ATR

September 29, 2021

1 Average True Range (ATR)

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

[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]:
```
n = 14
df['HL'] = df['High'] - df['Low']
df['HC'] = abs(df['High'] - df['Adj Close'].shift())
df['LC'] = abs(df['Low'] - df['Adj Close'].shift())
df['TR'] = df[['HL','HC','LC']].max(axis=1)
df['ATR'] = df['TR'].rolling(n).mean()
df = df.drop(['HL','HC','LC','TR'],axis=1)
```

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

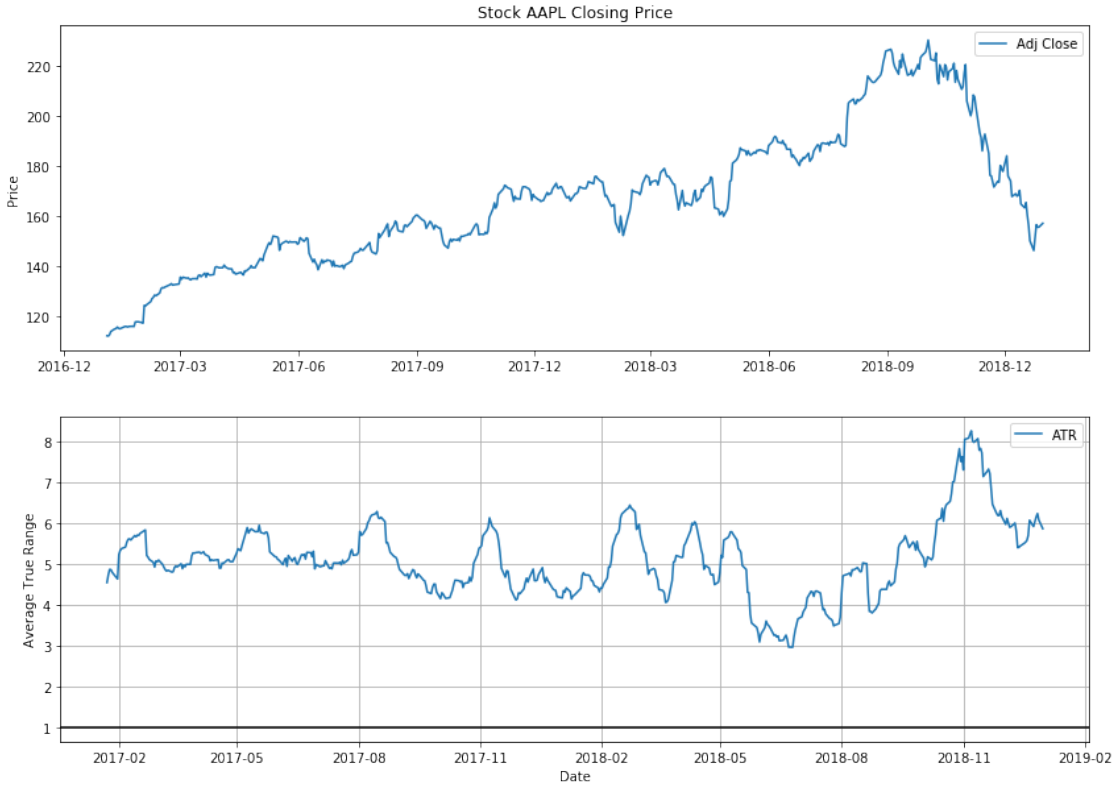
[4]:

Date	Open	High	Low	Close	Adj Close	Volume	ATR
2018-12-24	148.149994	151.550003	146.589996	146.830002	146.202972	37169200	5.909180
2018-12-26	148.300003	157.229996	146.720001	157.169998	156.498810	58582500	6.142487
2018-12-27	155.839996	156.770004	150.070007	156.149994	155.483154	53117100	6.227097
2018-12-28	157.500000	158.520004	154.550003	156.229996	155.562820	42291400	6.068525
2018-12-31	158.529999	159.360001	156.479996	157.740005	157.066376	35003500	5.856896

