Linear_Regression_Slope

September 29, 2021

1 Linear Regression Slope (LRS)

https://library.tradingtechnologies.com/trade/chrt-ti-linear-regression-slope.html

[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
symbol1 = 'AAPL'
symbol2 = 'QQQ'
start = '2018-08-01'
end = '2019-01-01'

# Read data
df1 = yf.download(symbol1,start,end)
df2 = yf.download(symbol2,start,end)
```

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

[3]:
```
# View Columns
df1.head()
```

[3]:

Date	Open	High	Low	Close	Adj Close
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

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

[4]:
```
df2.head()
```

[4]:
```
                  Open        High         Low       Close   Adj Close  \
Date
2018-08-01  176.860001  177.649994  176.100006  177.119995  175.977173
2018-08-02  175.869995  179.740005  175.789993  179.529999  178.371628
2018-08-03  179.869995  180.089996  179.080002  180.080002  178.918091
2018-08-06  179.960007  181.190002  179.740005  181.139999  179.971237
2018-08-07  181.649994  182.139999  181.259995  181.800003  180.626999

                Volume
Date
2018-08-01  37101900
2018-08-02  47178200
2018-08-03  28934400
2018-08-06  24808800
2018-08-07  29895700
```

[5]:
```
avg1 = df1['Adj Close'].mean()
avg2 = df2['Adj Close'].mean()
df1['AVGS1_S1'] = avg1 - df1['Adj Close']
df1['AVGS2_S2'] = avg2 - df2['Adj Close']
df1['Average_SQ'] = df1['AVGS1_S1']**2
df1['AVG_AVG'] = df1['AVGS1_S1']*df1['AVGS2_S2']
```

[6]:
```
sum_sq = df1['Average_SQ'].sum()
sum_avg = df1['AVG_AVG'].sum()
slope = sum_avg/sum_sq
intercept = avg2-(slope*avg1)
```

[7]:
```
m = (df1['Adj Close']-df1['Adj Close'].mean())*(df2['Adj Close']-df2['Adj␣
↪Close'].mean())/(df1['Adj Close']-df1['Adj Close'].mean())
```

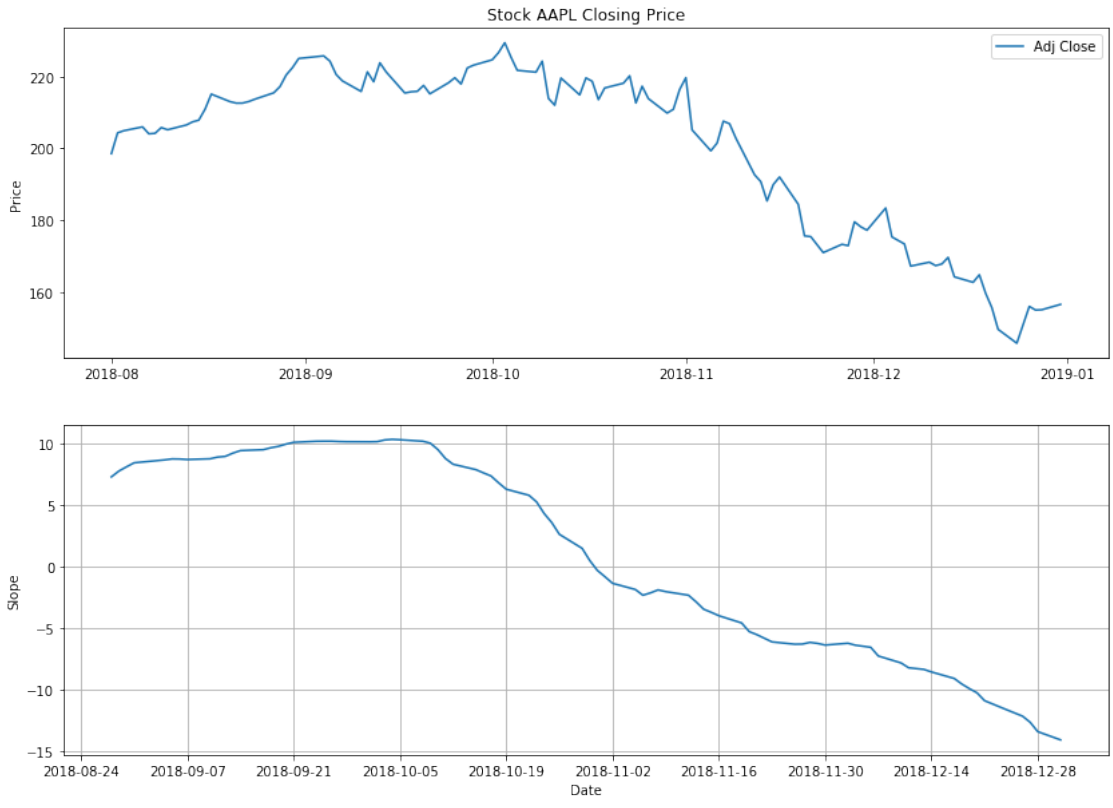
[8]:
```
n = 20
df1['Slope'] = m.rolling(n).mean()
```

[9]:
```
fig = plt.figure(figsize=(14,10))
ax1 = plt.subplot(2, 1, 1)
```

```
ax1.plot(df1['Adj Close'])
ax1.set_title('Stock '+ symbol1 +' Closing Price')
ax1.set_ylabel('Price')
ax1.legend(loc='best')

ax2 = plt.subplot(2, 1, 2)
#df1['VolumePositive'] = df1['Open'] < df1['Adj Close']
#colors = df1.VolumePositive.map({True: 'g', False: 'r'})
#ax2.bar(df1.index, df1['Volume'], color=colors, alpha=0.4)
ax2.plot(df1['Slope'], label='Slope')
ax2.grid()
ax2.set_ylabel('Slope')
ax2.set_xlabel('Date')
```

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



1.1 Candlestick with Linear Regression Slope

[10]:
```
from matplotlib import dates as mdates
import datetime as dt
```

```
dfc = df1.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()
```

[10]:

	Date	Open	High	Low	Close	Adj Close	Volume	AVGS1_S1	AVGS2_S2	Average_SQ	AVG_AVG	Slope	VolumePositive
0	736907.0	199.130005	201.759995	197.309998	201.500000	198.478760	67935700	2.593095	-3.527169	6.724141	-9.146283	NaN	False
1	736908.0	200.580002	208.380005	200.350006	207.389999	204.280457	62404000	-3.208602	-5.921624	10.295127	19.000134	NaN	True
2	736909.0	207.029999	208.740005	205.479996	207.990005	204.871445	33447400	-3.799590	-6.468087	14.436884	24.576078	NaN	False
3	736912.0	208.000000	209.250000	207.070007	209.070007	205.935257	25425400	-4.863402	-7.521233	23.652679	36.578778	NaN	False
4	736913.0	209.320007	209.500000	206.759995	207.110001	204.004639	25587400	-2.932784	-8.176995	8.601222	23.981359	NaN	False

[11]:
```
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*df1.Volume.max())
ax1.set_title('Stock '+ symbol1 +' Closing Price')
ax1.set_ylabel('Price')

ax2 = plt.subplot(2, 1, 2)
#df1['VolumePositive'] = df1['Open'] < df1['Adj Close']
#colors = df1.VolumePositive.map({True: 'g', False: 'r'})
#ax2.bar(df1.index, df1['Volume'], color=colors, alpha=0.4)
ax2.plot(df1['Slope'], label='Slope')
ax2.grid()
ax2.set_ylabel('Slope')
ax2.set_xlabel('Date')
```

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