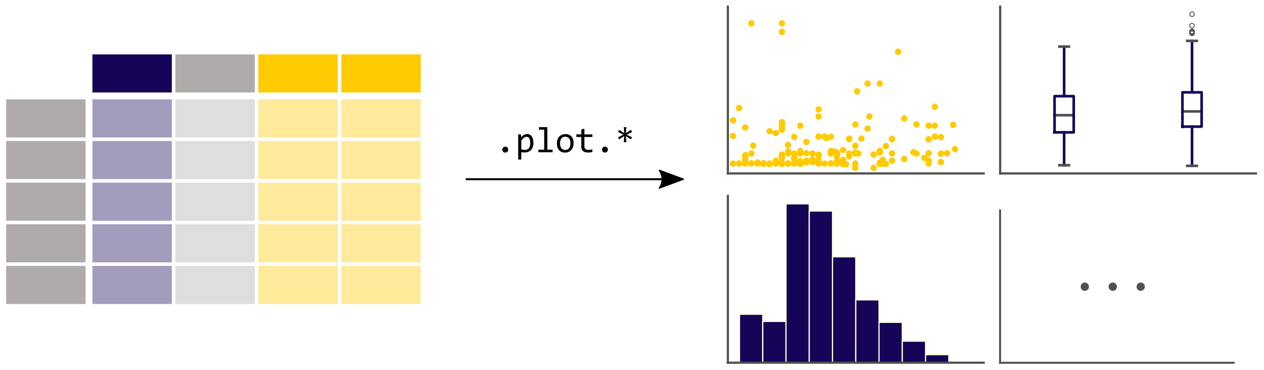
How do I create plots in pandas?



```
In [1]: import pandas as pd

In [2]: import matplotlib.pyplot as plt
```

Data used for this tutorial:

Air quality data

```
In [3]: air_quality = pd.read_csv("data/air_quality_no2.csv", index_col=0, parse_dates=True)

In [4]: air_quality.head()
Out[4]: 
                     station_antwerp  station_paris  station_london
datetime                                                           
2019-05-07 02:00:00              NaN            NaN            23.0
2019-05-07 03:00:00             50.5           25.0            19.0
2019-05-07 04:00:00             45.0           27.7            19.0
2019-05-07 05:00:00              NaN           50.4            16.0
2019-05-07 06:00:00              NaN           61.9             NaN
```

Note

The usage of the `index_col` and `parse_dates` parameters of the `read_csv` function to define the first (0th) column as index of the resulting `DataFrame` and convert the dates in the column to `Timestamp` objects, respectively.

I want a quick visual check of the data.

```
In [5]: air_quality.plot()
Out[5]: <Axes: xlabel='datetime'>

In [6]: plt.show()
```

