

nikhil-data-science-intern-task-1

July 31, 2023

```
[1]: #importing libraries to be used import numpy as np
# for linear algebra import pandas as pd # data
preprocessing import matplotlib.pyplot as plt # data
visualization library import seaborn as sns # data
visualization library
%matplotlib inline
import warnings
warnings.filterwarnings('ignore') # ignore warnings

from sklearn.preprocessing import MinMaxScaler # for
normalization from keras.models import Sequential
from keras.layers import Dense, Dropout, LSTM, Bidirectional
```

```
[5]: df = pd.read_csv('/content/drive/MyDrive/Dataset/GOOG .csv') #
data_importing df.head(10) # fetching first 10 rows of dataset
```

```
[5]: symbol          date  close  high    low  open \
0   GOOG 2016-06-14 00:00:00+00:00  718.27  722.47  713.1200  716.48
1   GOOG 2016-06-15 00:00:00+00:00  718.92  722.98  717.3100  719.00
2   GOOG 2016-06-16 00:00:00+00:00  710.36  716.65  703.2600  714.91
3   GOOG 2016-06-17 00:00:00+00:00  691.72  708.82  688.4515  708.65
4   GOOG 2016-06-20 00:00:00+00:00  693.71  702.48  693.4100  698.77
5   GOOG 2016-06-21 00:00:00+00:00  695.94  702.77  692.0100  698.40
6   GOOG 2016-06-22 00:00:00+00:00  697.46  700.86  693.0819  699.06
7   GOOG 2016-06-23 00:00:00+00:00  701.87  701.95  687.0000  697.45
8   GOOG 2016-06-24 00:00:00+00:00  675.22  689.40  673.4500  675.17
9   GOOG 2016-06-27 00:00:00+00:00  668.26  672.30  663.2840  671.00

      volume  adjClose  adjHigh  adjLow  adjOpen  adjVolume  divCash \
0  1306065    718.27    722.47  713.1200  716.48    1306065    0.0
1  1214517    718.92    722.98  717.3100  719.00    1214517    0.0
2  1982471    710.36    716.65  703.2600  714.91    1982471    0.0
3  3402357    691.72    708.82  688.4515  708.65    3402357    0.0
4  2082538    693.71    702.48  693.4100  698.77    2082538    0.0
5  1465634    695.94    702.77  692.0100  698.40    1465634    0.0
6  1184318    697.46    700.86  693.0819  699.06    1184318    0.0
7  2171415    701.87    701.95  687.0000  697.45    2171415    0.0
8  4449022    675.22    689.40  673.4500  675.17    4449022    0.0
9  2641085    668.26    672.30  663.2840  671.00    2641085    0.0
```

```

splitFactor
0      1.0 1
1.0 2 1.0 3
1.0 4 1.0 5
1.0 6 1.0 7
1.0 8 1.0
9      1.0

```

```

[6]: # shape of data
print("Shape of data:",df.shape)

```

Shape of data: (1258, 14)

```

[7]: # statistical description of data
df.describe()

```

```

[7]: close high low open volume \ count 1258.000000 1258.000000
1258.000000 1258.000000 1.258000e+03
mean  1216.317067    1227.430934    1204.176430    1215.260779
      1.601590e+06
std    383.333358    387.570872    378.777094          382.446995
      6.960172e+05
min    668.260000    672.300000    663.284000          671.000000
      3.467530e+05
25%    960.802500    968.757500    952.182500          959.005000
      1.173522e+06
50%    1132.460000    1143.935000    1117.915000    1131.150000
      1.412588e+06
75%    1360.595000    1374.345000    1348.557500    1361.075000
      1.812156e+06
max    2521.600000    2526.990000    2498.290000    2524.920000
      6.207027e+06
      adjClose      adjHigh      adjLow      adjOpen      adjVolume \
count 1258.000000 1258.000000 1258.000000 1258.000000 1.258000e+03
mean  1216.317067    1227.430936    1204.176436    1215.260779
      1.601590e+06
std    383.333358    387.570873    378.777099          382.446995
      6.960172e+05
min    668.260000    672.300000    663.284000          671.000000
      3.467530e+05
25%    960.802500    968.757500    952.182500          959.005000
      1.173522e+06
50%    1132.460000    1143.935000    1117.915000    1131.150000
      1.412588e+06
75%    1360.595000    1374.345000    1348.557500    1361.075000
      1.812156e+06

```

```
max    2521.600000 2526.990000 2498.290000 2524.920000
        6.207027e+06 divCash splitFactor
```

```
count 1258.0      1258.0
mean    0.0        1.0
std     0.0        0.0
min     0.0        1.0
25%     0.0        1.0
50%     0.0        1.0
75%     0.0        1.0
max     0.0        1.0
```

```
<google.colab._quickchart_helpers.SectionTitle at
0x7b92df122c80> import numpy as np from google.colab
import autoviz
df_8454858346676847654 = autoviz.get_df('df_8454858346676847654')

def value_plot(df, y, sort_ascending=False, figsize=(2, 1)):
    from matplotlib import pyplot as
    plt if sort_ascending:
        df =
    df.sort_values(y).reset_index(drop=True)
    _, ax = plt.subplots(figsize=figsize)
    df[y].plot(kind='line') plt.title(y)
    ax.spines[['top',
    'right',]].set_visible(False)
    plt.tight_layout()
    return autoviz.MplChart.from_current_mpl_state()

chart = value_plot(df_8454858346676847654,
*['close'], **{}) chart import numpy as np from
google.colab import autoviz
df_8454858346676847654 = autoviz.get_df('df_8454858346676847654')

def value_plot(df, y, sort_ascending=False, figsize=(2, 1)):
    from matplotlib import pyplot as
    plt if sort_ascending:
        df =
    df.sort_values(y).reset_index(drop=True)
    _, ax = plt.subplots(figsize=figsize)
    df[y].plot(kind='line') plt.title(y)
    ax.spines[['top',
    'right',]].set_visible(False)
    plt.tight_layout()
    return autoviz.MplChart.from_current_mpl_state()
```

```

chart = value_plot(df_8454858346676847654,
*['high'], **{}) chart import numpy as np from
google.colab import autoviz
df_8454858346676847654 =

autoviz.get_df('df_8454858346676847654') def value_plot(df,

y, sort_ascending=False, figsize=(2, 1)):

    from matplotlib import pyplot as
    plt if sort_ascending:
        df =
        df.sort_values(y).reset_index(drop=True)
        _, ax = plt.subplots(figsize=figsize)
        df[y].plot(kind='line') plt.title(y)
        ax.spines[['top',
        'right',]].set_visible(False)
        plt.tight_layout()
        return autoviz.MplChart.from_current_mpl_state()

chart = value_plot(df_8454858346676847654,
*['low'], **{}) chart import numpy as np from
google.colab import autoviz
df_8454858346676847654 = autoviz.get_df('df_8454858346676847654')

def value_plot(df, y, sort_ascending=False, figsize=(2, 1)):
    from matplotlib import pyplot as
    plt if sort_ascending:
        df =
        df.sort_values(y).reset_index(drop=True)
        _, ax = plt.subplots(figsize=figsize)
        df[y].plot(kind='line') plt.title(y)
        ax.spines[['top',
        'right',]].set_visible(False)
        plt.tight_layout()
        return autoviz.MplChart.from_current_mpl_state()

chart = value_plot(df_8454858346676847654, *['open'],
**{}) chart

<google.colab._quickchart_helpers.SectionTitle at
0x7b92dcff1ab0> import numpy as np from google.colab
import autoviz
df_8454858346676847654 = autoviz.get_df('df_8454858346676847654')

def histogram(df, colname, num_bins=20, figsize=(2, 1)):

