SuperTrend

September 29, 2021

1 SuperTrend

http://www.freebsensetips.com/blog/detail/7/What-is-supertrend-indicator-its-calculation

https://stocksfetcher.com/supertrend/

[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 = '2018-08-01'
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
2018-08-01	199.130005	201.759995	197.309998	201.500000	199.243088
2018-08-02	200.580002	208.380005	200.350006	207.389999	205.067123
2018-08-03	207.029999	208.740005	205.479996	207.990005	205.660416
2018-08-06	208.000000	209.250000	207.070007	209.070007	206.728317
2018-08-07	209.320007	209.500000	206.759995	207.110001	204.790268

```
              Volume
Date
2018-08-01  67935700
2018-08-02  62404000
2018-08-03  33447400
2018-08-06  25425400
2018-08-07  25587400
```

[3]:
```
n = 7 # Number of periods
df['H-L'] = abs(df['High']-df['Low'])
df['H-PC'] = abs(df['High']-df['Close'].shift(1))
df['L-PC'] = abs(df['Low']-df['Close'].shift(1))
df['TR'] = df[['H-L','H-PC','L-PC']].max(axis=1)
df['ATR'] = np.nan
df.ix[n-1,'ATR'] = df['TR'][:n-1].mean()
for i in range(n,len(df)):
    df['ATR'][i]=(df['ATR'][i-1]*(n-1)+ df['TR'][i])/n
```

[4]:
```
f = 3 # Number of factor
# BASIC UPPERBAND = (HIGH + LOW) / 2 + Multiplier * ATR
# BASIC LOWERBAND = (HIGH + LOW) / 2 - Multiplier * ATR
df['BASIC UPPERBAND']=(df['High']+df['Low'])/2+(f*df['ATR'])
df['BASIC LOWERBAND']=(df['High']+df['Low'])/2-(f*df['ATR'])
df['FINAL UPPERBAND']=df['BASIC UPPERBAND']
df['FINAL LOWERBAND']=df['BASIC LOWERBAND']


# FINAL UPPERBAND = IF( (Current BASICUPPERBAND < Previous FINAL UPPERBAND)
# and (Previous Close > Previous FINAL UPPERBAND))
# THEN (Current BASIC UPPERBAND) ELSE Previous FINALUPPERBAND)
for i in range(n,len(df)):
    if df['Close'][i-1]<=df['FINAL UPPERBAND'][i-1]:
        df['FINAL UPPERBAND'][i]=min(df['BASIC UPPERBAND'][i],df['FINAL␣
 ↪UPPERBAND'][i-1])
    else:
        df['FINAL UPPERBAND'][i]=df['BASIC UPPERBAND'][i]

# FINAL LOWERBAND = IF( (Current BASIC LOWERBAND > Previous FINAL LOWERBAND)
# and (Previous Close < Previous FINAL LOWERBAND))
# THEN (Current BASIC LOWERBAND) ELSE Previous FINAL LOWERBAND)
for i in range(n,len(df)):
    if df['Close'][i-1]>=df['BASIC LOWERBAND'][i-1]:
        df['FINAL LOWERBAND'][i]=max(df['BASIC LOWERBAND'][i],df['FINAL␣
 ↪LOWERBAND'][i-1])
    else:
        df['FINAL LOWERBAND'][i]=df['BASIC LOWERBAND'][i]
```

```
# SUPERTREND = IF(Current Close <= Current FINAL UPPERBAND)
# THEN Current FINAL UPPERBAND ELSE Current  FINAL LOWERBAND
df['SUPERTREND']=np.nan
for i in df['SUPERTREND']:
    if df['Close'][n-1]<=df['FINAL UPPERBAND'][n-1]:
        df['SUPERTREND'][n-1]=df['FINAL UPPERBAND'][n-1]
    elif df['Close'][n-1]>df['FINAL UPPERBAND'][i]:
        df['SUPERTREND'][n-1]=df['FINAL LOWERBAND '][n-1]

for i in range(n,len(df)):
    if df['SUPERTREND'][i-1]==df['FINAL UPPERBAND'][i-1] and␣
 ↪df['Close'][i]<=df['FINAL UPPERBAND'][i]:
        df['SUPERTREND'][i]=df['FINAL UPPERBAND'][i]
    elif df['SUPERTREND'][i-1]==df['FINAL UPPERBAND'][i-1] and␣
 ↪df['Close'][i]>=df['FINAL UPPERBAND'][i]:
        df['SUPERTREND'][i]=df['FINAL LOWERBAND'][i]
    elif df['SUPERTREND'][i-1]==df['FINAL LOWERBAND'][i-1] and␣
 ↪df['Close'][i]>=df['FINAL LOWERBAND'][i]:
        df['SUPERTREND'][i]=df['FINAL LOWERBAND'][i]
    elif df['SUPERTREND'][i-1]==df['FINAL LOWERBAND'][i-1] and␣
 ↪df['Close'][i]<=df['FINAL LOWERBAND'][i]:
        df['SUPERTREND'][i]=df['FINAL UPPERBAND'][i]
```