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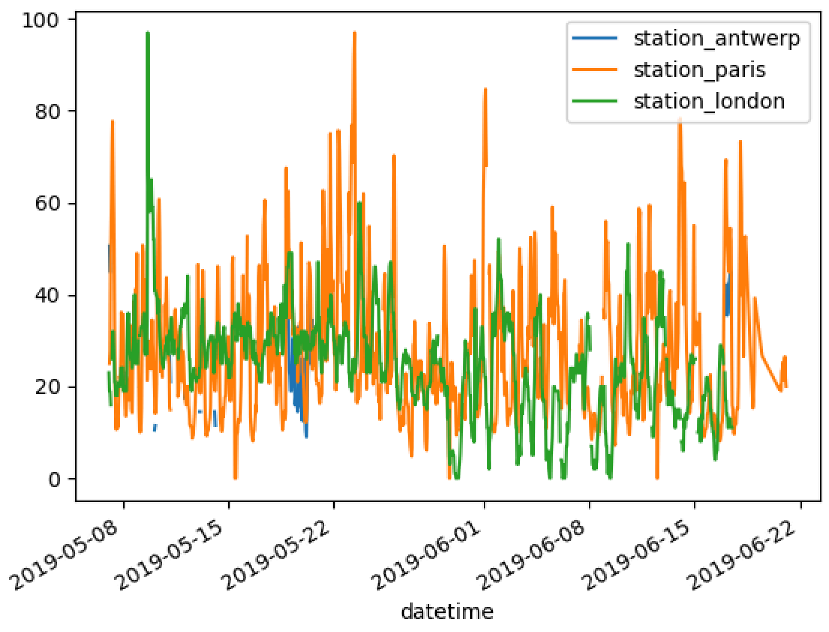
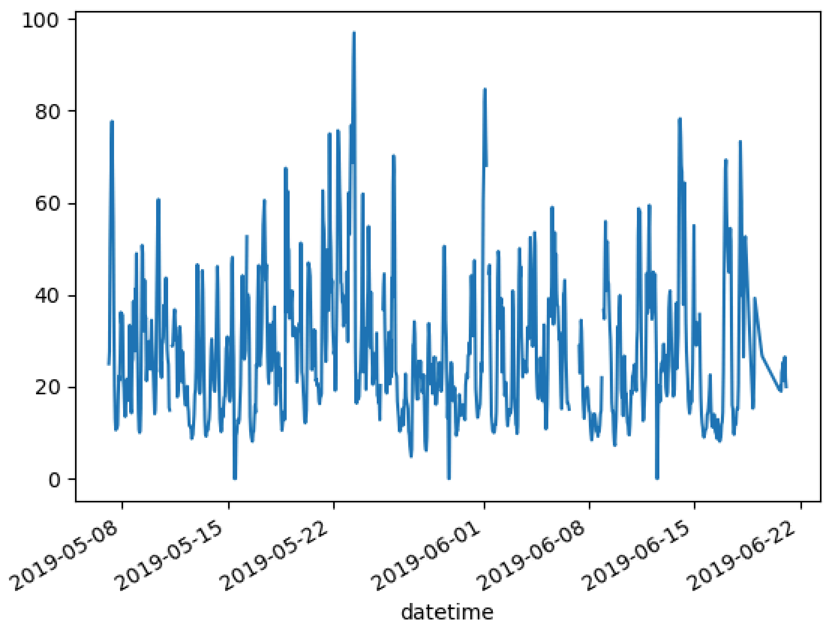


With a `DataFrame`, pandas creates by default one line plot for each of the columns with numeric data.

I want to plot only the columns of the data table with the data from Paris.

```
In [7]: air_quality["station_paris"].plot()
Out[7]: <Axes: xlabel='datetime'>

In [8]: plt.show()
```



To plot a specific column, use the selection method of the subset data tutorial in combination with the `plot()` method. Hence, the `plot()` method works on both `Series` and `DataFrame`.

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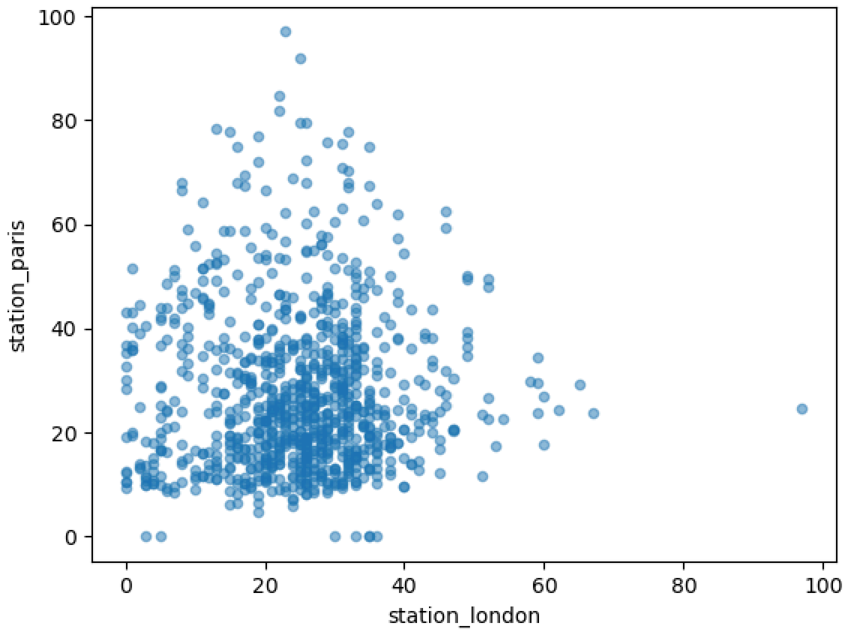
```
In [9]: air_quality.plot.scatter(x="station_london", y="station_paris", alpha=0.5)
Out[9]: <Axes: xlabel='station_london', ylabel='station_paris'>

In [10]: plt.show()
```



Apart from the default `line` plot when using the `plot` function, a number of alternatives are available to plot data. Let's use some standard Python to get an overview of the available plot methods:

```
In [11]: [
   ....:     method_name
   ....:     for method_name in dir(air_quality.plot)
   ....:     if not method_name.startswith("_")
   ....: ]
   ....:
Out[11]:
['area',
 'bar',
 'barh',
 'box',
 'density',
 'hexbin',
 'hist',
 'kde',
 'line',
 'pie',
 'scatter']
```

Note

In many development environments as well as IPython and Jupyter Notebook, use the TAB button to get an overview of the available methods, for example `air_quality.plot.` + TAB.

One of the options is `DataFrame.plot.box()`, which refers to a boxplot. The `box` method is applicable on the air quality example data:

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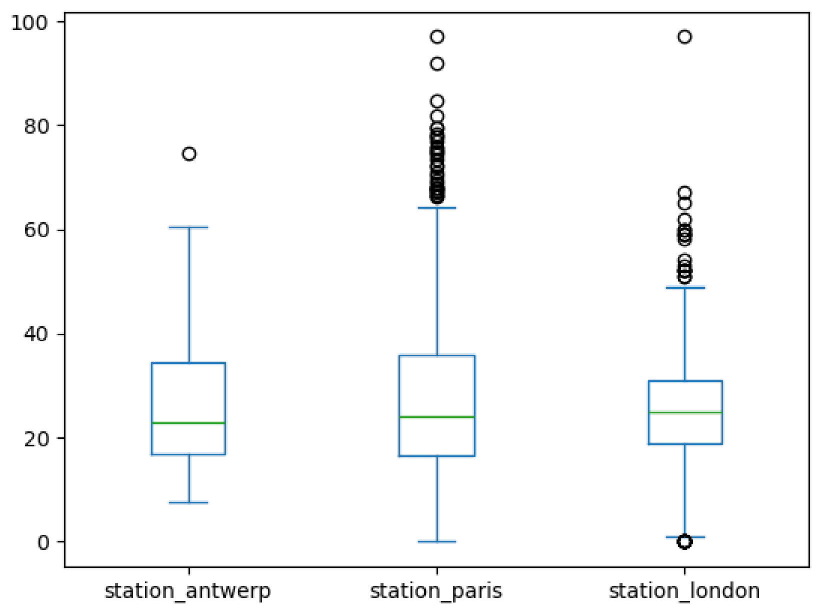
```
In [12]: air_quality.plot.box()
Out[12]: <Axes: >

In [13]: plt.show()
```