```

```

from matplotlib import pyplot as
plt _, ax =
plt.subplots(figsize=figsize)
plt.hist(df[colname], bins=num_bins,
histtype='stepfilled') plt.ylabel('count')
plt.title(colname) ax.spines[['top',
'right',]].set_visible(False) plt.tight_layout()
return autoviz.MplChart.from_current_mpl_state()

chart = histogram(df_8454858346676847654, *['close'],
**{}) chart
import numpy as np from
google.colab import autoviz
df_8454858346676847654 = autoviz.get_df('df_8454858346676847654')

def histogram(df, colname, num_bins=20, figsize=(2, 1)):
    from matplotlib import pyplot as
    plt _, ax =
    plt.subplots(figsize=figsize)
    plt.hist(df[colname], bins=num_bins,
histtype='stepfilled') plt.ylabel('count')
    plt.title(colname) ax.spines[['top',
'right',]].set_visible(False) plt.tight_layout()
    return autoviz.MplChart.from_current_mpl_state()

chart = histogram(df_8454858346676847654,
*['high'], **{}) chart import numpy as np from
google.colab import autoviz
df_8454858346676847654 = autoviz.get_df('df_8454858346676847654')

def histogram(df, colname, num_bins=20, figsize=(2, 1)):
    from matplotlib import pyplot as
    plt _, ax =
    plt.subplots(figsize=figsize)
    plt.hist(df[colname], bins=num_bins,
histtype='stepfilled') plt.ylabel('count')
    plt.title(colname) ax.spines[['top',
'right',]].set_visible(False) plt.tight_layout()
    return autoviz.MplChart.from_current_mpl_state()

chart = histogram(df_8454858346676847654,
*['low'], **{}) chart import numpy as np from
google.colab import autoviz
df_8454858346676847654 = autoviz.get_df('df_8454858346676847654')

def histogram(df, colname, num_bins=20, figsize=(2, 1)):

```

```

from matplotlib import pyplot as
plt _, ax =
plt.subplots(figsize=figsize)
plt.hist(df[colname], bins=num_bins,
histtype='stepfilled') plt.ylabel('count')
plt.title(colname) ax.spines[['top',
'right',]].set_visible(False) plt.tight_layout()
return autoviz.MplChart.from_current_mpl_state()

chart = histogram(df_8454858346676847654,

*['open'], **{}) chart

<google.colab._quickchart_helpers.SectionTitle at
0x7b92dcd69d80> import numpy as np from google.colab
import autoviz
df_8454858346676847654 = autoviz.get_df('df_8454858346676847654')

def scatter_plots(df, colname_pairs, scatter_plot_size=2.5, size=8,
alpha=.6): from matplotlib import pyplot as plt
plt.figure(figsize=(len(colname_pairs) * scatter_plot_size,
scatter_plot_size)) for plot_i, (x_colname, y_colname) in
enumerate(colname_pairs, start=1):
ax = plt.subplot(1, len(colname_pairs), plot_i)
ax.scatter(df[x_colname], df[y_colname], s=size,
alpha=alpha) plt.xlabel(x_colname)
plt.ylabel(y_colname)
ax.spines[['top', 'right',]].set_visible(False)
plt.tight_layout()
return autoviz.MplChart.from_current_mpl_state()

chart = scatter_plots(df_8454858346676847654, *[['close', 'high'],
['high', '
'low'], ['low', 'open'], ['open', 'volume']]],
**{}) chart

```

```

[8]: # summary of data
df.info()

```

```

<class
'pandas.core.frame.DataFrame'>
RangeIndex: 1258 entries, 0 to
1257 Data columns (total 14
columns):
#    Column      Non-Null Count  Dtype

```

```

--- -----
0    symbol      1258 non-null object
1    date        1258 non-null object
2    close       1258 non-null float64
3    high        1258 non-null float64
4    low         1258 non-null float64
5    open        1258 non-null float64
6    volume      1258 non-null int64
7    adjClose    1258 non-null float64
8    adjHigh     1258 non-null float64
9    adjLow      1258 non-null float64
10   adjOpen     1258 non-null float64
11   adjVolume   1258 non-null int64
12   divCash     1258 non-null float64
13   splitFactor 1258 non-      float64
    null
dtypes: float64(10), int64(2), object(2)
memory usage: 137.7+ KB

```

```
[9]: # checking null values
df.isnull().sum()
```

```

[9]: symbol      0
    date        0
    close       0
    high        0
    low         0
    open        0
    volume      0
    adjClose    0
    adjHigh     0
    adjLow      0
    adjOpen     0
    adjVolume   0
    divCash     0
    splitFactor 0
    dtype: int64

```

```

[10]: df = df[['date', 'open', 'close']] # Extracting required
columns df['date'] = pd.to_datetime(df['date'].apply(lambda x:
x.split()[0])) #_
    ↳converting object dtype of date column to datetime dtype
df.set_index('date', drop=True, inplace=True) # Setting date column
as index df.head(10)

```

```

[10]:          open close
date
2016-06-14  716.48  718.27
2016-06-15  719.00  718.92

```

```

2016-06-16 714.91 710.36
2016-06-17 708.65 691.72
2016-06-20 698.77 693.71
2016-06-21 698.40 695.94
2016-06-22 699.06 697.46
2016-06-23 697.45 701.87
2016-06-24 675.17 675.22
2016-06-27 671.00 668.26

```

```

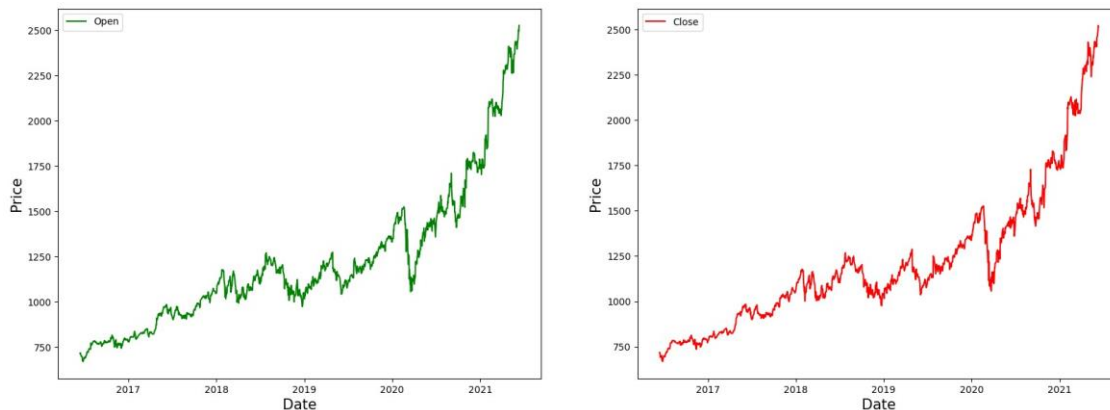
[11]: # plotting open and closing price on date
index fig, ax
=plt.subplots(1,2,figsize=(20,7))
ax[0].plot(df['open'],label='Open',color='
green') ax[0].set_xlabel('Date',size=15)
ax[0].set_ylabel('Price',size=15)
ax[0].legend()

ax[1].plot(df['close'],label='Close',color='red')
ax[1].set_xlabel('Date',size=15)

ax[1].set_ylabel('Price',size=15)
ax[1].legend()

fig.show()

```



```

[12]: # normalizing all the values of all columns using MinMaxScaler
MMS = MinMaxScaler()
df[df.columns] = MMS.fit_transform(df)
df.head(10)

