Z_Score_Indicator

September 29, 2021

1 Z-Score Indicator

[1]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt

import warnings
warnings.filterwarnings("ignore")

# fix_yahoo_finance is used to fetch data
import fix_yahoo_finance as yf
yf.pdr_override()
```

[2]:
```
# input
symbol = 'AAPL'
start = '2017-01-01'
end = '2019-01-01'

# Read data
df = yf.download(symbol,start,end)

# View Columns
df.head()
```

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

[2]:

Date	Open	High	Low	Close	Adj Close	Volume
2017-01-03	115.800003	116.330002	114.760002	116.150002	111.286987	28781900
2017-01-04	115.849998	116.510002	115.750000	116.019997	111.162437	21118100
2017-01-05	115.919998	116.860001	115.809998	116.610001	111.727715	
2017-01-06	116.779999	118.160004	116.470001	117.910004	112.973305	
2017-01-09	117.949997	119.430000	117.940002	118.989998	114.008080	

```
2017-01-05  22193600
2017-01-06  31751900
2017-01-09  33561900
```

[3]:
```
from scipy.stats import zscore
```

[4]:
```
df['z_score'] = zscore(df['Adj Close'])
```

[5]:
```
df.head()
```

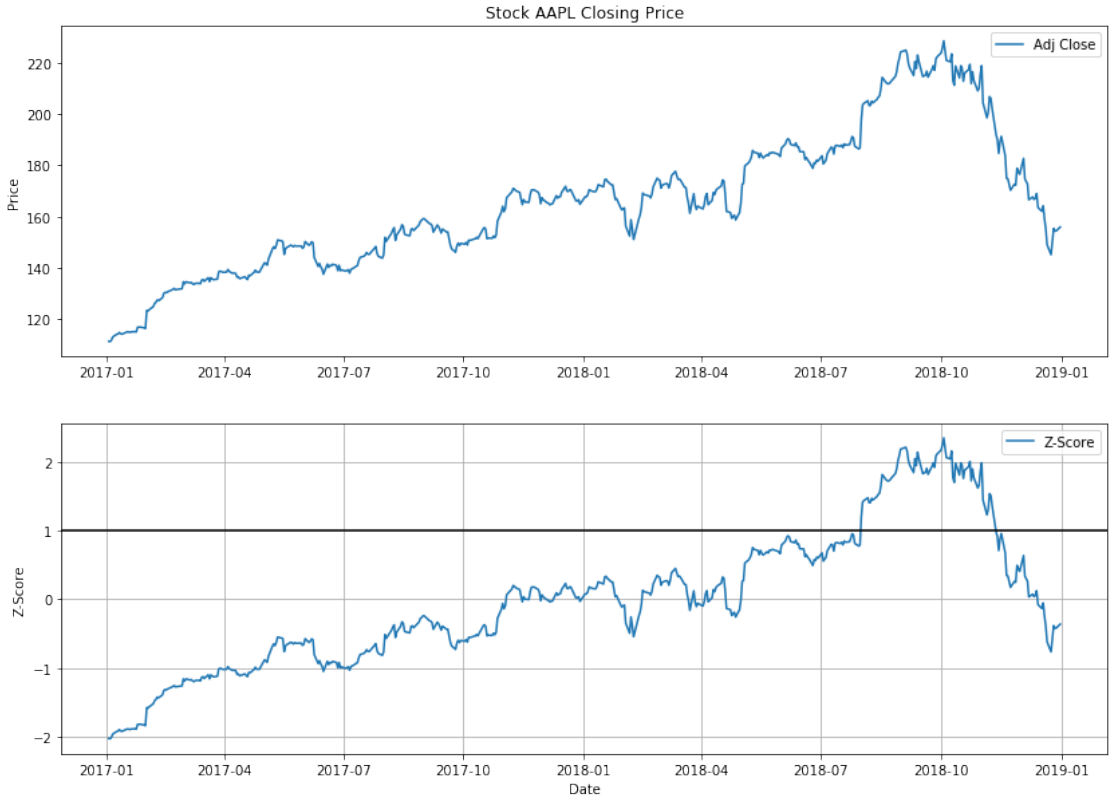
[5]:
```
                 Open        High         Low       Close   Adj Close  \
Date
2017-01-03  115.800003  116.330002  114.760002  116.150002  111.286987
2017-01-04  115.849998  116.510002  115.750000  116.019997  111.162437
2017-01-05  115.919998  116.860001  115.809998  116.610001  111.727715
2017-01-06  116.779999  118.160004  116.470001  117.910004  112.973305
2017-01-09  117.949997  119.430000  117.940002  118.989998  114.008080

              Volume   z_score
Date
2017-01-03  28781900 -2.021340
2017-01-04  21118100 -2.025979
2017-01-05  22193600 -2.004925
2017-01-06  31751900 -1.958534
2017-01-09  33561900 -1.919994
```

[6]:
```
fig = plt.figure(figsize=(14,10))
ax1 = plt.subplot(2, 1, 1)
ax1.plot(df['Adj Close'])
ax1.set_title('Stock '+ symbol +' Closing Price')
ax1.set_ylabel('Price')
ax1.legend(loc='best')

ax2 = plt.subplot(2, 1, 2)
ax2.plot(df['z_score'], label='Z-Score')
ax2.axhline(y=1, color='black')
ax2.grid()
ax2.legend(loc='best')
ax2.set_ylabel('Z-Score')
ax2.set_xlabel('Date')
```

[6]:
```
Text(0.5, 0, 'Date')
```



1.1 Candlestick with Z-Score

[7]:
```
from matplotlib import dates as mdates
import datetime as dt