[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['ATR'], label='ATR')
ax2.axhline(y=1, color='black')
ax2.grid()
ax2.legend(loc='best')
ax2.set_ylabel('Average True Range')
ax2.set_xlabel('Date')
```

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



1.1 Candlestick with ATR

[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	Volume	ATR	VolumePositive
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			

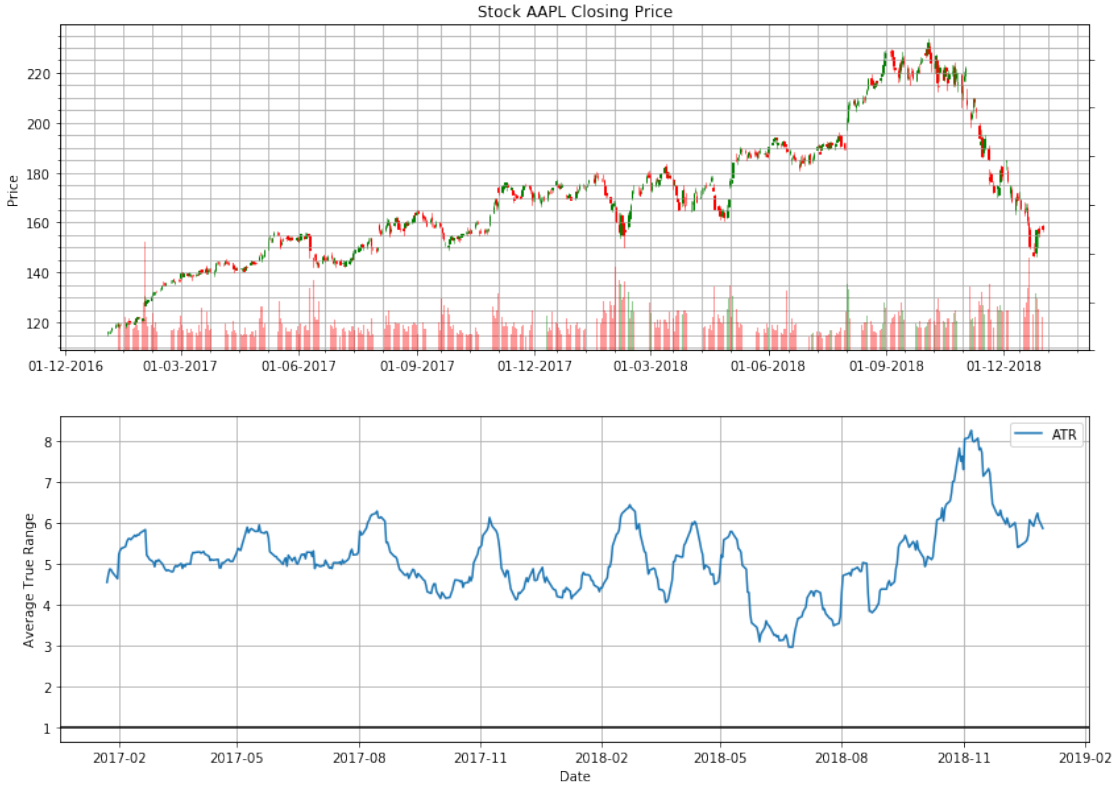
```
0  28781900  NaN          False
1  21118100  NaN          False
2  22193600  NaN          False
3  31751900  NaN          False
4  33561900  NaN          False
```

[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['ATR'], label='ATR')
ax2.axhline(y=1, color='black')
ax2.grid()
ax2.legend(loc='best')
ax2.set_ylabel('Average True Range')
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
ATR
Average True Range
8
7
6
5
4
3
2
1
2017-02
2017-05
2017-08
2017-11
2018-02
2018-05
2018-08
2018-11
2019-02
Date