```

```

[12]:          open      close
date
2016-06-14  0.024532  0.026984

```



```
2016-06-15 0.025891 0.027334
2016-06-16 0.023685 0.022716
2016-06-17 0.020308 0.012658
2016-06-20 0.014979 0.013732
2016-06-21 0.014779 0.014935
2016-06-22 0.015135 0.015755
2016-06-23 0.014267 0.018135
2016-06-24 0.002249 0.003755
2016-06-27 0.000000 0.000000
```

```
[13]: # splitting the data into training and test set training_size =
round(len(df) * 0.75) # Selecting 75 % for training and 25 %
↳for testing
training_size
```

```
[13]: 944
```

```
[14]: train_data = df[:training_size]
test_data = df[training_size:]
```

```
train_data.shape, test_data.shape
```

```
[14]: ((944, 2), (314, 2))
```

```
[15]: # Function to create sequence of data for training and testing

def create_sequence(dataset):
    sequences = []
    labels = []

    start_idx = 0

    for stop_idx in range(50, len(dataset)): # Selecting 50 rows at a time
        sequences.append(dataset.iloc[start_idx:stop_idx])
        labels.append(dataset.iloc[stop_idx])
        start_idx += 1
    return (np.array(sequences), np.array(labels))
```

```
[16]: train_seq, train_label = create_sequence(train_data)
test_seq, test_label = create_sequence(test_data)
train_seq.shape, train_label.shape, test_seq.shape, test_label.shape
```

```
[16]: ((894, 50, 2), (894, 2), (264, 50, 2), (264, 2))
```

```
[17]: # imported Sequential from keras.models
model = Sequential()
# importing Dense, Dropout, LSTM, Bidirectional from keras.layers
model.add(LSTM(units=50, return_sequences=True, input_shape = (train_seq.
↳shape[1], train_seq.shape[2])))

model.add(Dropout(0.1))
model.add(LSTM(units=50))

model.add(Dense(2))

model.compile(loss='mean_squared_error', optimizer='adam',
↳metrics=['mean_absolute_error'])

model.summary()
```

Model: "sequential"

Layer (type)	Output Shape	Param #
===== lstm (LSTM)	(None, 50, 50)	10600
dropout (Dropout)	(None, 50, 50)	0
lstm_1 (LSTM)	(None, 50)	20200
dense (Dense)	(None, 2)	102
=====		
Total params: 30,902		
Trainable params: 30,902		
Non-trainable params: 0		

```
[18]: # fitting the model by iterating the dataset over 100 times(100
epochs) model.fit(train_seq, train_label,
epochs=100,validation_data=(test_seq,
↳test_label), verbose=1)
```

```
Epoch 1/100
28/28 [=====] - 5s 73ms/step - loss: 0.0070
mean_absolute_error: 0.0597 - val_loss: 0.0155 -
val_mean_absolute_error: 0.1008
Epoch 2/100
28/28 [=====] - 1s 42ms/step - loss: 6.9591e-
04 mean_absolute_error: 0.0209 - val_loss: 0.0064 -
val_mean_absolute_error: 0.0646
Epoch 3/100
```

28/28 [=====] - 1s 52ms/step - loss: 4.4913e-04 mean_absolute_error: 0.0154 - val_loss: 0.0039 - val_mean_absolute_error: 0.0483
Epoch 4/100
28/28 [=====] - 1s 49ms/step - loss: 4.3055e-04 mean_absolute_error: 0.0150 - val_loss: 0.0055 - val_mean_absolute_error: 0.0597
Epoch 5/100
28/28 [=====] - 1s 38ms/step - loss: 4.1487e-04 mean_absolute_error: 0.0150 - val_loss: 0.0040 - val_mean_absolute_error: 0.0490
Epoch 6/100
28/28 [=====] - 1s 39ms/step - loss: 4.0929e-04 mean_absolute_error: 0.0148 - val_loss: 0.0055 - val_mean_absolute_error: 0.0592
Epoch 7/100
28/28 [=====] - 1s 39ms/step - loss: 4.1738e-04 mean_absolute_error: 0.0149 - val_loss: 0.0065 - val_mean_absolute_error: 0.0658
Epoch 8/100
28/28 [=====] - 1s 38ms/step - loss: 4.0575e-04 mean_absolute_error: 0.0148 - val_loss: 0.0031 - val_mean_absolute_error: 0.0420
Epoch 9/100
28/28 [=====] - 1s 38ms/step - loss: 3.8307e-04 mean_absolute_error: 0.0145 - val_loss: 0.0036 - val_mean_absolute_error: 0.0455
Epoch 10/100
28/28 [=====] - 1s 39ms/step - loss: 3.8019e-04 mean_absolute_error: 0.0143 - val_loss: 0.0044 - val_mean_absolute_error: 0.0520
Epoch 11/100
28/28 [=====] - 1s 39ms/step - loss: 3.7979e-04 mean_absolute_error: 0.0142 - val_loss: 0.0074 - val_mean_absolute_error: 0.0723
Epoch 12/100
28/28 [=====] - 1s 39ms/step - loss: 4.0588e-04 mean_absolute_error: 0.0149 - val_loss: 0.0049 - val_mean_absolute_error: 0.0552
Epoch 13/100
28/28 [=====] - 1s 40ms/step - loss: 3.9518e-04 mean_absolute_error: 0.0146 - val_loss: 0.0027 - val_mean_absolute_error: 0.0381
Epoch 14/100

```

28/28 [=====] - 1s 53ms/step - loss: 3.6978e-
04 mean_absolute_error: 0.0141 - val_loss: 0.0036 -
val_mean_absolute_error: 0.0463
Epoch 15/100
28/28 [=====] - 1s 52ms/step - loss: 3.3517e-
04 mean_absolute_error: 0.0134 - val_loss: 0.0026 -
val_mean_absolute_error: 0.0375
Epoch 16/100
28/28 [=====] - 1s 38ms/step - loss: 3.9181e-
04 mean_absolute_error: 0.0144 - val_loss: 0.0043 -
val_mean_absolute_error: 0.0521
Epoch 17/100
28/28 [=====] - 1s 36ms/step - loss: 3.3263e-
04 mean_absolute_error: 0.0133 - val_loss: 0.0034 -
val_mean_absolute_error: 0.0451
Epoch 18/100
28/28 [=====] - 1s 38ms/step - loss: 3.3538e-
04 mean_absolute_error: 0.0134 - val_loss: 0.0037 -
val_mean_absolute_error: 0.0482
Epoch 19/100
28/28 [=====] - 1s 38ms/step - loss: 3.0465e-
04 mean_absolute_error: 0.0127 - val_loss: 0.0023 -
val_mean_absolute_error: 0.0357
Epoch 20/100
28/28 [=====] - 1s 38ms/step - loss: 3.1931e-
04 mean_absolute_error: 0.0130 - val_loss: 0.0030 -
val_mean_absolute_error: 0.0422
Epoch 21/100
28/28 [=====] - 1s 48ms/step - loss: 3.0678e-
04 mean_absolute_error: 0.0128 - val_loss: 0.0052 -
val_mean_absolute_error: 0.0599
Epoch 22/100
28/28 [=====] - 1s 49ms/step - loss: 3.1832e-
04 mean_absolute_error: 0.0133 - val_loss: 0.0052 -
val_mean_absolute_error: 0.0596
Epoch 23/100
28/28 [=====] - 1s 38ms/step - loss: 2.9412e-
04 mean_absolute_error: 0.0127 - val_loss: 0.0032 -
val_mean_absolute_error: 0.0444
Epoch 24/100
28/28 [=====] - 2s 74ms/step - loss: 2.7506e-
04 mean_absolute_error: 0.0121 - val_loss: 0.0033 -
val_mean_absolute_error: 0.0447
Epoch 25/100

