Karthik-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]:
```python
# shape of data
print("Shape of data:",df.shape)
```

```
Shape of data: (1258, 14)
```

[7]:
```python
# 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
```

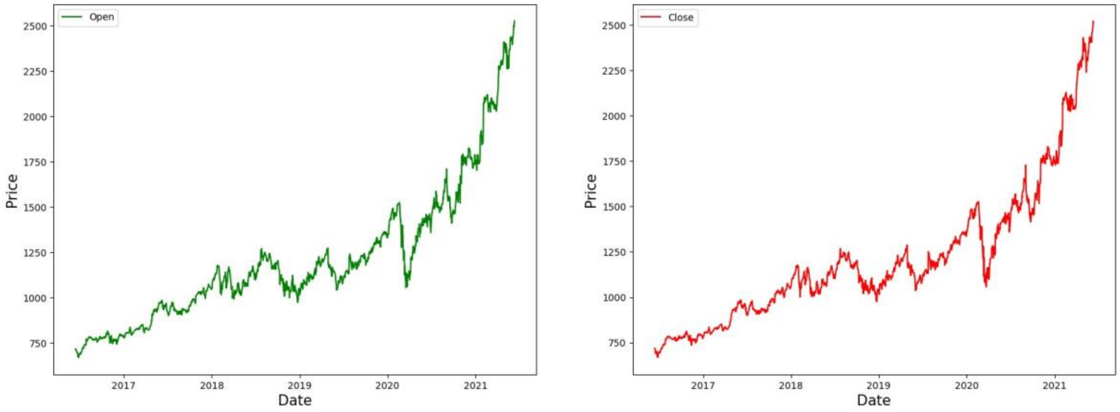
[10]:
```
df = df[['date','open','close']] # Extracting required
columns df['date'] = pd.to_datetime(df['date'].apply(lambda x:
x.split()[0])) #␣
 ↪converting object dtype of date column to datetime dtype
df.set_index('date',drop=True,inplace=True) # Setting date column
as index df.head(10)
```

[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)
```

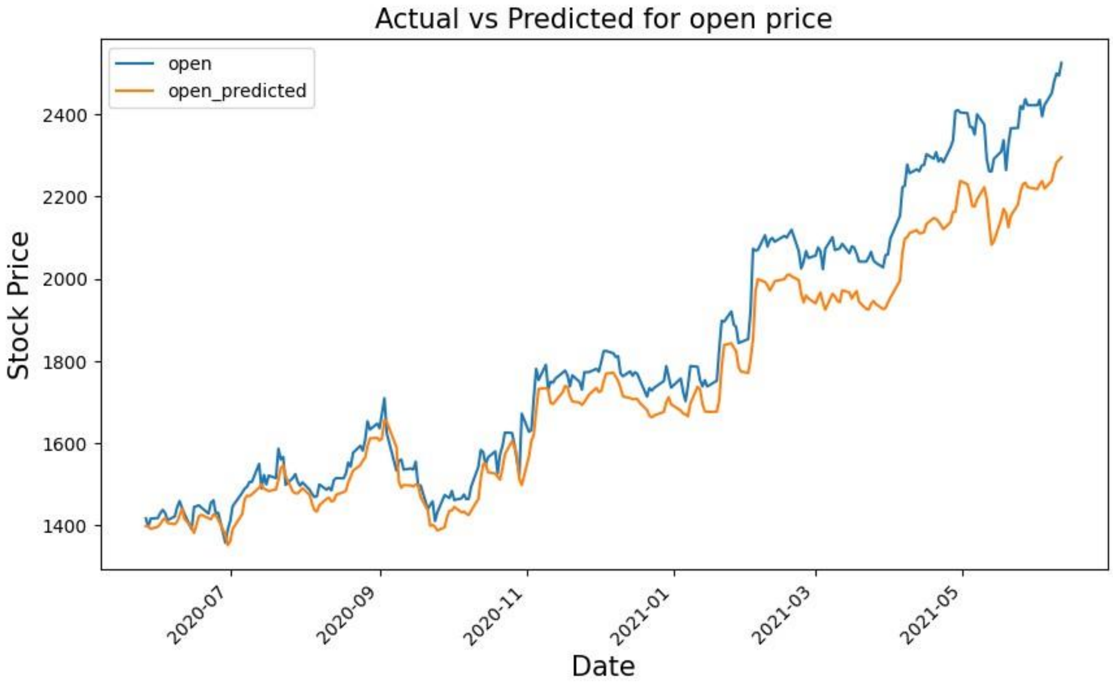
```
[22]: # Inversing normalization/scaling df_merge[['open','close']] =
      MMS.inverse_transform(df_merge[['open','close']]) df_merge.head()
```

