Stock_Time_Series_Analysis

September 29, 2021

1 Stock Time Series Analysis

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

     import warnings
     warnings.filterwarnings("ignore")

     # fetch yahoo data
     import yfinance as yf
     yf.pdr_override()
```

```python
[2]: # input
     symbol = 'AMD'
     start = '2014-01-01'
     end = '2018-08-27'

     # Read data
     dataset = yf.download(symbol,start,end)

     # Only keep close columns
     dataset.head()
```

```
[*********************100%***********************]  1 of 1 completed
```

```
[2]:            Adj Close  Close  High   Low   Open    Volume
     Date
     2014-01-02      3.95   3.95  3.98  3.84  3.85  20548400
     2014-01-03      4.00   4.00  4.00  3.88  3.98  22887200
     2014-01-06      4.13   4.13  4.18  3.99  4.01  42398300
     2014-01-07      4.18   4.18  4.25  4.11  4.19  42932100
     2014-01-08      4.18   4.18  4.26  4.14  4.23  30678700
```

```python
[3]: dataset.head()
```

```
[3]:           Adj Close  Close  High   Low   Open    Volume
     Date
     2014-01-02      3.95   3.95  3.98  3.84  3.85  20548400
     2014-01-03      4.00   4.00  4.00  3.88  3.98  22887200
     2014-01-06      4.13   4.13  4.18  3.99  4.01  42398300
     2014-01-07      4.18   4.18  4.25  4.11  4.19  42932100
     2014-01-08      4.18   4.18  4.26  4.14  4.23  30678700
```

```
[4]: dataset.tail()
```

```
[4]:            Adj Close      Close   High        Low       Open     Volume
     Date
     2018-08-20  19.980000  19.980000  20.08  19.350000  19.790001   62983200
     2018-08-21  20.400000  20.400000  20.42  19.860001  19.980000   55629000
     2018-08-22  20.900000  20.900000  20.92  20.209999  20.280001   62002700
     2018-08-23  22.290001  22.290001  22.32  21.139999  21.190001  113444100
     2018-08-24  23.980000  23.980000  24.00  22.670000  22.910000  164328200
```

```
[5]: len(dataset['Adj Close'].loc[:'2018-01-01'])
```

```
[5]: 1007
```

```
[6]: weekly_Monday = dataset.asfreq('W-Mon')
```

```
[7]: weekly_Monday
```

```
[7]:           Adj Close      Close       High        Low       Open       Volume
     Date
     2014-01-06   4.130000   4.130000   4.180000   3.990000   4.010000   42398300.0
     2014-01-13   4.130000   4.130000   4.200000   4.090000   4.190000   22856100.0
     2014-01-20        NaN        NaN        NaN        NaN        NaN          NaN
     2014-01-27   3.410000   3.410000   3.490000   3.350000   3.480000   31332300.0
     2014-02-03   3.330000   3.330000   3.440000   3.330000   3.430000   22280200.0
     2014-02-10   3.630000   3.630000   3.640000   3.450000   3.500000   21241100.0
     2014-02-17        NaN        NaN        NaN        NaN        NaN          NaN
     2014-02-24   3.710000   3.710000   3.730000   3.700000   3.710000   10717900.0
     2014-03-03   3.670000   3.670000   3.700000   3.600000   3.660000   19555800.0
     2014-03-10   3.810000   3.810000   4.060000   3.800000   4.040000   42135800.0
     2014-03-17   3.800000   3.800000   3.910000   3.780000   3.880000   20004100.0
     2014-03-24   4.050000   4.050000   4.140000   3.980000   4.050000   20669500.0
     2014-03-31   4.010000   4.010000   4.020000   3.900000   3.930000   15386000.0
     2014-04-07   3.880000   3.880000   3.990000   3.830000   3.980000   24874600.0
     2014-04-14   3.710000   3.710000   3.780000   3.650000   3.720000   22735100.0
     2014-04-21   4.120000   4.120000   4.200000   3.960000   4.010000  102651500.0
     2014-04-28   3.960000   3.960000   4.120000   3.870000   4.090000   31737100.0
     2014-05-05   4.090000   4.090000   4.140000   4.060000   4.100000    9015400.0
     2014-05-12   3.970000   3.970000   4.000000   3.860000   3.870000   14785500.0
```