```

```

28/28 [=====] - 2s 54ms/step - loss: 2.7607e-
04 mean_absolute_error: 0.0121 - val_loss: 0.0057 -
val_mean_absolute_error: 0.0621
Epoch 26/100
28/28 [=====] - 1s 39ms/step - loss: 2.6551e-
04 mean_absolute_error: 0.0118 - val_loss: 0.0025 -
val_mean_absolute_error: 0.0372
Epoch 27/100
28/28 [=====] - 1s 38ms/step - loss: 2.6288e-
04 mean_absolute_error: 0.0121 - val_loss: 0.0018 -
val_mean_absolute_error: 0.0311
Epoch 28/100
28/28 [=====] - 1s 38ms/step - loss: 3.0022e-
04 mean_absolute_error: 0.0127 - val_loss: 0.0024 -
val_mean_absolute_error: 0.0363
Epoch 29/100
28/28 [=====] - 1s 38ms/step - loss: 2.5981e-
04 mean_absolute_error: 0.0118 - val_loss: 0.0039 -
val_mean_absolute_error: 0.0494
Epoch 30/100
28/28 [=====] - 1s 38ms/step - loss: 2.5348e-
04 mean_absolute_error: 0.0118 - val_loss: 0.0029 -
val_mean_absolute_error: 0.0403
Epoch 31/100
28/28 [=====] - 1s 39ms/step - loss: 2.5479e-
04 mean_absolute_error: 0.0118 - val_loss: 0.0035 -
val_mean_absolute_error: 0.0465
Epoch 32/100
28/28 [=====] - 1s 37ms/step - loss: 2.4600e-
04 mean_absolute_error: 0.0115 - val_loss: 0.0027 -
val_mean_absolute_error: 0.0396
Epoch 33/100
28/28 [=====] - 1s 37ms/step - loss: 2.4682e-
04 mean_absolute_error: 0.0117 - val_loss: 0.0034 -
val_mean_absolute_error: 0.0449
Epoch 34/100
28/28 [=====] - 1s 38ms/step - loss: 2.4333e-
04 mean_absolute_error: 0.0115 - val_loss: 0.0034 -
val_mean_absolute_error: 0.0453
Epoch 35/100
28/28 [=====] - 1s 45ms/step - loss: 2.2664e-
04 mean_absolute_error: 0.0111 - val_loss: 0.0043 -
val_mean_absolute_error: 0.0523
Epoch 36/100

```

28/28 [=====] - 1s 51ms/step - loss: 2.5588e-04 mean_absolute_error: 0.0117 - val_loss: 0.0044 - val_mean_absolute_error: 0.0534
Epoch 37/100
28/28 [=====] - 1s 46ms/step - loss: 2.8117e-04 mean_absolute_error: 0.0123 - val_loss: 0.0044 - val_mean_absolute_error: 0.0538
Epoch 38/100
28/28 [=====] - 1s 37ms/step - loss: 2.3647e-04 mean_absolute_error: 0.0113 - val_loss: 0.0026 - val_mean_absolute_error: 0.0388
Epoch 39/100
28/28 [=====] - 1s 37ms/step - loss: 2.3214e-04 mean_absolute_error: 0.0114 - val_loss: 0.0035 - val_mean_absolute_error: 0.0457
Epoch 40/100
28/28 [=====] - 1s 38ms/step - loss: 2.2272e-04 mean_absolute_error: 0.0109 - val_loss: 0.0039 - val_mean_absolute_error: 0.0497
Epoch 41/100
28/28 [=====] - 1s 38ms/step - loss: 2.3288e-04 mean_absolute_error: 0.0113 - val_loss: 0.0018 - val_mean_absolute_error: 0.0310
Epoch 42/100
28/28 [=====] - 1s 39ms/step - loss: 2.3720e-04 mean_absolute_error: 0.0114 - val_loss: 0.0029 - val_mean_absolute_error: 0.0420
Epoch 43/100
28/28 [=====] - 1s 38ms/step - loss: 2.2844e-04 mean_absolute_error: 0.0111 - val_loss: 0.0044 - val_mean_absolute_error: 0.0547
Epoch 44/100
28/28 [=====] - 1s 38ms/step - loss: 2.2612e-04 mean_absolute_error: 0.0110 - val_loss: 0.0024 - val_mean_absolute_error: 0.0371
Epoch 45/100
28/28 [=====] - 1s 38ms/step - loss: 2.1131e-04 mean_absolute_error: 0.0105 - val_loss: 0.0021 - val_mean_absolute_error: 0.0342
Epoch 46/100
28/28 [=====] - 1s 40ms/step - loss: 2.1178e-04 mean_absolute_error: 0.0105 - val_loss: 0.0023 - val_mean_absolute_error: 0.0362
Epoch 47/100

```

28/28 [=====] - 1s 50ms/step - loss: 2.2767e-
04 mean_absolute_error: 0.0110 - val_loss: 0.0023 -
val_mean_absolute_error: 0.0363
Epoch 48/100
28/28 [=====] - 1s 52ms/step - loss: 2.3243e-
04 mean_absolute_error: 0.0113 - val_loss: 0.0040 -
val_mean_absolute_error: 0.0505
Epoch 49/100
28/28 [=====] - 1s 37ms/step - loss: 2.1314e-
04 mean_absolute_error: 0.0107 - val_loss: 0.0036 -
val_mean_absolute_error: 0.0467
Epoch 50/100
28/28 [=====] - 1s 38ms/step - loss: 1.9676e-
04 mean_absolute_error: 0.0103 - val_loss: 0.0025 -
val_mean_absolute_error: 0.0386
Epoch 51/100
28/28 [=====] - 1s 38ms/step - loss: 2.1936e-
04 mean_absolute_error: 0.0109 - val_loss: 0.0024 -
val_mean_absolute_error: 0.0371
Epoch 52/100
28/28 [=====] - 1s 38ms/step - loss: 1.9640e-
04 mean_absolute_error: 0.0103 - val_loss: 0.0022 -
val_mean_absolute_error: 0.0345
Epoch 53/100
28/28 [=====] - 1s 39ms/step - loss: 1.9537e-
04 mean_absolute_error: 0.0101 - val_loss: 0.0029 -
val_mean_absolute_error: 0.0423
Epoch 54/100
28/28 [=====] - 1s 38ms/step - loss: 2.0339e-
04 mean_absolute_error: 0.0103 - val_loss: 0.0024 -
val_mean_absolute_error: 0.0386
Epoch 55/100
28/28 [=====] - 1s 37ms/step - loss: 2.0150e-
04 mean_absolute_error: 0.0103 - val_loss: 0.0019 -
val_mean_absolute_error: 0.0319
Epoch 56/100
28/28 [=====] - 1s 37ms/step - loss: 1.8074e-
04 mean_absolute_error: 0.0097 - val_loss: 0.0026 -
val_mean_absolute_error: 0.0403
Epoch 57/100
28/28 [=====] - 1s 39ms/step - loss: 2.0540e-
04 mean_absolute_error: 0.0104 - val_loss: 0.0029 -
val_mean_absolute_error: 0.0435
Epoch 58/100

