

# ROC100

September 29, 2021

## 1 Rate of Change (ROC100)

<https://www.tradingtechnologies.com/xtrader-help/x-study/technical-indicator-definitions/rate-of-change-roc100/>

```
[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 yfinance as yf
yf.pdr_override()
```

```
[2]: # input
symbol = 'AAPL'
start = '2016-01-01'
end = '2019-01-01'

# Read data
df = yf.download(symbol, start, end)

# View Columns
df.head()
```

[\*\*\*\*\*100%\*\*\*\*\*] 1 of 1 completed

```
[2]:
```

	Adj Close	Close	High	Low	Open \
Date					
2016-01-04	98.446655	105.349998	105.370003	102.000000	102.610001
2016-01-05	95.979675	102.709999	105.849998	102.410004	105.750000
2016-01-06	94.101387	100.699997	102.370003	99.870003	100.559998
2016-01-07	90.129868	96.449997	100.129997	96.430000	98.680000
2016-01-08	90.606438	96.959999	99.110001	96.760002	98.550003
Volume					

```
Date
2016-01-04  67649400
2016-01-05  55791000
2016-01-06  68457400
2016-01-07  81094400
2016-01-08  70798000
```

```
[3]: n = 12
      df['ROC100'] = (df['Adj Close']/df['Adj Close'].shift(n)) * 100
```

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

```
[4]:
```

	Adj Close	Close	High	Low	Open \
Date					
2016-01-04	98.446655	105.349998	105.370003	102.000000	102.610001
2016-01-05	95.979675	102.709999	105.849998	102.410004	105.750000
2016-01-06	94.101387	100.699997	102.370003	99.870003	100.559998
2016-01-07	90.129868	96.449997	100.129997	96.430000	98.680000
2016-01-08	90.606438	96.959999	99.110001	96.760002	98.550003
2016-01-11	92.073563	98.529999	99.059998	97.339996	98.970001
2016-01-12	93.409874	99.959999	100.690002	98.839996	100.550003
2016-01-13	91.008270	97.389999	101.190002	97.300003	100.320000
2016-01-14	92.998695	99.519997	100.480003	95.739998	97.959999
2016-01-15	90.765305	97.129997	97.709999	95.360001	96.199997
2016-01-19	90.326103	96.660004	98.650002	95.500000	98.410004
2016-01-20	90.447578	96.790001	98.190002	93.419998	95.099998
2016-01-21	89.989700	96.300003	97.879997	94.940002	97.059998
2016-01-22	94.774200	101.419998	101.459999	98.370003	98.629997
2016-01-25	92.923958	99.440002	101.529999	99.209999	101.519997
2016-01-26	93.437889	99.989998	100.879997	98.070000	99.930000
2016-01-27	87.298416	93.419998	96.629997	93.339996	96.040001
2016-01-28	87.924500	94.089996	94.519997	92.389999	93.790001
2016-01-29	90.961533	97.339996	97.339996	94.349998	94.790001
2016-02-01	90.111168	96.430000	96.709999	95.400002	96.470001

	Volume	ROC100
Date		
2016-01-04	67649400	NaN
2016-01-05	55791000	NaN
2016-01-06	68457400	NaN
2016-01-07	81094400	NaN
2016-01-08	70798000	NaN
2016-01-11	49739400	NaN
2016-01-12	49154200	NaN
2016-01-13	62439600	NaN
2016-01-14	63170100	NaN
2016-01-15	79833900	NaN

2016-01-19	53087700	NaN
2016-01-20	72334400	NaN
2016-01-21	52161500	91.409607
2016-01-22	65800500	98.744031
2016-01-25	51794500	98.748765
2016-01-26	75077000	103.670283
2016-01-27	133369700	96.349022
2016-01-28	55678800	95.493752
2016-01-29	64416500	97.378927
2016-02-01	40943500	99.014263

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

```
[5]:
```

	Adj Close	Close	High	Low	Open \
Date					
2018-12-24	144.656540	146.830002	151.550003	146.589996	148.149994
2018-12-26	154.843475	157.169998	157.229996	146.720001	148.300003
2018-12-27	153.838562	156.149994	156.770004	150.070007	155.839996
2018-12-28	153.917389	156.229996	158.520004	154.550003	157.500000
2018-12-31	155.405045	157.740005	159.360001	156.479996	158.529999

