

# DEMA

September 29, 2021

## 1 Double Exponential Moving Average (DEMA)

<https://www.investopedia.com/terms/d/double-exponential-moving-average.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 = '2018-08-01'
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						
2018-08-01	199.130005	201.759995	197.309998	201.500000	199.243088	
2018-08-02	200.580002	208.380005	200.350006	207.389999	205.067123	
2018-08-03	207.029999	208.740005	205.479996	207.990005	205.660416	
2018-08-06	208.000000	209.250000	207.070007	209.070007	206.728317	
2018-08-07	209.320007	209.500000	206.759995	207.110001	204.790268	

	Volume
Date	

```

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

```

```
[3]: import talib as ta
```

```
[5]: df['EMA'] = ta.EMA(df['Adj Close'], timeperiod=5)
```

```
[7]: df['EMA_S'] = ta.EMA(df['EMA'], timeperiod=5)
```

```
[8]: df['DEMA'] = (2*df['EMA']) - df['EMA_S']
```

```
[9]: df.head(15)
```

```
[9]:
```

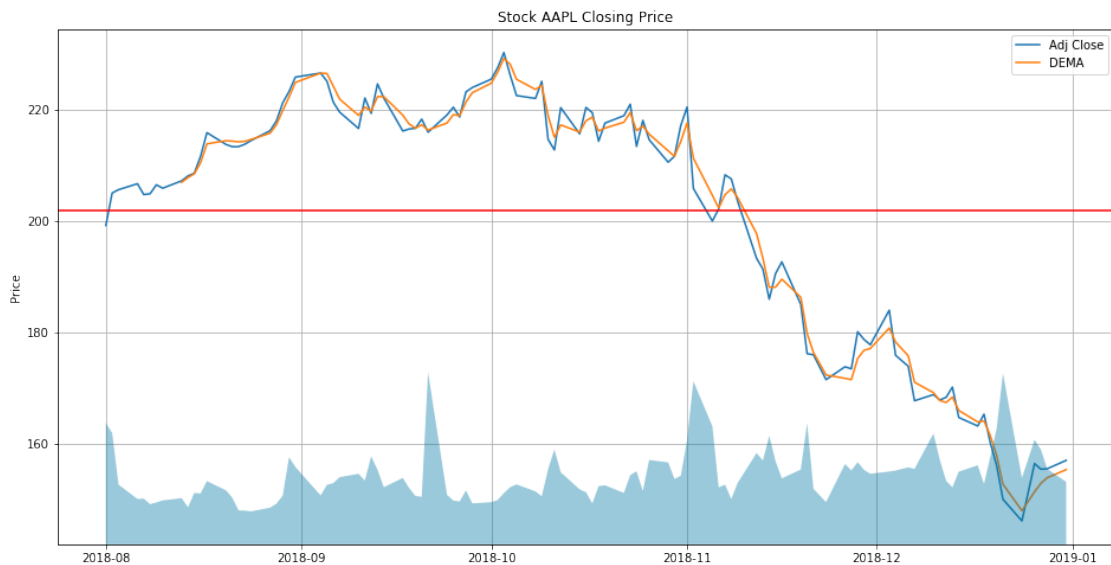
	Open	High	Low	Close	Adj Close \
Date					
2018-08-01	199.130005	201.759995	197.309998	201.500000	199.243088
2018-08-02	200.580002	208.380005	200.350006	207.389999	205.067123
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2018-08-06	208.000000	209.250000	207.070007	209.070007	206.728317
2018-08-07	209.320007	209.500000	206.759995	207.110001	204.790268
2018-08-08	206.050003	207.809998	204.520004	207.250000	204.928696
2018-08-09	207.279999	209.779999	207.199997	208.880005	206.540436
2018-08-10	207.360001	209.100006	206.669998	207.529999	205.925232
2018-08-13	207.699997	210.949997	207.699997	208.869995	207.254883
2018-08-14	210.160004	210.559998	208.259995	209.750000	208.128067
2018-08-15	209.220001	210.740005	208.330002	210.240005	208.614273
2018-08-16	211.750000	213.809998	211.470001	213.320007	211.670471
2018-08-17	213.440002	217.949997	213.160004	217.580002	215.897522
2018-08-20	218.100006	219.179993	215.110001	215.460007	213.793930
2018-08-21	216.800003	217.190002	214.029999	215.039993	213.377167

	Volume	EMA	EMA_S	DEMA
Date				
2018-08-01	67935700	NaN	NaN	NaN
2018-08-02	62404000	NaN	NaN	NaN
2018-08-03	33447400	NaN	NaN	NaN
2018-08-06	25425400	NaN	NaN	NaN
2018-08-07	25587400	204.297842	NaN	NaN
2018-08-08	22525500	204.508127	NaN	NaN
2018-08-09	23469200	205.185563	NaN	NaN
2018-08-10	24611200	205.432120	NaN	NaN
2018-08-13	25869100	206.039707	205.092672	206.986743
2018-08-14	20748000	206.735827	205.640390	207.831264
2018-08-15	28807600	207.361976	206.214252	208.509699

2018-08-16	28500400	208.798141	207.075548	210.520733
2018-08-17	35427000	211.164601	208.438566	213.890636
2018-08-20	30287700	212.041044	209.639392	214.442696
2018-08-21	26159800	212.486418	210.588401	214.384436

```
[11]: # Line Chart
fig = plt.figure(figsize=(16,8))
ax1 = plt.subplot(111)
ax1.plot(df.index, df['Adj Close'])
ax1.plot(df.index, df['DEMA'])
ax1.axhline(y=df['Adj Close'].mean(),color='r')
ax1.grid()
#ax1.grid(True, which='both')
#ax1.grid(which='minor', linestyle='-', linewidth='0.5', color='black')
#ax1.grid(which='major', linestyle='-', linewidth='0.5', color='red')
#ax1.minorticks_on()
ax1.legend(loc='best')
ax1v = ax1.twinx()
ax1v.fill_between(df.index[0:],0, df.Volume[0:], facecolor='#0079a3', 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')
```

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



## 1.1 Candlestick with DEMA

```
[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	736919.0	207.699997	210.949997	207.699997	208.869995	207.254883	
1	736920.0	210.160004	210.559998	208.259995	209.750000	208.128067	
2	736921.0	209.220001	210.740005	208.330002	210.240005	208.614273	
3	736922.0	211.750000	213.809998	211.470001	213.320007	211.670471	
4	736923.0	213.440002	217.949997	213.160004	217.580002	215.897522	

	Volume	EMA	EMA_S	DEMA	VolumePositive
0	25869100	206.039707	205.092672	206.986743	False
1	20748000	206.735827	205.640390	207.831264	False
2	28807600	207.361976	206.214252	208.509699	False
3	28500400	208.798141	207.075548	210.520733	False
4	35427000	211.164601	208.438566	213.890636	True

```
[13]: from mpl_finance import candlestick_ohlc

fig = plt.figure(figsize=(16,8))
ax1 = plt.subplot(111)
candlestick_ohlc(ax1,dfc.values, width=0.5, colorup='g', colordown='r', alpha=1.
    ↪0)
ax1.plot(df.index, df['DEMA'])
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')
```

```
[13]: Text(0,0.5,'Price')
```