```

28/28 [=====] - 1s 46ms/step - loss: 1.9212e-04 mean_absolute_error: 0.0100 - val_loss: 0.0019 - val_mean_absolute_error: 0.0325
Epoch 59/100
28/28 [=====] - 2s 56ms/step - loss: 1.7550e-04 mean_absolute_error: 0.0098 - val_loss: 0.0025 - val_mean_absolute_error: 0.0388
Epoch 60/100
28/28 [=====] - 1s 40ms/step - loss: 1.9490e-04 mean_absolute_error: 0.0102 - val_loss: 0.0037 - val_mean_absolute_error: 0.0507
Epoch 61/100
28/28 [=====] - 1s 38ms/step - loss: 1.8077e-04 mean_absolute_error: 0.0097 - val_loss: 0.0024 - val_mean_absolute_error: 0.0382
Epoch 62/100
28/28 [=====] - 1s 40ms/step - loss: 2.0307e-04 mean_absolute_error: 0.0103 - val_loss: 0.0017 - val_mean_absolute_error: 0.0306
Epoch 63/100
28/28 [=====] - 1s 37ms/step - loss: 1.6272e-04 mean_absolute_error: 0.0092 - val_loss: 0.0015 - val_mean_absolute_error: 0.0292
Epoch 64/100
28/28 [=====] - 1s 37ms/step - loss: 1.6148e-04 mean_absolute_error: 0.0092 - val_loss: 0.0011 - val_mean_absolute_error: 0.0243
Epoch 65/100
28/28 [=====] - 1s 37ms/step - loss: 1.9973e-04 mean_absolute_error: 0.0105 - val_loss: 0.0026 - val_mean_absolute_error: 0.0397
Epoch 66/100
28/28 [=====] - 1s 37ms/step - loss: 1.6555e-04 mean_absolute_error: 0.0092 - val_loss: 0.0028 - val_mean_absolute_error: 0.0431
Epoch 67/100
28/28 [=====] - 1s 38ms/step - loss: 1.8140e-04 mean_absolute_error: 0.0098 - val_loss: 0.0011 - val_mean_absolute_error: 0.0243
Epoch 68/100
28/28 [=====] - 1s 39ms/step - loss: 1.5566e-04 mean_absolute_error: 0.0090 - val_loss: 0.0016 - val_mean_absolute_error: 0.0297
Epoch 69/100


```

28/28 [=====] - 1s 44ms/step - loss: 1.5642e-
04 mean_absolute_error: 0.0089 - val_loss: 0.0020 -
val_mean_absolute_error: 0.0342
Epoch 70/100
28/28 [=====] - 1s 53ms/step - loss: 1.5181e-
04 mean_absolute_error: 0.0089 - val_loss: 0.0012 -
val_mean_absolute_error: 0.0250
Epoch 71/100
28/28 [=====] - 1s 45ms/step - loss: 1.5722e-
04 mean_absolute_error: 0.0092 - val_loss: 0.0012 -
val_mean_absolute_error: 0.0253
Epoch 72/100
28/28 [=====] - 1s 38ms/step - loss: 1.5028e-
04 mean_absolute_error: 0.0088 - val_loss: 0.0031 -
val_mean_absolute_error: 0.0448
Epoch 73/100
28/28 [=====] - 1s 38ms/step - loss: 1.5013e-
04 mean_absolute_error: 0.0087 - val_loss: 0.0020 -
val_mean_absolute_error: 0.0336
Epoch 74/100
28/28 [=====] - 1s 40ms/step - loss: 1.5820e-
04 mean_absolute_error: 0.0090 - val_loss: 0.0016 -
val_mean_absolute_error: 0.0295
Epoch 75/100
28/28 [=====] - 1s 40ms/step - loss: 1.4808e-
04 mean_absolute_error: 0.0089 - val_loss: 0.0016 -
val_mean_absolute_error: 0.0297
Epoch 76/100
28/28 [=====] - 1s 38ms/step - loss: 1.4740e-
04 mean_absolute_error: 0.0088 - val_loss: 0.0021 -
val_mean_absolute_error: 0.0354
Epoch 77/100
28/28 [=====] - 1s 38ms/step - loss: 1.4434e-
04 mean_absolute_error: 0.0086 - val_loss: 9.5732e-04 -
val_mean_absolute_error:
0.0227
Epoch 78/100
28/28 [=====] - 1s 38ms/step - loss: 1.5803e-
04 mean_absolute_error: 0.0090 - val_loss: 0.0013 -
val_mean_absolute_error: 0.0262
Epoch 79/100
28/28 [=====] - 1s 39ms/step - loss: 1.5157e-
04 mean_absolute_error: 0.0088 - val_loss: 0.0014 -
val_mean_absolute_error: 0.0278
Epoch 80/100

```

```

28/28 [=====] - 1s 42ms/step - loss: 1.4757e-
04 mean_absolute_error: 0.0088 - val_loss: 0.0025 -
val_mean_absolute_error: 0.0400
Epoch 81/100
28/28 [=====] - 1s 51ms/step - loss: 1.4949e-
04 mean_absolute_error: 0.0089 - val_loss: 0.0012 -
val_mean_absolute_error: 0.0254
Epoch 82/100
28/28 [=====] - 1s 51ms/step - loss: 1.3308e-
04 mean_absolute_error: 0.0083 - val_loss: 0.0030 -
val_mean_absolute_error: 0.0434
Epoch 83/100
28/28 [=====] - 1s 38ms/step - loss: 1.3501e-
04 mean_absolute_error: 0.0082 - val_loss: 0.0019 -
val_mean_absolute_error: 0.0329
Epoch 84/100
28/28 [=====] - 1s 39ms/step - loss: 1.3702e-
04 mean_absolute_error: 0.0086 - val_loss: 0.0018 -
val_mean_absolute_error: 0.0318
Epoch 85/100
28/28 [=====] - 1s 38ms/step - loss: 1.3023e-
04 mean_absolute_error: 0.0081 - val_loss: 0.0024 -
val_mean_absolute_error: 0.0382
Epoch 86/100
28/28 [=====] - 1s 38ms/step - loss: 1.2756e-
04 mean_absolute_error: 0.0080 - val_loss: 0.0025 -
val_mean_absolute_error: 0.0389
Epoch 87/100
28/28 [=====] - 1s 39ms/step - loss: 1.3654e-
04 mean_absolute_error: 0.0084 - val_loss: 0.0028 -
val_mean_absolute_error: 0.0416
Epoch 88/100
28/28 [=====] - 1s 38ms/step - loss: 1.4430e-
04 mean_absolute_error: 0.0087 - val_loss: 0.0014 -
val_mean_absolute_error: 0.0268
Epoch 89/100
28/28 [=====] - 1s 41ms/step - loss: 1.3139e-
04 mean_absolute_error: 0.0083 - val_loss: 0.0016 -
val_mean_absolute_error: 0.0295
Epoch 90/100
28/28 [=====] - 1s 38ms/step - loss: 1.2766e-
04 mean_absolute_error: 0.0082 - val_loss: 0.0013 -
val_mean_absolute_error: 0.0267 Epoch 91/100
28/28 [=====] - 1s 42ms/step - loss: 1.2961e-
04 mean_absolute_error: 0.0082 - val_loss: 0.0014 -
val_mean_absolute_error: 0.0280

```

```

Epoch 92/100
28/28 [=====] - 1s 53ms/step - loss: 1.2139e-
04 mean_absolute_error: 0.0081 - val_loss: 0.0016 -
val_mean_absolute_error: 0.0300
Epoch 93/100
28/28 [=====] - 1s 50ms/step - loss: 1.2566e-
04 mean_absolute_error: 0.0079 - val_loss: 0.0015 -
val_mean_absolute_error: 0.0289
Epoch 94/100
28/28 [=====] - 1s 40ms/step - loss: 1.2364e-
04 mean_absolute_error: 0.0082 - val_loss: 0.0016 -
val_mean_absolute_error: 0.0296
Epoch 95/100
28/28 [=====] - 1s 39ms/step - loss: 1.2415e-
04 mean_absolute_error: 0.0080 - val_loss: 0.0016 -
val_mean_absolute_error: 0.0296
Epoch 96/100
28/28 [=====] - 1s 38ms/step - loss: 1.1602e-
04 mean_absolute_error: 0.0076 - val_loss: 0.0020 -
val_mean_absolute_error: 0.0339
Epoch 97/100
28/28 [=====] - 1s 39ms/step - loss: 1.1907e-
04 mean_absolute_error: 0.0078 - val_loss: 0.0018 -
val_mean_absolute_error: 0.0311
Epoch 98/100
28/28 [=====] - 1s 39ms/step - loss: 1.2545e-
04 mean_absolute_error: 0.0080 - val_loss: 0.0019 -
val_mean_absolute_error: 0.0326
Epoch 99/100
28/28 [=====] - 1s 38ms/step - loss: 1.2563e-
04 mean_absolute_error: 0.0079 - val_loss: 0.0015 -
val_mean_absolute_error: 0.0290 Epoch 100/100
28/28 [=====] - 1s 39ms/step - loss: 1.3376e-
04 mean_absolute_error: 0.0084 - val_loss: 0.0028 -
val_mean_absolute_error: 0.0426

```

```
[18]: <keras.callbacks.History at 0x7b92dc653970>
```

```
[19]: # predicting the values after running the model
test_predicted = model.predict(test_seq)
test_predicted[:5]
```

```
9/9 [=====] - 1s 8ms/step
```

```
[19]: array([[0.3925917 , 0.3948203 ],
            [0.39278576, 0.39529413],
            [0.3889445 , 0.39180565],
```

```
[0.3916219 , 0.3940799 ],
[0.39539546, 0.3975677 ]], dtype=float32)
```

```
[20]: # Inversing normalization/scaling on predicted data
test_inverse_predicted = MMS.inverse_transform(test_predicted)
test_inverse_predicted[:5]
```

```
[20]: array([[1398.8336, 1399.9962],
[1399.1934, 1400.8745],
[1392.072 , 1394.4092],
[1397.0356, 1398.624 ],
[1404.0315, 1405.0881]], dtype=float32)
```

```
[21]: # Merging actual and predicted data for better
```

```
visualization df_merge = pd.concat([df.iloc[-
264:].copy(), pd.
↳ DataFrame(test_inverse_predicted, columns=['open_predicted', 'close_p
redicted'], index=df.iloc[-
264:].index)], axis=1)
```

```
[22]: # Inversing normalization/scaling df_merge[['open', 'close']] =
MMS.inverse_transform(df_merge[['open', 'close']]) df_merge.head()
```

```
[22]: open close open_predicted close_predicted
date
2020-05-27 1417.25 1417.84 1398.833618 1399.996216
2020-05-28 1396.86 1416.73 1399.193359 1400.874512
2020-05-29 1416.94 1428.92 1392.072021 1394.409180
2020-06-01 1418.39 1431.82 1397.035645 1398.624023
2020-06-02 1430.55 1439.22 1404.031494 1405.088135
<google.colab._quickchart_helpers.SectionTitle at
0x7b92dcd87d00> import numpy as np from google.colab
import autoviz
df_2868927680624221977 = autoviz.get_df('df_2868927680624221977')

def value_plot(df, y, sort_ascending=False, figsize=(2, 1)):
    from matplotlib import pyplot as
    plt if sort_ascending:
        df =
        df.sort_values(y).reset_index(drop=True)
    _, ax = plt.subplots(figsize=figsize)
    df[y].plot(kind='line') plt.title(y)
    ax.spines[['top',
'right',]].set_visible(False)
    plt.tight_layout()
    return autoviz.MplChart.from_current_mpl_state()
```

```

chart = value_plot(df_2868927680624221977,
*['open'], **{}) chart import numpy as np from
google.colab import autoviz
df_2868927680624221977 = autoviz.get_df('df_2868927680624221977')
def value_plot(df, y, sort_ascending=False, figsize=(2, 1)):
    from matplotlib import pyplot as
    plt if sort_ascending:
        df =
        df.sort_values(y).reset_index(drop=True)
        _, ax = plt.subplots(figsize=figsize)
        df[y].plot(kind='line') plt.title(y)
        ax.spines[['top',
        'right',]].set_visible(False)
        plt.tight_layout()
        return autoviz.MplChart.from_current_mpl_state()

```

```

chart = value_plot(df_2868927680624221977,
*['close'], **{}) chart import numpy as np from
google.colab import autoviz
df_2868927680624221977 = autoviz.get_df('df_2868927680624221977')

```

```

def value_plot(df, y, sort_ascending=False, figsize=(2, 1)):
    from matplotlib import pyplot as
    plt if sort_ascending:
        df =
        df.sort_values(y).reset_index(drop=True)
        _, ax = plt.subplots(figsize=figsize)
        df[y].plot(kind='line') plt.title(y)
        ax.spines[['top',
        'right',]].set_visible(False)
        plt.tight_layout()
        return autoviz.MplChart.from_current_mpl_state()

```

```

chart = value_plot(df_2868927680624221977,
*['open_predicted'], **{}) chart import numpy as np from
google.colab import autoviz
df_2868927680624221977 = autoviz.get_df('df_2868927680624221977')

```

```

def value_plot(df, y, sort_ascending=False, figsize=(2, 1)):
    from matplotlib import pyplot as
    plt if sort_ascending:
        df =
        df.sort_values(y).reset_index(drop=True)
        _, ax = plt.subplots(figsize=figsize)
        df[y].plot(kind='line') plt.title(y)
        ax.spines[['top',

```

```

    'right',]].set_visible(False)
plt.tight_layout()
return autoviz.MplChart.from_current_mpl_state()

chart = value_plot(df_2868927680624221977, *['close_predicted'],
**{}) chart
<google.colab._quickchart_helpers.SectionTitle at
0x7b92dcee9a80> import numpy as np from google.colab
import autoviz
df_2868927680624221977 = autoviz.get_df('df_2868927680624221977')

def histogram(df, colname, num_bins=20, figsize=(2, 1)):
    from matplotlib import pyplot as
    plt _, ax =
    plt.subplots(figsize=figsize)
    plt.hist(df[colname], bins=num_bins,
    histtype='stepfilled') plt.ylabel('count')
    plt.title(colname) ax.spines[['top',
    'right',]].set_visible(False) plt.tight_layout()
    return autoviz.MplChart.from_current_mpl_state()

chart = histogram(df_2868927680624221977,
*['open'], **{}) chart import numpy as np from
google.colab import autoviz
df_2868927680624221977 = autoviz.get_df('df_2868927680624221977')

def histogram(df, colname, num_bins=20, figsize=(2, 1)):
    from matplotlib import pyplot as
    plt _, ax =
    plt.subplots(figsize=figsize)
    plt.hist(df[colname], bins=num_bins,
    histtype='stepfilled') plt.ylabel('count')
    plt.title(colname) ax.spines[['top',
    'right',]].set_visible(False) plt.tight_layout()
    return autoviz.MplChart.from_current_mpl_state()

chart = histogram(df_2868927680624221977,
*['close'], **{}) chart import numpy as np from
google.colab import autoviz
df_2868927680624221977 = autoviz.get_df('df_2868927680624221977')

def histogram(df, colname, num_bins=20, figsize=(2, 1)):
    from matplotlib import pyplot as
    plt _, ax =
    plt.subplots(figsize=figsize)

