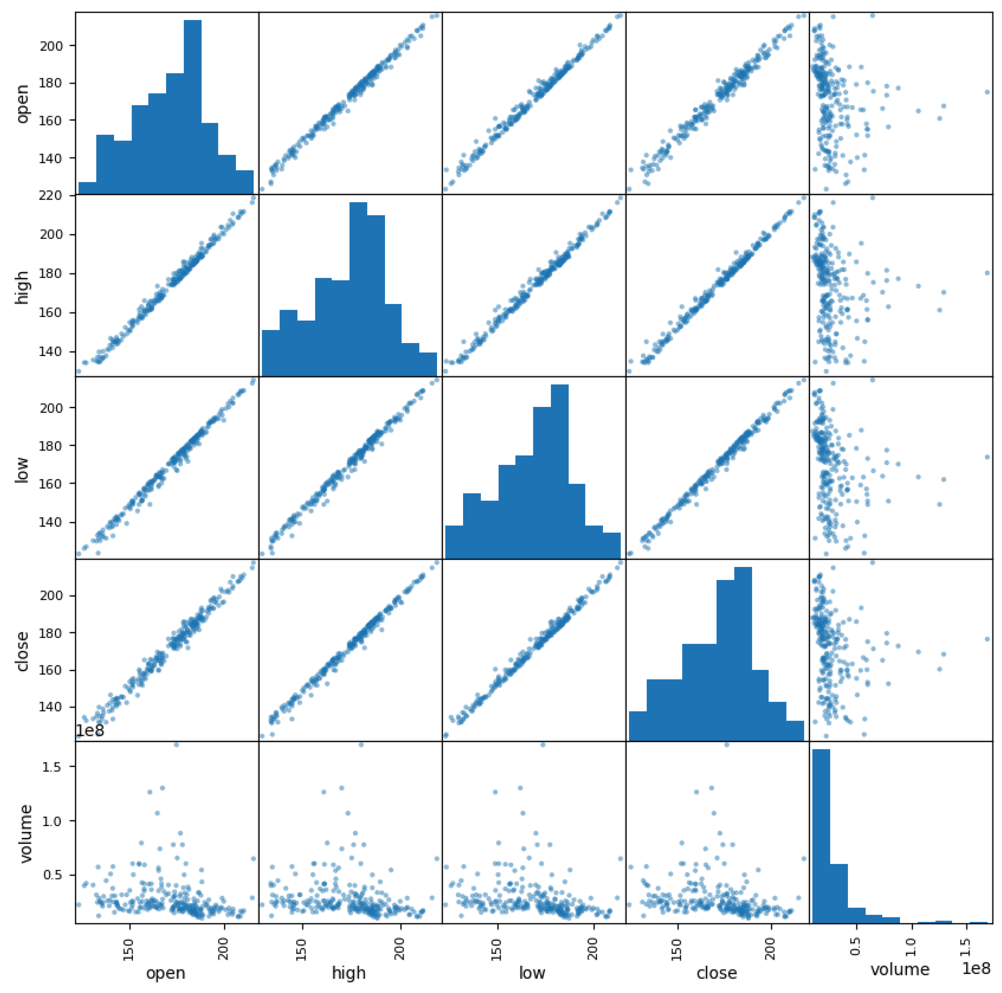
# pandas.plotting subpackage

## Setup

```
%matplotlib inline
import matplotlib.pyplot as plt
import numpy as np
import pandas as pd
fb = pd.read_csv(
 'fb_stock_prices_2018.csv', index_col='date', parse_dates=True
)
```

```
from pandas.plotting import scatter_matrix # scatter matrix
scatter_matrix(fb, figsize=(10, 10))
```