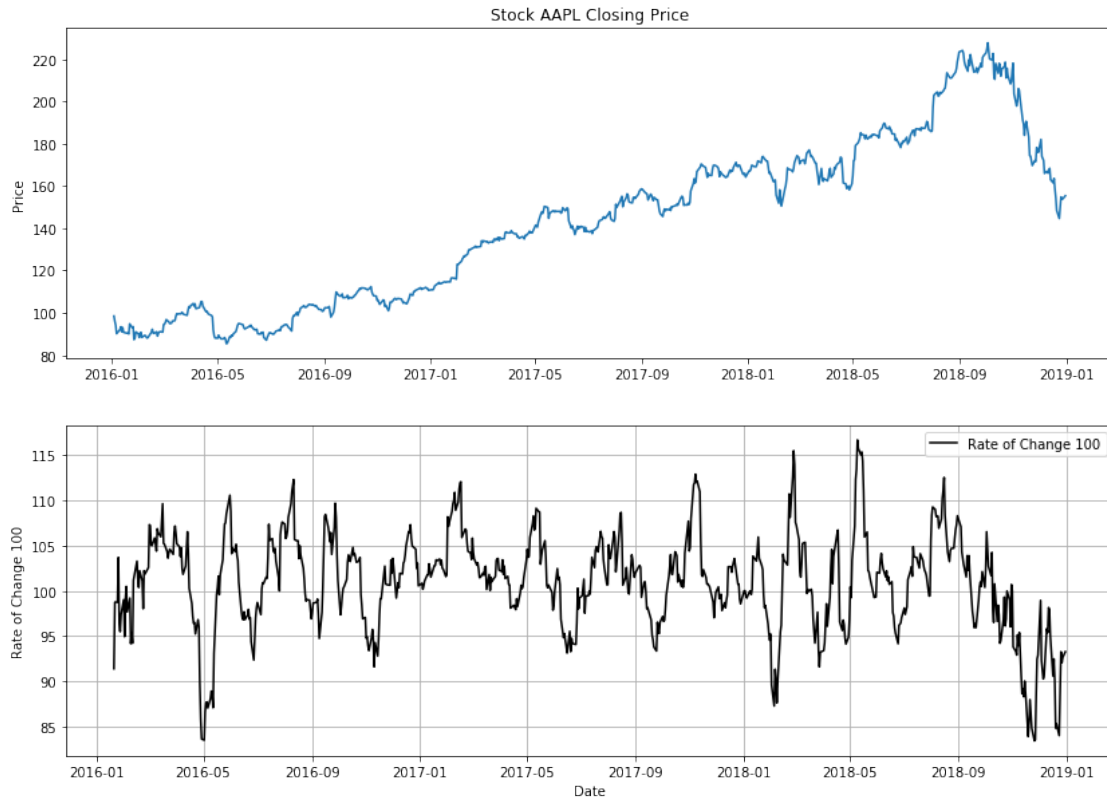
  

	Volume	ROC100
Date		
2018-12-24	37169200	84.037324
2018-12-26	58582500	93.281491
2018-12-27	53117100	92.069569
2018-12-28	42291400	92.646615
2018-12-31	35003500	93.282087

```
[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['ROC100'], label='Rate of Change 100', color='black')
#ax2.axhline(y=0, color='blue', linestyle='--')
#ax2.axhline(y=10, color='red')
#ax2.axhline(y=-10, color='green')
ax2.grid()
ax2.set_ylabel('Rate of Change 100')
ax2.set_xlabel('Date')
ax2.legend(loc='best')
```

```
[6]: <matplotlib.legend.Legend at 0x1f88ae9d630>
```



## 1.1 Candlestick with (ROC100)

```
[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  Adj Close  Close  High  Low  Open  \
0  735967.0  98.446655  105.349998  105.370003  102.000000  102.610001
1  735968.0  95.979675  102.709999  105.849998  102.410004  105.750000
2  735969.0  94.101387  100.699997  102.370003  99.870003  100.559998
3  735970.0  90.129868  96.449997  100.129997  96.430000  98.680000
4  735971.0  90.606438  96.959999  99.110001  96.760002  98.550003

      Volume  ROC100  VolumePositive
```

0	67649400	NaN	False
1	55791000	NaN	False
2	68457400	NaN	False
3	81094400	NaN	False
4	70798000	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['ROC100'], label='Rate of Change100', color='black')
#ax2.axhline(y=0, color='blue', linestyle='--')
#ax2.axhline(y=10, color='red')
#ax2.axhline(y=-10, color='green')
ax2.grid()
ax2.set_ylabel('Rate of Change 100')
ax2.set_xlabel('Date')
ax2.legend(loc='best')
```

```
[8]: <matplotlib.legend.Legend at 0x1f88cdebe80>
```

