Linear_Weighted_Moving_Average

September 29, 2021

1 Linearly Weighted Moving Average

https://www.investopedia.com/terms/l/linearlyweightedmovingaverage.asp

[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	198.478760	
2018-08-02	200.580002	208.380005	200.350006	207.389999	204.280457	
2018-08-03	207.029999	208.740005	205.479996	207.990005	204.871445	
2018-08-06	208.000000	209.250000	207.070007	209.070007	205.935257	
2018-08-07	209.320007	209.500000	206.759995	207.110001	204.004639	

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

[3]:
```
def linear_weight_moving_average(close, n):
    lwma = [np.nan] * n
    for i in range(n, len(close)):
        lwma.append((close[i - n : i] * (np.arange(n) + 1)).sum()/(np.arange(n␣
↪+ 1).sum()))
    return lwma
```

[4]:
```
df['LWMA'] = linear_weight_moving_average(df['Adj Close'], 5)
```

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

[5]:

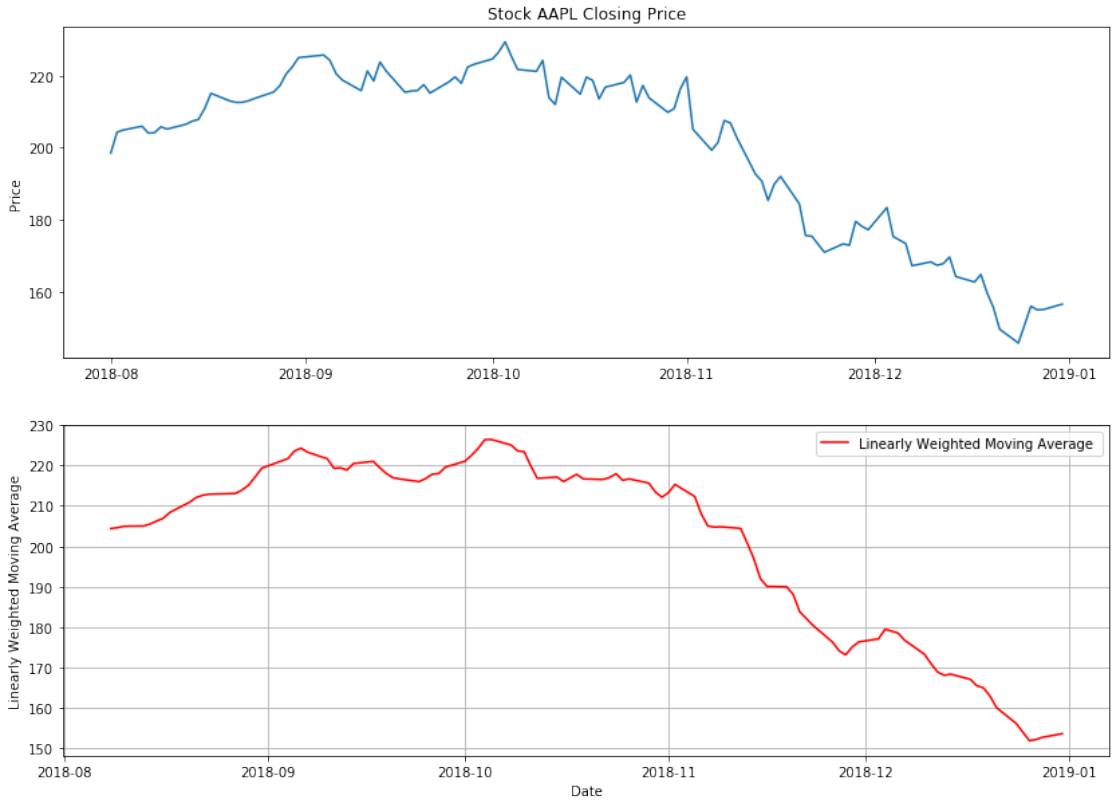
Date	Open	High	Low	Close	Adj Close	Volume	LWMA
2018-08-01	199.130005	201.759995	197.309998	201.500000	198.478760	67935700	NaN
2018-08-02	200.580002	208.380005	200.350006	207.389999	204.280457	62404000	NaN
2018-08-03	207.029999	208.740005	205.479996	207.990005	204.871445	33447400	NaN
2018-08-06	208.000000	209.250000	207.070007	209.070007	205.935257	25425400	NaN
2018-08-07	209.320007	209.500000	206.759995	207.110001	204.004639	25587400	NaN
2018-08-08	206.050003	207.809998	204.520004	207.250000	204.142532	22525500	204.361215
2018-08-09	209.529999	209.779999	207.199997	208.880005	205.748108	23492600	204.570689
2018-08-10	207.360001	209.100006	206.669998	207.529999	205.135254	24611200	204.937770
2018-08-13	209.309998	210.949997	207.699997	208.869995	206.459793	25890900	205.002722
2018-08-14	210.160004	210.559998	208.259995	209.750000	207.329651	20748000	205.491601

[6]:
```
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['LWMA'], label='Linearly 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('Linearly Weighted Moving Average')
ax2.set_xlabel('Date')
ax2.legend(loc='best')
```

[6]: <matplotlib.legend.Legend at 0x2105d3625c0>



1.1 Candlestick with Linearly Weighted Moving Average

[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'] = pd.to_datetime(dfc['Date'])
dfc['Date'] = dfc['Date'].apply(mdates.date2num)
dfc.head()
```

[7]:

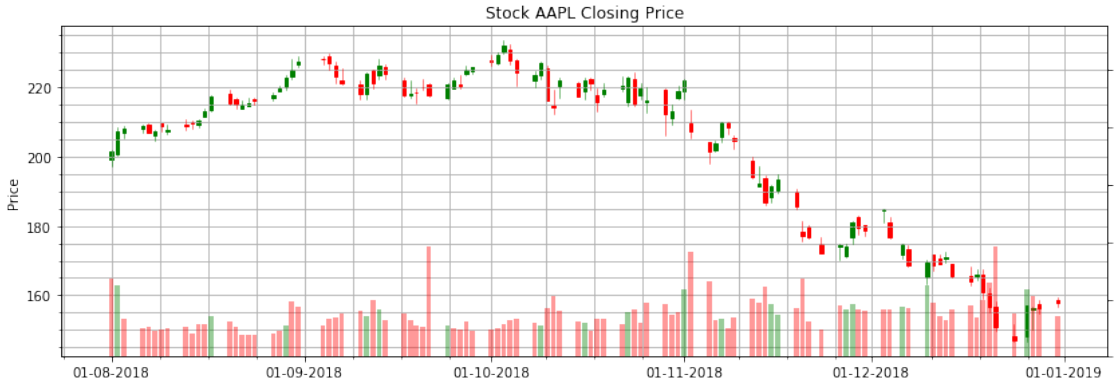
	Date	Open	High	Low	Close	Adj Close	Volume	LWMA	VolumePositive
0	736907.0	199.130005	201.759995	197.309998	201.500000	198.478760	67935700	NaN	False
1	736908.0	200.580002	208.380005	200.350006	207.389999	204.280457	62404000	NaN	True
2	736909.0	207.029999	208.740005	205.479996	207.990005	204.871445	33447400	NaN	False
3	736912.0	208.000000	209.250000	207.070007	209.070007	205.935257	25425400	NaN	False
4	736913.0	209.320007	209.500000	206.759995	207.110001	204.004639	25587400	NaN	False

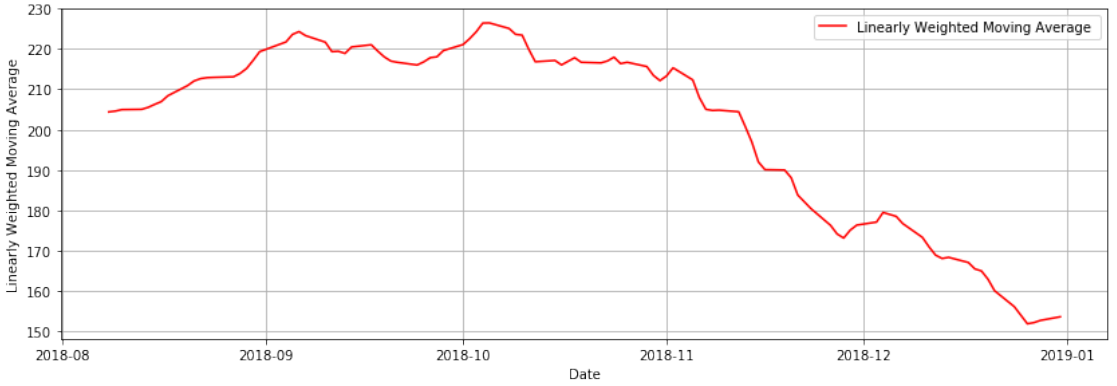
[8]:
```
from mpl_finance import candlestick_ohlc

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['LWMA'], label='Linearly Weighted Moving Average', color='red')
ax2.grid()
ax2.set_ylabel('Linearly Weighted Moving Average')
ax2.set_xlabel('Date')
ax2.legend(loc='best')
```

[8]:
```
<matplotlib.legend.Legend at 0x2105d7e29e8>
```


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


Linearly Weighted Moving Average
Linearly Weighted Moving Average
230
220
210
200
190
180
170
160
150
2018-08
2018-09
2018-10
2018-11
2018-12
2019-01
Date