dfc = df.copy()
dfc['VolumePositive'] = dfc['Open'] < dfc['Adj Close']
#dfc = dfc.dropna()
dfc = dfc.reset_index()
dfc['Date'] = pd.to_datetime(dfc['Date'])
dfc['Date'] = dfc['Date'].apply(mdates.date2num)
dfc.head()
```

[7]:

	Date	Open	High	Low	Close	Adj Close	Volume	z_score	VolumePositive
0	736332.0	115.800003	116.330002	114.760002	116.150002	111.286987			
1	736333.0	115.849998	116.510002	115.750000	116.019997	111.162437			
2	736334.0	115.919998	116.860001	115.809998	116.610001	111.727715			
3	736335.0	116.779999	118.160004	116.470001	117.910004	112.973305			
4	736338.0	117.949997	119.430000	117.940002	118.989998	114.008080			

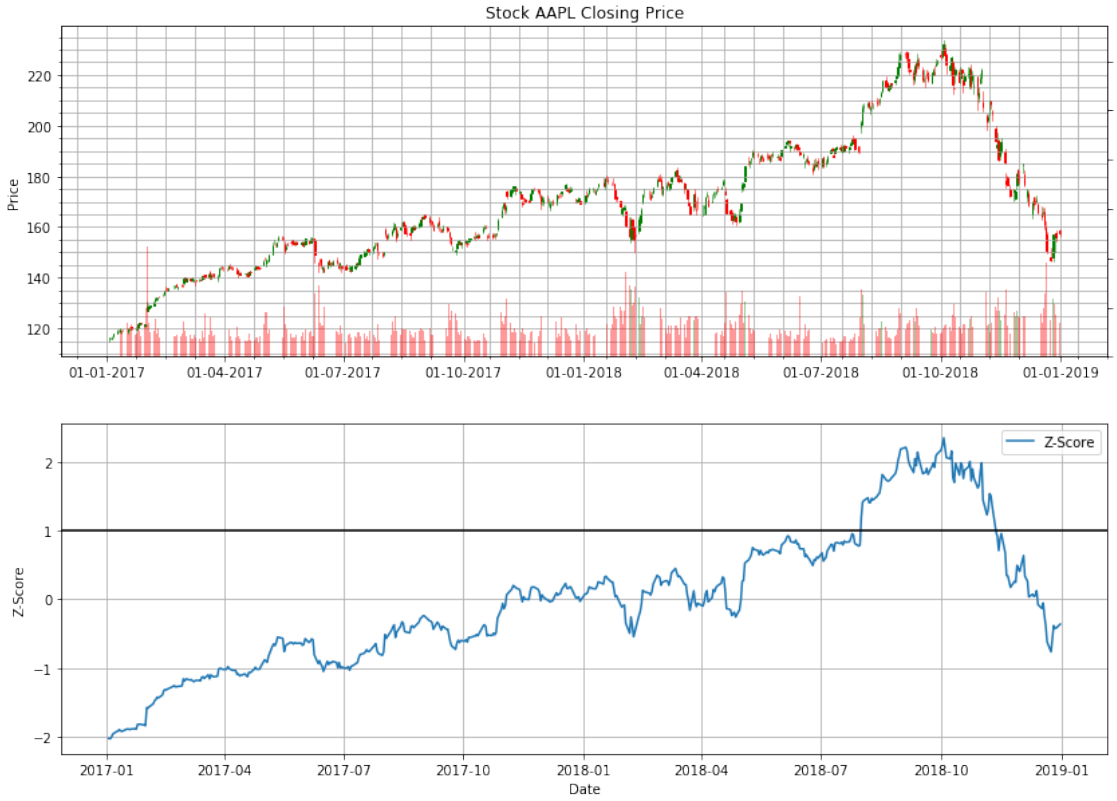
```
0  28781900 -2.021340          False
1  21118100 -2.025979          False
2  22193600 -2.004925          False
3  31751900 -1.958534          False
4  33561900 -1.919994          False
```

[8]:
```
from mpl_finance import candlestick_ohlc

fig = plt.figure(figsize=(14,10))
ax1 = plt.subplot(2, 1, 1)
candlestick_ohlc(ax1,dfc.values, width=0.5, colorup='g', colordown='r', alpha=1.
↪0)
ax1.xaxis_date()
ax1.xaxis.set_major_formatter(mdates.DateFormatter('%d-%m-%Y'))
ax1.grid(True, which='both')
ax1.minorticks_on()
ax1v = ax1.twinx()
colors = dfc.VolumePositive.map({True: 'g', False: 'r'})
ax1v.bar(dfc.Date, dfc['Volume'], color=colors, alpha=0.4)
ax1v.axes.yaxis.set_ticklabels([])
ax1v.set_ylim(0, 3*df.Volume.max())
ax1.set_title('Stock '+ symbol +' Closing Price')
ax1.set_ylabel('Price')

ax2 = plt.subplot(2, 1, 2)
ax2.plot(df['z_score'], label='Z-Score')
ax2.axhline(y=1, color='black')
ax2.grid()
ax2.legend(loc='best')
ax2.set_ylabel('Z-Score')
ax2.set_xlabel('Date')
```

[8]:
```
Text(0.5, 0, 'Date')
```


Stock AAPL Closing Price
Price
220
200
180
160
140
120
01-01-2017
01-04-2017
01-07-2017
01-10-2017
01-01-2018
01-04-2018
01-07-2018
01-10-2018
01-01-2019
Z-Score
2
1
0
−1
−2
2017-01
2017-04
2017-07
2017-10
2018-01
2018-04
2018-07
2018-10
2019-01
Date