

EWMA

September 29, 2021

1 Exponential Weighted Moving Average (EWMA)

<https://www.investopedia.com/articles/07/ewma.asp>

<https://www.thebalance.com/simple-exponential-and-weighted-moving-averages-1031196>

```
[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 = '2018-01-01'
end = '2019-01-01'

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

# View Columns
df.head()
```

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

```
[2]:
```

	Open	High	Low	Close	Adj Close	\
Date						
2018-01-02	170.160004	172.300003	169.259995	172.259995	168.339050	
2018-01-03	172.529999	174.550003	171.960007	172.229996	168.309738	
2018-01-04	172.539993	173.470001	172.080002	173.029999	169.091522	
2018-01-05	173.440002	175.369995	173.050003	175.000000	171.016678	
2018-01-08	174.350006	175.610001	173.929993	174.350006	170.381485	

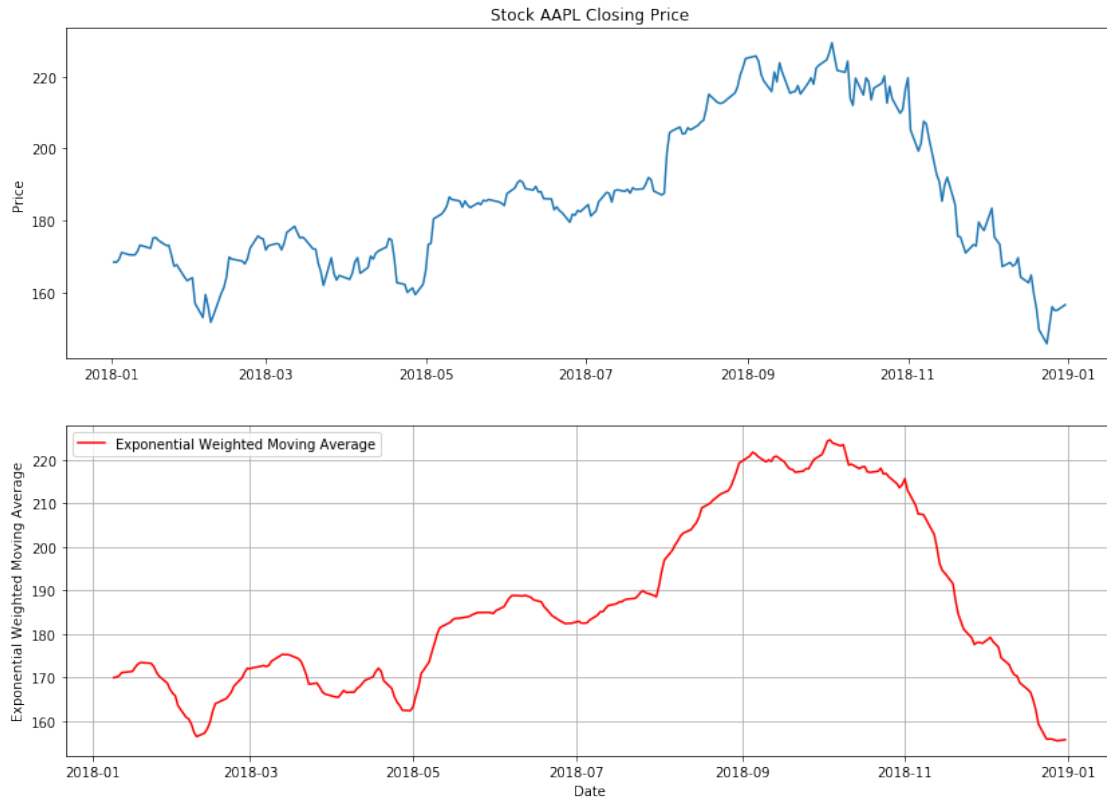
Date	Volume
2018-01-02	25555900
2018-01-03	29517900
2018-01-04	22434600
2018-01-05	23660000
2018-01-08	20567800

```
[3]: n = 7
df['EWMA'] = df['Adj Close'].ewm(ignore_na=False, min_periods=n - 1,
span=n).mean()
```

```
[4]: 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')

ax2 = plt.subplot(2, 1, 2)
ax2.plot(df['EWMA'], label='Exponential Weighted Moving Average', color='red')
#ax2.axhline(y=0, color='blue', linestyle='--')
#ax2.axhline(y=0.5, color='darkblue')
#ax2.axhline(y=-0.5, color='darkblue')
ax2.grid()
ax2.set_ylabel('Exponential Weighted Moving Average')
ax2.set_xlabel('Date')
ax2.legend(loc='best')
```

```
[4]: <matplotlib.legend.Legend at 0x18615f15630>
```



1.1 Candlestick with Exponential Weighted Moving Average (EWMA)

```
[5]: 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()
```

```
[5]:
```

	Date	Open	High	Low	Close	Adj Close	\
0	736696.0	170.160004	172.300003	169.259995	172.259995	168.339050	
1	736697.0	172.529999	174.550003	171.960007	172.229996	168.309738	
2	736698.0	172.539993	173.470001	172.080002	173.029999	169.091522	
3	736699.0	173.440002	175.369995	173.050003	175.000000	171.016678	
4	736702.0	174.350006	175.610001	173.929993	174.350006	170.381485	

Volume EWMA VolumePositive

0	25555900	NaN	False
1	29517900	NaN	False
2	22434600	NaN	False
3	23660000	NaN	False
4	20567800	NaN	False

```
[6]: 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['EWMA'], label='Exponential Weighted Moving Average', color='red')
#ax2.axhline(y=0, color='blue', linestyle='--')
#ax2.axhline(y=0.5, color='darkblue')
#ax2.axhline(y=-0.5, color='darkblue')
ax2.grid()
ax2.set_ylabel('Exponential Weighted Moving Average')
ax2.set_xlabel('Date')
ax2.legend(loc='best')
```

```
[6]: <matplotlib.legend.Legend at 0x18617973a58>
```