```
2014-05-19   4.090000   4.090000   4.100000   3.960000   4.000000   18171000.0
2014-05-26        NaN        NaN        NaN        NaN        NaN         NaN
2014-06-02   3.970000   3.970000   4.030000   3.940000   4.030000   10859500.0
2014-06-09   4.070000   4.070000   4.100000   4.040000   4.050000    7597200.0
2014-06-16   4.440000   4.440000   4.440000   4.260000   4.260000   26192800.0
2014-06-23   4.010000   4.010000   4.080000   3.900000   4.060000   49634100.0
2014-06-30   4.190000   4.190000   4.250000   4.080000   4.120000   25850200.0
2014-07-07   4.260000   4.260000   4.310000   4.210000   4.230000   21165500.0
2014-07-14   4.640000   4.640000   4.650000   4.390000   4.440000   73046000.0
2014-07-21   3.780000   3.780000   3.870000   3.750000   3.860000   34219100.0
2014-07-28   3.730000   3.730000   3.780000   3.680000   3.770000   31443400.0
...              ...        ...        ...        ...        ...         ...
2018-01-29  13.320000  13.320000  13.470000  13.050000  13.130000   66645400.0
2018-02-05  11.570000  11.570000  12.180000  10.930000  12.050000  116568900.0
2018-02-12  11.680000  11.680000  11.800000  11.430000  11.470000   63160900.0
2018-02-19        NaN        NaN        NaN        NaN        NaN         NaN
2018-02-26  12.420000  12.420000  12.430000  12.050000  12.140000   42265200.0
2018-03-05  11.910000  11.910000  12.060000  11.610000  11.690000   43734800.0
2018-03-12  11.520000  11.520000  11.820000  11.480000  11.760000   83748700.0
2018-03-19  11.430000  11.430000  11.740000  11.350000  11.410000   53308600.0
2018-03-26  10.440000  10.440000  10.800000  10.180000  10.710000   75878500.0
2018-04-02   9.530000   9.530000  10.140000   9.510000   9.990000   64824600.0
2018-04-09   9.530000   9.530000   9.840000   9.520000   9.750000   38382600.0
2018-04-16  10.090000  10.090000  10.170000   9.900000  10.000000   28875100.0
2018-04-23  10.040000  10.040000  10.190000   9.970000  10.090000   42971300.0
2018-04-30  10.880000  10.880000  11.140000  10.870000  11.060000   50608800.0
2018-05-07  11.590000  11.590000  11.680000  11.300000  11.320000   54001700.0
2018-05-14  12.230000  12.230000  12.360000  12.110000  12.140000   50263800.0
2018-05-21  12.990000  12.990000  13.310000  12.880000  13.250000   49714200.0
2018-05-28        NaN        NaN        NaN        NaN        NaN         NaN
2018-06-04  14.850000  14.850000  14.980000  14.520000  14.760000   74546000.0
2018-06-11  15.730000  15.730000  15.890000  15.010000  15.210000   80737600.0
2018-06-18  17.110001  17.110001  17.340000  16.129999  16.180000  104317400.0
2018-06-25  15.110000  15.110000  15.740000  14.540000  15.640000   94418400.0
2018-07-02  15.160000  15.160000  15.180000  14.740000  14.800000   43398800.0
2018-07-09  16.610001  16.610001  16.840000  16.170000  16.730000   58525500.0
2018-07-16  16.580000  16.580000  17.000000  16.410000  16.420000   65275300.0
2018-07-23  16.660000  16.660000  16.680000  15.900000  16.469999   44940800.0
2018-07-30  19.420000  19.420000  20.180000  19.309999  19.400000  160823400.0
2018-08-06  19.430000  19.430000  19.440001  18.459999  18.889999   83579700.0
2018-08-13  19.730000  19.730000  19.930000  19.120001  19.160000   81411300.0
2018-08-20  19.980000  19.980000  20.080000  19.350000  19.790001   62983200.0

