

# Force\_Index

September 29, 2021

## 1 Force Index

[https://stockcharts.com/school/doku.php?id=chart\\_school:technical\\_indicators:force\\_index](https://stockcharts.com/school/doku.php?id=chart_school:technical_indicators:force_index)

```
[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 = '2016-01-01'
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						
2016-01-04	102.610001	105.370003	102.000000	105.349998	99.499107	
2016-01-05	105.750000	105.849998	102.410004	102.709999	97.005730	
2016-01-06	100.559998	102.370003	99.870003	100.699997	95.107361	
2016-01-07	98.680000	100.129997	96.430000	96.449997	91.093399	
2016-01-08	98.550003	99.110001	96.760002	96.959999	91.575073	

	Volume
Date	

```

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

```

```

[3]: n = 13
df['FI_1'] = (df['Adj Close'] - df['Adj Close'].shift())*df['Volume']
df['FI_13'] = df['FI_1'].ewm(ignore_na=False,span=n,min_periods=n,adjust=True).
↳mean()

```

```

[4]: df.head(20)

```

```

[4]:
      Open      High      Low      Close  Adj Close  \
Date
2016-01-04  102.610001  105.370003  102.000000  105.349998  99.499107
2016-01-05  105.750000  105.849998  102.410004  102.709999  97.005730
2016-01-06  100.559998  102.370003  99.870003  100.699997  95.107361
2016-01-07  98.680000  100.129997  96.430000  96.449997  91.093399
2016-01-08  98.550003  99.110001  96.760002  96.959999  91.575073
2016-01-11  98.970001  99.059998  97.339996  98.529999  93.057869
2016-01-12  100.550003  100.690002  98.839996  99.959999  94.408447
2016-01-13  100.320000  101.190002  97.300003  97.389999  91.981194
2016-01-14  97.959999  100.480003  95.739998  99.519997  93.992889
2016-01-15  96.199997  97.709999  95.360001  97.129997  91.735634
2016-01-19  98.410004  98.650002  95.500000  96.660004  91.291718
2016-01-20  95.099998  98.190002  93.419998  96.790001  91.414520
2016-01-21  97.059998  97.879997  94.940002  96.300003  90.951736
2016-01-22  98.629997  101.459999  98.370003  101.419998  95.787369
2016-01-25  101.519997  101.529999  99.209999  99.440002  93.917336
2016-01-26  99.930000  100.879997  98.070000  99.989998  94.436790
2016-01-27  96.040001  96.629997  93.339996  93.419998  88.231659
2016-01-28  93.790001  94.519997  92.389999  94.089996  88.864449
2016-01-29  94.790001  97.339996  94.349998  97.339996  91.933960
2016-02-01  96.470001  96.709999  95.400002  96.430000  91.074501

      Volume      FI_1      FI_13
Date
2016-01-04  67649400      NaN      NaN
2016-01-05  55791000 -1.391080e+08      NaN
2016-01-06  68457400 -1.299574e+08      NaN
2016-01-07  81094400 -3.255098e+08      NaN
2016-01-08  70798000  3.410156e+07      NaN
2016-01-11  49739400  7.375338e+07      NaN
2016-01-12  49154200  6.638658e+07      NaN
2016-01-13  62439600 -1.515567e+08      NaN
2016-01-14  63170100  1.270790e+08      NaN

```

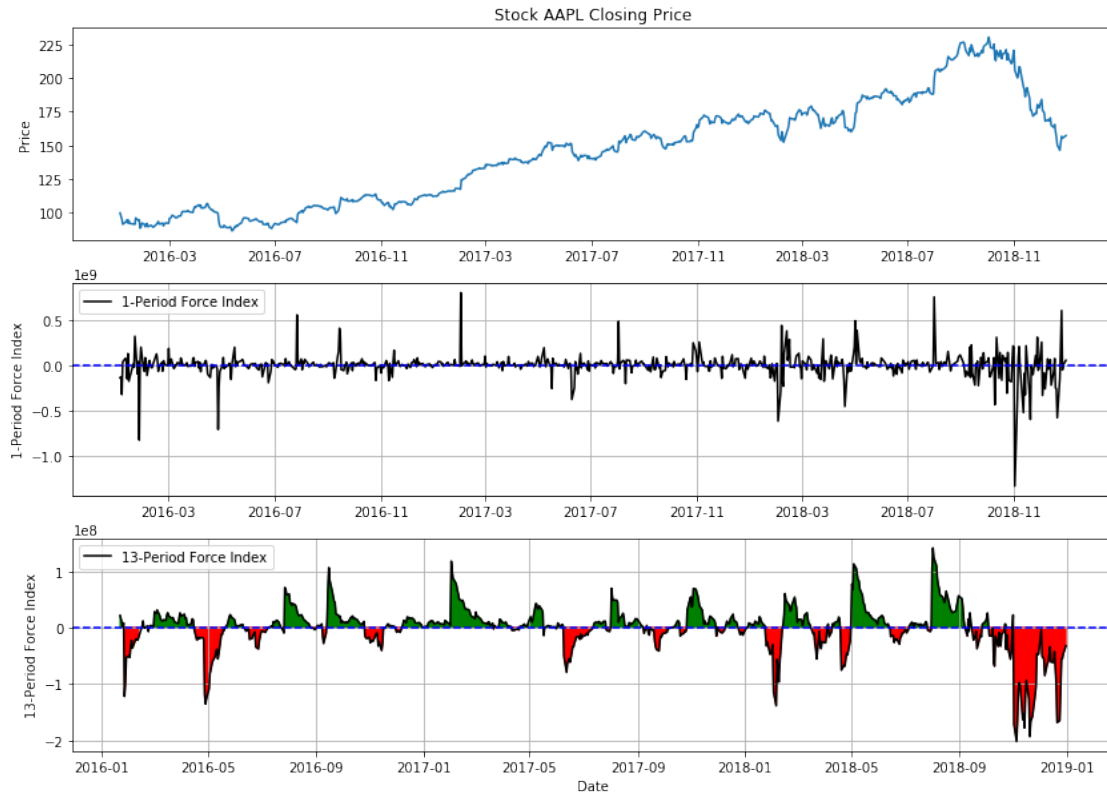
2016-01-15	79010000	-1.783457e+08	NaN
2016-01-19	53087700	-2.356648e+07	NaN
2016-01-20	72334400	8.882809e+06	NaN
2016-01-21	52161500	-2.413951e+07	NaN
2016-01-22	65800500	3.181871e+08	2.126319e+07
2016-01-25	51794500	-9.685742e+07	2.184385e+06
2016-01-26	75077000	3.899905e+07	8.021738e+06
2016-01-27	133369700	-8.275765e+08	-1.224227e+08
2016-01-28	55678800	3.523299e+07	-9.813313e+07
2016-01-29	64416500	1.977272e+08	-5.305603e+07
2016-02-01	40943500	-3.518926e+07	-5.035948e+07

```
[5]: fig = plt.figure(figsize=(14,10))
ax1 = plt.subplot(3, 1, 1)
ax1.plot(df['Adj Close'])
ax1.set_title('Stock ' + symbol + ' Closing Price')
ax1.set_ylabel('Price')

ax2 = plt.subplot(3, 1, 2)
ax2.plot(df['FI_1'], label='1-Period Force Index', color='black')
ax2.axhline(y=0, color='blue', linestyle='--')
ax2.grid()
ax2.set_ylabel('1-Period Force Index')
ax2.legend(loc='best')

ax3 = plt.subplot(3, 1, 3)
ax3.plot(df['FI_13'], label='13-Period Force Index', color='black')
ax3.axhline(y=0, color='blue', linestyle='--')
ax3.fill_between(df.index, df['FI_13'], where=df['FI_13']>0, color='green')
ax3.fill_between(df.index, df['FI_13'], where=df['FI_13']<0, color='red')
ax3.grid()
ax3.set_ylabel('13-Period Force Index')
ax3.set_xlabel('Date')
ax3.legend(loc='best')
```

```
[5]: <matplotlib.legend.Legend at 0x18b310c7128>
```



## 1.1 Candlestick with Force Index

```
[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	735967.0	102.610001	105.370003	102.000000	105.349998	99.499107	
1	735968.0	105.750000	105.849998	102.410004	102.709999	97.005730	
2	735969.0	100.559998	102.370003	99.870003	100.699997	95.107361	
3	735970.0	98.680000	100.129997	96.430000	96.449997	91.093399	
4	735971.0	98.550003	99.110001	96.760002	96.959999	91.575073	

	Volume	FI_1	FI_13	VolumePositive
0	67649400	NaN	NaN	False

1	55791000	-1.391080e+08	NaN	False
2	68457400	-1.299574e+08	NaN	False
3	81094400	-3.255098e+08	NaN	False
4	70798000	3.410156e+07	NaN	False

```
[7]: from mpl_finance import candlestick_ohlc

fig = plt.figure(figsize=(14,10))
ax1 = plt.subplot(3, 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(3, 1, 2)
ax2.plot(df['FI_1'], label='1-Period Force Index', color='black')
ax2.axhline(y=0, color='blue', linestyle='--')
ax2.grid()
ax2.set_ylabel('1-Period Force Index')
ax2.legend(loc='best')

ax3 = plt.subplot(3, 1, 3)
ax3.plot(df['FI_13'], label='13-Period Force Index', color='black')
ax3.axhline(y=0, color='blue', linestyle='--')
ax3.fill_between(df.index, df['FI_13'], where=df['FI_13']>0, color='green')
ax3.fill_between(df.index, df['FI_13'], where=df['FI_13']<0, color='red')
ax3.grid()
ax3.set_ylabel('13-Period Force Index')
ax3.set_xlabel('Date')
ax3.legend(loc='best')
```

```
[7]: <matplotlib.legend.Legend at 0x18b3320ba58>
```