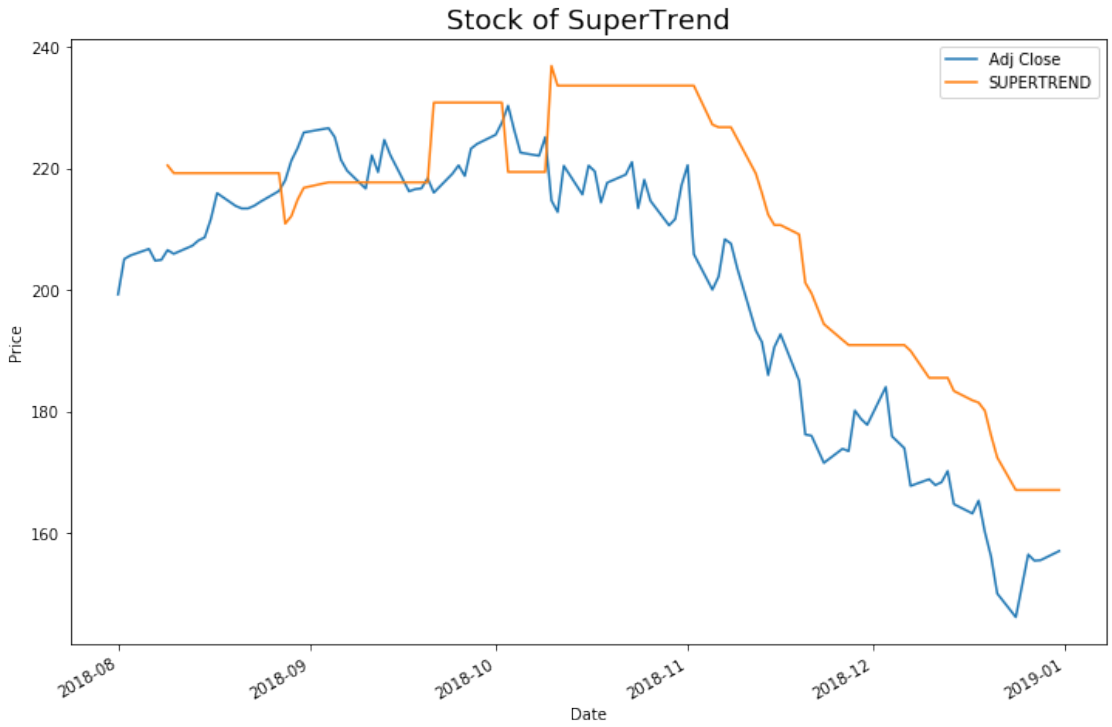
[5]:
```
df.head(10)
```

[5]:

Date	Open	High	Low	Close	Adj Close	Volume	H-L	H-PC	L-PC	TR	ATR
2018-08-01	199.130005	201.759995	197.309998	201.500000	199.243088	67935700	4.449997	NaN	NaN	4.449997	NaN
2018-08-02	200.580002	208.380005	200.350006	207.389999	205.067123	62404000	8.029999	6.880005	1.149994	8.029999	NaN
2018-08-03	207.029999	208.740005	205.479996	207.990005	205.660416	33447400	3.260009	1.350006	1.910003	3.260009	NaN
2018-08-06	208.000000	209.250000	207.070007	209.070007	206.728317	25425400	2.179993	1.259995	0.919998	2.179993	NaN
2018-08-07	209.320007	209.500000	206.759995	207.110001	204.790268	25587400	2.740005	0.429993	2.310012	2.740005	NaN
2018-08-08	206.050003	207.809998	204.520004	207.250000	204.928696	22525500	3.289994	0.699997	2.589997	3.289994	NaN
2018-08-09	207.279999	209.779999	207.199997	208.880005	206.540436	23469200	2.580002	2.529999	0.050003	2.580002	3.991666
2018-08-10	207.360001	209.100006	206.669998	207.529999	205.925232						
2018-08-13	207.699997	210.949997	207.699997	208.869995	207.254883						
2018-08-14	210.160004	210.559998	208.259995	209.750000	208.128067						

```
2018-08-10  24611200  2.430008  0.220001  2.210007  2.430008  3.768572
2018-08-13  25869100  3.250000  3.419998  0.169998  3.419998  3.718776
2018-08-14  20748000  2.300003  1.690003  0.610000  2.300003  3.516094

            BASIC UPPERBAND  BASIC LOWERBAND  FINAL UPPERBAND  \
Date
2018-08-01              NaN              NaN              NaN
2018-08-02              NaN              NaN              NaN
2018-08-03              NaN              NaN              NaN
2018-08-06              NaN              NaN              NaN
2018-08-07              NaN              NaN              NaN
2018-08-08              NaN              NaN              NaN
2018-08-09       220.464997       196.515000       220.464997
2018-08-10       219.190718       196.579286       219.190718
2018-08-13       220.481325       198.168669       219.190718
2018-08-14       219.958279       198.861714       219.190718

            FINAL LOWERBAND  SUPERTREND
Date
2018-08-01              NaN         NaN
2018-08-02              NaN         NaN
2018-08-03              NaN         NaN
2018-08-06              NaN         NaN
2018-08-07              NaN         NaN
2018-08-08              NaN         NaN
2018-08-09       196.515000  220.464997
2018-08-10       196.579286  219.190718
2018-08-13       198.168669  219.190718
2018-08-14       198.861714  219.190718
```

