

Moving_Dispersion

September 29, 2021

1 Moving Dispersion

<https://www.fmlabs.com/reference/default.htm>

```
[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 = '2018-12-31'

# 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 | 198.478760 | |
| 2018-08-02 | 200.580002 | 208.380005 | 200.350006 | 207.389999 | 204.280457 | |
| 2018-08-03 | 207.029999 | 208.740005 | 205.479996 | 207.990005 | 204.871445 | |
| 2018-08-06 | 208.000000 | 209.250000 | 207.070007 | 209.070007 | 205.935257 | |
| 2018-08-07 | 209.320007 | 209.500000 | 206.759995 | 207.110001 | 204.004639 | |

| | Volume |
|------|--------|
| Date | |

```

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

```

```

[3]: from math import sqrt, log
      n = 14 # Number of days
      df['Disp'] = np.sqrt(((abs(np.log(df['Adj Close']/df['Adj Close'].shift()))).
      ↪rolling(n).sum())/n)

```

```

[4]: df.head(20)

```

```

[4]:
      Open      High      Low      Close  Adj Close  \
Date
2018-08-01 199.130005 201.759995 197.309998 201.500000 198.478760
2018-08-02 200.580002 208.380005 200.350006 207.389999 204.280457
2018-08-03 207.029999 208.740005 205.479996 207.990005 204.871445
2018-08-06 208.000000 209.250000 207.070007 209.070007 205.935257
2018-08-07 209.320007 209.500000 206.759995 207.110001 204.004639
2018-08-08 206.050003 207.809998 204.520004 207.250000 204.142532
2018-08-09 207.279999 209.779999 207.199997 208.880005 205.748108
2018-08-10 207.360001 209.100006 206.669998 207.529999 205.135254
2018-08-13 207.699997 210.949997 207.699997 208.869995 206.459793
2018-08-14 210.160004 210.559998 208.259995 209.750000 207.329651
2018-08-15 209.220001 210.740005 208.330002 210.240005 207.813995
2018-08-16 211.750000 213.809998 211.470001 213.320007 210.858459
2018-08-17 213.440002 217.949997 213.160004 217.580002 215.069290
2018-08-20 218.100006 219.179993 215.110001 215.460007 212.973755
2018-08-21 216.800003 217.190002 214.029999 215.039993 212.558609
2018-08-22 214.100006 216.360001 213.839996 215.050003 212.568481
2018-08-23 214.649994 217.050003 214.600006 215.490005 213.003418
2018-08-24 216.600006 216.899994 215.110001 216.160004 213.665680
2018-08-27 217.149994 218.740005 216.330002 217.940002 215.425140
2018-08-28 219.009995 220.539993 218.919998 219.699997 217.164825

```

```

      Volume      Disp
Date
2018-08-01 67935700    NaN
2018-08-02 62404000    NaN
2018-08-03 33447400    NaN
2018-08-06 25425400    NaN
2018-08-07 25587400    NaN
2018-08-08 22525500    NaN
2018-08-09 23469200    NaN
2018-08-10 24611200    NaN
2018-08-13 25869100    NaN

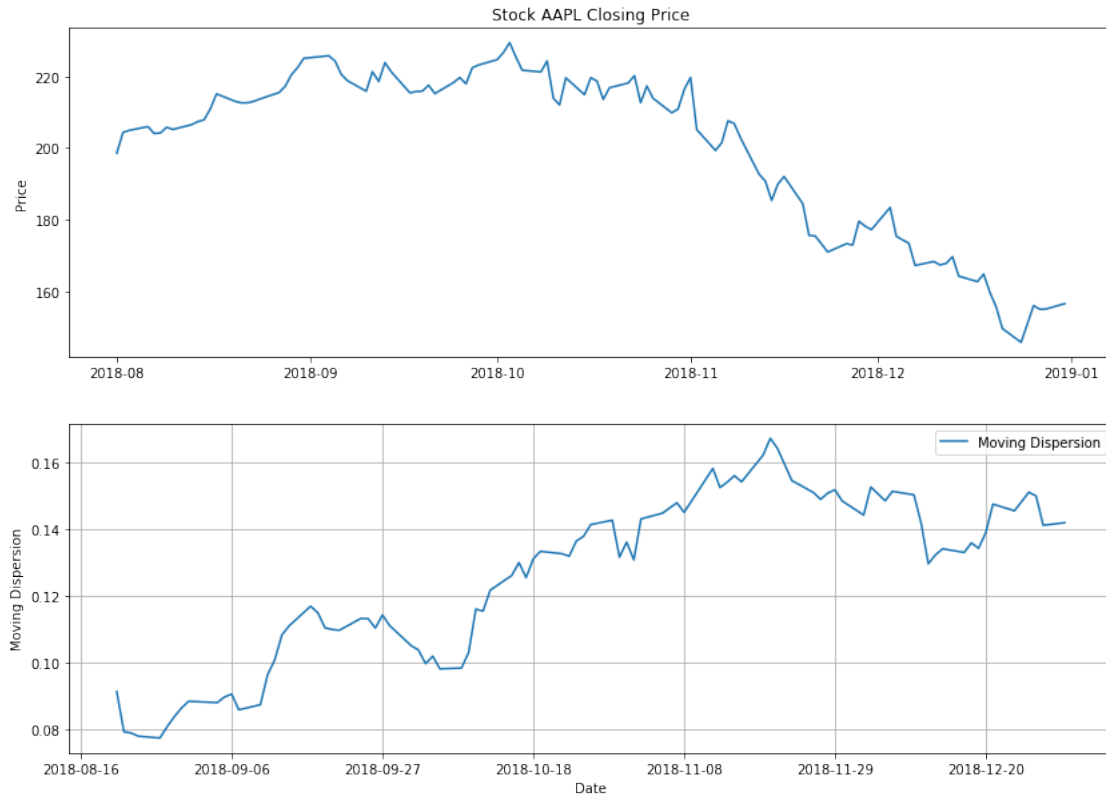
```

| | | |
|------------|----------|----------|
| 2018-08-14 | 20748000 | NaN |
| 2018-08-15 | 28807600 | NaN |
| 2018-08-16 | 28500400 | NaN |
| 2018-08-17 | 35427000 | NaN |
| 2018-08-20 | 30287700 | NaN |
| 2018-08-21 | 26159800 | 0.091349 |
| 2018-08-22 | 19018100 | 0.079309 |
| 2018-08-23 | 18883200 | 0.078928 |
| 2018-08-24 | 18476400 | 0.077984 |
| 2018-08-27 | 20525100 | 0.077424 |
| 2018-08-28 | 22776800 | 0.080751 |

```
[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['Disp'], label='Moving Dispersion')
ax2.grid()
ax2.legend(loc='best')
ax2.set_ylabel('Moving Dispersion')
ax2.set_xlabel('Date')
```

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



1.1 Candlestick with Moving Dispersion

```
[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 | 736907.0 | 199.130005 | 201.759995 | 197.309998 | 201.500000 | 198.478760 | |
| 1 | 736908.0 | 200.580002 | 208.380005 | 200.350006 | 207.389999 | 204.280457 | |
| 2 | 736909.0 | 207.029999 | 208.740005 | 205.479996 | 207.990005 | 204.871445 | |
| 3 | 736912.0 | 208.000000 | 209.250000 | 207.070007 | 209.070007 | 205.935257 | |
| 4 | 736913.0 | 209.320007 | 209.500000 | 206.759995 | 207.110001 | 204.004639 | |

| | Volume | Disp | VolumePositive |
|---|----------|------|----------------|
| 0 | 67935700 | NaN | False |

| | | | |
|---|----------|-----|-------|
| 1 | 62404000 | NaN | True |
| 2 | 33447400 | NaN | False |
| 3 | 25425400 | NaN | False |
| 4 | 25587400 | NaN | 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['Disp'], label='Moving Dispersion')
ax2.grid()
ax2.legend(loc='best')
ax2.set_ylabel('Moving Dispersion')
ax2.set_xlabel('Date')
```

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

