In [19]:
```python
import sys
print('python: {}'.format(sys.version))
import scipy
print('Scipy: {}'.format(scipy.__version__))
import numpy
print('numpy: {}'.format(numpy.__version__))
import matplotlib
print('Matplotlib: {}'.format(matplotlib.__version__))
import pandas
print('pandas: {}'.format(pandas.__version__))
import sklearn
print('sklearn: {}'.format(sklearn.__version__))
```

```
python: 3.7.6 (default, Jan  8 2020, 20:23:39) [MSC v.1916 64 bit (AMD64)]
Scipy: 1.4.1
numpy: 1.18.1
Matplotlib: 3.1.3
pandas: 1.0.1
sklearn: 0.22.1
```

In [20]:
```python
import pandas
from pandas import read_csv
from pandas.plotting import scatter_matrix
from matplotlib import pyplot
from sklearn.model_selection import train_test_split
from sklearn.model_selection import cross_val_score
from sklearn.model_selection import StratifiedKFold
from sklearn.metrics import classification_report
from sklearn.metrics import confusion_matrix
from sklearn.metrics import accuracy_score
from sklearn.linear_model import LogisticRegression
from sklearn.tree import DecisionTreeClassifier
from sklearn.neighbors import KNeighborsClassifier
from sklearn.discriminant_analysis import LinearDiscriminantAnalysis
from sklearn.naive_bayes import GaussianNB
from sklearn.svm import SVC
from sklearn import model_selection
from sklearn.ensemble import VotingClassifier
```

In [21]:
```python
url = "https://raw.githubusercontent.com/jbrownlee/datasets/master/iris.csv"
names = ['sepal-length','sepal-width','petal-length','petal-width','class']
dataset = read_csv(url,names=names)
```

In [22]:
```python
print(dataset.shape)
```

```
(150, 5)
```

In [23]:
```python
print(dataset.head(15))
```

```
    sepal-length  sepal-width  petal-length  petal-width        class
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
5            5.4          3.9           1.7          0.4  Iris-setosa
6            4.6          3.4           1.4          0.3  Iris-setosa
7            5.0          3.4           1.5          0.2  Iris-setosa
8            4.4          2.9           1.4          0.2  Iris-setosa
9            4.9          3.1           1.5          0.1  Iris-setosa
10           5.4          3.7           1.5          0.2  Iris-setosa
11           4.8          3.4           1.6          0.2  Iris-setosa
12           4.8          3.0           1.4          0.1  Iris-setosa
13           4.3          3.0           1.1          0.1  Iris-setosa
14           5.8          4.0           1.2          0.2  Iris-setosa
```

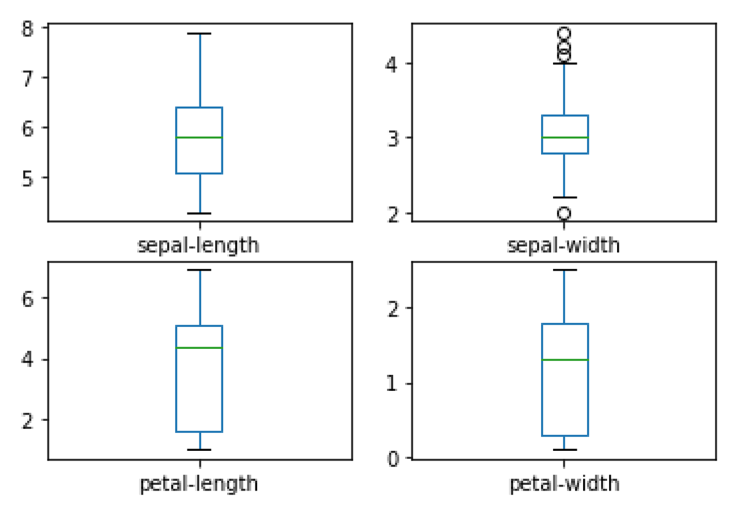
In [24]:
```python
print(dataset.describe())
```

```
       sepal-length  sepal-width  petal-length  petal-width
count    150.000000   150.000000    150.000000   150.000000
mean       5.843333     3.054000      3.758667     1.198667
std        0.828066     0.433594      1.764420     0.763161
min        4.300000     2.000000      1.000000     0.100000
25%        5.100000     2.800000      1.600000     0.300000
50%        5.800000     3.000000      4.350000     1.300000
75%        6.400000     3.300000      5.100000     1.800000
max        7.900000     4.400000      6.900000     2.500000
```

