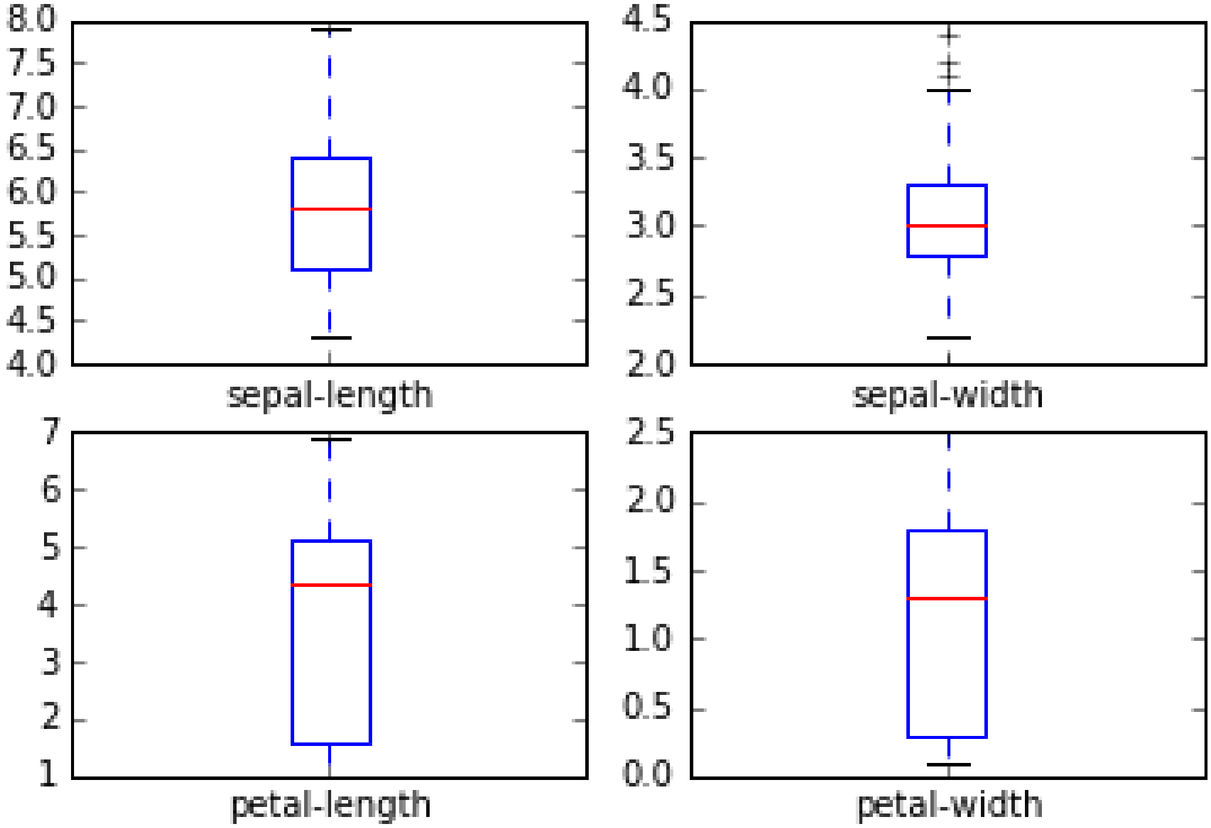
```
#import and test needed libraries

# Python version
import sys
print('Python: {}'.format(sys.version))
# scipy
import scipy
print('scipy: {}'.format(scipy.__version__))
# numpy
import numpy
print('numpy: {}'.format(numpy.__version__))
# matplotlib
import matplotlib
print('matplotlib: {}'.format(matplotlib.__version__))
# pandas
import pandas
print('pandas: {}'.format(pandas.__version__))
# scikit-learn
import sklearn
print('sklearn: {}'.format(sklearn.__version__))

#import libraries
from pandas.tools.plotting import scatter_matrix
import matplotlib.pyplot as plt
from sklearn import cross_validation
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
```

RESULT:

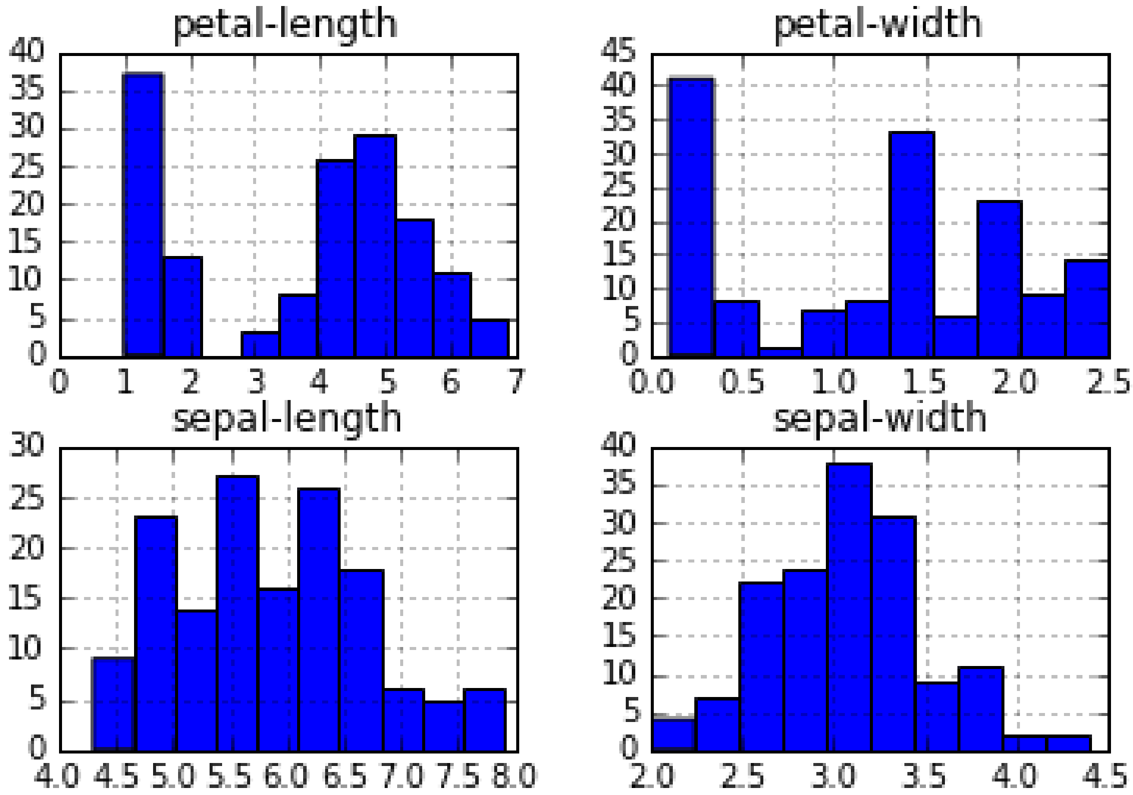
```
Python: 3.5.2 |Anaconda custom (64-bit)| (default, Jul  5 2016, 11:41:13) [MSC v.1900 64 bit (AMD64)]
scipy: 0.18.1
numpy: 1.11.1
matplotlib: 1.5.3
pandas: 0.18.1
sklearn: 0.17.1
```

```
#load dataset
url = "https://archive.ics.uci.edu/ml/machine-learning-databases/iris/iris.data"
names = ['sepal-length', 'sepal-width', 'petal-length', 'petal-width', 'class']
dataset = pandas.read_csv(url, names=names)
```

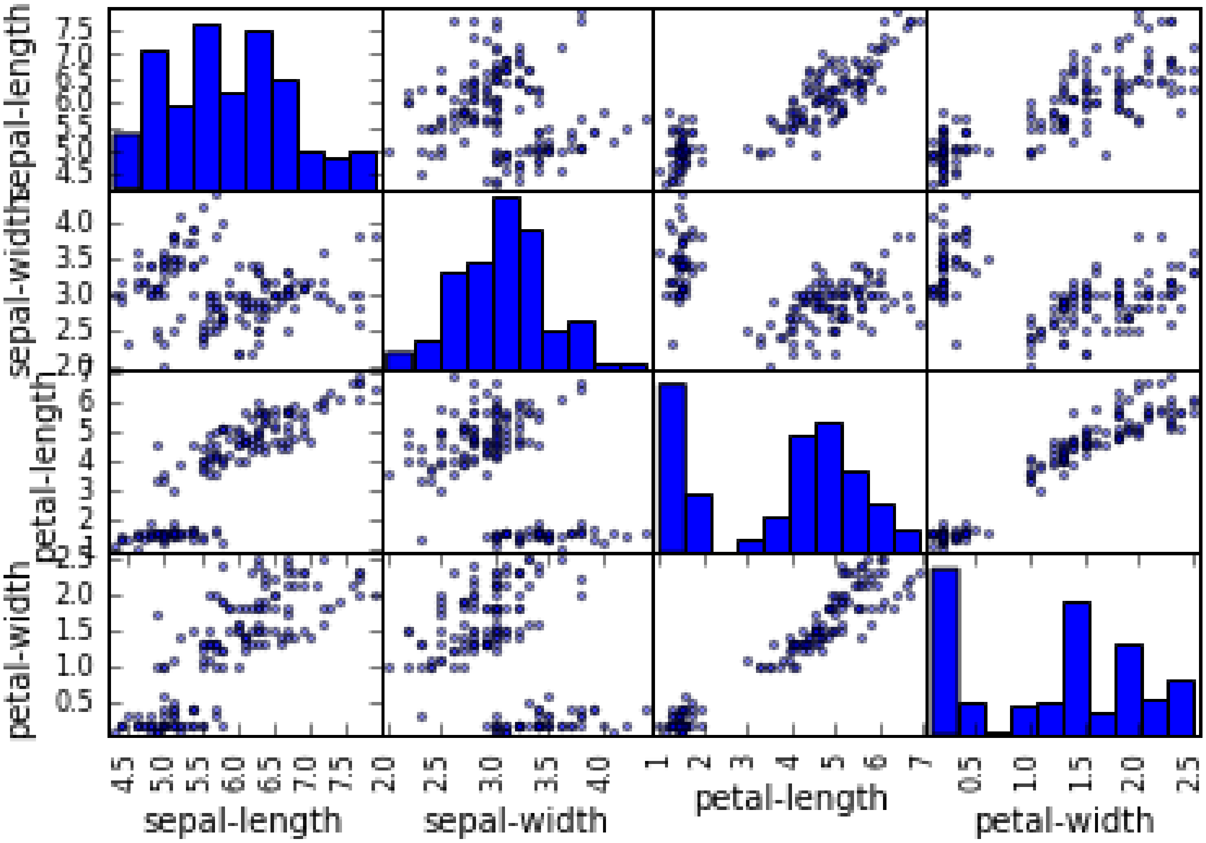
```
#shape
print(dataset.shape)

#head
print(dataset.head(20))

#descriptions
print(dataset.groupby('class').size())

#box and whisper plots
dataset.plot(kind='box', subplots=True, layout=(2,2), sharex=False, sharey=False)
plt.show()
```



```
#histograms
dataset.hist()
plt.show()
```



```
#scatter plot matrix
scatter_matrix(dataset)
plt.show()
```



```
#separate training and validation datsests with 80/20 split
array=dataset.values
X = array[:,0:4]
Y = array[:, 4]
validation_size=0.20
seed = 7
X_train, X_validation, Y_train, Y_validation = cross_validation.train_test_split(X,Y,
test_size=validation_size, random_state=seed)

# Test options and evaluation metric
num_folds = 10
num_instances = len(X_train)
seed = 7
scoring = 'accuracy'

# Spot Check Algorithms
models = []
models.append(('LR', LogisticRegression()))
models.append(('LDA', LinearDiscriminantAnalysis()))
models.append(('KNN', KNeighborsClassifier()))
models.append(('CART', DecisionTreeClassifier()))
models.append(('NB', GaussianNB()))
models.append(('SVM', SVC()))
# evaluate each model in turn
results = []
names = []
for name, model in models:
        kfold = cross_validation.KFold(n=num_instances, n_folds=num_folds, random_state=seed)
        cv_results = cross_validation.cross_val_score(model, X_train, Y_train, cv=kfold, scoring=scoring)
        results.append(cv_results)
        names.append(name)
        msg = "%s: %f (%f)" % (name, cv_results.mean(), cv_results.std())
        print(msg)
```

```
LR: 0.966667 (0.040825)
LDA: 0.975000 (0.038188)
KNN: 0.983333 (0.033333)
CART: 0.975000 (0.038188)
NB: 0.975000 (0.053359)
SVM: 0.991667 (0.025000)
```

KNN is the best of the 6 algorithms evaluated with a 98% accuracy score.

```
 # Compare Algorithms
fig = plt.figure()
fig.suptitle('Algorithm Comparison')
ax = fig.add_subplot(111)
plt.boxplot(results)
ax.set_xticklabels(names)
plt.show()
```

```
# Make predictions on validation dataset
knn = KNeighborsClassifier()
knn.fit(X_train, Y_train)
predictions = knn.predict(X_validation)
print(accuracy_score(Y_validation, predictions))
print(confusion_matrix(Y_validation, predictions))
print(classification_report(Y_validation, predictions))
```

```
0.9      #90% accuracy

[[ 7  0  0]
 [ 0 11  1]
 [ 0  2  9]]
        precision    recall  f1-score   support

Iris-setosa       1.00      1.00      1.00         7
Iris-versicolor       0.85      0.92      0.88        12
```

```
Iris-virginica       0.90      0.82      0.86        11

avg / total       0.90      0.90      0.90        30
```