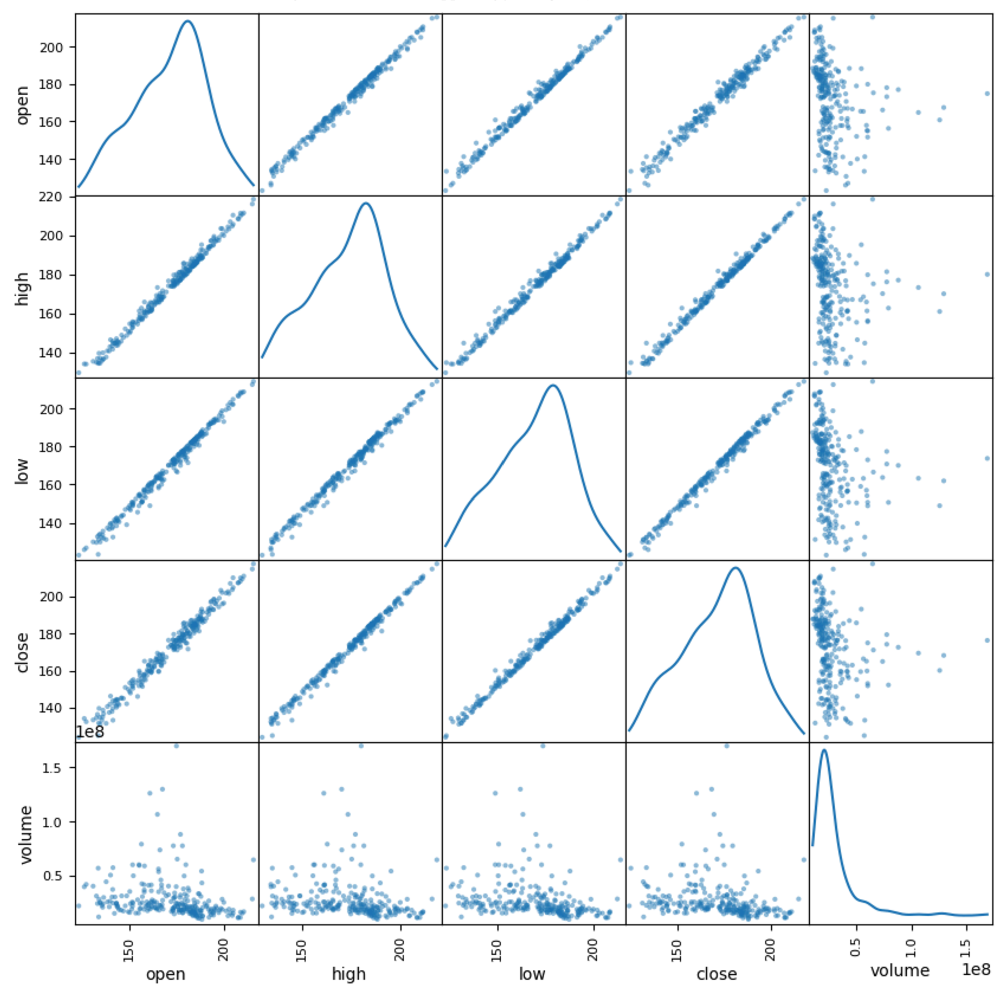
```
array([[<Axes: xlabel='open', ylabel='open'>,
        <Axes: xlabel='high', ylabel='open'>,
        <Axes: xlabel='low', ylabel='open'>,
        <Axes: xlabel='close', ylabel='open'>,
        <Axes: xlabel='volume', ylabel='open'>],
       [<Axes: xlabel='open', ylabel='high'>,
        <Axes: xlabel='high', ylabel='high'>,
        <Axes: xlabel='low', ylabel='high'>,
        <Axes: xlabel='close', ylabel='high'>,
        <Axes: xlabel='volume', ylabel='high'>],
       [<Axes: xlabel='open', ylabel='low'>,
        <Axes: xlabel='high', ylabel='low'>,
        <Axes: xlabel='low', ylabel='low'>,
        <Axes: xlabel='close', ylabel='low'>,
        <Axes: xlabel='volume', ylabel='low'>],
       [<Axes: xlabel='open', ylabel='close'>,
        <Axes: xlabel='high', ylabel='close'>,
        <Axes: xlabel='low', ylabel='close'>,
        <Axes: xlabel='close', ylabel='close'>,
        <Axes: xlabel='volume', ylabel='close'>],
       [<Axes: xlabel='open', ylabel='volume'>,
        <Axes: xlabel='high', ylabel='volume'>,
        <Axes: xlabel='low', ylabel='volume'>,
        <Axes: xlabel='close', ylabel='volume'>,
        <Axes: xlabel='volume', ylabel='volume'>]], dtype=object)
```




