SMMA

September 29, 2021

1 Smoothed Moving Average (SMMA)

https://www.metatrader5.com/en/terminal/help/indicators/trend_indicators/ma#smma

[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	Volume
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	

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

[3]:
```
df.shape
```

[3]:
```
(105, 6)
```

[4]:
```
n = 10
SMMA = np.array([np.nan] * len(df['Adj Close']))
SMMA[n - 2] = df['Adj Close'][:n - 1].mean()
for i in range(n - 1, len(df['Adj Close'])):
    SMMA[i] = (SMMA [i - 1] * (n - 2) + 2 * df['Adj Close'][i]) / n
```

[5]:
```
SMMA
```

[5]:
```
array([          nan,           nan,           nan,           nan,
                 nan,           nan,           nan,           nan,
        205.12649544,  205.72680976,  206.3043024 ,  207.37753612,
        209.0815333 ,  210.02401264,  210.69464351,  211.23313181,
        211.75124245,  212.29869296,  213.08990337,  214.07214849,
        215.50886939,  217.06507892,  218.82602553,  220.37965283,
        221.32685766,  221.33645553,  220.98691642,  220.11787794,
        220.51811215,  220.28659972,  221.16113098,  221.35072478,
        220.31962102,  219.56617962,  218.9892261 ,  218.85709748,
        218.28106058,  218.44138587,  218.84748429,  218.82109963,
        219.69898491,  220.55807413,  221.5469933 ,  222.73900464,
        224.24630011,  224.64244729,  224.22508463,  223.78799931,
        224.05353484,  222.18022108,  220.30252046,  220.32051677,
        219.39225941,  219.60024253,  219.57611683,  218.53080926,
        218.34747761,  218.46673629,  218.97492703,  217.86529622,
        217.91230838,  217.2553289 ,  215.92402932,  215.06934746,
        215.48900157,  216.49152785,  214.36834428,  211.50090703,
        209.63958982,  209.37697346,  209.02150977,  207.93657121,
        205.01741497,  202.29574658,  199.03705206,  197.34815965,
        196.41923512,  194.1486449 ,  190.56375532,  187.65601525,
        184.4356582 ,  182.32338316,  180.55788873,  180.47977038,
        180.14046311,  179.67584709,  180.54682387,  179.62455009,
        178.49441248,  176.34962538,  174.8548467 ,  173.46585056,
        172.44825425,  172.0025944 ,  170.55673852,  169.09337062,
        168.34685829,  166.71807203,  164.60651023,  161.70246898,
        158.60256959,  158.18181767,  157.64208493,  157.22623195,
        157.19426076])
```

[6]:
```
x = SMMA.reshape(-1,1)
data = pd.DataFrame.from_records(x)
data
```

[6]:

	0
0	NaN
1	NaN
2	NaN
3	NaN
4	NaN
5	NaN
6	NaN
7	NaN
8	205.126495
9	205.726810
10	206.304302
11	207.377536
12	209.081533
13	210.024013
14	210.694644
15	211.233132
16	211.751242
17	212.298693
18	213.089903
19	214.072148
20	215.508869
21	217.065079
22	218.826026
23	220.379653
24	221.326858
25	221.336456
26	220.986916
27	220.117878
28	220.518112
29	220.286600
..	…
75	197.348160
76	196.419235
77	194.148645
78	190.563755
79	187.656015
80	184.435658
81	182.323383
82	180.557889
83	180.479770
84	180.140463
85	179.675847

```
86   180.546824
87   179.624550
88   178.494412
89   176.349625
90   174.854847
91   173.465851
92   172.448254
93   172.002594
94   170.556739
95   169.093371
96   168.346858
97   166.718072
98   164.606510
99   161.702469
100  158.602570
101  158.181818
102  157.642085
103  157.226232
104  157.194261

[105 rows x 1 columns]
```