```

```

plt.hist(df[colname], bins=num_bins,
histtype='stepfilled') plt.ylabel('count')
plt.title(colname) ax.spines[['top',
'right',]].set_visible(False) plt.tight_layout()
return autoviz.MplChart.from_current_mpl_state()
chart = histogram(df_2868927680624221977,
*['open_predicted'], **{}) chart
import numpy as np from
google.colab import autoviz
df_2868927680624221977 = autoviz.get_df('df_2868927680624221977')

def histogram(df, colname, num_bins=20, figsize=(2, 1)):
    from matplotlib import pyplot as
    plt _, ax =
    plt.subplots(figsize=figsize)
    plt.hist(df[colname], bins=num_bins,
histtype='stepfilled') plt.ylabel('count')
    plt.title(colname) ax.spines[['top',
'right',]].set_visible(False) plt.tight_layout()
    return autoviz.MplChart.from_current_mpl_state()

chart = histogram(df_2868927680624221977, *['close_predicted'],
**{}) chart

<google.colab._quickchart_helpers.SectionTitle at
0x7b92dceb1240> import numpy as np from google.colab
import autoviz
df_2868927680624221977 = autoviz.get_df('df_2868927680624221977')

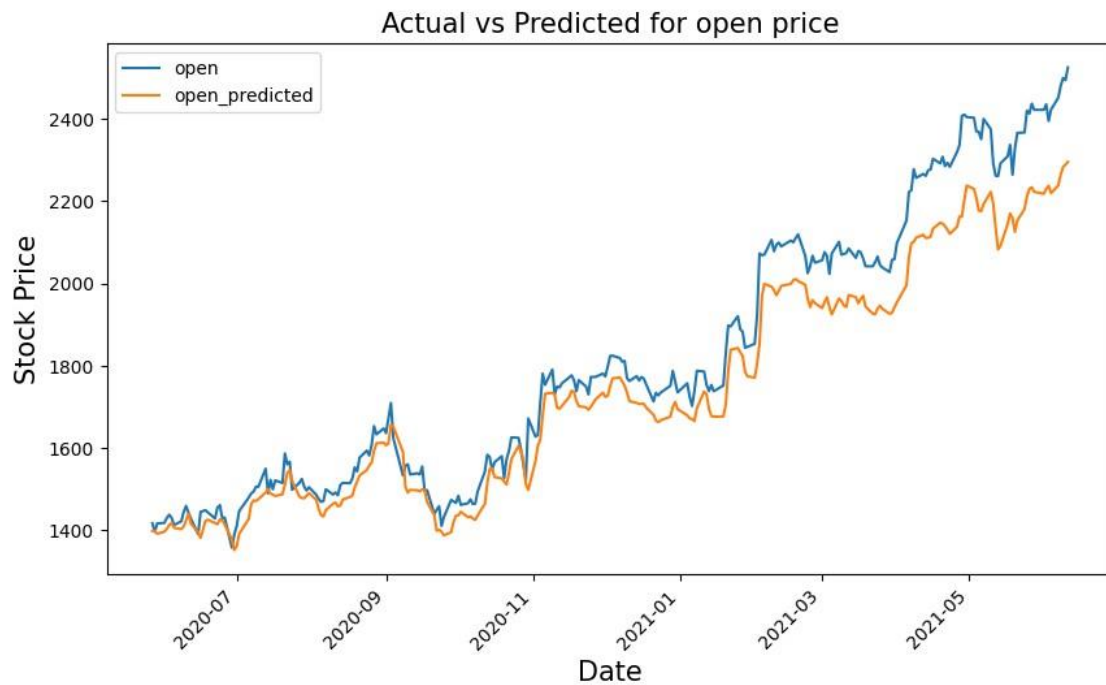
def scatter_plots(df, colname_pairs, scatter_plot_size=2.5, size=8,
alpha=.6): from matplotlib import pyplot as plt
plt.figure(figsize=(len(colname_pairs) * scatter_plot_size,
scatter_plot_size)) for plot_i, (x_colname, y_colname) in
enumerate(colname_pairs, start=1):
    ax = plt.subplot(1, len(colname_pairs), plot_i)
    ax.scatter(df[x_colname], df[y_colname], s=size,
alpha=alpha) plt.xlabel(x_colname)
    plt.ylabel(y_colname)
    ax.spines[['top', 'right',]].set_visible(False)
    plt.tight_layout()
    return autoviz.MplChart.from_current_mpl_state()

chart = scatter_plots(df_2868927680624221977, *[[['open', 'close'],
['close', '
'open_predicted'], ['open_predicted', 'close_predicted']]],
**{}) chart

```

```
[23]: # plotting the actual open and predicted open prices on
date index
df_merge[['open','open_predicted']].plot(figsize=(10,6))
plt.xticks(rotation=45) plt.xlabel('Date',size=15)
plt.ylabel('Stock Price',size=15)
plt.title('Actual vs Predicted for open price',size=15)

plt.show()
```



```
[24]: # plotting the actual close and predicted close prices on
date index
df_merge[['close','close_predicted']].plot(figsize=(10,6))
plt.xticks(rotation=45) plt.xlabel('Date',size=15)
plt.ylabel('Stock Price',size=15) plt.title('Actual vs
Predicted for close price',size=15) plt.show()
```




```
[25]: # Creating a dataframe and adding 10 days to existing index

df_merge = df_merge.append(pd.DataFrame(columns=df_merge.columns,
index=pd.date_range(start=df_merge.index[-1], periods=11, freq='D',
closed='right')) df_merge['2021-06-09':'2021-06-16']
```

```
[25]: open close open_predicted close_predicted 2021-06-09 2499.50
      2491.40 2283.043457 2308.479004
2021-06-10 2494.01 2521.60 2288.935547 2315.539062
2021-06-11 2524.92 2513.93 2295.734131 2322.352783
2021-06-12      NaN      NaN          NaN          NaN
2021-06-13      NaN      NaN          NaN          NaN
2021-06-14      NaN      NaN          NaN          NaN
2021-06-15      NaN      NaN          NaN          NaN
2021-06-16      NaN      NaN          NaN          NaN
```

```
<google.colab._quickchart_helpers.SectionTitle at
0x7b92dcb7da50> import numpy as np from google.colab
import autoviz
df_2077258851996054484 = autoviz.get_df('df_2077258851996054484')

def value_plot(df, y, sort_ascending=False, figsize=(2, 1)):
    from matplotlib import pyplot as plt
```

```

if sort_ascending:
    df =
df.sort_values(y).reset_index(drop=True)
_, ax = plt.subplots(figsize=figsize)
df[y].plot(kind='line') plt.title(y)
ax.spines[['top',
'right',]].set_visible(False)
plt.tight_layout()
return autoviz.MplChart.from_current_mpl_state()

chart = value_plot(df_2077258851996054484,
*['open'], **{}) chart import numpy as np from
google.colab import autoviz
df_2077258851996054484 = autoviz.get_df('df_2077258851996054484')

def value_plot(df, y, sort_ascending=False, figsize=(2, 1)):
    from matplotlib import pyplot as
plt if sort_ascending:
    df =
df.sort_values(y).reset_index(drop=True)
_, ax = plt.subplots(figsize=figsize)
df[y].plot(kind='line') plt.title(y)
ax.spines[['top',
'right',]].set_visible(False)
plt.tight_layout()
return autoviz.MplChart.from_current_mpl_state()

chart = value_plot(df_2077258851996054484,
*['close'], **{}) chart import numpy as np from
google.colab import autoviz
df_2077258851996054484 = autoviz.get_df('df_2077258851996054484')

def value_plot(df, y, sort_ascending=False, figsize=(2, 1)):
    from matplotlib import pyplot as
plt if sort_ascending:
    df =
df.sort_values(y).reset_index(drop=True)
_, ax = plt.subplots(figsize=figsize)
df[y].plot(kind='line') plt.title(y)
ax.spines[['top',
'right',]].set_visible(False)
plt.tight_layout()
return autoviz.MplChart.from_current_mpl_state()

chart = value_plot(df_2077258851996054484,
*['open_predicted'], **{}) chart import numpy as np

```

```

from google.colab import autoviz
df_2077258851996054484 = autoviz.get_df('df_2077258851996054484')

def value_plot(df, y, sort_ascending=False, figsize=(2, 1)):
    from matplotlib import pyplot as
    plt if sort_ascending:
        df =
    df.sort_values(y).reset_index(drop=True)
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    df[y].plot(kind='line') plt.title(y)
    ax.spines[['top',
    'right',]].set_visible(False)
    plt.tight_layout()
    return autoviz.MplChart.from_current_mpl_state()

chart = value_plot(df_2077258851996054484, *['close_predicted'],
**) chart

<google.colab._quickchart_helpers.SectionTitle at
0x7b92ca5342b0> import numpy as np from google.colab
import autoviz
df_2077258851996054484 = autoviz.get_df('df_2077258851996054484')

def histogram(df, colname, num_bins=20, figsize=(2, 1)):
    from matplotlib import pyplot as
    plt _, ax =
    plt.subplots(figsize=figsize)
    plt.hist(df[colname], bins=num_bins,
    histtype='stepfilled') plt.ylabel('count')
    plt.title(colname) ax.spines[['top',
    'right',]].set_visible(False) plt.tight_layout()
    return autoviz.MplChart.from_current_mpl_state()

chart = histogram(df_2077258851996054484,
*['open'], **) chart import numpy as np from
google.colab import autoviz
df_2077258851996054484 = autoviz.get_df('df_2077258851996054484')

def histogram(df, colname, num_bins=20, figsize=(2, 1)):
    from matplotlib import pyplot as
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    plt.subplots(figsize=figsize)
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    histtype='stepfilled') plt.ylabel('count')
    plt.title(colname) ax.spines[['top',
    'right',]].set_visible(False) plt.tight_layout()

```

```

    return autoviz.MplChart.from_current_mpl_state()
chart = histogram(df_2077258851996054484,
*['close'], **{}) chart import numpy as np from
google.colab import autoviz
df_2077258851996054484 = autoviz.get_df('df_2077258851996054484')

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    plt.subplots(figsize=figsize)
    plt.hist(df[colname], bins=num_bins,
    histtype='stepfilled') plt.ylabel('count')
    plt.title(colname) ax.spines[['top',
    'right',]].set_visible(False) plt.tight_layout()
    return autoviz.MplChart.from_current_mpl_state()

chart = histogram(df_2077258851996054484,
*['open_predicted'], **{}) chart import numpy as np from
google.colab import autoviz
df_2077258851996054484 = autoviz.get_df('df_2077258851996054484')

def histogram(df, colname, num_bins=20, figsize=(2, 1)):
    from matplotlib import pyplot as
    plt _, ax =
    plt.subplots(figsize=figsize)
    plt.hist(df[colname], bins=num_bins,
    histtype='stepfilled') plt.ylabel('count')
    plt.title(colname) ax.spines[['top',
    'right',]].set_visible(False) plt.tight_layout()
    return autoviz.MplChart.from_current_mpl_state()

chart = histogram(df_2077258851996054484, *['close_predicted'],
**{}) chart

<google.colab._quickchart_helpers.SectionTitle at
0x7b92ca303520> import numpy as np from google.colab
import autoviz
df_2077258851996054484 = autoviz.get_df('df_2077258851996054484')

def scatter_plots(df, colname_pairs, scatter_plot_size=2.5, size=8,
    alpha=.6): from matplotlib import pyplot as plt
    plt.figure(figsize=(len(colname_pairs) * scatter_plot_size,
    scatter_plot_size)) for plot_i, (x_colname, y_colname) in
    enumerate(colname_pairs, start=1):

```

```

ax = plt.subplot(1, len(colname_pairs), plot_i)
ax.scatter(df[x_colname], df[y_colname], s=size, alpha=alpha)
plt.xlabel(x_colname) plt.ylabel(y_colname)
ax.spines[['top', 'right',]].set_visible(False)
plt.tight_layout()
return autoviz.MplChart.from_current_mpl_state()

```

```

chart = scatter_plots(df_2077258851996054484, *[['open', 'close'],
['close', 'open'],
['open_predicted', 'open_predicted', 'close_predicted']],
**{}) chart

```

```

[26]: # creating a DataFrame and filling values of open and close column
upcoming_prediction =

```

```

pd.DataFrame(columns=['open', 'close'], index=df_merge.
index)
upcoming_prediction.index=pd.to_datetime(upcoming_prediction.index)

```

```

[27]: curr_seq = test_seq[-1:]

```

```

for i in range(-10,0):
    up_pred = model.predict(curr_seq)
    upcoming_prediction.iloc[i] = up_pred
    curr_seq =
    np.append(curr_seq[0][1:], up_pred, axis=0)
    curr_seq = curr_seq.reshape(test_seq[-1:].shape)

```

```

1/1 [=====] - 0s 26ms/step
1/1 [=====] - 0s 20ms/step
1/1 [=====] - 0s 17ms/step
1/1 [=====] - 0s 22ms/step
1/1 [=====] - 0s 46ms/step
1/1 [=====] - 0s 30ms/step
1/1 [=====] - 0s 29ms/step
1/1 [=====] - 0s 37ms/step
1/1 [=====] - 0s 31ms/step
1/1 [=====] - 0s 50ms/step

```

```

[28]: # inversing Normalization/scaling

```

```

upcoming_prediction[['open', 'close']] = MMS.
inverse_transform(upcoming_prediction[['open', 'close']])

```

```

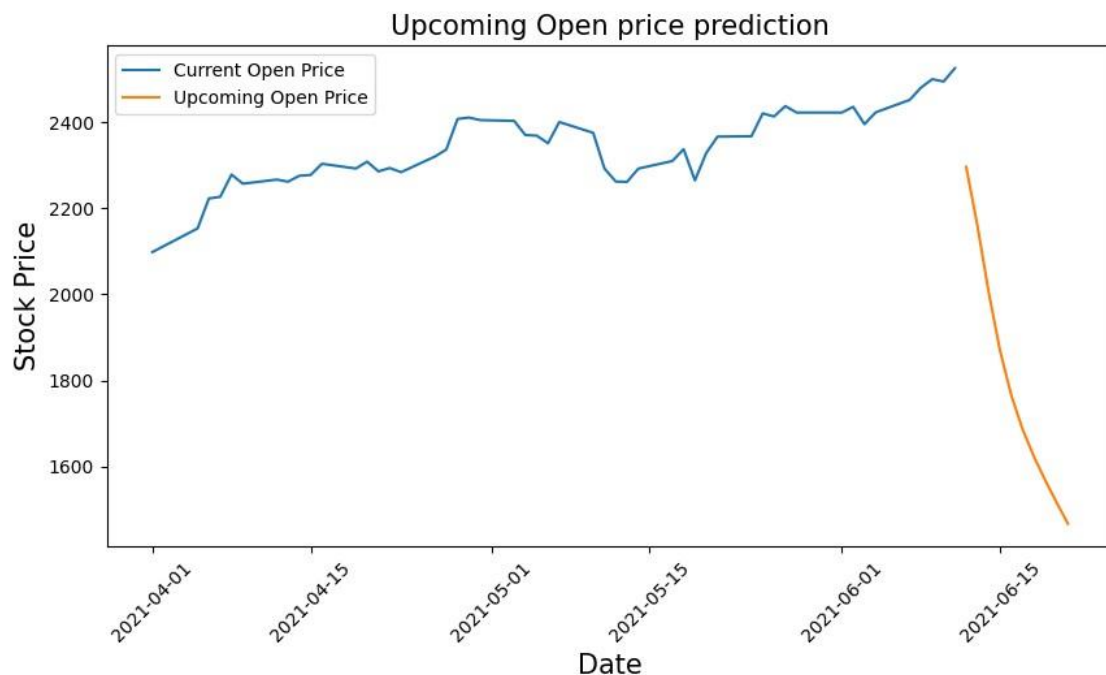
[29]: # plotting Upcoming Open price on date index
fig, ax=plt.subplots(figsize=(10,5))

```

```

ax.plot(df_merge.loc['2021-04-01':, 'open'], label='Current Open Price')
ax.plot(upcoming_prediction.loc['2021-04-01':, 'open'], label='Upcoming Open Price')
plt.setp(ax.xaxis.get_majorticklabels(), rotation=45)
ax.set_xlabel('Date', size=15)
ax.set_ylabel('Stock Price', size=15)
ax.set_title('Upcoming Open price prediction', size=15)
ax.legend()
fig.show()

```



[30]: # plotting Upcoming Close price on date index

```

fig, ax = plt.subplots(figsize=(10, 5))
ax.plot(df_merge.loc['2021-04-01':, 'close'], label='Current close Price')
ax.plot(upcoming_prediction.loc['2021-04-01':, 'close'], label='Upcoming close Price')
plt.setp(ax.xaxis.get_majorticklabels(), rotation=45)
ax.set_xlabel('Date', size=15)
ax.set_ylabel('Stock Price', size=15)
ax.set_title('Upcoming close price prediction', size=15)
ax.legend()
fig.show()

```



[]: