Exercise: Iris Dataset

Now that you have a good understanding of exploritory data analysis and it's importance, it's time to put your knowledge to a more practical example. We'll be focusing on a iris public dataset from the scikit-learn library.

Our main objectives for this dataset are:

1. Load the iris dataset into a pandas dataframe
2. Create a table summary of the features and target values
3. Create a histogram of all the features and target
4. Create a correlation matrix of the features and target
5. Create scatter plots of all the features and target

In [45]:

```
import pandas as pd
import sklearn
import numpy as np
from sklearn import datasets
import matplotlib.pyplot as plt
```

In [3]:

```
# Load in the iris dataset
iris = datasets.load_iris()
```

In [4]:

```
# For clarity, the iris dataset is a dictionary with the data and target separated
iris.keys()
```

Out[4]:

```
dict_keys(['data', 'target', 'target_names', 'DESCR', 'feature_names', 'filename'])
```

In [11]:

```
# Create the iris `data` dataset as a dataframe and name the columns with `feature_names`
df = pd.DataFrame(iris['data'], columns=iris['feature_names'])

# Include the target as well
df['target'] = iris['target']
df.head(5)
```

Out[11]:

	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)	target
0	5.1	3.5	1.4	0.2	0
1	4.9	3.0	1.4	0.2	0
2	4.7	3.2	1.3	0.2	0
3	4.6	3.1	1.5	0.2	0
4	5.0	3.6	1.4	0.2	0

In [41]:

```
# Loading iris dataset, use `as_frame=True` to return it as a dataframe
iris = datasets.load_iris()
```

In [42]:

```
# For clarity, the iris dataset is a dictionary with the data and target separated
iris.keys()
```

Out[42]:

```
dict_keys(['data', 'target', 'target_names', 'DESCR', 'feature_names', 'filename'])
```

In [46]:

```
# Create the iris dataset as a dataframe, it'll be the `frame` key
df =pd.DataFrame(np.column_stack((iris.data, iris.target)), columns = iris.feature_names+['target'])
```

In [47]:

```
# Check your dataframe by `.head()`
df.head()
```

Out[47]:

	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)	target
0	5.1	3.5	1.4	0.2	0.0
1	4.9	3.0	1.4	0.2	0.0
2	4.7	3.2	1.3	0.2	0.0
3	4.6	3.1	1.5	0.2	0.0
4	5.0	3.6	1.4	0.2	0.0

In [48]:

```
# Simple table summary
df.describe()
```

Out[48]:

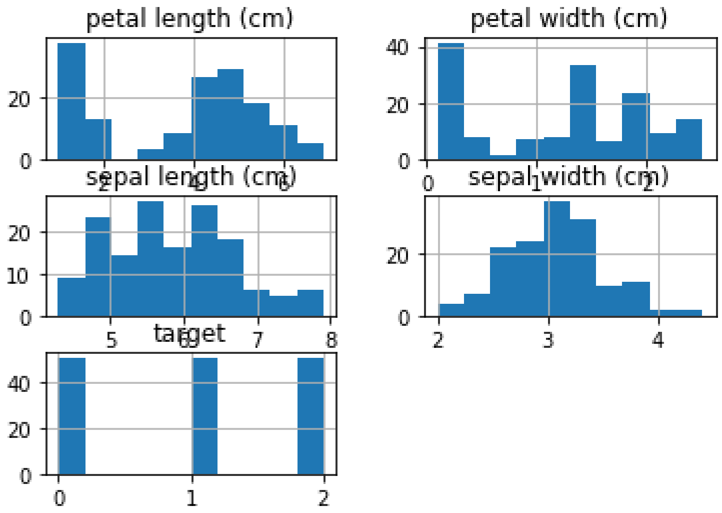
	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)	target
count	150.000000	150.000000	150.000000	150.000000	150.000000
mean	5.843333	3.057333	3.758000	1.199333	1.000000
std	0.828066	0.435866	1.765298	0.762238	0.819232
min	4.300000	2.000000	1.000000	0.100000	0.000000
25%	5.100000	2.800000	1.600000	0.300000	0.000000
50%	5.800000	3.000000	4.350000	1.300000	1.000000
75%	6.400000	3.300000	5.100000	1.800000	2.000000
max	7.900000	4.400000	6.900000	2.500000	2.000000

