Logarithmic_Return_Indicator

September 29, 2021

1 Logarithmic Return Indicator

https://www.investopedia.com/terms/l/logarithmicscale.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 = '2018-01-01'
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
2018-01-02	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	

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

[3]:
```
n = 10
df['Logarithmic_Return'] = np.log(df['Adj Close']) - np.log(df['Adj Close'].
 ↪shift(1))
```

[4]:
```
df.head(20)
```

[4]:

Date	Open	High	Low	Close	Adj Close	Volume	Logarithmic_Return
2018-01-02	170.160004	172.300003	169.259995	172.259995	168.339050	25555900	NaN
2018-01-03	172.529999	174.550003	171.960007	172.229996	168.309738	29517900	-0.000174
2018-01-04	172.539993	173.470001	172.080002	173.029999	169.091522	22434600	0.004634
2018-01-05	173.440002	175.369995	173.050003	175.000000	171.016678	23660000	0.011321
2018-01-08	174.350006	175.610001	173.929993	174.350006	170.381485	20567800	-0.003721
2018-01-09	174.550003	175.059998	173.410004	174.330002	170.361954	21584000	-0.000115
2018-01-10	173.160004	174.300003	173.000000	174.289993	170.322845	23959900	-0.000230
2018-01-11	174.589996	175.490005	174.490005	175.279999	171.290329	18667700	0.005664
2018-01-12	176.179993	177.360001	175.649994	177.089996	173.059113	25418100	0.010273
2018-01-16	177.899994	179.389999	176.139999	176.190002	172.179611	29565900	-0.005095
2018-01-17	176.149994	179.250000	175.070007	179.100006	175.023361		
2018-01-18	179.369995	180.100006	178.250000	179.259995	175.179718		
2018-01-19	178.610001	179.580002	177.410004	178.460007	174.397949		
2018-01-22	177.300003	177.779999	176.600006	177.000000	172.971176		
2018-01-23	177.300003	179.440002	176.820007	177.039993	173.010254		
2018-01-24	177.250000	177.300003	173.199997	174.220001	170.254440		
2018-01-25	174.509995	174.949997	170.529999	171.110001	167.215210		
2018-01-26	172.000000	172.000000	170.059998	171.509995	167.606140		
2018-01-29	170.160004	170.160004	167.070007	167.960007	164.136932		
2018-01-30	165.529999	167.369995	164.699997	166.970001	163.169464		

```
2018-01-17  34386800            0.016381
2018-01-18  31193400            0.000893
2018-01-19  32425100           -0.004473
2018-01-22  27108600           -0.008215
2018-01-23  32689100            0.000226
2018-01-24  51105100           -0.016057
2018-01-25  41529000           -0.018012
2018-01-26  39143000            0.002335
2018-01-29  50640400           -0.020916
2018-01-30  46048200           -0.005912
```

[5]:
```
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['Logarithmic_Return'], label='Logarithmic Return', 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('Logarithmic Return')
ax2.set_xlabel('Date')
ax2.legend(loc='best')
```

[5]:
```
<matplotlib.legend.Legend at 0x1daf4f15400>
```

1.1 Candlestick with Triple Exponential Weighted Moving Average

[6]:
```
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()
```

[6]:

	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	Logarithmic_Return	VolumePositive

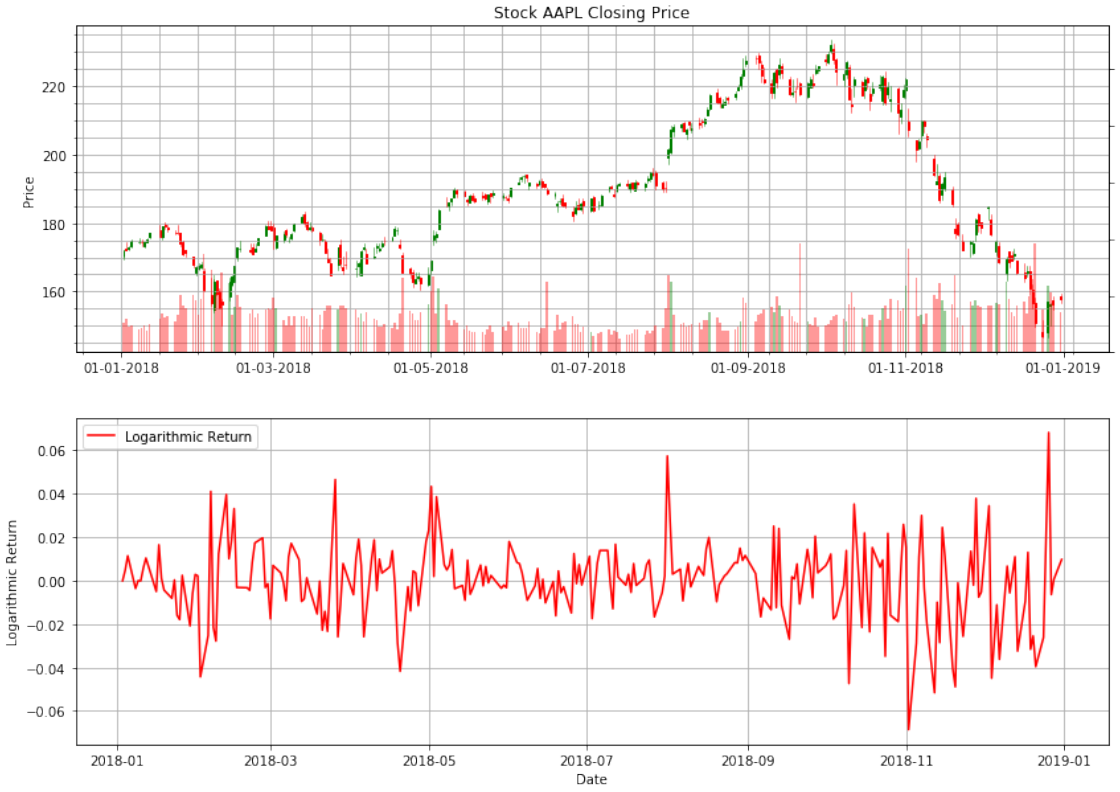
```
0  25555900                NaN          False
1  29517900          -0.000174          False
2  22434600           0.004634          False
3  23660000           0.011321          False
4  20567800          -0.003721          False
```

[7]:
```
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['Logarithmic_Return'], label='Logarithmic Return', 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('Logarithmic Return')
ax2.set_xlabel('Date')
ax2.legend(loc='best')
```

[7]:
```
<matplotlib.legend.Legend at 0x1daf6730da0>
```


Stock AAPL Closing Price
Price
220
200
180
160
01-01-2018
01-03-2018
01-05-2018
01-07-2018
01-09-2018
01-11-2018
01-01-2019
Logarithmic Return
Logarithmic Return
0.06
0.04
0.02
0.00
−0.02
−0.04
−0.06
2018-01
2018-03
2018-05
2018-07
2018-09
2018-11
2019-01
Date