02_how_to_use_talib

September 29, 2021

1 How to use TA-Lib to generate Alpha Factors

1.1 Imports & Settings

[1]:
```
import warnings
warnings.filterwarnings('ignore')
```

[2]:
```
%matplotlib inline

import matplotlib.pyplot as plt
import seaborn as sns
import pandas as pd
from talib import RSI, BBANDS, MACD
```

[3]:
```
sns.set_style('whitegrid')
idx = pd.IndexSlice
```

1.2 Get Data

The `assets.h5` store can be generated using the the notebook create_datasets in the data directory in the root directory of this repo for instruction to download the following dataset.

Set data store location:

[5]:
```
DATA_STORE = '../data/assets.h5'
```

We load the AAPL stock price for the 2007-10 using `pd.IndexSlice` to perform a slice operation on the `pd.MultiIndex`, select the adjusted close price and unpivot the column to convert the DataFrame to wide format with tickers in the columns and timestamps in the rows:

[6]:
```
with pd.HDFStore(DATA_STORE) as store:
    data = (store['quandl/wiki/prices']
            .loc[idx['2007':'2010', 'AAPL'],
                 ['adj_open', 'adj_high', 'adj_low', 'adj_close', 'adj_volume']]
            .unstack('ticker')
            .swaplevel(axis=1)
            .loc[:, 'AAPL']
            .rename(columns=lambda x: x.replace('adj_', '')))
```

[7]:
```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
DatetimeIndex: 1008 entries, 2007-01-03 to 2010-12-31
Data columns (total 5 columns):
 #   Column  Non-Null Count  Dtype
---  ------  --------------  -----
 0   open    1008 non-null   float64
 1   high    1008 non-null   float64
 2   low     1008 non-null   float64
 3   close   1008 non-null   float64
 4   volume  1008 non-null   float64
dtypes: float64(5)
memory usage: 47.2 KB
```

1.3 Compute Bollinger Bands

[8]:
```
up, mid, low = BBANDS(data.close, timeperiod=21, nbdevup=2, nbdevdn=2, matype=0)
```

1.4 Compute Relative Strength Index

[9]:
```
rsi = RSI(data.close, timeperiod=14)
```

1.5 Moving Average Convergence/Divergence

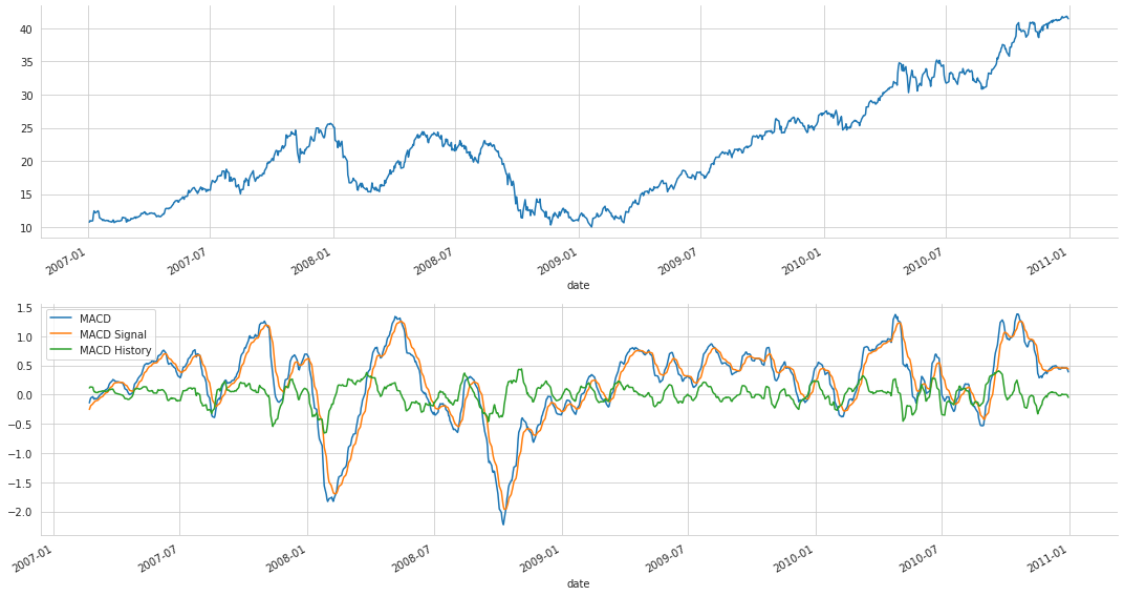
The MACD computes the difference between two Exponential Moving Averages (EMA), one longer- and one shorter-term.

