NVI2

September 29, 2021

1 Negative Volume Index (NVI)

https://www.investopedia.com/terms/n/nvi.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  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]:
```python
returns = df['Adj Close'].pct_change()
vol_decrease = (df['Volume'].shift(1) > df['Volume'])

nvi = pd.Series(data=np.nan, index=df['Adj Close'].index, dtype='float64')

nvi.iloc[0] = 1000
for i in range(1,len(nvi)):
    if vol_decrease.iloc[i]:
        nvi.iloc[i] = nvi.iloc[i - 1] * (1.0 + returns.iloc[i])
    else:
        nvi.iloc[i] = nvi.iloc[i - 1]

nvi = nvi.replace([np.inf, -np.inf], np.nan).fillna(1000)

df['NVI'] = pd.Series(nvi)
```

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

[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

              Volume          NVI
Date
2018-08-01  67935700  1000.000000
2018-08-02  62404000  1029.230820
2018-08-03  33447400  1032.208409
2018-08-06  25425400  1037.568237
2018-08-07  25587400  1037.568237
```

[5]:
```python
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')
```
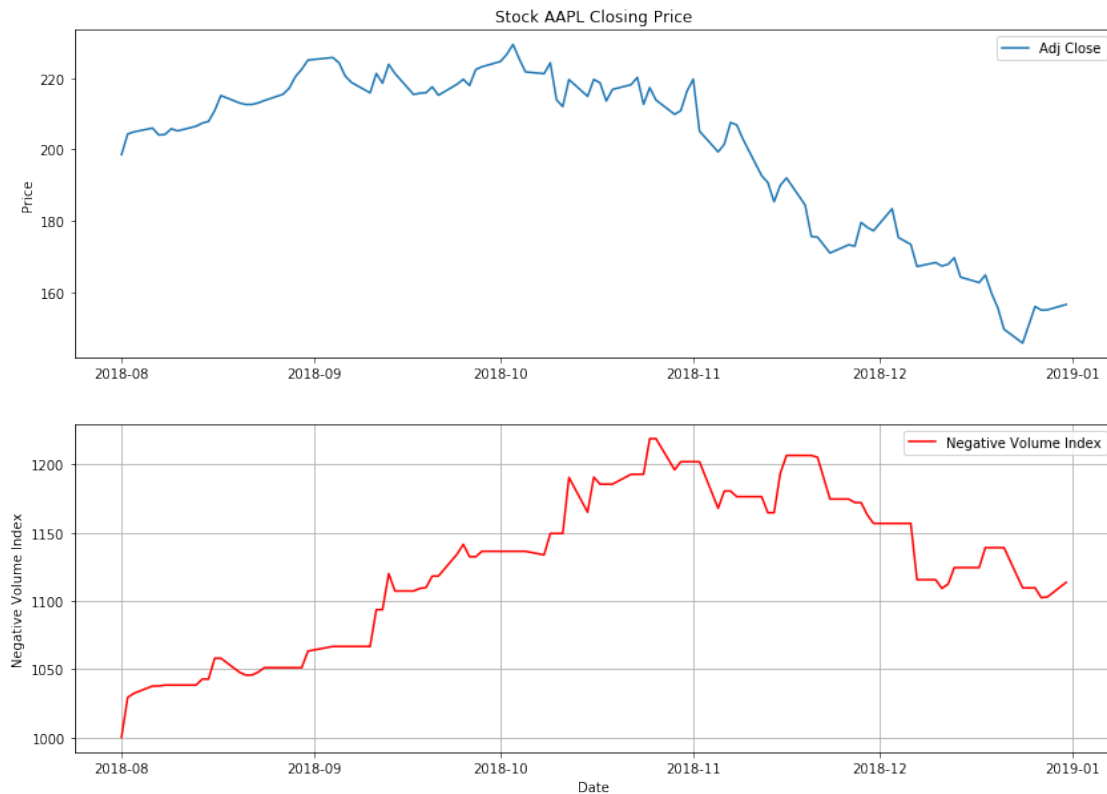
```
ax2 = plt.subplot(2, 1, 2)
ax2.plot(df['NVI'], label='Negative Volume Index', color='red')
ax2.grid()
ax2.legend(loc='best')
ax2.set_ylabel('Negative Volume Index')
ax2.set_xlabel('Date')
```

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

1.1 Candlestick with Negative Volume 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   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          NVI  VolumePositive
    0   67935700  1000.000000           False
    1   62404000  1029.230820            True
    2   33447400  1032.208409           False
    3   25425400  1037.568237           False
    4   25587400  1037.568237           False
```

```python
[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['NVI'], label='Negative Volume Index', color='red')
     ax2.grid()
     ax2.legend(loc='best')
     ax2.set_ylabel('Negative Volume Index')
     ax2.set_xlabel('Date')
```

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

Stock AAPL Closing Price