[6]:
```
plt.figure(figsize=(12,8))

df['Adj Close'].plot()
df['SUPERTREND'].plot()
plt.title('Stock of SuperTrend', fontsize=18)
plt.legend(loc='best')
plt.xlabel('Date')
plt.ylabel('Price')
plt.show()
```



1.1 Candlestick with SuperTrend

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

[7]:

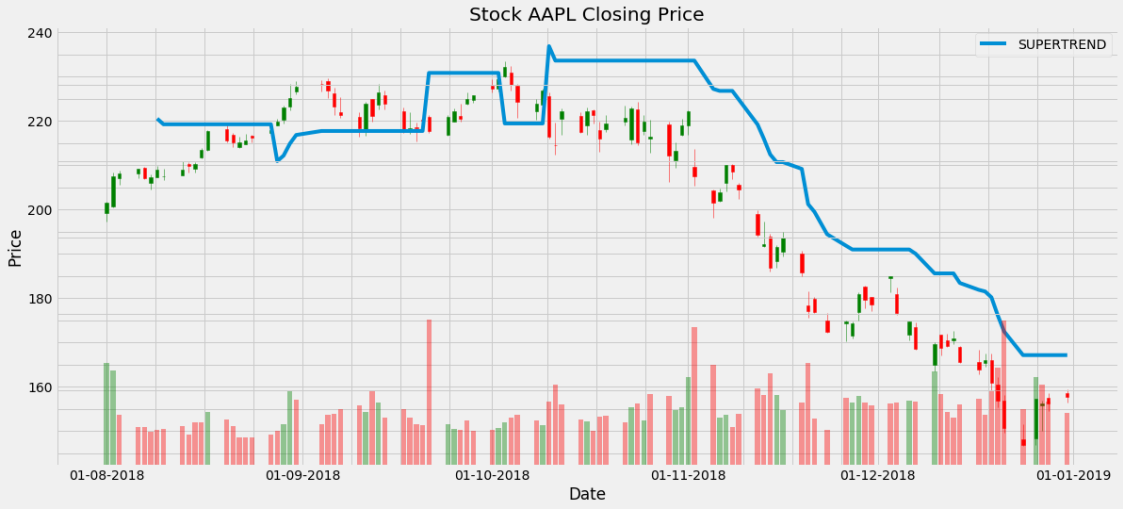
	Date	Open	High	Low	Close	Adj Close	\
0	736907.0	199.130005	201.759995	197.309998	201.500000	199.243088	
1	736908.0	200.580002	208.380005	200.350006	207.389999	205.067123	
2	736909.0	207.029999	208.740005	205.479996	207.990005	205.660416	
3	736912.0	208.000000	209.250000	207.070007	209.070007	206.728317	
4	736913.0	209.320007	209.500000	206.759995	207.110001	204.790268	

	Volume	H-L	H-PC	L-PC	TR	ATR	BASIC UPPERBAND	\
0	67935700	4.449997	NaN	NaN	4.449997	NaN	NaN	
1	62404000	8.029999	6.880005	1.149994	8.029999	NaN	NaN	
2	33447400	3.260009	1.350006	1.910003	3.260009	NaN	NaN	

```
3  25425400  2.179993  1.259995  0.919998  2.179993  NaN              NaN
4  25587400  2.740005  0.429993  2.310012  2.740005  NaN              NaN

   BASIC LOWERBAND  FINAL UPPERBAND  FINAL LOWERBAND  SUPERTREND  \
0              NaN              NaN              NaN         NaN
1              NaN              NaN              NaN         NaN
2              NaN              NaN              NaN         NaN
3              NaN              NaN              NaN         NaN
4              NaN              NaN              NaN         NaN

   VolumePositive
0            True
1            True
2           False
3           False
4           False
```

[8]:
```
from mpl_finance import candlestick_ohlc

plt.style.use('fivethirtyeight')
fig = plt.figure(figsize=(18,8))
ax1 = plt.subplot(111)
candlestick_ohlc(ax1,dfc.values, width=0.5, colorup='g', colordown='r', alpha=1.
 ↪0)
ax1.plot(df['SUPERTREND'])
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')
ax1.set_xlabel('Date')
ax1.legend()
```

[8]:
```
<matplotlib.legend.Legend at 0x2d718cce3c8>
```


Stock AAPL Closing Price
SUPERTREND
240
220
200
180
160
Price
01-08-2018
01-09-2018
01-10-2018
01-11-2018
01-12-2018
01-01-2019
Date