[242 rows x 6 columns]
```
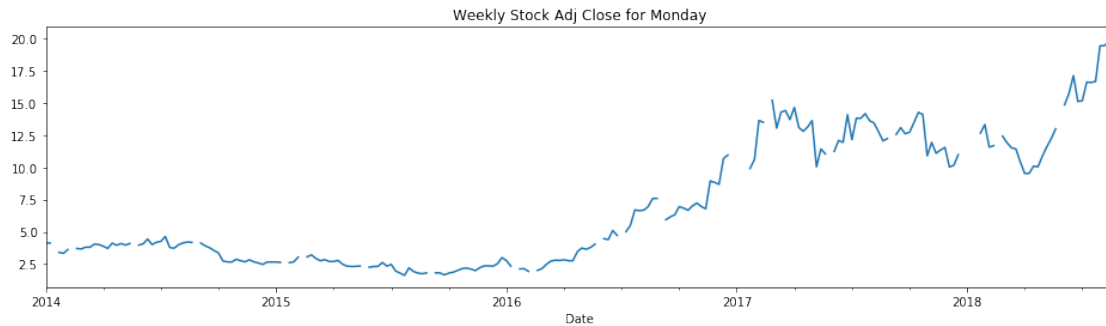
```
[8]: fig, ax = plt.subplots(figsize=(16, 4))
```

```
weekly_Monday['Adj Close'].plot(title='Weekly Stock Adj Close for Monday',␣
 ↪ax=ax)
```

[8]: <matplotlib.axes._subplots.AxesSubplot at 0x29c1d6be390>

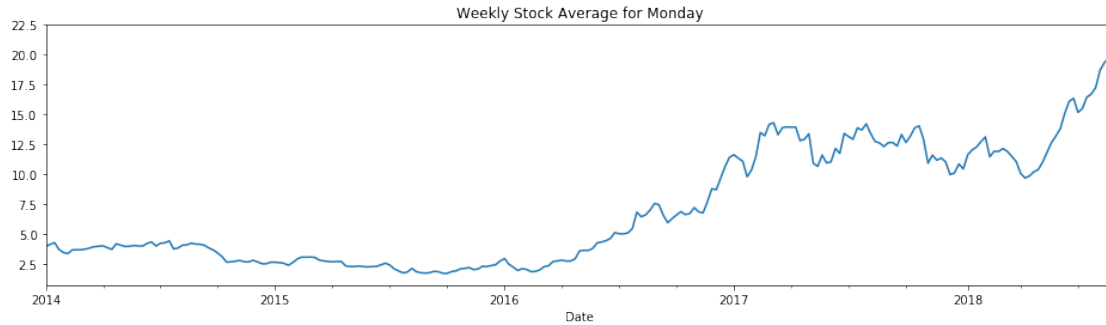[9]: ```
weekly_avg = dataset.resample('W').mean()
```

[10]: ```
weekly_avg
```

[10]:

Date	Adj Close	Close	High	Low	Open	Volume
2014-01-05	3.9750	3.9750	3.990000	3.8600	3.9150	21717800
2014-01-12	4.1500	4.1500	4.224000	4.0720	4.1440	33503500
2014-01-19	4.2920	4.2920	4.392000	4.1940	4.2640	44944460
2014-01-26	3.7325	3.7325	3.862500	3.6950	3.8425	55743225
2014-02-02	3.4680	3.4680	3.522000	3.4180	3.4780	22354740
2014-02-09	3.3780	3.3780	3.440000	3.3320	3.3840	19802540
2014-02-16	3.6820	3.6820	3.710000	3.6020	3.6420	19903400
2014-02-23	3.7000	3.7000	3.740000	3.6625	3.7050	13253775
2014-03-02	3.7040	3.7040	3.746000	3.6740	3.7120	13192860
2014-03-09	3.7520	3.7520	3.786000	3.6860	3.7060	21392180
2014-03-16	3.8560	3.8560	3.978000	3.8280	3.9080	25950440
2014-03-23	3.9520	3.9520	4.002000	3.8800	3.9280	22253300
2014-03-30	3.9880	3.9880	4.080000	3.9520	4.0280	17541480
2014-04-06	4.0300	4.0300	4.090000	3.9740	4.0380	17846720
2014-04-13	3.8700	3.8700	3.974000	3.8200	3.9340	21855420
2014-04-20	3.7375	3.7375	3.807500	3.6975	3.7625	23677700
2014-04-27	4.2000	4.2000	4.284000	4.0940	4.1820	49987520
2014-05-04	4.0800	4.0800	4.138000	4.0040	4.0820	23405240
2014-05-11	3.9740	3.9740	4.054000	3.9380	4.0120	15970500
2014-05-18	3.9920	3.9920	4.036000	3.9240	3.9600	14305320
2014-05-25	4.0540	4.0540	4.092000	3.9980	4.0540	13784440
2014-06-01	4.0175	4.0175	4.052500	4.0025	4.0325	9530975
2014-06-08	4.0180	4.0180	4.052000	3.9740	4.0100	11438820
2014-06-15	4.2260	4.2260	4.292000	4.1660	4.2040	20191920

4