Changing the diagonal from histograms to KDE:

```
scatter_matrix(fb, figsize=(10, 10), diagonal='kde') # change the diagonal section to kde
```

```
array([[<Axes: xlabel='open', ylabel='open'>,
        <Axes: xlabel='high', ylabel='open'>,
        <Axes: xlabel='low', ylabel='open'>,
        <Axes: xlabel='close', ylabel='open'>,
        <Axes: xlabel='volume', ylabel='open'>],
       [<Axes: xlabel='open', ylabel='high'>,
        <Axes: xlabel='high', ylabel='high'>,
        <Axes: xlabel='low', ylabel='high'>,
        <Axes: xlabel='close', ylabel='high'>,
        <Axes: xlabel='volume', ylabel='high'>],
       [<Axes: xlabel='open', ylabel='low'>,
        <Axes: xlabel='high', ylabel='low'>,
        <Axes: xlabel='low', ylabel='low'>,
        <Axes: xlabel='close', ylabel='low'>,
        <Axes: xlabel='volume', ylabel='low'>],
       [<Axes: xlabel='open', ylabel='close'>,
        <Axes: xlabel='high', ylabel='close'>,
        <Axes: xlabel='low', ylabel='close'>,
        <Axes: xlabel='close', ylabel='close'>,
        <Axes: xlabel='volume', ylabel='close'>],
       [<Axes: xlabel='open', ylabel='volume'>,
        <Axes: xlabel='high', ylabel='volume'>,
        <Axes: xlabel='low', ylabel='volume'>,
        <Axes: xlabel='close', ylabel='volume'>,
        <Axes: xlabel='volume', ylabel='volume'>]], dtype=object)
```

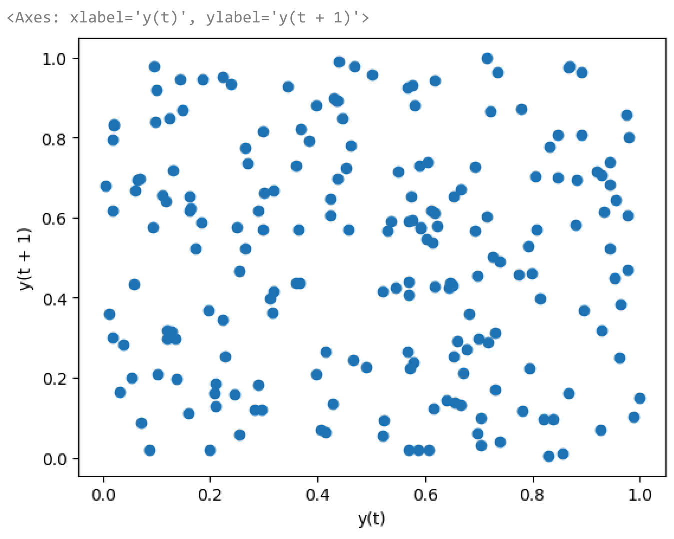



## Lag plot

Lag plots let us see how the variable correlations with past observations of itself. Random data has no pattern:

```
from pandas.plotting import lag_plot # lag plot
np.random.seed(0) # make this repeatable
lag_plot(pd.Series(np.random.random(size=200)))
```

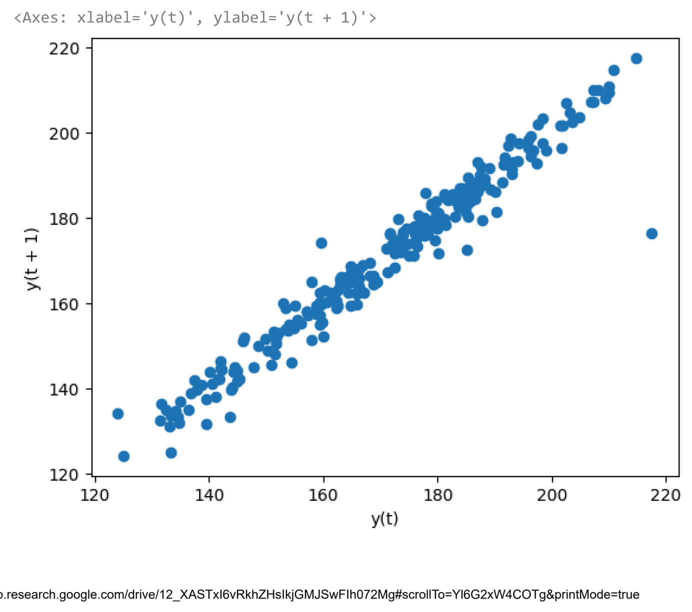
```
<Axes: xlabel='y(t)', ylabel='y(t + 1)'>
```




Data with some level of correlation to itself (autocorrelation) may have patterns. Stock prices are highly auto-correlated:

```
lag_plot(fb.close) # lag plotting closing price shows the correlation between the plots
```

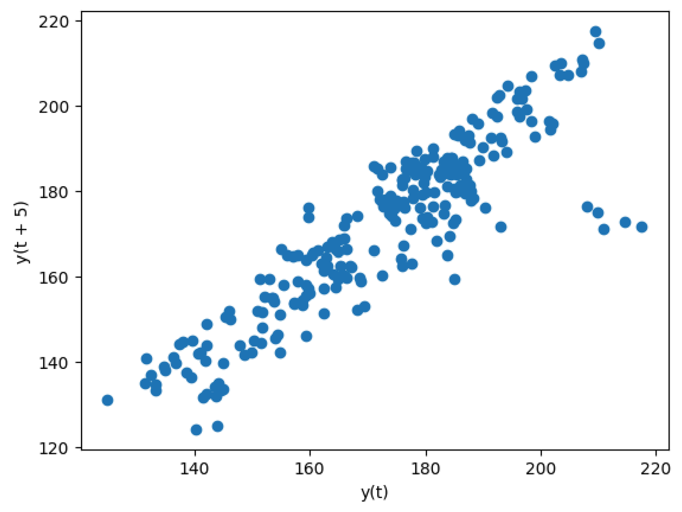
```
<Axes: xlabel='y(t)', ylabel='y(t + 1)'>
```



The default lag is 1, but we can alter this with the parameter. Let's look at a 5 day lag (a week of trading activity):

```
lag_plot(fb.close, lag=5) # 5 day lag
```

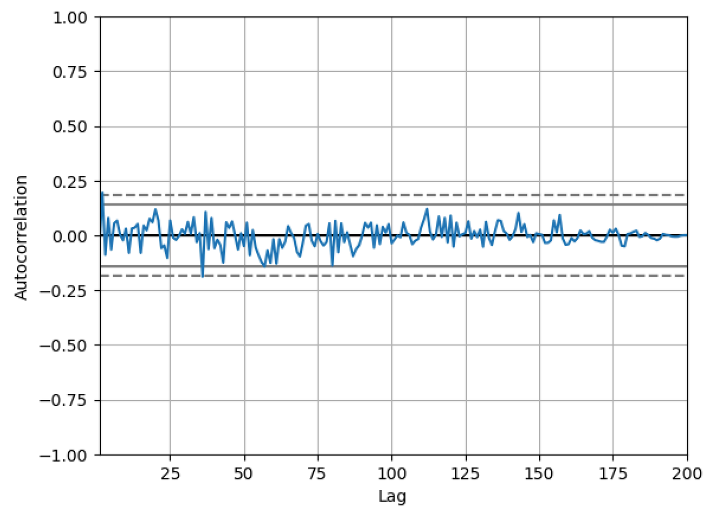
<Axes: xlabel='y(t)', ylabel='y(t + 5)'>




## Autocorrelation plots

```
from pandas.plotting import autocorrelation_plot # autocorrelation plot
np.random.seed(0) # make this repeatable
autocorrelation_plot(pd.Series(np.random.random(size=200)))
```

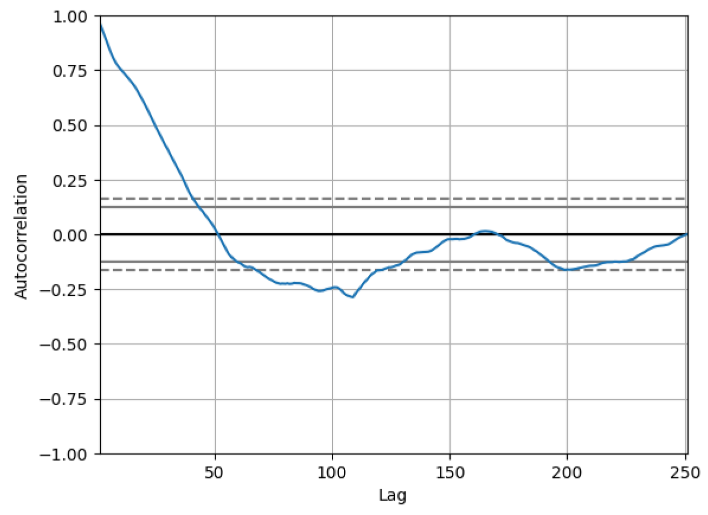
<Axes: xlabel='Lag', ylabel='Autocorrelation'>




Stock data, on the other hand, does have significant autocorrelation:

```
autocorrelation_plot(fb.close)
```

<Axes: xlabel='Lag', ylabel='Autocorrelation'>




## Bootstrap plot

This plot helps us understand the uncertainty in our summary statistics

```
from pandas.plotting import bootstrap_plot # bootstrap_plot that helps understand uncertainty in summary statistics
fig = bootstrap_plot(fb.volume, fig=plt.figure(figsize=(10, 6)))
```