Week4

May 3, 2019

1 Pandas Visualization

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

%matplotlib notebook
```

In [2]:
```
# see the pre-defined styles provided.
plt.style.available
```

Out[2]:
```
['grayscale',
 'seaborn-colorblind',
 'seaborn-bright',
 'seaborn-deep',
 'seaborn-pastel',
 'classic',
 'seaborn-muted',
 'seaborn-darkgrid',
 'seaborn-white',
 'seaborn-paper',
 'seaborn-dark',
 'seaborn-whitegrid',
 'dark_background',
 'seaborn-poster',
 'ggplot',
 'seaborn-ticks',
 'seaborn-dark-palette',
 'seaborn-notebook',
 'bmh',
 'seaborn-talk',
 'fivethirtyeight',
 'seaborn']
```

In [3]:
```
# use the 'seaborn-colorblind' style
plt.style.use('seaborn-colorblind')
```

1.0.1 DataFrame.plot

```
In [4]: np.random.seed(123)

        df = pd.DataFrame({'A': np.random.randn(365).cumsum(0),
                           'B': np.random.randn(365).cumsum(0) + 20,
                           'C': np.random.randn(365).cumsum(0) - 20},
                          index=pd.date_range('1/1/2017', periods=365))
        df.head()
```

```
Out[4]:                    A          B          C
        2017-01-01 -1.085631  20.059291 -20.230904
        2017-01-02 -0.088285  21.803332 -16.659325
        2017-01-03  0.194693  20.835588 -17.055481
        2017-01-04 -1.311601  21.255156 -17.093802
        2017-01-05 -1.890202  21.462083 -19.518638
```

```
In [5]: df.plot(); # add a semi-colon to the end of the plotting call to suppress u
```

```
<IPython.core.display.Javascript object>
```

```
<IPython.core.display.HTML object>
```

We can select which plot we want to use by passing it into the 'kind' parameter.

```
In [6]: df.plot('A','B', kind = 'scatter');
```

```
<IPython.core.display.Javascript object>
```

```
<IPython.core.display.HTML object>
```

You can also choose the plot kind by using the `DataFrame.plot.kind` methods instead of providing the `kind` keyword argument.

`kind` : - `'line'` : line plot (default) - `'bar'` : vertical bar plot - `'barh'` : horizontal bar plot - `'hist'` : histogram - `'box'` : boxplot - `'kde'` : Kernel Density Estimation plot - `'density'` : same as 'kde' - `'area'` : area plot - `'pie'` : pie plot - `'scatter'` : scatter plot - `'hexbin'` : hexbin plot

```
In [7]: # create a scatter plot of columns 'A' and 'C', with changing color (c) and
        df.plot.scatter('A', 'C', c='B', s=df['B'], colormap='viridis')
```

```
<IPython.core.display.Javascript object>
```

```
<IPython.core.display.HTML object>
```

```
Out[7]: <matplotlib.axes._subplots.AxesSubplot at 0x7f36102d3978>

In [8]: ax = df.plot.scatter('A', 'C', c='B', s=df['B'], colormap='viridis')
        ax.set_aspect('equal')

<IPython.core.display.Javascript object>


<IPython.core.display.HTML object>


In [9]: df.plot.box();

<IPython.core.display.Javascript object>


<IPython.core.display.HTML object>


In [10]: df.plot.hist(alpha=0.7);

<IPython.core.display.Javascript object>


<IPython.core.display.HTML object>
```

Kernel density estimation plots are useful for deriving a smooth continuous function from a given sample.

