

Stock_Time_Series_Analysis

September 29, 2021

1 Stock Time Series Analysis

```
[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()
```

```
[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

```
[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

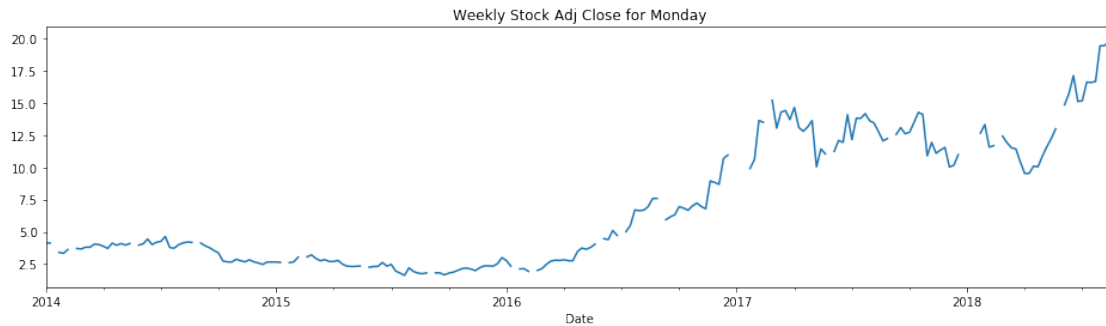
2014-05-19	4.090000	4.090000	4.100000	3.960000	4.000000	18171000.0
2014-05-26	NaN	NaN	NaN	NaN	NaN	NaN
2014-06-02	3.970000	3.970000	4.030000	3.940000	4.030000	10859500.0
2014-06-09	4.070000	4.070000	4.100000	4.040000	4.050000	7597200.0
2014-06-16	4.440000	4.440000	4.440000	4.260000	4.260000	26192800.0
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

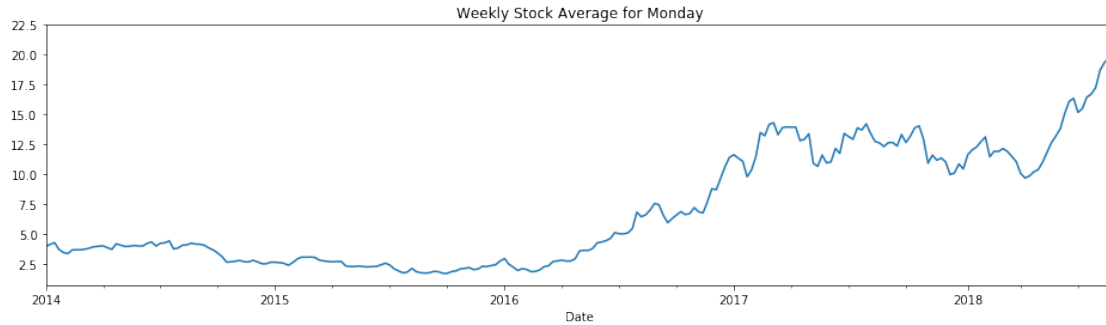
Date	Adj Close	Close	High	Low	Open	Volume
2014-01-05	3.9750	3.9750	3.990000	3.8600	3.9150	21717800
2014-01-12	4.1500	4.1500	4.224000	4.0720	4.1440	33503500
2014-01-19	4.2920	4.2920	4.392000	4.1940	4.2640	44944460
2014-01-26	3.7325	3.7325	3.862500	3.6950	3.8425	55743225
2014-02-02	3.4680	3.4680	3.522000	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

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)
```

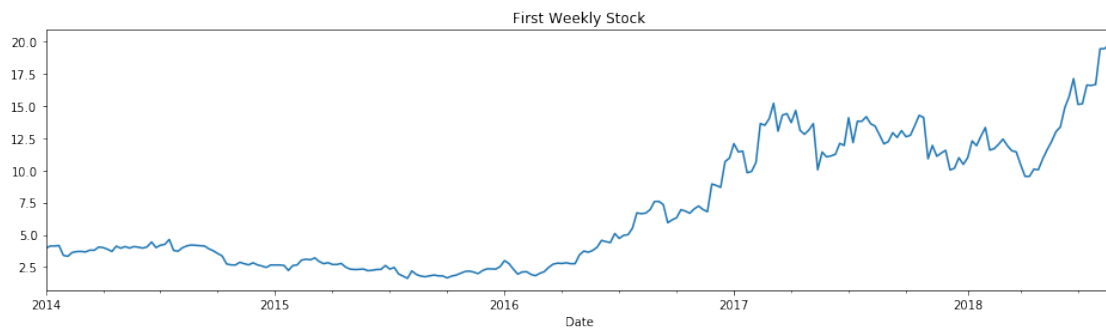
```
[11]: <matplotlib.axes._subplots.AxesSubplot at 0x29c1f767978>
```



```
[12]: weekly_first = dataset.resample('W').first()
```

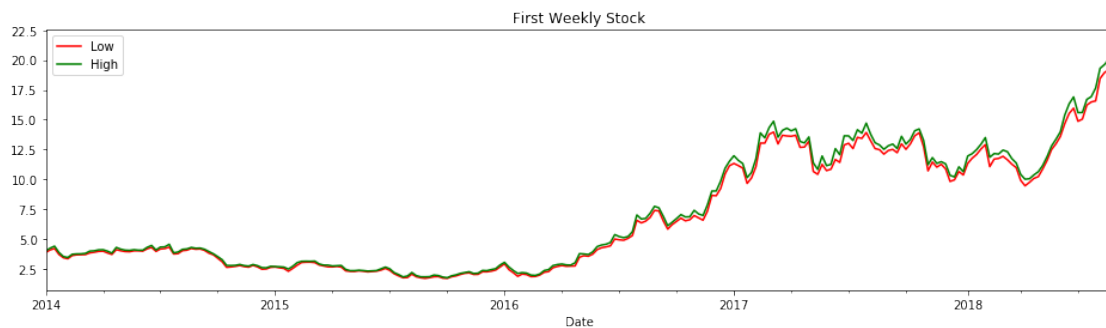
```
[13]: fig, ax = plt.subplots(figsize=(16, 4))
      weekly_first['Adj Close'].plot(title='First Weekly Stock', ax=ax)
```

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



```
[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>
```



```
[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)
```

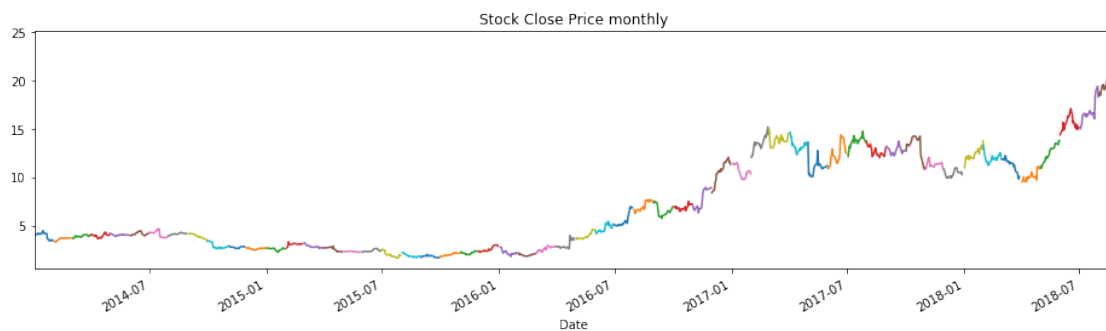
```
[16]: Date
2014-01-31    AxesSubplot(0.125,0.2;0.775x0.68)
2014-02-28    AxesSubplot(0.125,0.2;0.775x0.68)
2014-03-31    AxesSubplot(0.125,0.2;0.775x0.68)
2014-04-30    AxesSubplot(0.125,0.2;0.775x0.68)
2014-05-30    AxesSubplot(0.125,0.2;0.775x0.68)
2014-06-30    AxesSubplot(0.125,0.2;0.775x0.68)
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)
```

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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)
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)
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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
```