True_Strength_Index

September 29, 2021

1 True Strength Index

https://stockcharts.com/school/doku.php?id=chart_school:technical_indicators:true_strength_index

[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	112.140007	
2017-01-04	115.849998	116.510002	115.750000	116.019997	112.014503	
2017-01-05	115.919998	116.860001	115.809998	116.610001	112.584129	
2017-01-06	116.779999	118.160004	116.470001	117.910004	113.839249	
2017-01-09	117.949997	119.430000	117.940002	118.989998	114.881950	

```
2017-01-03  28781900
2017-01-04  21118100
2017-01-05  22193600
2017-01-06  31751900
2017-01-09  33561900
```

[3]:
```
df['PC'] = df['Adj Close'] - df['Adj Close'].shift()
df['EMA_FS'] = df['PC'].ewm(ignore_na=False,span=25,min_periods=25,adjust=True).
 ↪mean()
df['EMA_SS'] = df['EMA_FS'].
 ↪ewm(ignore_na=False,span=13,min_periods=13,adjust=True).mean()
df['Absolute_PC'] = abs(df['Adj Close'] - df['Adj Close'].shift())
df['Absolute_FS'] = df['Absolute_PC'].ewm(span=25,min_periods=25).mean()
df['Absolute_SS'] = df['Absolute_FS'].ewm(span=13,min_periods=13).mean()
df['TSI'] = 100 * df['EMA_SS']/df['Absolute_SS']
df = df.
 ↪drop(['PC','EMA_FS','EMA_SS','Absolute_PC','Absolute_FS','Absolute_SS'],axis=1)
```

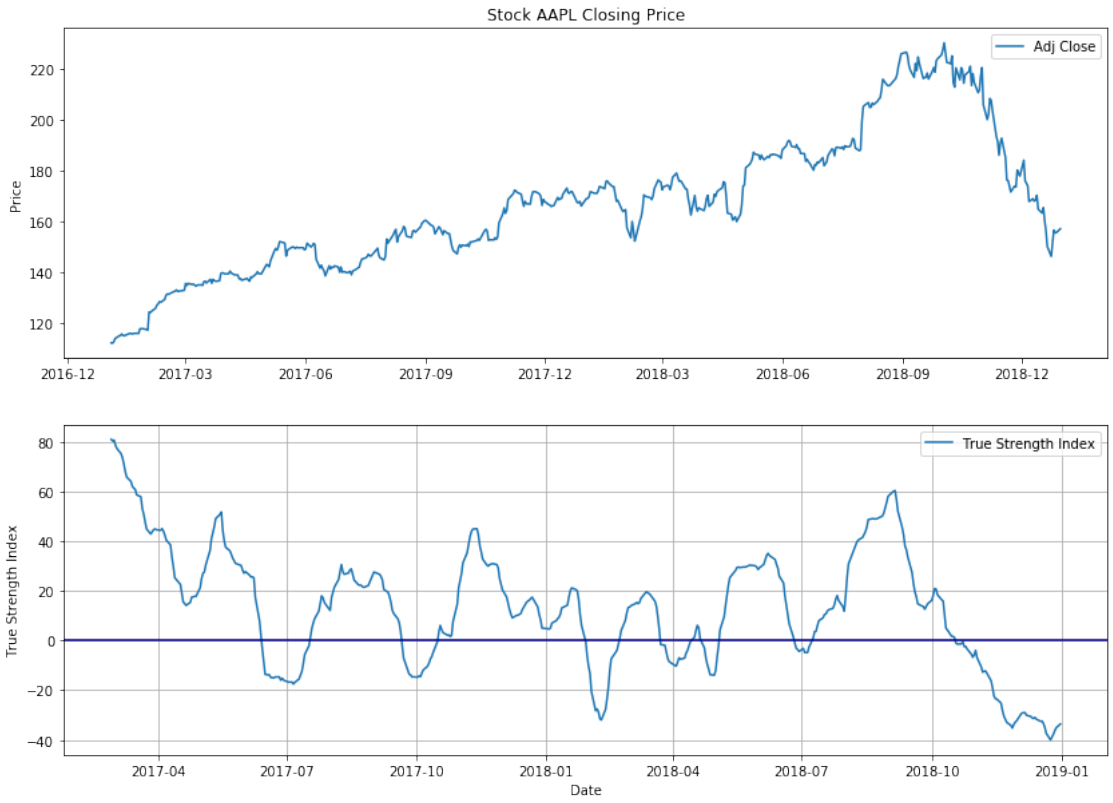
[4]:
```
df.head()
```

[4]:
```
                 Open        High         Low       Close   Adj Close  \
Date
2017-01-03  115.800003  116.330002  114.760002  116.150002  112.140007
2017-01-04  115.849998  116.510002  115.750000  116.019997  112.014503
2017-01-05  115.919998  116.860001  115.809998  116.610001  112.584129
2017-01-06  116.779999  118.160004  116.470001  117.910004  113.839249
2017-01-09  117.949997  119.430000  117.940002  118.989998  114.881950

              Volume  TSI
Date
2017-01-03  28781900  NaN
2017-01-04  21118100  NaN
2017-01-05  22193600  NaN
2017-01-06  31751900  NaN
2017-01-09  33561900  NaN
```

[5]:
```
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['TSI'], label='True Strength Index')
ax2.axhline(y=0, color='darkblue')
ax2.grid()
```

```
ax2.legend(loc='best')
ax2.set_ylabel('True Strength Index')
ax2.set_xlabel('Date')
```

[5]: Text(0.5,0,'Date')



1.1 Candlestick with True Strength Index

[6]:
```
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'] = mdates.date2num(dfc['Date'].astype(dt.date))
dfc.head()
```

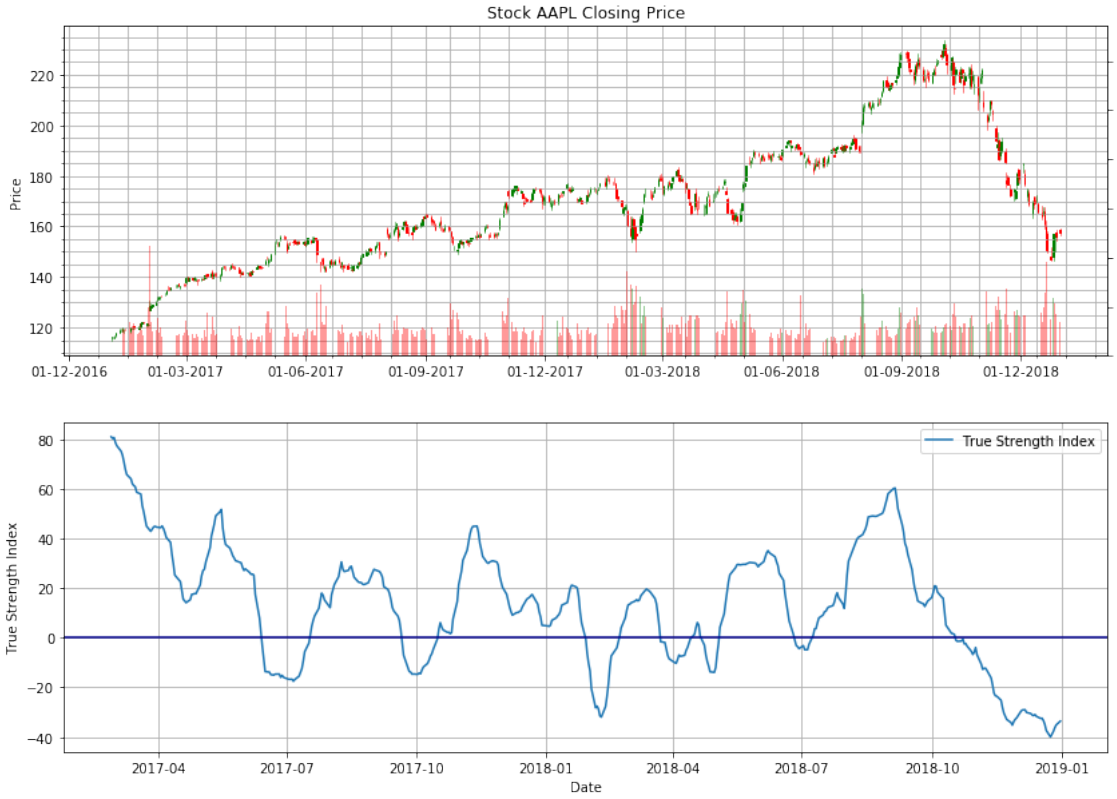
[6]:

	Date	Open	High	Low	Close	Adj Close	\
0	736332.0	115.800003	116.330002	114.760002	116.150002	112.140007	
1	736333.0	115.849998	116.510002	115.750000	116.019997	112.014503	

```
2  736334.0  115.919998  116.860001  115.809998  116.610001  112.584129
3  736335.0  116.779999  118.160004  116.470001  117.910004  113.839249
4  736338.0  117.949997  119.430000  117.940002  118.989998  114.881950

     Volume  TSI  VolumePositive
0  28781900  NaN           False
1  21118100  NaN           False
2  22193600  NaN           False
3  31751900  NaN           False
4  33561900  NaN           False
```

[7]:
```
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['TSI'], label='True Strength Index')
ax2.axhline(y=0, color='darkblue')
ax2.grid()
ax2.legend(loc='best')
ax2.set_ylabel('True Strength Index')
ax2.set_xlabel('Date')
```

[7]:
```
Text(0.5,0,'Date')
```


Stock AAPL Closing Price
Price
220
200
180
160
140
120
01-12-2016
01-03-2017
01-06-2017
01-09-2017
01-12-2017
01-03-2018
01-06-2018
01-09-2018
01-12-2018
True Strength Index
True Strength Index
80
60
40
20
0
−20
−40
2017-04
2017-07
2017-10
2018-01
2018-04
2018-07
2018-10
2019-01
Date