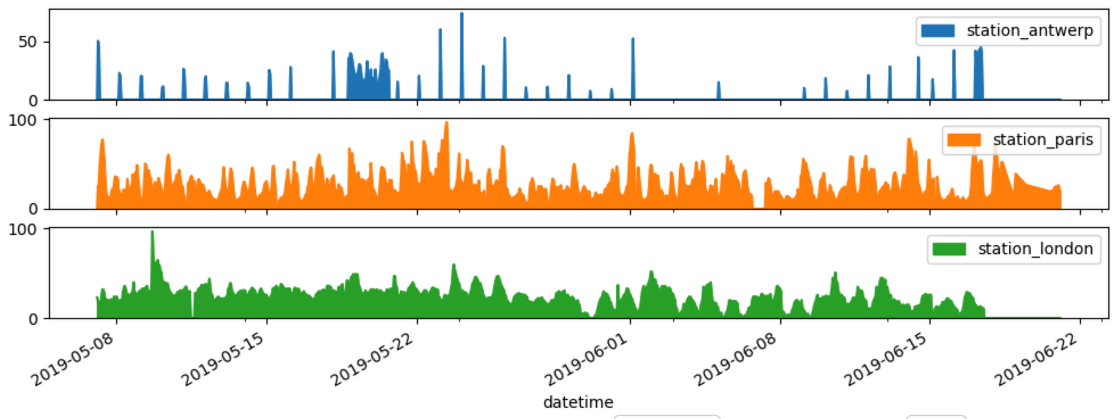


To user guide For an introduction to plots other than the default line plot, see the user guide section about supported plot styles.

I want each of the columns in a separate subplot.

```
In [14]: axs = air_quality.plot.area(figsize=(12, 4), subplots=True)

In [15]: plt.show()
```



Separate subplots for each of the data columns are supported by the `subplots` argument of the `plot` functions. The builtin options available in each of the pandas plot functions are worth reviewing.

To user guide Some more formatting options are explained in the user guide section on plot formatting.

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I want to further customize, extend or save the resulting plot.

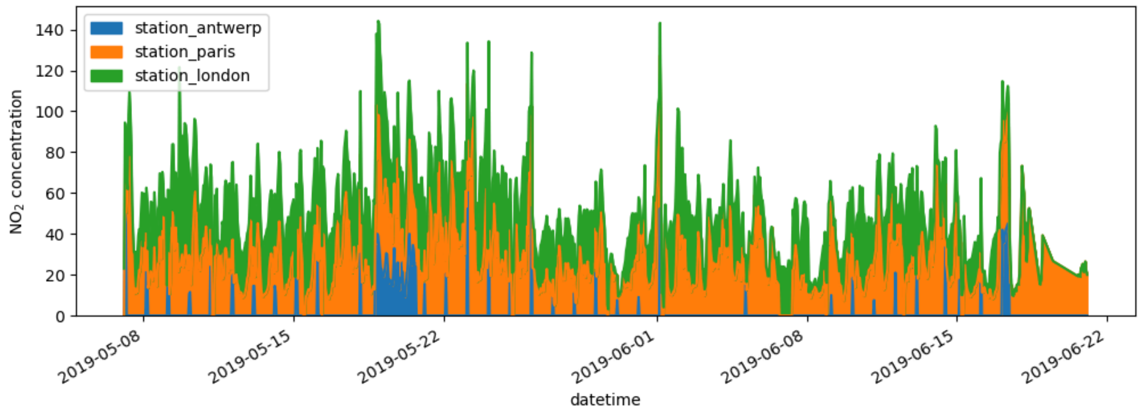
```
In [16]: fig, axs = plt.subplots(figsize=(12, 4))

In [17]: air_quality.plot.area(ax=axs)
Out[17]: <Axes: xlabel='datetime'>

In [18]: axs.set_ylabel("NO$_2$ concentration")
Out[18]: Text(0, 0.5, 'NO$_2$ concentration')

In [19]: fig.savefig("no2_concentrations.png")

In [20]: plt.show()
```



Each of the plot objects created by pandas is a Matplotlib object. As Matplotlib provides plenty of options to customize plots, making the link between pandas and Matplotlib explicit enables all the power of Matplotlib to the plot. This strategy is applied in the previous example:

```
fig, axs = plt.subplots(figsize=(12, 4))        # Create an empty Matplotlib Figure and Axes
air_quality.plot.area(ax=axs)                   # Use pandas to put the area plot on the prepared Figure/Axes
axs.set_ylabel("NO$_2$ concentration")          # Do any Matplotlib customization you like
fig.savefig("no2_concentrations.png")           # Save the Figure/Axes using the existing Matplotlib method.
plt.show()                                      # Display the plot
```

REMEMBER

- The `.plot.*` methods are applicable on both Series and DataFrames.
- By default, each of the columns is plotted as a different element (line, boxplot,…).
- Any plot created by pandas is a Matplotlib object.