WilliamR

September 29, 2021

1 William %R

https://stockcharts.com/school/doku.php?id=chart_school:technical_indicators:williams_r

```
[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 = '2017-01-01'
     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
     2017-01-03  115.800003  116.330002  114.760002  116.150002  112.140007
     2017-01-04  115.849998  116.510002  115.750000  116.019997  112.014503
     2017-01-05  115.919998  116.860001  115.809998  116.610001  112.584129
     2017-01-06  116.779999  118.160004  116.470001  117.910004  113.839249
     2017-01-09  117.949997  119.430000  117.940002  118.989998  114.881950

                    Volume
     Date
```

```
2017-01-03  28781900
2017-01-04  21118100
2017-01-05  22193600
2017-01-06  31751900
2017-01-09  33561900
```

[3]:
```
n = 14
df['Lowest Low'] = df['Low'].rolling(n).min()
df['Highest High'] = df['High'].rolling(n).max()
df['William%R'] = -100*(df['Highest High'] - df['Adj Close'])/(df['Highest␣
 ↪High'] - df['Lowest Low'])
df = df.drop(['Lowest Low','Highest High'],axis=1)
```

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

[4]:
```
                 Open        High         Low       Close   Adj Close  \
Date
2017-01-03  115.800003  116.330002  114.760002  116.150002  112.140007
2017-01-04  115.849998  116.510002  115.750000  116.019997  112.014503
2017-01-05  115.919998  116.860001  115.809998  116.610001  112.584129
2017-01-06  116.779999  118.160004  116.470001  117.910004  113.839249
2017-01-09  117.949997  119.430000  117.940002  118.989998  114.881950
2017-01-10  118.769997  119.379997  118.300003  119.110001  114.997818
2017-01-11  118.739998  119.930000  118.599998  119.750000  115.615723
2017-01-12  118.900002  119.300003  118.209999  119.250000  115.132988
2017-01-13  119.110001  119.620003  118.809998  119.040001  114.930237
2017-01-17  118.339996  120.239998  118.220001  120.000000  115.857086
2017-01-18  120.000000  120.500000  119.709999  119.989998  115.847435
2017-01-19  119.400002  120.089996  119.370003  119.779999  115.644691
2017-01-20  120.449997  120.449997  119.730003  120.000000  115.857086
2017-01-23  120.000000  120.809998  119.769997  120.080002  115.934326
2017-01-24  119.550003  120.099998  119.500000  119.970001  115.828125
2017-01-25  120.419998  122.099998  120.279999  121.879997  117.672188
2017-01-26  121.669998  122.440002  121.599998  121.940002  117.730118
2017-01-27  122.139999  122.349998  121.599998  121.949997  117.739769
2017-01-30  120.930000  121.629997  120.660004  121.629997  117.430817
2017-01-31  121.150002  121.389999  120.620003  121.349998  117.160492

              Volume   William%R
Date
2017-01-03  28781900         NaN
2017-01-04  21118100         NaN
2017-01-05  22193600         NaN
2017-01-06  31751900         NaN
2017-01-09  33561900         NaN
2017-01-10  24462100         NaN
2017-01-11  27588600         NaN
```
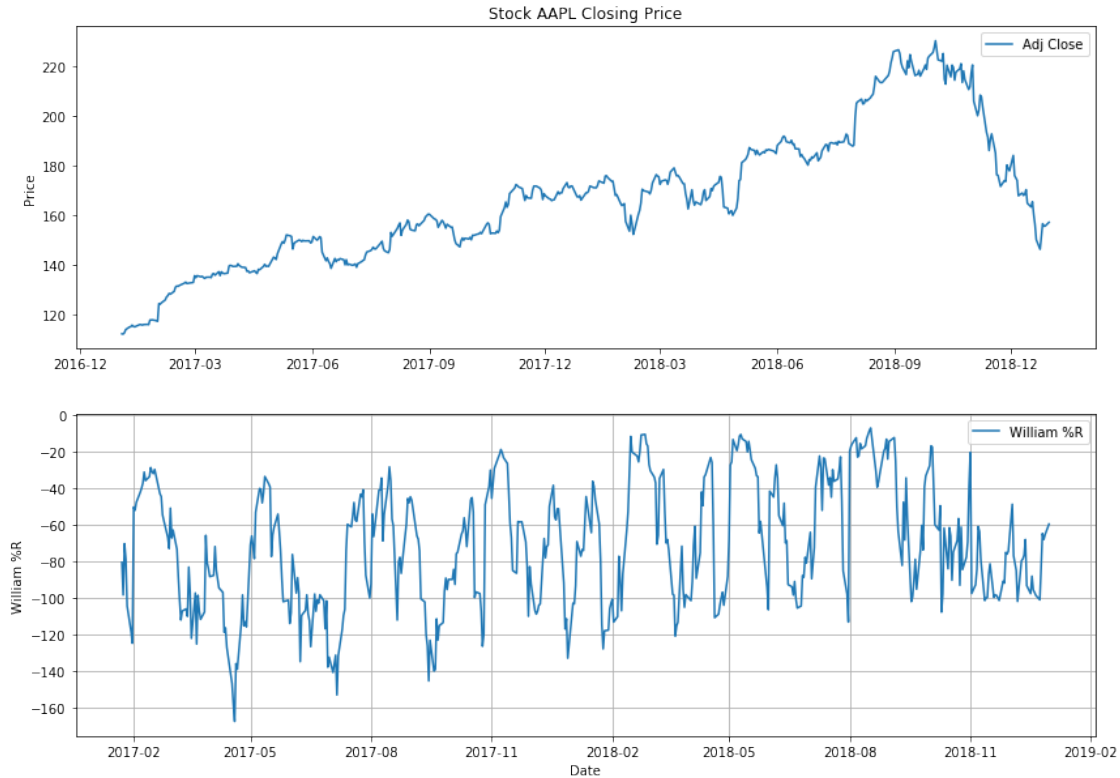
```
2017-01-12  27086200          NaN
2017-01-13  26111900          NaN
2017-01-17  34439800          NaN
2017-01-18  23713000          NaN
2017-01-19  25597300          NaN
2017-01-20  32597900          NaN
2017-01-23  22050200   -80.589673
2017-01-24  23211000   -98.456027
2017-01-25  32377600   -70.394436
2017-01-26  26337600   -78.892516
2017-01-27  20562900  -104.449622
2017-01-30  30377500  -118.420365
2017-01-31  49201000  -124.811023
```

[5]:
```python
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')
ax1.legend(loc='best')

ax2 = plt.subplot(2, 1, 2)
ax2.plot(df['William%R'], label='William %R')
#ax2.axhline(y=20, color='red')
#ax2.axhline(y=50, color='black', linestyle='--')
#ax2.axhline(y=80, color='red')
ax2.grid()
ax2.legend(loc='best')
ax2.set_ylabel('William %R')
ax2.set_xlabel('Date')
```

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

1.1 Candlestick with William %R

```
[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'] = mdates.date2num(dfc['Date'].astype(dt.date))
     dfc.head()
```

```
[6]:         Date        Open        High         Low       Close    Adj Close  \
     0   736332.0  115.800003  116.330002  114.760002  116.150002  112.140007
     1   736333.0  115.849998  116.510002  115.750000  116.019997  112.014503
     2   736334.0  115.919998  116.860001  115.809998  116.610001  112.584129
     3   736335.0  116.779999  118.160004  116.470001  117.910004  113.839249
     4   736338.0  117.949997  119.430000  117.940002  118.989998  114.881950

           Volume  William%R  VolumePositive
     0   28781900        NaN           False
     1   21118100        NaN           False
```

4

```
2  22193600        NaN             False
3  31751900        NaN             False
4  33561900        NaN             False
```

```python
[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['William%R'], label='William %R')
     #ax2.axhline(y=20, color='red')
     #ax2.axhline(y=50, color='black', linestyle='--')
     #ax2.axhline(y=80, color='red')
     ax2.grid()
     ax2.legend(loc='best')
     ax2.set_ylabel('William %R')
     ax2.set_xlabel('Date')
```

```
[7]: Text(0.5,0,'Date')
```

Stock AAPL Closing Price