```
[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()
```

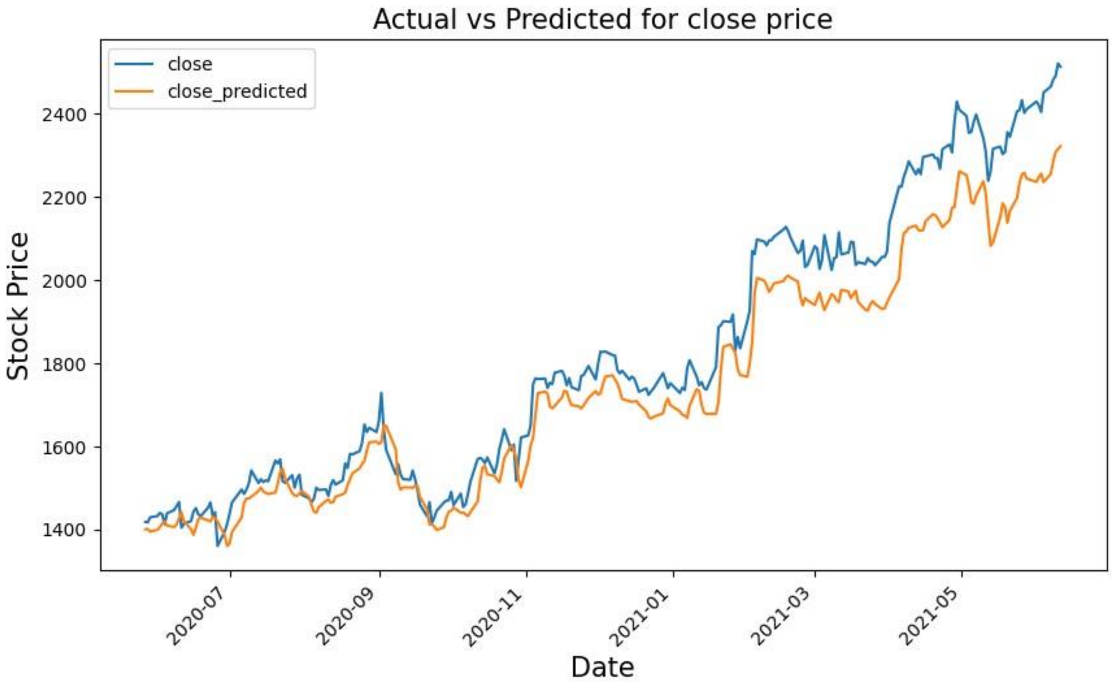
```
chart = value_plot(df_2868927680624221977,
*['open'], **{}) chart import numpy as np from
google.colab import autoviz
df_2868927680624221977 = autoviz.get_df('df_2868927680624221977')
def value_plot(df, y, sort_ascending=False, figsize=(2, 1)):
  from matplotlib import pyplot as
  plt if sort_ascending:
    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)
  _, 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_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
  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'], **{}) 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,
*['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_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.inde
x)
```

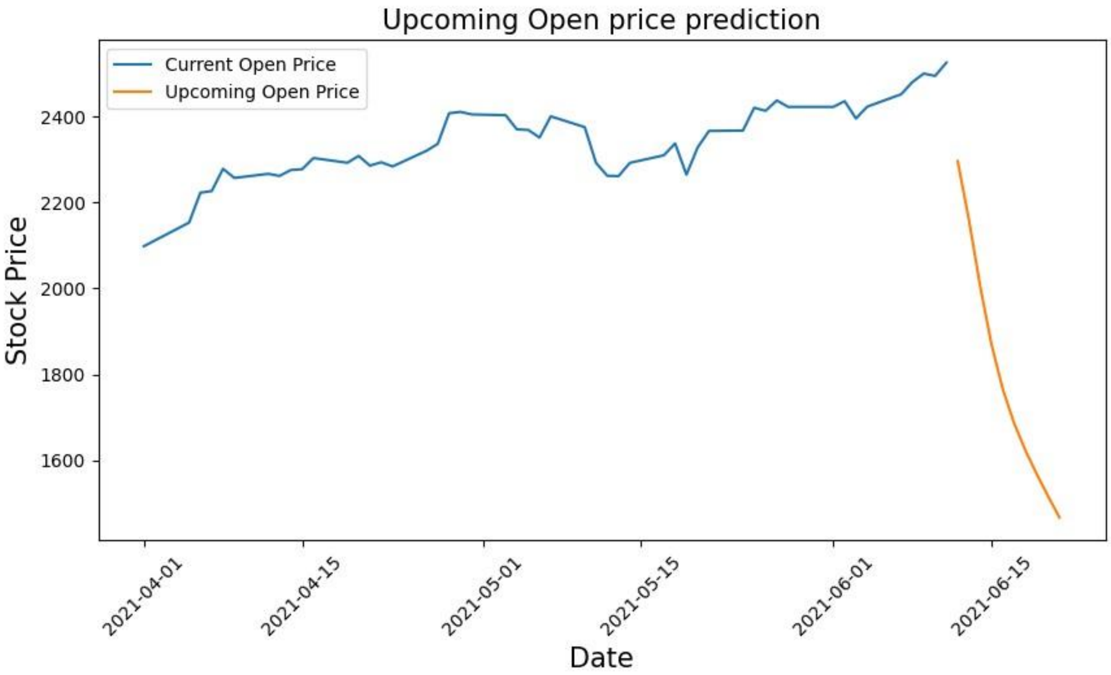
[27]:
```
curr_seq = test_seq[-1:]