```
2014-06-22      4.3540      4.3540      4.452000      4.2840      4.3860      25188460
2014-06-29      4.0100      4.0100      4.070000      3.9500      4.0060      24311260
2014-07-06      4.2475      4.2475      4.315000      4.1525      4.2300      24567750
2014-07-13      4.2740      4.2740      4.332000      4.1880      4.2340      28596820
2014-07-20      4.4460      4.4460      4.548000      4.3080      4.4120      95979060
2014-07-27      3.7660      3.7660      3.830000      3.7360      3.7960      31946680
...                ...         ...           ...         ...         ...            ...
2018-02-04     13.1260     13.1260     13.498000     12.9060     13.2320      89167100
2018-02-11     11.4700     11.4700     11.848000     11.0600     11.6100      80276100
2018-02-18     11.9340     11.9340     12.158000     11.6960     11.8600      51101040
2018-02-25     11.9125     11.9125     12.117500     11.7500     11.9025      39624050
2018-03-04     12.1540     12.1540     12.448000     11.9260     12.2320      52591780
2018-03-11     11.9160     11.9160     12.312000     11.6380     11.9420      76754960
2018-03-18     11.4900     11.4900     11.736000     11.2700     11.5760      88511400
2018-03-25     11.0680     11.0680     11.366000     10.9760     11.1980      55581180
2018-04-01     10.0750     10.0750     10.410000      9.9200     10.2875      64485825
2018-04-08      9.6960      9.6960     10.004000      9.4520      9.7160      60783800
2018-04-15      9.8680      9.8680     10.046000      9.7440      9.9100      39424240
2018-04-22     10.2140     10.2140     10.364000     10.0740     10.2040      42707700
2018-04-29     10.3980     10.3980     10.636000     10.2220     10.4820      79634680
2018-05-06     11.0380     11.0380     11.160000     10.8620     10.9540      40902640
2018-05-13     11.8460     11.8460     11.906000     11.5820     11.6660      46486800
2018-05-20     12.6640     12.6640     12.792000     12.4920     12.5620      52113380
2018-05-27     13.2040     13.2040     13.356000     12.9760     13.1280      45826960
2018-06-03     13.8275     13.8275     13.977500     13.5875     13.6625      54060125
2018-06-10     15.1020     15.1020     15.388000     14.6700     15.0060      81909700
2018-06-17     16.0980     16.0980     16.334000     15.5240     15.9080      85725660
2018-06-24     16.3540     16.3540     16.908000     15.9660     16.4580      85607280
2018-07-01     15.1760     15.1760     15.590000     14.8660     15.3740      58978160
2018-07-08     15.5050     15.5050     15.602500     15.0500     15.1650      45324450
2018-07-15     16.4520     16.4520     16.700000     16.2200     16.5120      44592960
2018-07-22     16.7020     16.7020     16.925999     16.4860     16.6460      46523580
2018-07-29     17.2380     17.2380     17.652000     16.5740     17.1500     108062420
2018-08-05     18.7020     18.7020     19.304000     18.4540     18.8400      92164240
2018-08-12     19.3460     19.3460     19.622000     18.9460     19.3100      64191640
2018-08-19     19.7100     19.7100     20.040000     19.1860     19.5940      77462560
2018-08-26     21.5100     21.5100     21.548000     20.6460     20.8300      91677440

[243 rows x 6 columns]
```

```
[11]: fig, ax = plt.subplots(figsize=(16, 4))
      weekly_avg['Adj Close'].plot(title='Weekly Stock Average for Monday', ax=ax)
```
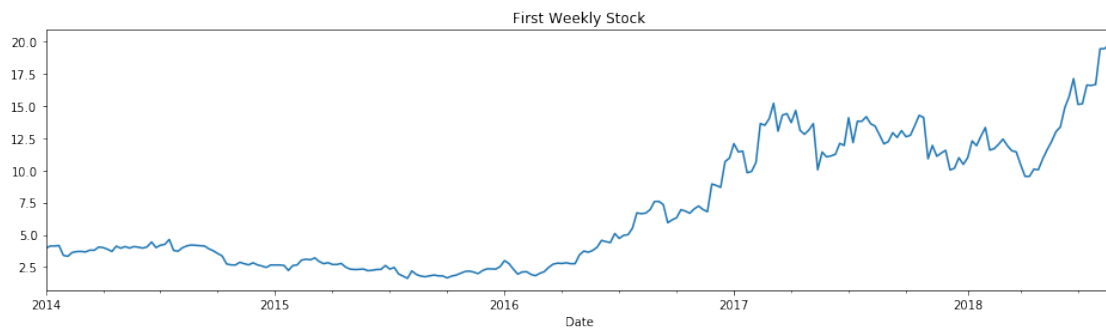
```
[11]: <matplotlib.axes._subplots.AxesSubplot at 0x29c1f767978>
```

Weekly Stock Average for Monday

```
[12]: weekly_first = dataset.resample('W').first()
```
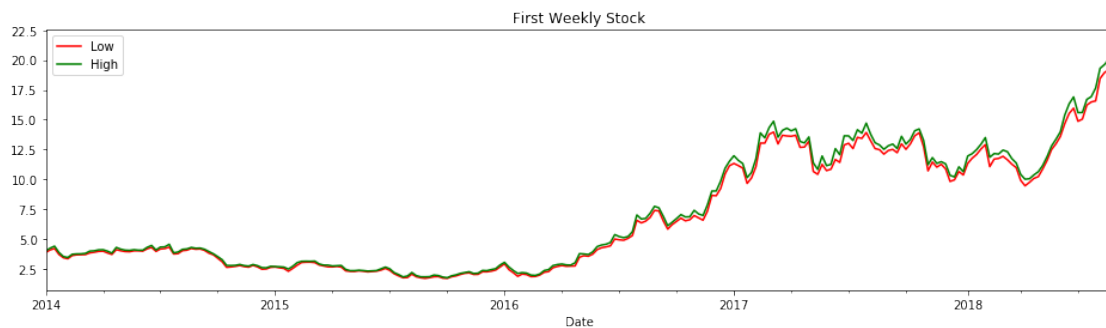
```
[13]: fig, ax = plt.subplots(figsize=(16, 4))
      weekly_first['Adj Close'].plot(title='First Weekly Stock', ax=ax)
```

```
[13]: <matplotlib.axes._subplots.AxesSubplot at 0x29c1f734860>
```


First Weekly Stock

```
[20]: fig, ax = plt.subplots(figsize=(16, 4))
      (dataset.groupby(pd.Grouper(freq='W'))[['Low','High']]).mean().
      ↪plot(color=['Red', 'Green'], ax=ax, title='First Weekly Stock')
```

```
[20]: <matplotlib.axes._subplots.AxesSubplot at 0x29c1fb6c6d8>
```


First Weekly Stock

```
[15]: business_monthly = dataset.resample('BM')
```

```
[16]: fig, ax = plt.subplots(figsize=(16, 4))
      business_monthly['Adj Close'].plot(title='Stock Close Price monthly', ax=ax)
```
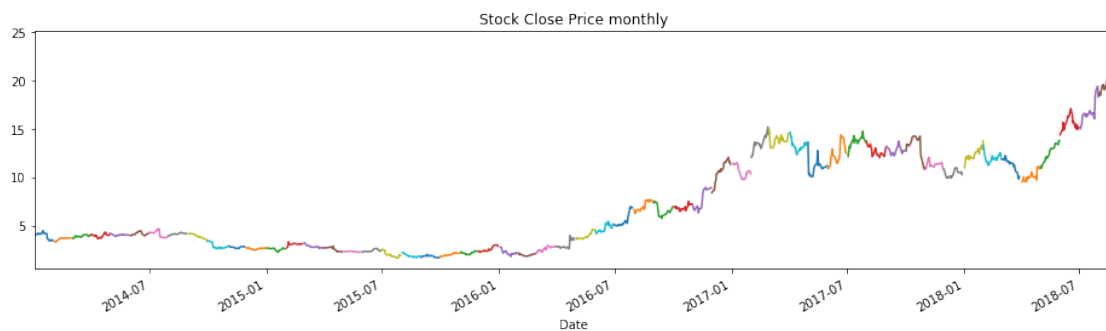
```
[16]: Date
      2014-01-31    AxesSubplot(0.125,0.2;0.775x0.68)
      2014-02-28    AxesSubplot(0.125,0.2;0.775x0.68)
      2014-03-31    AxesSubplot(0.125,0.2;0.775x0.68)
      2014-04-30    AxesSubplot(0.125,0.2;0.775x0.68)
      2014-05-30    AxesSubplot(0.125,0.2;0.775x0.68)
      2014-06-30    AxesSubplot(0.125,0.2;0.775x0.68)
      2014-07-31    AxesSubplot(0.125,0.2;0.775x0.68)
      2014-08-29    AxesSubplot(0.125,0.2;0.775x0.68)
      2014-09-30    AxesSubplot(0.125,0.2;0.775x0.68)
      2014-10-31    AxesSubplot(0.125,0.2;0.775x0.68)
      2014-11-28    AxesSubplot(0.125,0.2;0.775x0.68)
      2014-12-31    AxesSubplot(0.125,0.2;0.775x0.68)
      2015-01-30    AxesSubplot(0.125,0.2;0.775x0.68)
      2015-02-27    AxesSubplot(0.125,0.2;0.775x0.68)
      2015-03-31    AxesSubplot(0.125,0.2;0.775x0.68)
      2015-04-30    AxesSubplot(0.125,0.2;0.775x0.68)
      2015-05-29    AxesSubplot(0.125,0.2;0.775x0.68)
      2015-06-30    AxesSubplot(0.125,0.2;0.775x0.68)
      2015-07-31    AxesSubplot(0.125,0.2;0.775x0.68)
      2015-08-31    AxesSubplot(0.125,0.2;0.775x0.68)
      2015-09-30    AxesSubplot(0.125,0.2;0.775x0.68)
      2015-10-30    AxesSubplot(0.125,0.2;0.775x0.68)
      2015-11-30    AxesSubplot(0.125,0.2;0.775x0.68)
      2015-12-31    AxesSubplot(0.125,0.2;0.775x0.68)
      2016-01-29    AxesSubplot(0.125,0.2;0.775x0.68)
      2016-02-29    AxesSubplot(0.125,0.2;0.775x0.68)
      2016-03-31    AxesSubplot(0.125,0.2;0.775x0.68)
      2016-04-29    AxesSubplot(0.125,0.2;0.775x0.68)
      2016-05-31    AxesSubplot(0.125,0.2;0.775x0.68)
      2016-06-30    AxesSubplot(0.125,0.2;0.775x0.68)
      2016-07-29    AxesSubplot(0.125,0.2;0.775x0.68)
      2016-08-31    AxesSubplot(0.125,0.2;0.775x0.68)
      2016-09-30    AxesSubplot(0.125,0.2;0.775x0.68)
      2016-10-31    AxesSubplot(0.125,0.2;0.775x0.68)
      2016-11-30    AxesSubplot(0.125,0.2;0.775x0.68)
      2016-12-30    AxesSubplot(0.125,0.2;0.775x0.68)
      2017-01-31    AxesSubplot(0.125,0.2;0.775x0.68)
      2017-02-28    AxesSubplot(0.125,0.2;0.775x0.68)
      2017-03-31    AxesSubplot(0.125,0.2;0.775x0.68)
```

```
2017-04-28    AxesSubplot(0.125,0.2;0.775x0.68)
2017-05-31    AxesSubplot(0.125,0.2;0.775x0.68)
2017-06-30    AxesSubplot(0.125,0.2;0.775x0.68)
2017-07-31    AxesSubplot(0.125,0.2;0.775x0.68)
2017-08-31    AxesSubplot(0.125,0.2;0.775x0.68)
2017-09-29    AxesSubplot(0.125,0.2;0.775x0.68)
2017-10-31    AxesSubplot(0.125,0.2;0.775x0.68)
2017-11-30    AxesSubplot(0.125,0.2;0.775x0.68)
2017-12-29    AxesSubplot(0.125,0.2;0.775x0.68)
2018-01-31    AxesSubplot(0.125,0.2;0.775x0.68)
2018-02-28    AxesSubplot(0.125,0.2;0.775x0.68)
2018-03-30    AxesSubplot(0.125,0.2;0.775x0.68)
2018-04-30    AxesSubplot(0.125,0.2;0.775x0.68)
2018-05-31    AxesSubplot(0.125,0.2;0.775x0.68)
2018-06-29    AxesSubplot(0.125,0.2;0.775x0.68)
2018-07-31    AxesSubplot(0.125,0.2;0.775x0.68)
2018-08-31    AxesSubplot(0.125,0.2;0.775x0.68)
Freq: BM, Name: Adj Close, dtype: object
```



```
[17]: business_monthly['Adj Close'].plot(title='Stock Close Price monthly', ax=ax)
```

```
[17]: Date
      2014-01-31    AxesSubplot(0.125,0.2;0.775x0.68)
      2014-02-28    AxesSubplot(0.125,0.2;0.775x0.68)
      2014-03-31    AxesSubplot(0.125,0.2;0.775x0.68)
      2014-04-30    AxesSubplot(0.125,0.2;0.775x0.68)
      2014-05-30    AxesSubplot(0.125,0.2;0.775x0.68)
      2014-06-30    AxesSubplot(0.125,0.2;0.775x0.68)
      2014-07-31    AxesSubplot(0.125,0.2;0.775x0.68)
      2014-08-29    AxesSubplot(0.125,0.2;0.775x0.68)
      2014-09-30    AxesSubplot(0.125,0.2;0.775x0.68)
      2014-10-31    AxesSubplot(0.125,0.2;0.775x0.68)
      2014-11-28    AxesSubplot(0.125,0.2;0.775x0.68)
      2014-12-31    AxesSubplot(0.125,0.2;0.775x0.68)
      2015-01-30    AxesSubplot(0.125,0.2;0.775x0.68)
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2015-02-27    AxesSubplot(0.125,0.2;0.775x0.68)
2015-03-31    AxesSubplot(0.125,0.2;0.775x0.68)
2015-04-30    AxesSubplot(0.125,0.2;0.775x0.68)
2015-05-29    AxesSubplot(0.125,0.2;0.775x0.68)
2015-06-30    AxesSubplot(0.125,0.2;0.775x0.68)
2015-07-31    AxesSubplot(0.125,0.2;0.775x0.68)
2015-08-31    AxesSubplot(0.125,0.2;0.775x0.68)
2015-09-30    AxesSubplot(0.125,0.2;0.775x0.68)
2015-10-30    AxesSubplot(0.125,0.2;0.775x0.68)
2015-11-30    AxesSubplot(0.125,0.2;0.775x0.68)
2015-12-31    AxesSubplot(0.125,0.2;0.775x0.68)
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2016-02-29    AxesSubplot(0.125,0.2;0.775x0.68)
2016-03-31    AxesSubplot(0.125,0.2;0.775x0.68)
2016-04-29    AxesSubplot(0.125,0.2;0.775x0.68)
2016-05-31    AxesSubplot(0.125,0.2;0.775x0.68)
2016-06-30    AxesSubplot(0.125,0.2;0.775x0.68)
2016-07-29    AxesSubplot(0.125,0.2;0.775x0.68)
2016-08-31    AxesSubplot(0.125,0.2;0.775x0.68)
2016-09-30    AxesSubplot(0.125,0.2;0.775x0.68)
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2017-07-31    AxesSubplot(0.125,0.2;0.775x0.68)
2017-08-31    AxesSubplot(0.125,0.2;0.775x0.68)
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2018-01-31    AxesSubplot(0.125,0.2;0.775x0.68)
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2018-05-31    AxesSubplot(0.125,0.2;0.775x0.68)
2018-06-29    AxesSubplot(0.125,0.2;0.775x0.68)
2018-07-31    AxesSubplot(0.125,0.2;0.775x0.68)
2018-08-31    AxesSubplot(0.125,0.2;0.775x0.68)
Freq: BM, Name: Adj Close, dtype: object
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