Hull_Moving_Average

September 29, 2021

1 Hull Moving Average

https://www.incrediblecharts.com/indicators/hull-moving-average.php

https://www.fidelity.com/learning-center/trading-investing/technical-analysis/technical-indicator-guide/hull-moving-average

```
[1]: import numpy as np
     import pandas as pd
     import matplotlib.pyplot as plt
     import math

     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 = '2018-01-01'
     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
     2018-01-02  170.160004  172.300003  169.259995  172.259995  168.339050
     2018-01-03  172.529999  174.550003  171.960007  172.229996  168.309738
     2018-01-04  172.539993  173.470001  172.080002  173.029999  169.091522
     2018-01-05  173.440002  175.369995  173.050003  175.000000  171.016678
```

```
2018-01-08   174.350006   175.610001   173.929993   174.350006   170.381485

              Volume
Date
2018-01-02   25555900
2018-01-03   29517900
2018-01-04   22434600
2018-01-05   23660000
2018-01-08   20567800
```

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

[4]:
```python
n = 30
df['WMA_1'] = ta.WMA(df['Adj Close'], timeperiod=n/2) * 2
df['WMA_2'] = df['WMA_1'] - ta.WMA(df['Adj Close'], timeperiod=n)
df['HMA'] = ta.WMA(df['WMA_2'], timeperiod=math.sqrt(n))
df = df.drop(['WMA_1', 'WMA_2'], axis=1)
```

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

[5]:
```
                 Open         High          Low        Close    Adj Close  \
Date
2018-12-24   148.149994   151.550003   146.589996   146.830002   145.642090
2018-12-26   148.300003   157.229996   146.720001   157.169998   155.898438
2018-12-27   155.839996   156.770004   150.070007   156.149994   154.886688
2018-12-28   157.500000   158.520004   154.550003   156.229996   154.966034
2018-12-31   158.529999   159.360001   156.479996   157.740005   156.463837

               Volume          HMA
Date
2018-12-24   37169200   157.223447
2018-12-26   58582500   154.946850
2018-12-27   53117100   153.115045
2018-12-28   42291400   151.774790
2018-12-31   35003500   150.991700
```
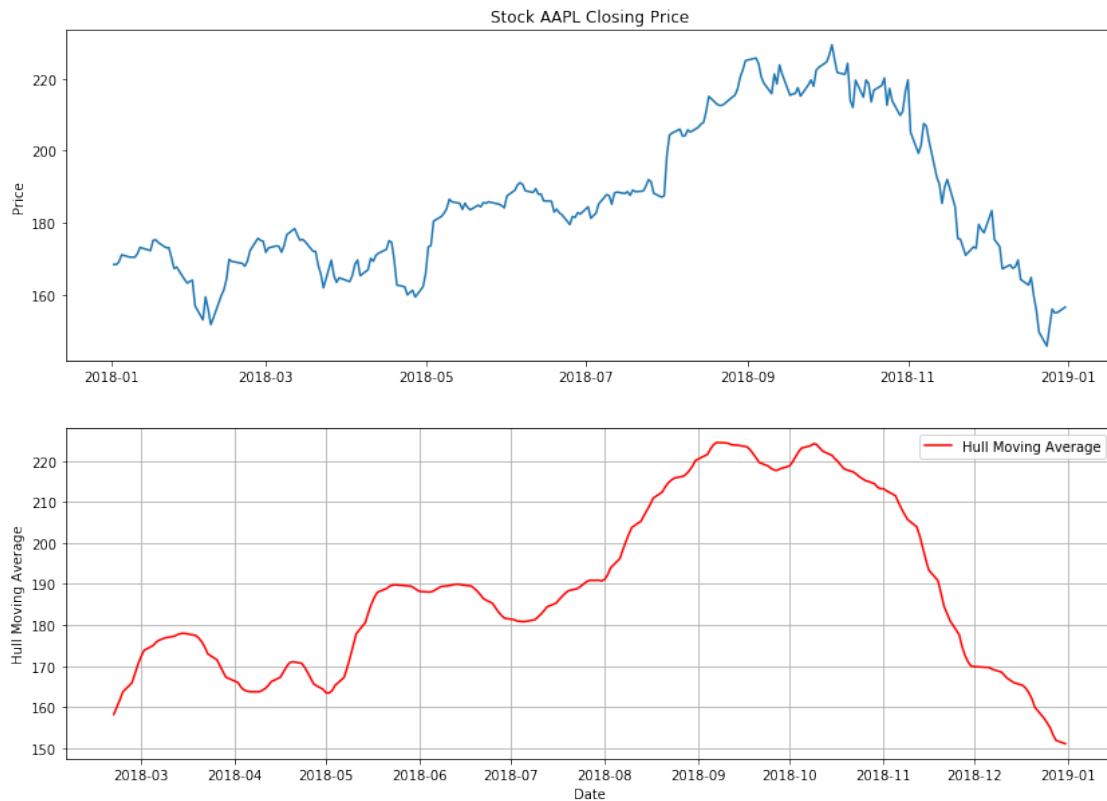
[6]:
```python
fig = plt.figure(figsize=(14,10))
ax1 = plt.subplot(2, 1, 1)
ax1.plot(df['Adj Close'])
ax1.set_title('Stock '+ symbol +' Closing Price')
ax1.set_ylabel('Price')

ax2 = plt.subplot(2, 1, 2)
ax2.plot(df['HMA'], label='Hull Moving Average', color='red')
#ax2.axhline(y=0, color='blue', linestyle='--')
ax2.grid()
ax2.set_ylabel('Hull Moving Average')
```

```
ax2.set_xlabel('Date')
ax2.legend(loc='best')
```

[6]: <matplotlib.legend.Legend at 0x2914dc9b828>

1.1 Candlestick with Hull Moving Average

```python
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   Open   High   Low   Close   Adj Close \
    0 736696.0 170.160004 172.300003 169.259995 172.259995 168.339050
    1 736697.0 172.529999 174.550003 171.960007 172.229996 168.309738

```
2  736698.0  172.539993  173.470001  172.080002  173.029999  169.091522
3  736699.0  173.440002  175.369995  173.050003  175.000000  171.016678
4  736702.0  174.350006  175.610001  173.929993  174.350006  170.381485

      Volume  HMA  VolumePositive
0  25555900  NaN           False
1  29517900  NaN           False
2  22434600  NaN           False
3  23660000  NaN           False
4  20567800  NaN           False
```

[8]:
```python
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['HMA'], label='Hull Moving Average', color='red')
#ax2.axhline(y=0, color='blue', linestyle='--')
ax2.grid()
ax2.set_ylabel('Hull Moving Average')
ax2.set_xlabel('Date')
ax2.legend(loc='best')
```

[8]: <matplotlib.legend.Legend at 0x2914f6f5ac8>

Stock AAPL Closing Price