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
```

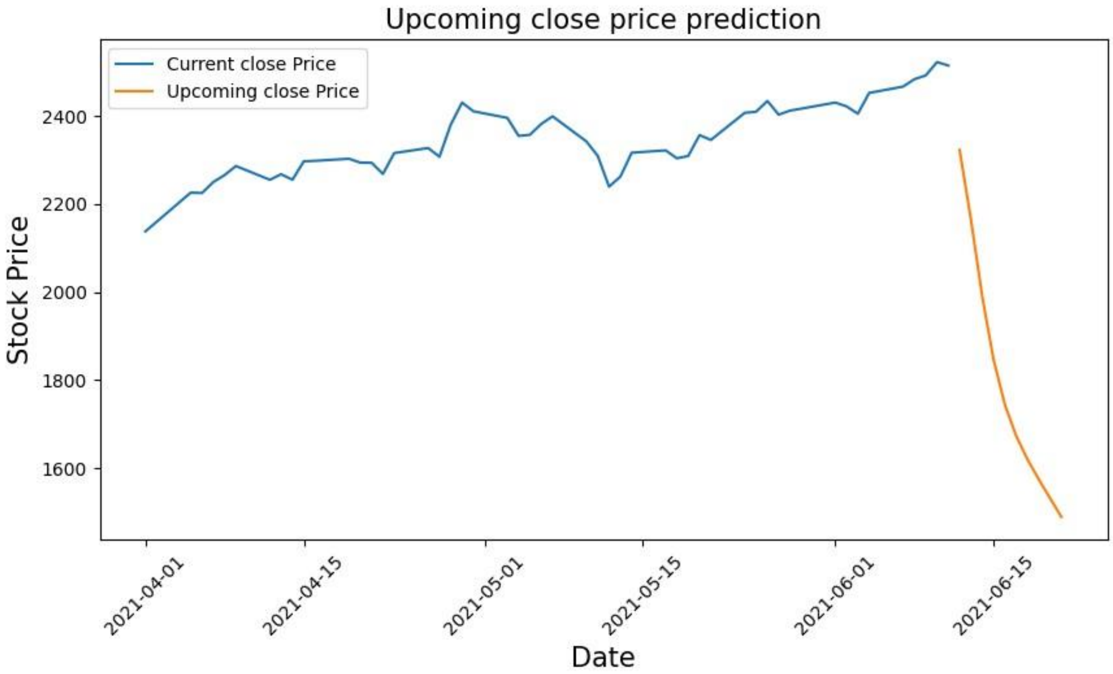
[28]:
```
# inversing Normalization/scaling
upcoming_prediction[['open','close']] = MMS.
 ↪inverse_transform(upcoming_prediction[['open','close']])
```

[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()
```


Upcoming close price prediction
Current close Price
Upcoming close Price
Stock Price
2400
2200
2000
1800
1600
Date
2021-04-01
2021-04-15
2021-05-01
2021-05-15
2021-06-01
2021-06-15

```
[ ]:
```