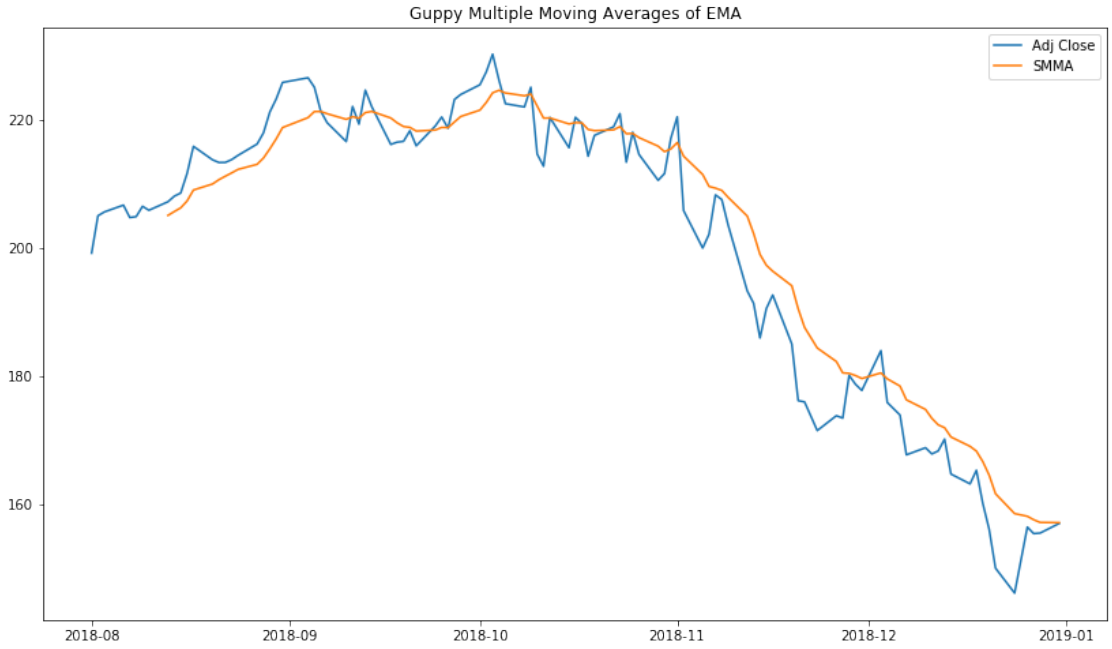
[7]:
```
df['SMMA'] = data.values
df.head(10)
```

[7]:

Date	Open	High	Low	Close	Adj Close	Volume	SMMA
2018-08-01	199.130005	201.759995	197.309998	201.500000	199.243088	67935700	NaN
2018-08-02	200.580002	208.380005	200.350006	207.389999	205.067123	62404000	NaN
2018-08-03	207.029999	208.740005	205.479996	207.990005	205.660416	33447400	NaN
2018-08-06	208.000000	209.250000	207.070007	209.070007	206.728317	25425400	NaN
2018-08-07	209.320007	209.500000	206.759995	207.110001	204.790268	25587400	NaN
2018-08-08	206.050003	207.809998	204.520004	207.250000	204.928696	22525500	NaN
2018-08-09	207.279999	209.779999	207.199997	208.880005	206.540436	23469200	NaN
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         NaN
2018-08-13  25869100  205.126495
2018-08-14  20748000  205.726810
```

[8]:
```
# Line Chart
plt.figure(figsize=(14,8))
plt.plot(df['Adj Close'])
plt.plot(df['SMMA'])
plt.title('Guppy Multiple Moving Averages of EMA')
plt.legend(loc='best')
plt.show()
```



1.1 Candlestick with SMMA

[9]:
```
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()
```

[9]:

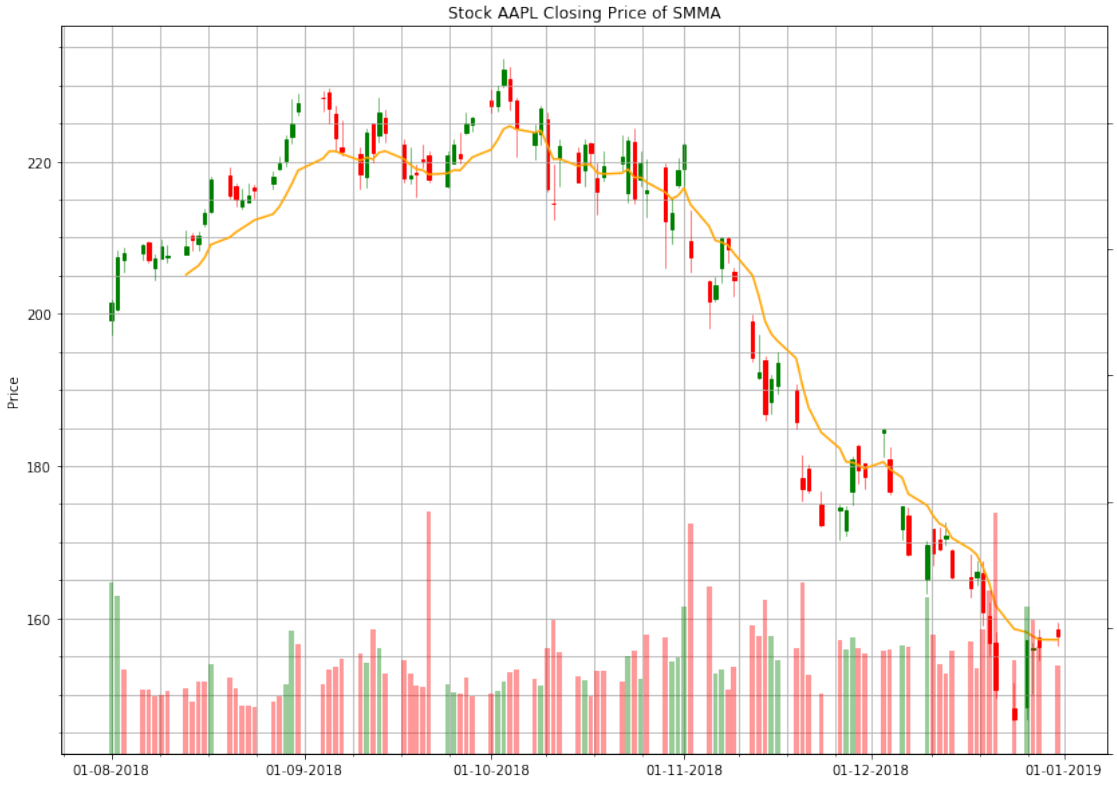
	Date	Open	High	Low	Close	Adj Close	\
0	736907.0	199.130005	201.759995	197.309998	201.500000	199.243088	
1	736908.0	200.580002	208.380005	200.350006	207.389999	205.067123	
2	736909.0	207.029999	208.740005	205.479996	207.990005	205.660416	
3	736912.0	208.000000	209.250000	207.070007	209.070007	206.728317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

	Volume	SMMA	VolumePositive
0	67935700	NaN	True
1	62404000	NaN	True
2	33447400	NaN	False
3	25425400	NaN	False
4	25587400	NaN	False

[10]:
```
from mpl_finance import candlestick_ohlc

fig = plt.figure(figsize=(14,10))
ax1 = plt.subplot(111)
candlestick_ohlc(ax1,dfc.values, width=0.5, colorup='g', colordown='r', alpha=1.
↪0)
ax1.plot(df['SMMA'], color='orange')
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 of SMMA')
ax1.set_ylabel('Price')
```

[10]:
```
Text(0,0.5,'Price')
```


Stock AAPL Closing Price of SMMA
Price
220
200
180
160
01-08-2018
01-09-2018
01-10-2018
01-11-2018
01-12-2018
01-01-2019