Epoch 8/25
109/109 [==============================] - 10s 90ms/step - loss: 1.7953e-04
Epoch 9/25
109/109 [==============================] - 10s 95ms/step - loss: 1.6816e-04
Epoch 10/25
109/109 [==============================] - 9s 79ms/step - loss: 1.7564e-04
Epoch 11/25
109/109 [==============================] - 11s 98ms/step - loss: 1.6241e-04
Epoch 12/25
109/109 [==============================] - 10s 89ms/step - loss: 1.5531e-04
Epoch 13/25
109/109 [==============================] - 10s 89ms/step - loss: 1.5255e-04
Epoch 14/25
109/109 [==============================] - 9s 79ms/step - loss: 1.5798e-04
Epoch 15/25
109/109 [==============================] - 10s 89ms/step - loss: 1.3866e-04
Epoch 16/25
109/109 [==============================] - 10s 88ms/step - loss: 1.4036e-04
Epoch 17/25
109/109 [==============================] - 10s 88ms/step - loss: 1.2347e-04
Epoch 18/25
109/109 [==============================] - 9s 79ms/step - loss: 1.4984e-04
Epoch 19/25
109/109 [==============================] - 10s 89ms/step - loss: 1.2144e-04
Epoch 20/25
109/109 [==============================] - 10s 88ms/step - loss: 1.3161e-04
Epoch 21/25
109/109 [==============================] - 10s 88ms/step - loss: 1.2896e-04
Epoch 22/25
109/109 [==============================] - 9s 79ms/step - loss: 1.2551e-04
Epoch 23/25
109/109 [==============================] - 10s 88ms/step - loss: 1.3308e-04
Epoch 24/25
109/109 [==============================] - 10s 88ms/step - loss: 1.1407e-04
Epoch 25/25
109/109 [==============================] - 10s 88ms/step - loss: 1.1913e-04
<keras.src.callbacks.History at 0x79fc0bb71630>
```

```
# test the model
test_data = scaled_data[training_data_len-60:, :]
x_test = []
y_test = df.iloc[training_data_len:, :]['Close'].values
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))

# get the model's predicted price values
predictions = model.predict(x_test)
```

```
# visualize the predictions
plt.figure(figsize=(16,8))
plt.title('Google Stock Prices - Predicted vs Actual')
plt.plot(df.iloc[training_data_len:, :].index, y_test, label='Actual')
plt.plot(df.iloc[training_data_len:, :].index, predictions, label='Predicted')
plt.xlabel('Date', fontsize=18)
plt.ylabel('Close Price USD ($)', fontsize=18)
plt.legend()
plt.show()
```