

PMO

September 29, 2021

1 Decision Point Price Momentum Oscillator (PMO)

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

```
[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]: df.tail()
```

```
[3]:
```

	Open	High	Low	Close	Adj Close \
Date					
2018-12-24	148.149994	151.550003	146.589996	146.830002	146.202972
2018-12-26	148.300003	157.229996	146.720001	157.169998	156.498810
2018-12-27	155.839996	156.770004	150.070007	156.149994	155.483154
2018-12-28	157.500000	158.520004	154.550003	156.229996	155.562820
2018-12-31	158.529999	159.360001	156.479996	157.740005	157.066376

```

Volume
Date
2018-12-24  37169200
2018-12-26  58582500
2018-12-27  53117100
2018-12-28  42291400
2018-12-31  35003500

```

```
[4]: df['ROC'] = ((df['Adj Close'] - df['Adj Close'].shift(1))/df['Adj Close']
    ↪.shift(1)) * 100
df = df.dropna()
df.head()
```

```
[4]:
```

	Open	High	Low	Close	Adj Close \
Date					
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

```

Volume      ROC
Date
2017-01-04  21118100 -0.111917
2017-01-05  22193600  0.508529
2017-01-06  31751900  1.114829
2017-01-09  33561900  0.915942
2017-01-10  24462100  0.100858

```

```
[5]: df['35_Custom_EMA_ROC'] = df['ROC']
    ↪.ewm(ignore_na=False,span=35,min_periods=0,adjust=True).mean()
```

```
df.head()
```

```
[5]:
```

	Open	High	Low	Close	Adj Close	\
Date						
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	

	Volume	ROC	35_Custom_EMA_ROC
Date			
2017-01-04	21118100	-0.111917	-0.111917
2017-01-05	22193600	0.508529	0.207169
2017-01-06	31751900	1.114829	0.527171
2017-01-09	33561900	0.915942	0.632848
2017-01-10	24462100	0.100858	0.513954

```
[6]: df['35_Custom_EMA_ROC_10'] = df['35_Custom_EMA_ROC']*10
df.head()
```

```
[6]:
```

	Open	High	Low	Close	Adj Close	\
Date						
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	

	Volume	ROC	35_Custom_EMA_ROC	35_Custom_EMA_ROC_10
Date				
2017-01-04	21118100	-0.111917	-0.111917	-1.119172
2017-01-05	22193600	0.508529	0.207169	2.071693
2017-01-06	31751900	1.114829	0.527171	5.271710
2017-01-09	33561900	0.915942	0.632848	6.328485
2017-01-10	24462100	0.100858	0.513954	5.139537

```
[7]: df = df.dropna()
df.head(20)
```

```
[7]:
```

	Open	High	Low	Close	Adj Close	\
Date						
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
2017-02-01	127.029999	130.490005	127.010002	128.750000	124.305000

	Volume	ROC	35_Custom_EMA_ROC	35_Custom_EMA_ROC_10
Date				
2017-01-04	21118100	-0.111917	-0.111917	-1.119172
2017-01-05	22193600	0.508529	0.207169	2.071693
2017-01-06	31751900	1.114829	0.527171	5.271710
2017-01-09	33561900	0.915942	0.632848	6.328485
2017-01-10	24462100	0.100858	0.513954	5.139537
2017-01-11	27588600	0.537319	0.518425	5.184247
2017-01-12	27086200	-0.417534	0.360738	3.607379
2017-01-13	26111900	-0.176102	0.279470	2.794700
2017-01-17	34439800	0.806445	0.352269	3.522685
2017-01-18	23713000	-0.008330	0.306254	3.062542
2017-01-19	25597300	-0.175009	0.248970	2.489696
2017-01-20	32597900	0.183662	0.241660	2.416600
2017-01-23	22050200	0.066668	0.223119	2.231192
2017-01-24	23211000	-0.091604	0.191373	1.913733
2017-01-25	32377600	1.592068	0.326535	3.265355
2017-01-26	26337600	0.049230	0.300829	3.008289
2017-01-27	20562900	0.008198	0.274673	2.746732
2017-01-30	30377500	-0.262402	0.228239	2.282395
2017-01-31	49201000	-0.230199	0.189792	1.897924
2017-02-01	111985000	6.098052	0.671648	6.716483

```
[8]: df['PMO_Line'] = df['35_Custom_EMA_ROC_10'].
      ↪ewm(ignore_na=False,span=20,min_periods=0,adjust=True).mean()
df.head()
```

```
[8]:
```

	Open	High	Low	Close	Adj Close \
Date					
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

	Volume	ROC	35_Custom_EMA_ROC	35_Custom_EMA_ROC_10	\
Date					
2017-01-04	21118100	-0.111917	-0.111917	-1.119172	
2017-01-05	22193600	0.508529	0.207169	2.071693	
2017-01-06	31751900	1.114829	0.527171	5.271710	
2017-01-09	33561900	0.915942	0.632848	6.328485	
2017-01-10	24462100	0.100858	0.513954	5.139537	

	PMO_Line
Date	
2017-01-04	-1.119172
2017-01-05	0.556032
2017-01-06	2.287601
2017-01-09	3.454141
2017-01-10	3.861824

```
[9]: df['PMO_Signal_Line'] = df['PMO_Line'].
      ewm(ignore_na=False,span=10,min_periods=0,adjust=True).mean()
```

```
[10]: df = df.dropna()
      df.head()
```

```
[10]:
```

	Open	High	Low	Close	Adj Close	\
Date						
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	

	Volume	ROC	35_Custom_EMA_ROC	35_Custom_EMA_ROC_10	\
Date					
2017-01-04	21118100	-0.111917	-0.111917	-1.119172	
2017-01-05	22193600	0.508529	0.207169	2.071693	
2017-01-06	31751900	1.114829	0.527171	5.271710	
2017-01-09	33561900	0.915942	0.632848	6.328485	
2017-01-10	24462100	0.100858	0.513954	5.139537	

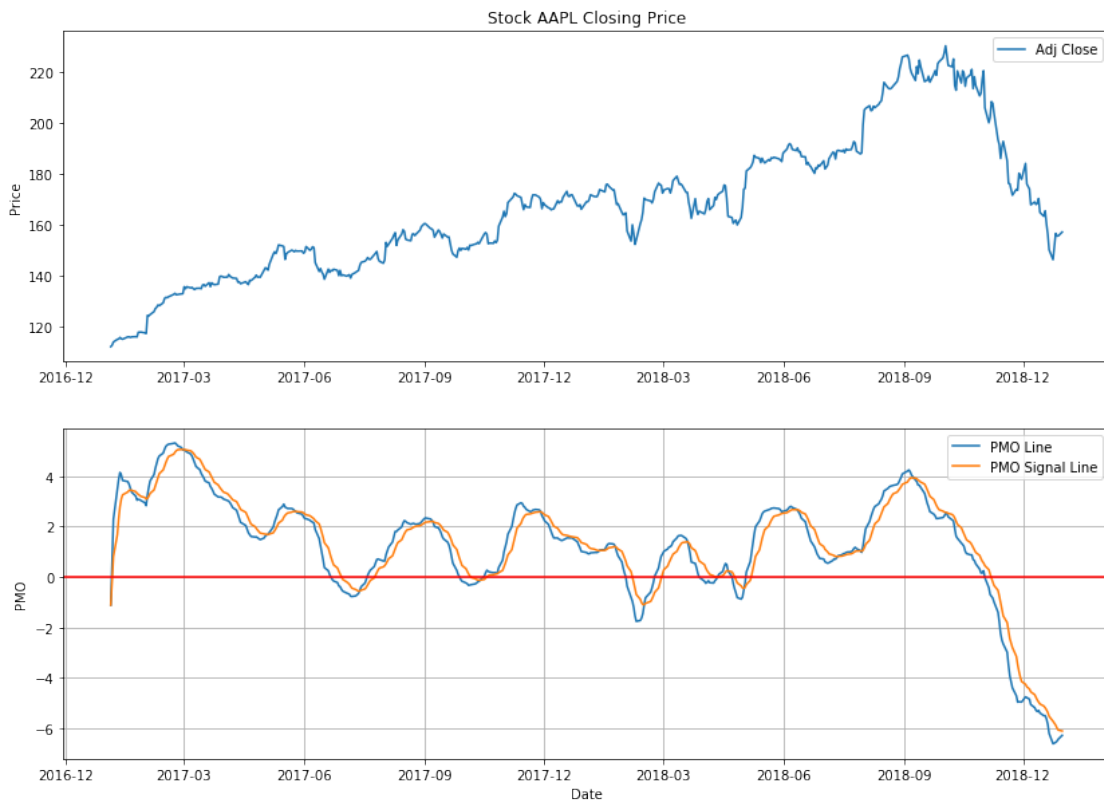
	PMO_Line	PMO_Signal_Line
Date		
2017-01-04	-1.119172	-1.119172
2017-01-05	0.556032	-0.197810
2017-01-06	2.287601	0.801309

2017-01-09	3.454141	1.675299
2017-01-10	3.861824	2.302991

```
[11]: 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['PMO_Line'], label='PMO Line')
ax2.plot(df['PMO_Signal_Line'], label='PMO Signal Line')
ax2.axhline(y=0, color='red')
ax2.grid()
ax2.legend(loc='best')
ax2.set_ylabel('PMO')
ax2.set_xlabel('Date')
```

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



1.1 Candlestick with PMO

```
[12]: 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()
```

```
[12]:
```

	Date	Open	High	Low	Close	Adj Close \
0	736333.0	115.849998	116.510002	115.750000	116.019997	112.014503
1	736334.0	115.919998	116.860001	115.809998	116.610001	112.584129
2	736335.0	116.779999	118.160004	116.470001	117.910004	113.839249
3	736338.0	117.949997	119.430000	117.940002	118.989998	114.881950
4	736339.0	118.769997	119.379997	118.300003	119.110001	114.997818

	Volume	ROC	35_Custom_EMA_ROC	35_Custom_EMA_ROC_10	PMO_Line \
0	21118100	-0.111917	-0.111917	-1.119172	-1.119172
1	22193600	0.508529	0.207169	2.071693	0.556032
2	31751900	1.114829	0.527171	5.271710	2.287601
3	33561900	0.915942	0.632848	6.328485	3.454141
4	24462100	0.100858	0.513954	5.139537	3.861824

	PMO_Signal_Line	VolumePositive
0	-1.119172	False
1	-0.197810	False
2	0.801309	False
3	1.675299	False
4	2.302991	False

```
[13]: 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['PMO_Line'], label='PMO_Line')
ax2.plot(df['PMO_Signal_Line'], label='PMO_Signal_Line')
ax2.axhline(y=0, color='red')
ax2.grid()
ax2.set_ylabel('PMO')
ax2.set_xlabel('Date')
ax2.legend(loc='best')

```

[13]: <matplotlib.legend.Legend at 0x204fa9711d0>