```
In [11]: df.plot.kde();

<IPython.core.display.Javascript object>


<IPython.core.display.HTML object>
```

1.0.2 pandas.tools.plotting

Iris flower data set

```
In [12]: iris = pd.read_csv('iris.csv')
         iris.head()

Out[12]:    SepalLength  SepalWidth  PetalLength  PetalWidth         Name
         0          5.1         3.5          1.4         0.2  Iris-setosa
         1          4.9         3.0          1.4         0.2  Iris-setosa
         2          4.7         3.2          1.3         0.2  Iris-setosa
         3          4.6         3.1          1.5         0.2  Iris-setosa
         4          5.0         3.6          1.4         0.2  Iris-setosa
```

```
In [13]: pd.tools.plotting.scatter_matrix(iris);
```

```
<IPython.core.display.Javascript object>
```

```
<IPython.core.display.HTML object>
```

```
In [14]: plt.figure()
         pd.tools.plotting.parallel_coordinates(iris, 'Name');
```

```
<IPython.core.display.Javascript object>
```

```
<IPython.core.display.HTML object>
```

2 Seaborn

```
In [15]: import numpy as np
         import pandas as pd
         import matplotlib.pyplot as plt
         import seaborn as sns

         %matplotlib notebook
```

```
In [16]: np.random.seed(1234)

         v1 = pd.Series(np.random.normal(0,10,1000), name='v1')
         v2 = pd.Series(2*v1 + np.random.normal(60,15,1000), name='v2')
```

```
In [17]: plt.figure()
         plt.hist(v1, alpha=0.7, bins=np.arange(-50,150,5), label='v1');
         plt.hist(v2, alpha=0.7, bins=np.arange(-50,150,5), label='v2');
         plt.legend();
```

```
<IPython.core.display.Javascript object>
```

```
<IPython.core.display.HTML object>
```

```
In [18]: # plot a kernel density estimation over a stacked barchart
         plt.figure()
         plt.hist([v1, v2], histtype='barstacked', normed=True);
         v3 = np.concatenate((v1,v2))
         sns.kdeplot(v3);
```

```
<IPython.core.display.Javascript object>
```

```
<IPython.core.display.HTML object>
```

```
In [19]: plt.figure()
         # we can pass keyword arguments for each individual component of the plot
         sns.distplot(v3, hist_kws={'color': 'Teal'}, kde_kws={'color': 'Navy'});
```

```
<IPython.core.display.Javascript object>
```

```
<IPython.core.display.HTML object>
```

```
In [20]: sns.jointplot(v1, v2, alpha=0.4);
```

```
<IPython.core.display.Javascript object>
```

```
<IPython.core.display.HTML object>
```

```
In [21]: grid = sns.jointplot(v1, v2, alpha=0.4);
         grid.ax_joint.set_aspect('equal')
```

```
<IPython.core.display.Javascript object>
```

```
<IPython.core.display.HTML object>
```

```
In [22]: sns.jointplot(v1, v2, kind='hex');
```

```
<IPython.core.display.Javascript object>
```

```
<IPython.core.display.HTML object>
```

```
In [23]: # set the seaborn style for all the following plots
         sns.set_style('white')

         sns.jointplot(v1, v2, kind='kde', space=0);
```

```
<IPython.core.display.Javascript object>
```

```
<IPython.core.display.HTML object>
```

```
In [24]: iris = pd.read_csv('iris.csv')
         iris.head()
```

Out[24]:

	SepalLength	SepalWidth	PetalLength	PetalWidth	Name
0	5.1	3.5	1.4	0.2	Iris-setosa
1	4.9	3.0	1.4	0.2	Iris-setosa
2	4.7	3.2	1.3	0.2	Iris-setosa
3	4.6	3.1	1.5	0.2	Iris-setosa
4	5.0	3.6	1.4	0.2	Iris-setosa

In [25]:
```
sns.pairplot(iris, hue='Name', diag_kind='kde', size=2);
```

```
<IPython.core.display.Javascript object>
```

```
<IPython.core.display.HTML object>
```

In [27]:
```
plt.figure(figsize=(8,6))
plt.subplot(121)
sns.swarmplot('Name', 'PetalLength', data=iris);
plt.subplot(122)
sns.violinplot('Name', 'PetalLength', data=iris);
```

```
<IPython.core.display.Javascript object>
```

```
<IPython.core.display.HTML object>
```

In [ ]: