In [4]:
```
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: 3.7.3 (default, Mar 27 2019, 22:11:17)
[GCC 7.3.0]
Scipy: 1.4.1
Numpy: 1.16.1
Matplotlib: 3.0.3
Pandas: 0.25.0
Sklearn: 0.20.2
```

In [13]:
```
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 [19]:
```
#Loading the data
url="https://raw.githubusercontent.com/jbrownlee/Datasets/master/iris.csv"
names= ['sepal-length','sepal-width','petal-lenth','petal-width','class']
dataset=read_csv(url,names=names)
```

In [20]:
```
#dimensions of the dataset
print(dataset.shape)
```

```
(150, 5)
```

In [21]:
```
#take a peak at the data
print(dataset.head(21))
```

```
    sepal-length  sepal-width  petal-lenth  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
15           5.7          4.4          1.5          0.4  Iris-setosa
16           5.4          3.9          1.3          0.4  Iris-setosa
17           5.1          3.5          1.4          0.3  Iris-setosa
18           5.7          3.8          1.7          0.3  Iris-setosa
19           5.1          3.8          1.5          0.3  Iris-setosa
20           5.4          3.4          1.7          0.2  Iris-setosa
```

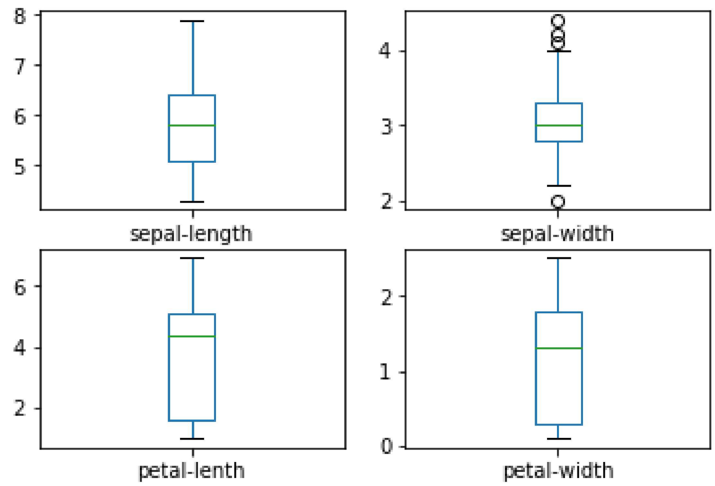
In [22]:
```
#statistical summary
print(dataset.describe())
```

```
       sepal-length  sepal-width  petal-lenth  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
```

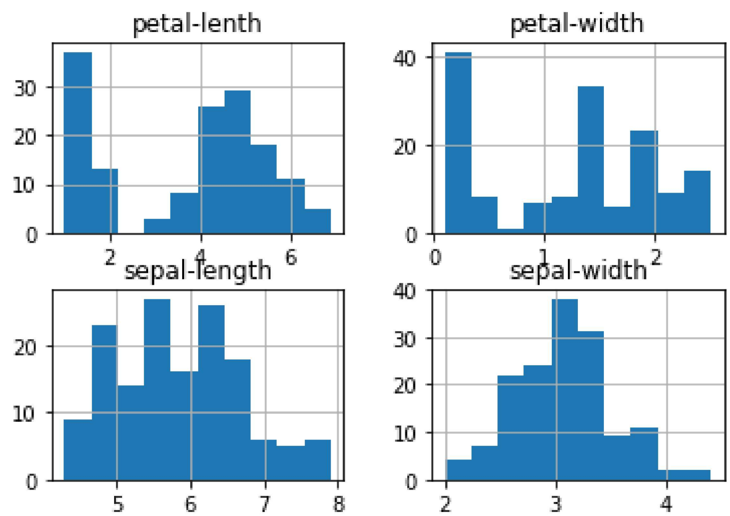
In [23]:
```
#class distrubution
print(dataset.groupby('class').size())
```

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

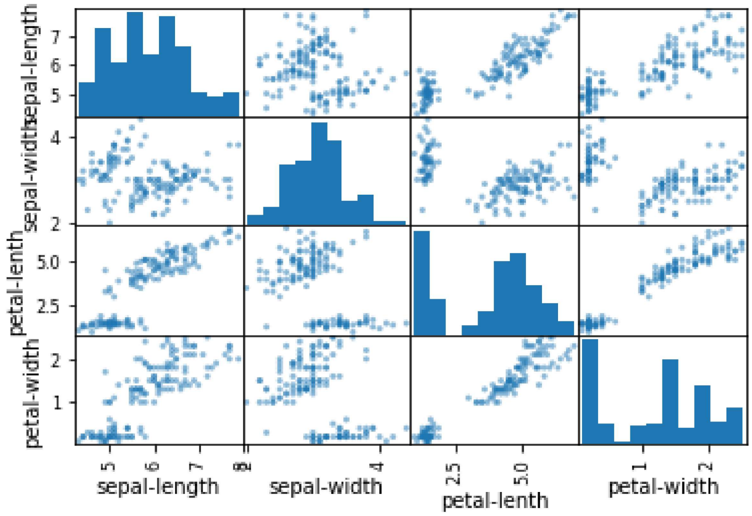
In [24]:
```
#univariate plots -box and whisker plots
dataset.plot(kind='box',subplots=True,layout=(2,2),sharex=False,sharey=False)
pyplot.show()
```



In [25]:
```
#histogram of the variable
dataset.hist()
pyplot.show()
```



In [27]:
```
#multivariate plots
scatter_matrix(dataset)
pyplot.show()
```



In [28]:
```
#creating a validation dataset
#splitting dataset
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)
```

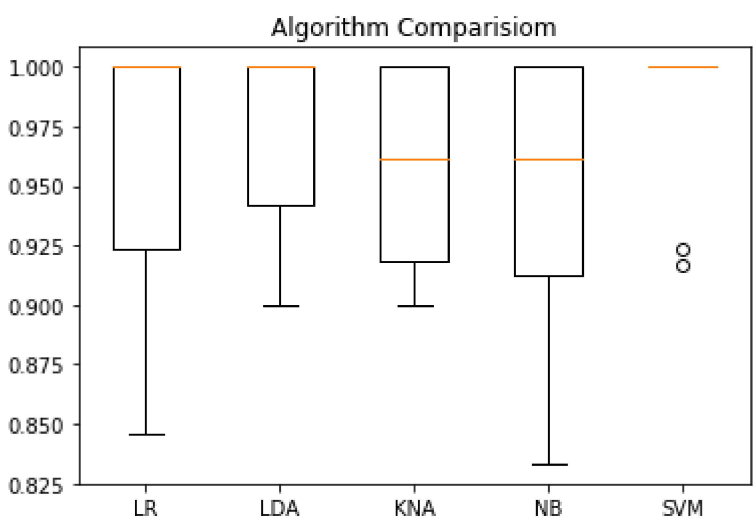
In [33]:
```
#Logistic Regression
#Linear Discriminant Analysis
#K-Nearest Analysis
#Classification and Regression Trees
#Gaussian Naive Bayes
#Support Vector Machines

#building models
models=[]
models.append(('LR',LogisticRegression(solver='liblinear',multi_class='ovr'
)))
models.append(('LDA',LinearDiscriminantAnalysis()))
models.append(('KNA',KNeighborsClassifier()))
models.append(('NB',GaussianNB()))
models.append(('SVM',SVC(gamma='auto')))
```

In [36]:
```
#evaluate the created models
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='accu
racy')
    results.append(cv_results)
    names.append(name)
    print('%s: %f(%f)' %(name,cv_results.mean(),cv_results.std()))
```

```
LR: 0.960897(0.052113)
LDA: 0.973974(0.040110)
KNA: 0.957191(0.043263)
NB: 0.948858(0.056322)
SVM: 0.983974(0.032083)
```

In [38]:
```
#compare our models
pyplot.boxplot(results,labels=names)
pyplot.title("Algorithm Comparisiom")
pyplot.show()
```



In [39]:
```
#make predicions on SVM
model=SVC(gamma='auto')
model.fit(X_train,Y_train)
predictions=model.predict(X_validation)
```

In [40]:
```
#evaluate our predictions on SVM
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

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