In [66]:

```
# Histogram to show all the data distributions including the target
df.hist()
```

Out[66]:

```
array([[<matplotlib.axes._subplots.AxesSubplot object at 0x7fea1f13b2d0>,
        <matplotlib.axes._subplots.AxesSubplot object at 0x7fea1ec75590>],
       [<matplotlib.axes._subplots.AxesSubplot object at 0x7fea1ecbcd50>,
        <matplotlib.axes._subplots.AxesSubplot object at 0x7fea1ed72590>],
       [<matplotlib.axes._subplots.AxesSubplot object at 0x7fea1ed92d50>,
        <matplotlib.axes._subplots.AxesSubplot object at 0x7fea1eed8590>]],
      dtype=object)
```



In [67]:

```
# Investigate to see if any data are correlated positively or negatively
df.corr()
```

Out[67]:

	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)	target
sepal length (cm)	1.000000	-0.117570	0.871754	0.817941	0.782561
sepal width (cm)	-0.117570	1.000000	-0.428440	-0.366126	-0.426658
petal length (cm)	0.871754	-0.428440	1.000000	0.962865	0.949035
petal width (cm)	0.817941	-0.366126	0.962865	1.000000	0.956547
target	0.782561	-0.426658	0.949035	0.956547	1.000000

Scatter Plot Of Features

Create a scatter plot of the four features against eachother to visualize the results from the correlation matrix

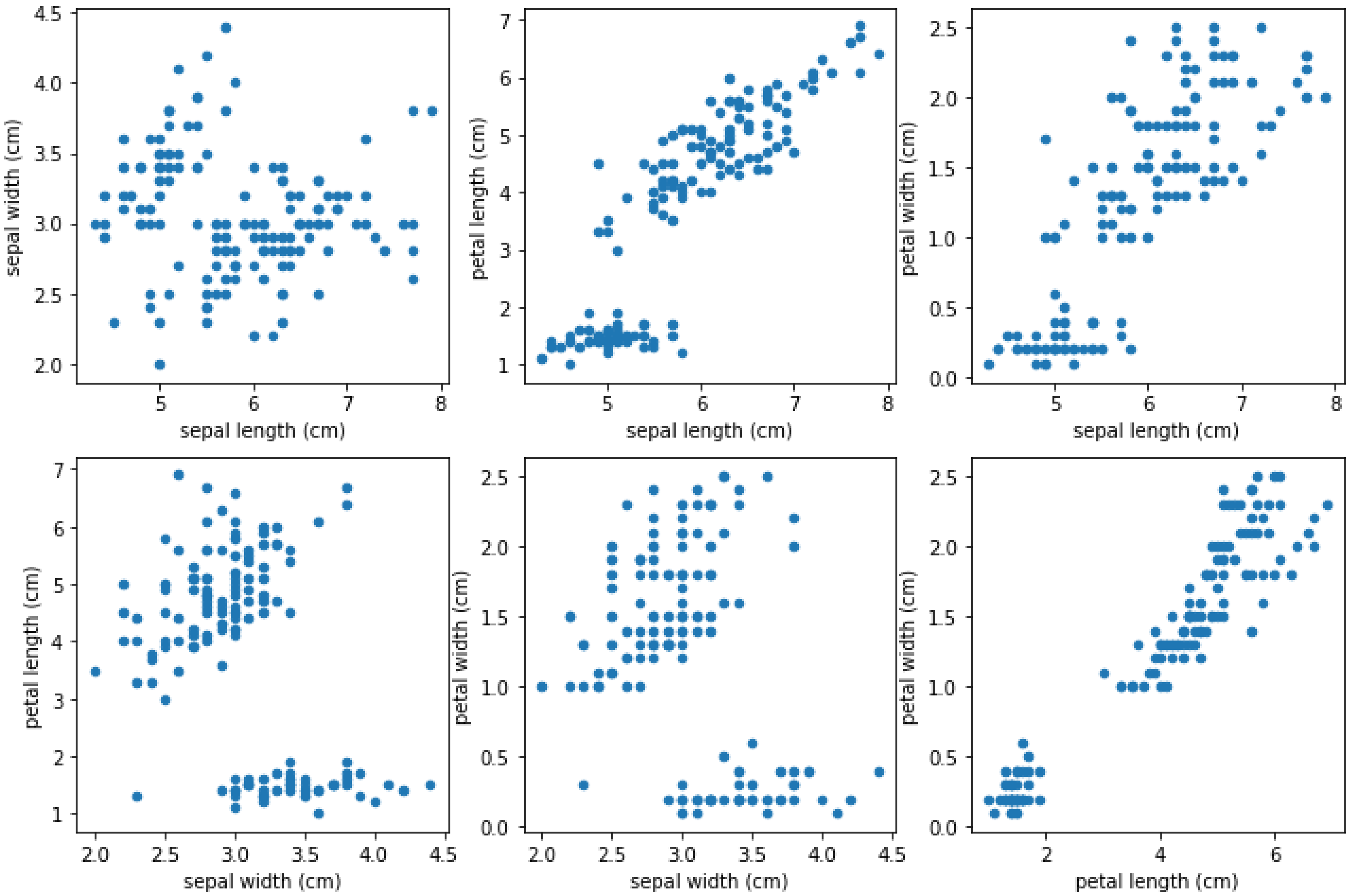
1. `sepal length (cm)` vs. `sepal width (cm)`
2. `sepal length (cm)` vs. `petal length (cm)`
3. `sepal length (cm)` vs. `petal width (cm)`
4. `sepal width (cm)` vs. `petal length (cm)`
5. `sepal width (cm)` vs. `petal width (cm)`
6. `petal length (cm)` vs. `petal width (cm)`

In [75]:

```
fig, axes = plt.subplots(nrows=2, ncols=3, figsize=(12, 8))
df.plot(ax=axes[0,0], x='sepal length (cm)', y='sepal width (cm)', kind='scatter')
df.plot(ax=axes[0,1], x='sepal length (cm)', y='petal length (cm)', kind='scatter')
df.plot(ax=axes[0,2], x='sepal length (cm)', y='petal width (cm)', kind='scatter')
df.plot(ax=axes[1,0], x='sepal width (cm)', y='petal length (cm)', kind='scatter')
df.plot(ax=axes[1,1], x='sepal width (cm)', y='petal width (cm)', kind='scatter')
df.plot(ax=axes[1,2], x='petal length (cm)', y='petal width (cm)', kind='scatter')
```

Out[75]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fea1f91f110>
```



Scatter Plot Of Features And Target

Create a scatter plot of the four features against the target

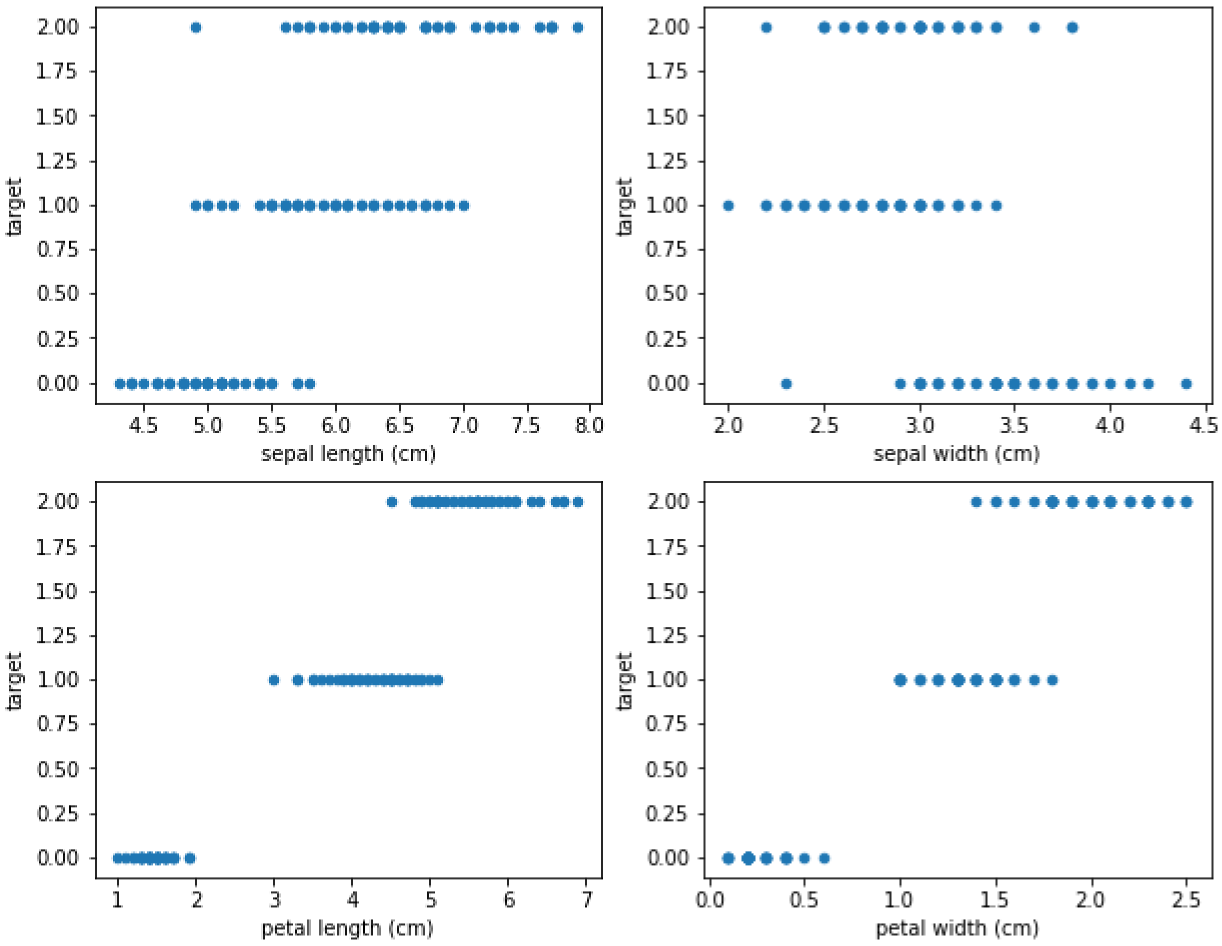
1. `sepal length (cm)`
2. `sepal width (cm)`
3. `petal length (cm)`
4. `petal width (cm)`

In [77]:

```
fig, axes = plt.subplots(nrows=2, ncols=2, figsize=(10, 8))
df.plot(ax=axes[0, 0], x='sepal length (cm)', y ='target', kind='scatter')
df.plot(ax=axes[0, 1], x='sepal width (cm)', y ='target', kind='scatter')
df.plot(ax=axes[1, 0], x='petal length (cm)', y ='target', kind='scatter')
df.plot(ax=axes[1, 1], x='petal width (cm)', y ='target', kind='scatter')
```

```
Out[77]:

<matplotlib.axes._subplots.AxesSubplot at 0x7fea207ab810>
```


target
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
4.5
5.0
5.5
6.0
6.5
7.0
7.5
8.0
sepal length (cm)
target
2.0
2.5
3.0
3.5
4.0
4.5
sepal width (cm)
target
1
2
3
4
5
6
7
petal length (cm)
target
0.0
0.5
1.0
1.5
2.0
2.5
petal width (cm)