The ta-lib MACD Indicator implementation has four inputs: - the close price - `fastperiod`: the short-term EMA period - `slowperiod`: the long-term EMA period - `signalperiod`: the period for the EMA of the MACD itself

It has three outputs: - `macd` is the difference between the fast EMA and slow EMA. - `macdsignal` is the EMA of the MACD value with period `signalperiod` - `macdhist` computes the difference between `macd` and `macdsignal`

[10]:
```
macd, macdsignal, macdhist = MACD(data.close, fastperiod=12, slowperiod=26,␣
↪signalperiod=9)
```

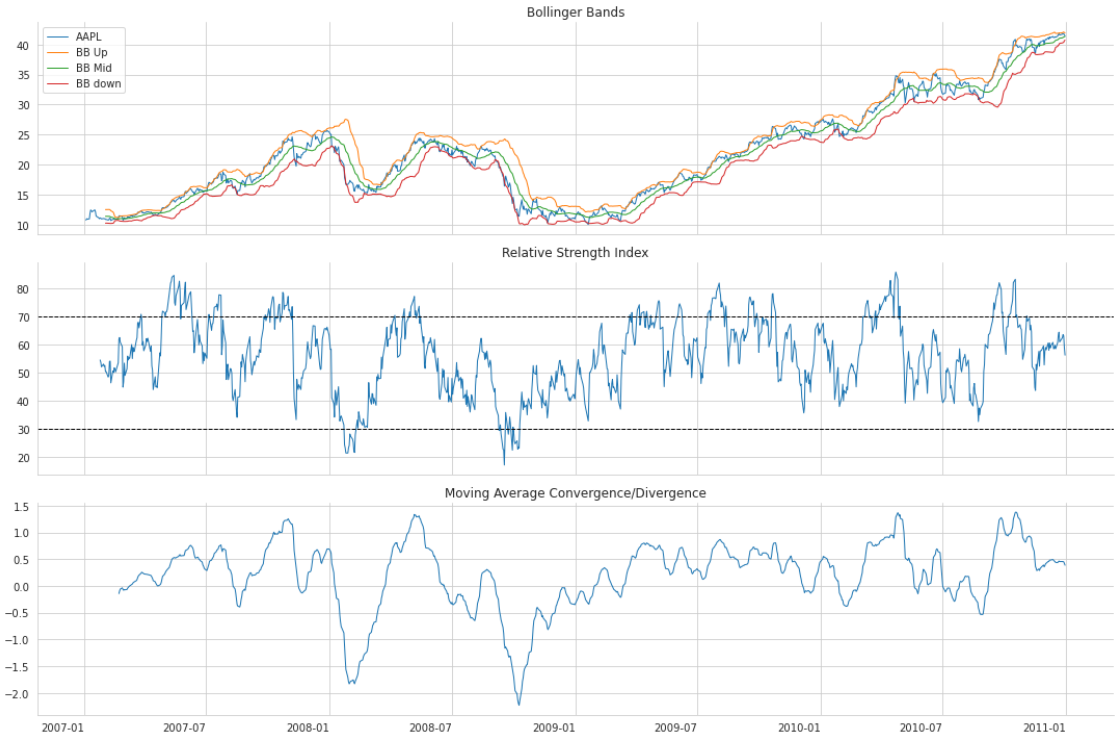
[11]:
```
macd_data = pd.DataFrame({'AAPL': data.close, 'MACD': macd, 'MACD Signal':␣
↪macdsignal, 'MACD History': macdhist})

fig, axes= plt.subplots(nrows=2, figsize=(15, 8))
macd_data.AAPL.plot(ax=axes[0])
macd_data.drop('AAPL', axis=1).plot(ax=axes[1])
fig.tight_layout()
sns.despine();
```



1.6 Plot Result

[12]:
```
data = pd.DataFrame({'AAPL': data.close, 'BB Up': up, 'BB Mid': mid, 'BB down':␣
↪low, 'RSI': rsi, 'MACD': macd})
```

[13]:
```
fig, axes= plt.subplots(nrows=3, figsize=(15, 10), sharex=True)
data.drop(['RSI', 'MACD'], axis=1).plot(ax=axes[0], lw=1, title='Bollinger␣
↪Bands')
data['RSI'].plot(ax=axes[1], lw=1, title='Relative Strength Index')
axes[1].axhline(70, lw=1, ls='--', c='k')
axes[1].axhline(30, lw=1, ls='--', c='k')
data.MACD.plot(ax=axes[2], lw=1, title='Moving Average Convergence/Divergence',␣
↪rot=0)
axes[2].set_xlabel('')
fig.tight_layout()
sns.despine();
```


Bollinger Bands
AAPL
BB Up
BB Mid
BB down
40
35
30
25
20
15
10
Relative Strength Index
80
70
60
50
40
30
20
Moving Average Convergence/Divergence
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
2007-01
2007-07
2008-01
2008-07
2009-01
2009-07
2010-01
2010-07
2011-01