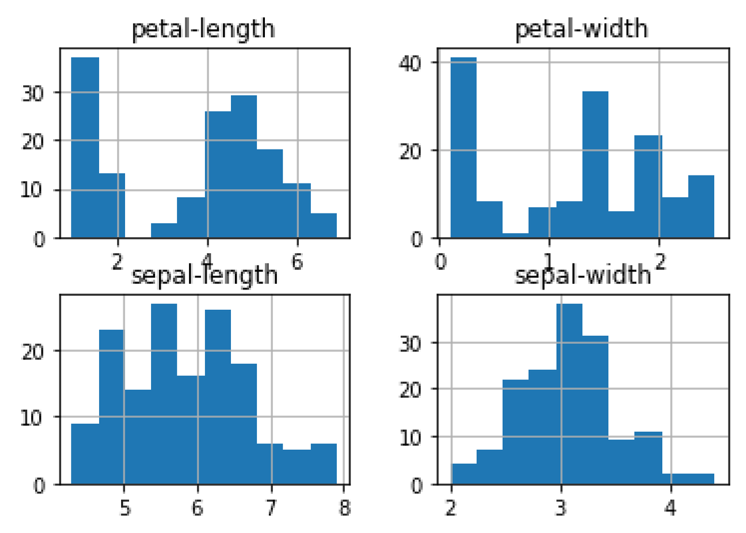
In [26]:
```python
print(dataset.groupby('class').size())
```

```
class
Iris-setosa        50
Iris-versicolor    50
Iris-virginica     50
dtype: int64
```

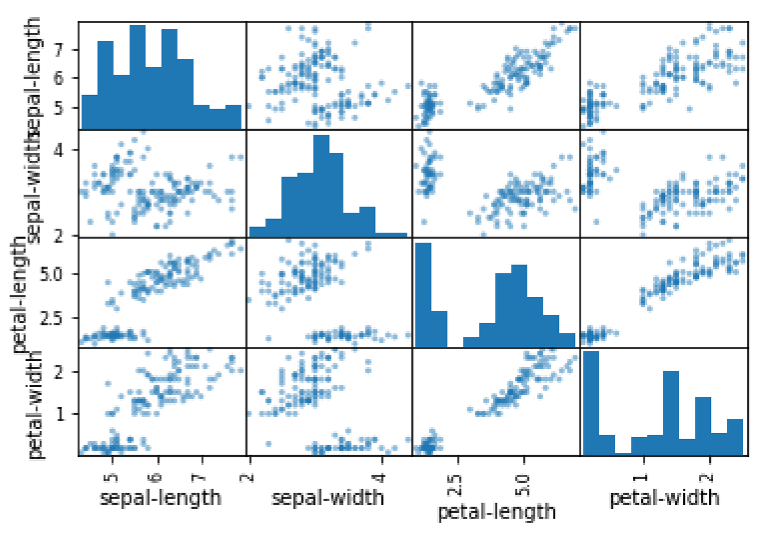
In [27]:
```python
dataset.plot(kind = 'box' , subplots = True,layout=(2,2),sharex=False,sharey=False)
pyplot.show()
```



In [29]:
```python
dataset.hist()
pyplot.show()
```



In [31]:
```python
scatter_matrix(dataset)
pyplot.show()
```



In [32]:
```python
array= dataset.values
x= array[:,0:4]
y=array[:,4]
x_train,x_validation,y_train,y_validation=train_test_split(x,y,test_size=0.2,random_state=1)
```

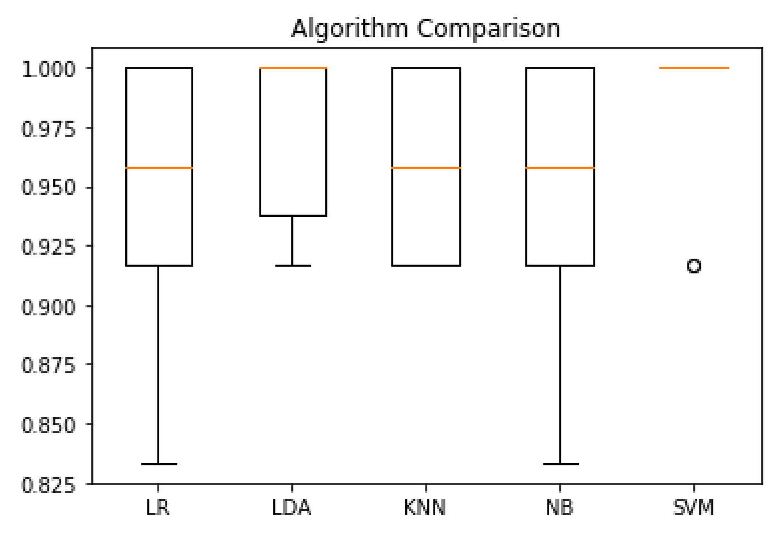
In [34]:
```python
models = []
models.append(('LR',LogisticRegression(solver='liblinear',multi_class='ovr')))
models.append(('LDA',LinearDiscriminantAnalysis()))
models.append(('KNN',KNeighborsClassifier()))
models.append(('NB',GaussianNB()))
models.append(('SVM',SVC(gamma='auto')))
```

In [38]:
```python
results=[]
names=[]
for name,model in models:
    kfold = StratifiedKFold(n_splits=10,random_state=1)
    cv_results = cross_val_score(model, x_train, y_train, cv=kfold, scoring='accuracy')
    results.append(cv_results)
    names.append(name)
    print('%s: %f (%f)' % (name, cv_results.mean(), cv_results.std()))
```

```
LR: 0.950000 (0.055277)
LDA: 0.975000 (0.038188)
KNN: 0.958333 (0.041667)
NB: 0.950000 (0.055277)
SVM: 0.983333 (0.033333)
```

```
C:\Users\sridh\anaconda3\lib\site-packages\sklearn\model_selection\_split.py:296: FutureWarning: Setting a random_state has no effect since shuffle is False. This will raise an error in 0.24. You should leave random_state to its default (None), or set shuffle=True.
  FutureWarning
C:\Users\sridh\anaconda3\lib\site-packages\sklearn\model_selection\_split.py:296: FutureWarning: Setting a random_state has no effect since shuffle is False. This will raise an error in 0.24. You should leave random_state to its default (None), or set shuffle=True.
  FutureWarning
C:\Users\sridh\anaconda3\lib\site-packages\sklearn\model_selection\_split.py:296: FutureWarning: Setting a random_state has no effect since shuffle is False. This will raise an error in 0.24. You should leave random_state to its default (None), or set shuffle=True.
  FutureWarning
C:\Users\sridh\anaconda3\lib\site-packages\sklearn\model_selection\_split.py:296: FutureWarning: Setting a random_state has no effect since shuffle is False. This will raise an error in 0.24. You should leave random_state to its default (None), or set shuffle=True.
  FutureWarning
C:\Users\sridh\anaconda3\lib\site-packages\sklearn\model_selection\_split.py:296: FutureWarning: Setting a random_state has no effect since shuffle is False. This will raise an error in 0.24. You should leave random_state to its default (None), or set shuffle=True.
  FutureWarning
```

In [39]:
```python
pyplot.boxplot(results, labels=names)
pyplot.title('Algorithm Comparison')
pyplot.show()
```



In [41]:
```python
model = SVC(gamma='auto')
model.fit(x_train, y_train)
predictions = model.predict(x_validation)
```

In [43]:
```python
print(accuracy_score(y_validation, predictions))
print(confusion_matrix(y_validation, predictions))
print(classification_report(y_validation, predictions))
```

```
0.9666666666666667
[[11  0  0]
 [ 0 12  1]
 [ 0  0  6]]
                 precision    recall  f1-score   support

    Iris-setosa       1.00      1.00      1.00        11
Iris-versicolor       1.00      0.92      0.96        13
 Iris-virginica       0.86      1.00      0.92         6

       accuracy                           0.97        30
      macro avg       0.95      0.97      0.96        30
   weighted avg       0.97      0.97      0.97        30
```

In [ ]: