In [1]:
```
#importing libraries

import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import random
```

In [2]:
```
df = pd.read_csv('iris.csv',header = None)
df.columns = ['separ_length','separ_width','petal_length','petal_width','clas
```

In [3]:
```
df.head(10)
```

Out[3]:

	separ_length	separ_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

In [4]:
```
df.shape
```

Out[4]:
```
(150, 5)
```

In [5]:
```
df.describe()
```

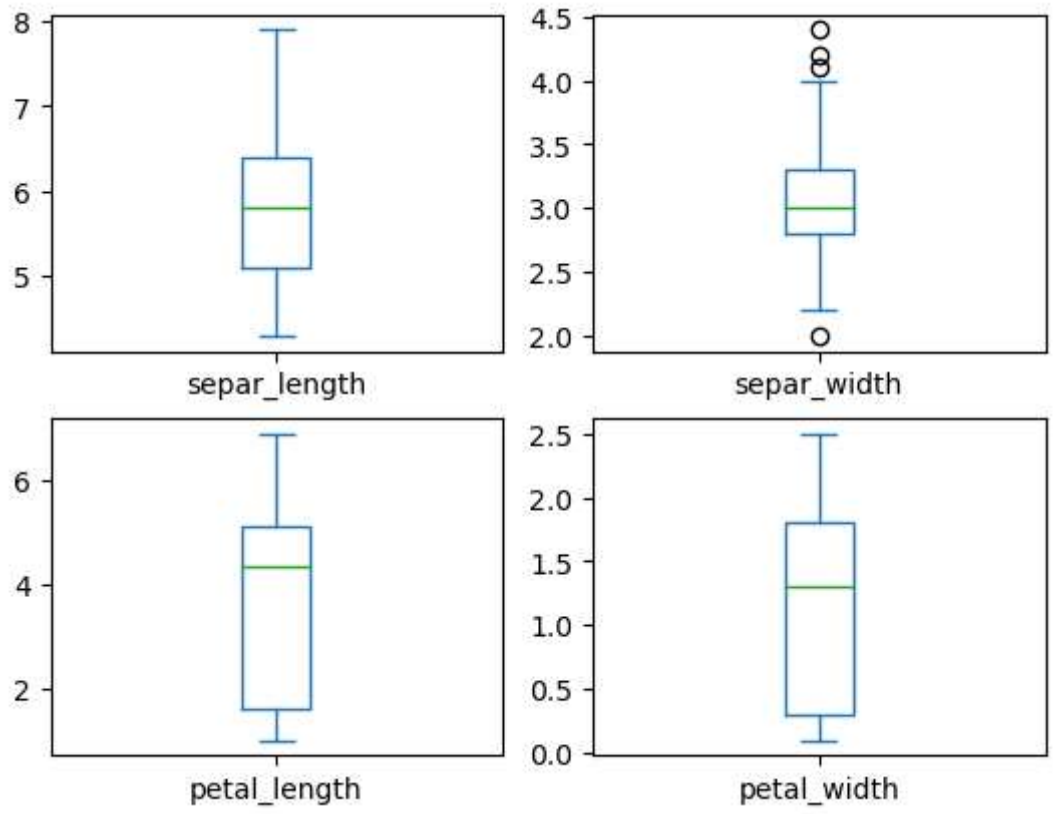
Out[5]:

	separ_length	separ_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 [6]:
```
df['class'].value_counts()
```

Out[6]:
```
Iris-setosa        50
Iris-versicolor    50
Iris-virginica     50
Name: class, dtype: int64
```

In [7]:
```
#ploting box plot

df.plot(kind='box',subplots=True,layout=(2,2),sharex=False,sharey=False)
plt.show()
```



In [8]:
```
#removing outliers from the dataset

Q1 = df.separ_width.quantile(0.25)
Q3 = df.separ_width.quantile(0.75)
IQR = Q3-Q1
df = df[(df.separ_width>=Q1-1.5*IQR) & (df.separ_width<=Q3+1.5*IQR)]
```

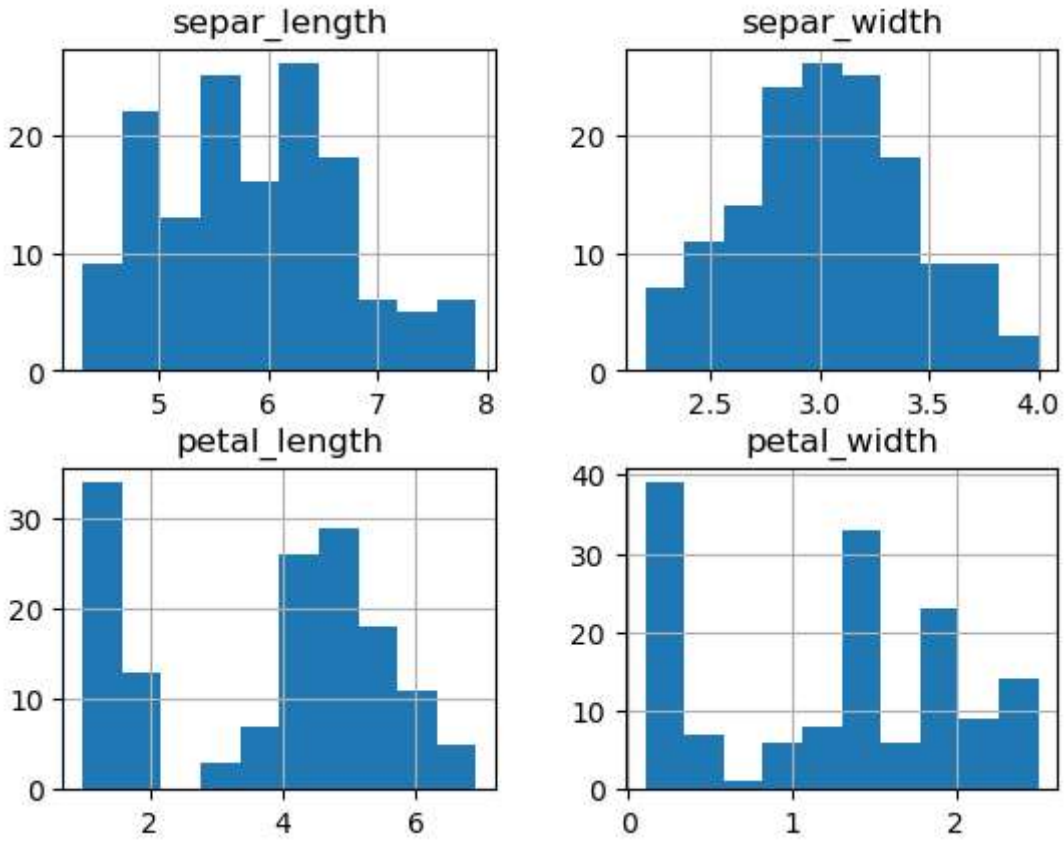
In [9]:
```
df
```

Out[9]:

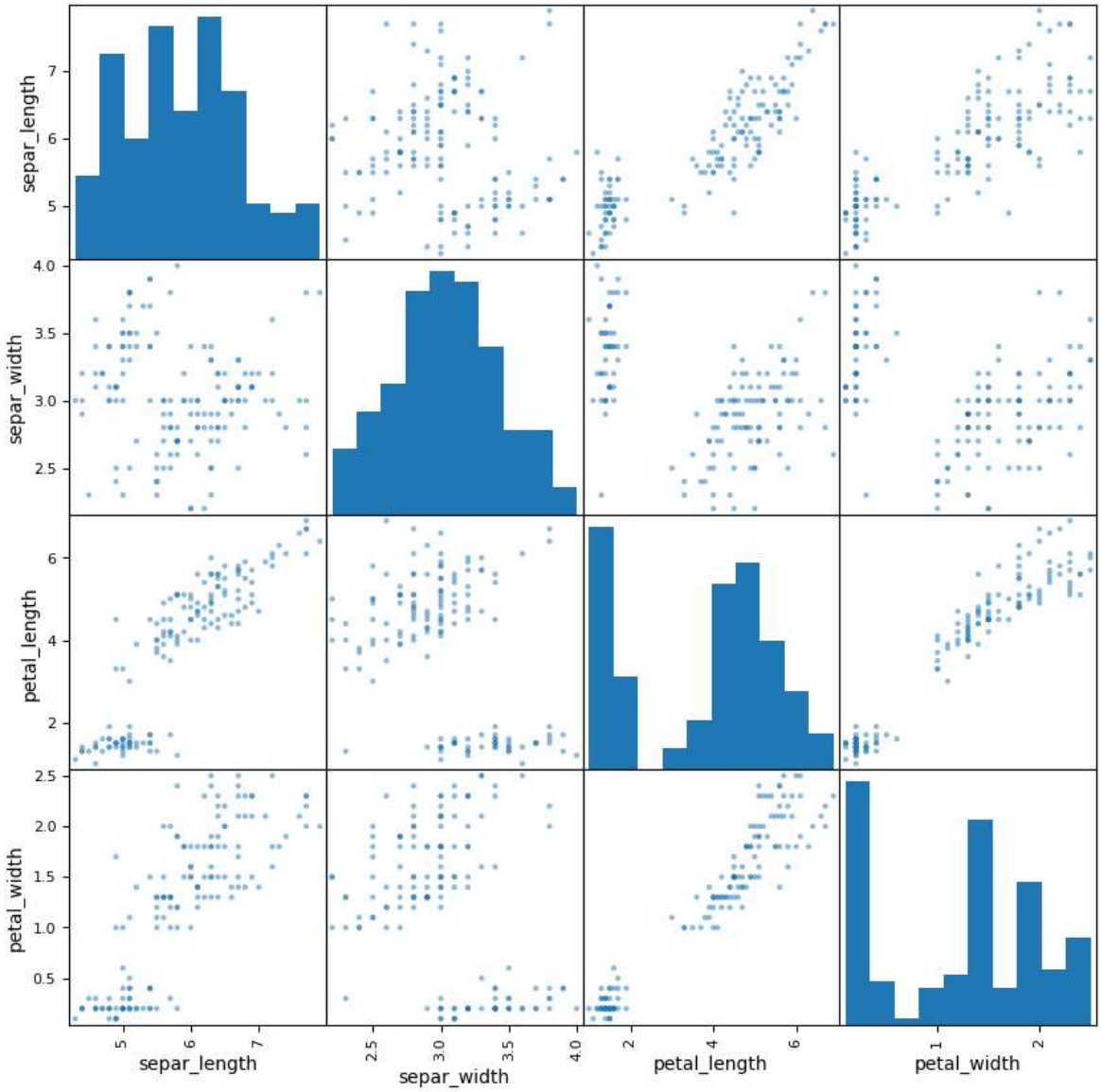
	separ_length	separ_width	petal_length	petal_width	class
0	5.1	3.5	1.4	0.2	Iris-setosa
1	4.9	3.0	1.4	0.2	Iris-setosa
2	4.7	3.2	1.3	0.2	Iris-setosa
3	4.6	3.1	1.5	0.2	Iris-setosa
4	5.0	3.6	1.4	0.2	Iris-setosa
...	...	...	...	...	...
145	6.7	3.0	5.2	2.3	Iris-virginica
146	6.3	2.5	5.0	1.9	Iris-virginica
147	6.5	3.0	5.2	2.0	Iris-virginica
148	6.2	3.4	5.4	2.3	Iris-virginica
149	5.9	3.0	5.1	1.8	Iris-virginica

146 rows × 5 columns

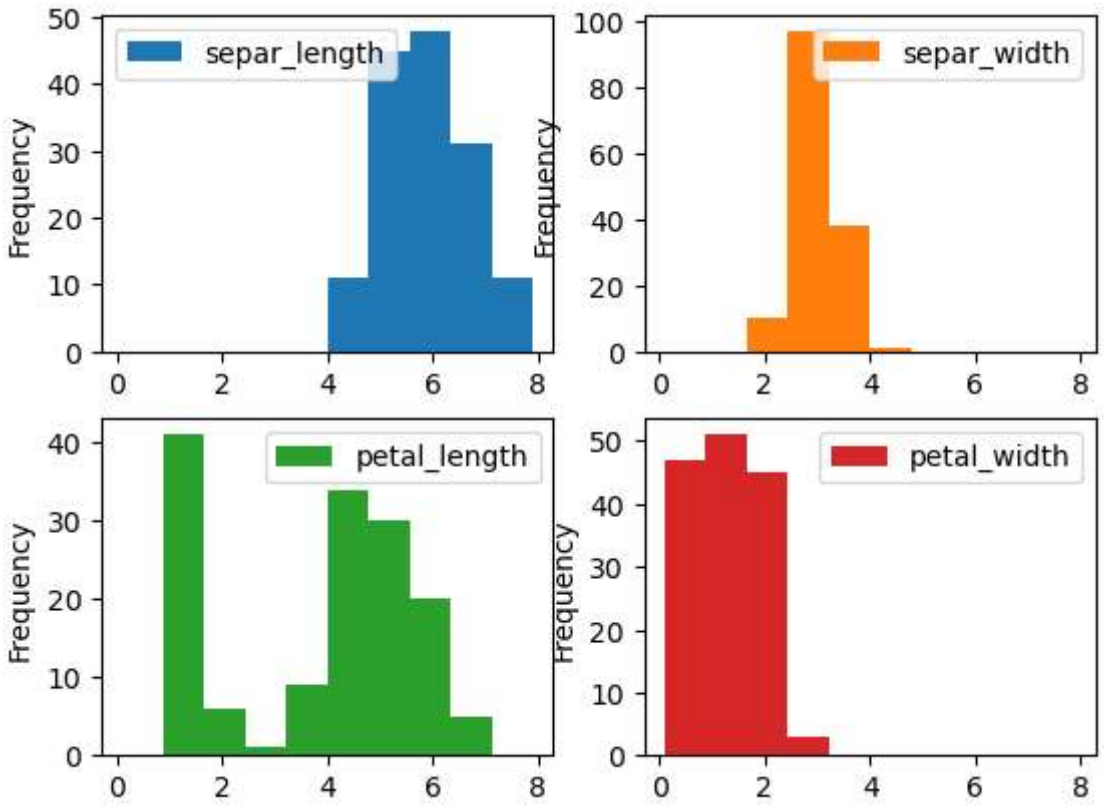
In [10]:
```
#ploting histogram

df.hist()
plt.show()
```



In [11]:
```
#show scatter matrics

pd.plotting.scatter_matrix(df,figsize=(10,10))
plt.show()
```



In [12]:
```
df.plot(kind='hist',subplots=True,layout=(2,2),sharex=False,sharey=False)
plt.show()
```



In [13]:
```
#spitting dataset

arr = df.values
x = arr[:,:4]
y = arr[:,4]
```

In [14]:
```
#changing string labels to number values/labels with the help of LabelEncoder
from sklearn.preprocessing import LabelEncoder

y = LabelEncoder().fit_transform(y)
```

In [15]:
```
#importint libraries
from sklearn.model_selection import train_test_split
from sklearn.model_selection import cross_validate
```

In [16]:
```
x_train,x_test,y_train,y_test = train_test_split(x,y,test_size = 0.2,random_s
```

In [17]:
```
#determining shape of splitting dataset
print("shape of x_train = ",x_train.shape)
print("shape of x_test  = ",x_test.shape)
print("shape of y_train = ",y_train.shape)
print("shape of y_test  = ",y_test.shape)
```

```
shape of x_train =  (116, 4)
shape of x_test  =  (30, 4)
shape of y_train =  (116,)
shape of y_test  =  (30,)
```

In [18]:
```
#import multiple models for comparison

from sklearn.linear_model import LogisticRegression
from sklearn.tree import DecisionTreeRegressor
from sklearn.discriminant_analysis import LinearDiscriminantAnalysis
from sklearn.neighbors import KNeighborsClassifier
from sklearn.naive_bayes import GaussianNB
from sklearn.svm import SVC

from sklearn.model_selection import cross_val_score
from sklearn.model_selection import KFold
```

In [19]:
```
#creating set of models

models = {}
models["LR"] = LogisticRegression()
models["DTR"] = DecisionTreeRegressor()
models["LDA"] = LinearDiscriminantAnalysis()
models["KNC"] = KNeighborsClassifier()
models["GNB"] =  GaussianNB()
models["SVM"] = SVC()
```

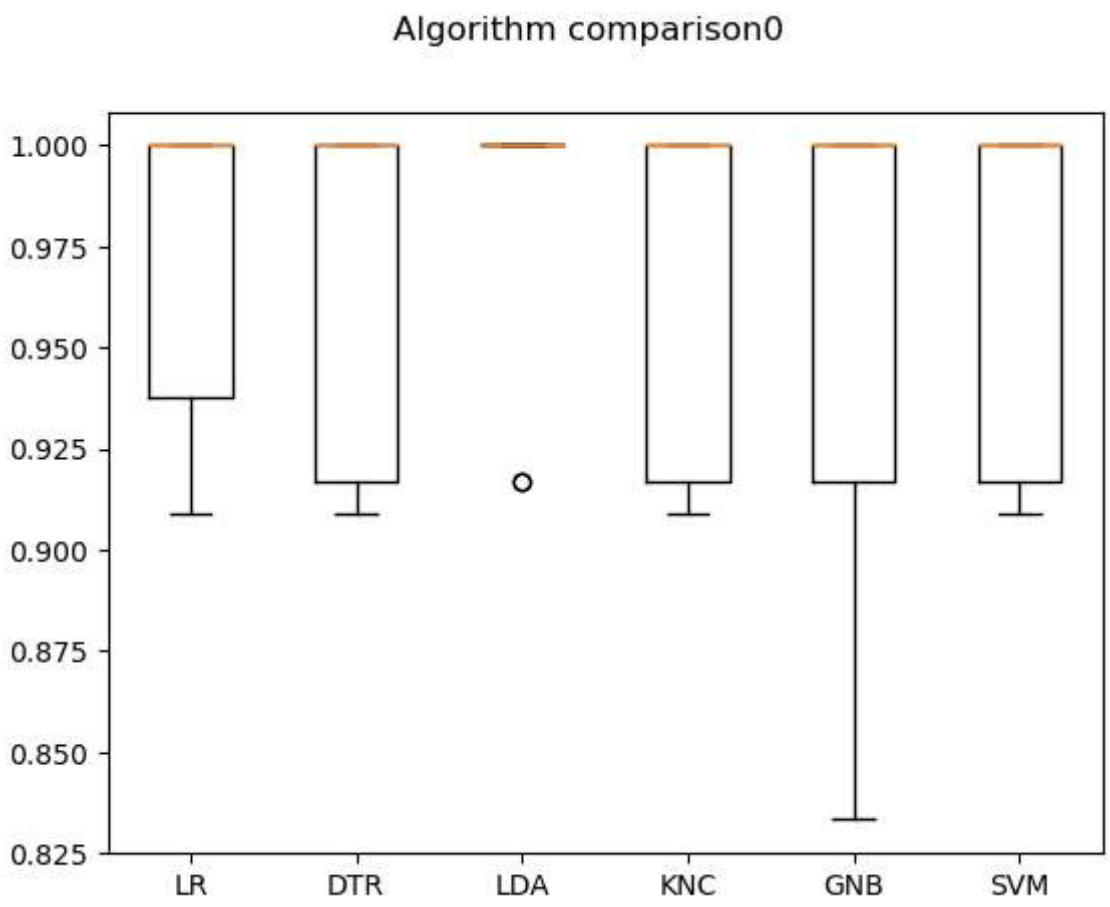
In [20]:
```
result = []
for key in models:
    kfold = KFold(n_splits=10,random_state=1,shuffle=True)
    cv_results = cross_val_score(models[key],x_train,y_train,cv=kfold,scoring
    result.append(cv_results)
    print('%s : %f (%f)',(key,cv_results.mean(),cv_results.std()))
```

```
%s : %f (%f) ('LR', 0.9742424242424242, 0.03939393939393941)
%s : %f (%f) ('DTR', 0.9659090909090908, 0.041804180791883035)
%s : %f (%f) ('LDA', 0.9833333333333332, 0.03333333333333335)
%s : %f (%f) ('KNC', 0.9651515151515151, 0.04274768478686633)
%s : %f (%f) ('GNB', 0.9575757575757576, 0.05650926120900459)
%s : %f (%f) ('SVM', 0.9651515151515151, 0.04274768478686633)
```

```
C:\ProgramData\anaconda3\Lib\site-packages\sklearn\linear_model\_logistic.p
y:460: ConvergenceWarning: lbfgs failed to converge (status=1):
STOP: TOTAL NO. of ITERATIONS REACHED LIMIT.

Increase the number of iterations (max_iter) or scale the data as shown in:
    https://scikit-learn.org/stable/modules/preprocessing.html (https://scik
it-learn.org/stable/modules/preprocessing.html)
Please also refer to the documentation for alternative solver options:
    https://scikit-learn.org/stable/modules/linear_model.html#logistic-regre
ssion (https://scikit-learn.org/stable/modules/linear_model.html#logistic-re
gression)
  n_iter_i = _check_optimize_result(
C:\ProgramData\anaconda3\Lib\site-packages\sklearn\linear_model\_logistic.p
y:460: ConvergenceWarning: lbfgs failed to converge (status=1):
STOP: TOTAL NO. of ITERATIONS REACHED LIMIT.

Increase the number of iterations (max_iter) or scale the data as shown in:
    https://scikit-learn.org/stable/modules/preprocessing.html (https://scik
it-learn.org/stable/modules/preprocessing.html)
Please also refer to the documentation for alternative solver options:
    https://scikit-learn.org/stable/modules/linear_model.html#logistic-regre
ssion (https://scikit-learn.org/stable/modules/linear_model.html#logistic-re
gression)
  n_iter_i = _check_optimize_result(
C:\ProgramData\anaconda3\Lib\site-packages\sklearn\linear_model\_logistic.p
y:460: ConvergenceWarning: lbfgs failed to converge (status=1):
STOP: TOTAL NO. of ITERATIONS REACHED LIMIT.

Increase the number of iterations (max_iter) or scale the data as shown in:
    https://scikit-learn.org/stable/modules/preprocessing.html (https://scik
it-learn.org/stable/modules/preprocessing.html)
Please also refer to the documentation for alternative solver options:
    https://scikit-learn.org/stable/modules/linear_model.html#logistic-regre
ssion (https://scikit-learn.org/stable/modules/linear_model.html#logistic-re
gression)
  n_iter_i = _check_optimize_result(
C:\ProgramData\anaconda3\Lib\site-packages\sklearn\linear_model\_logistic.p
y:460: ConvergenceWarning: lbfgs failed to converge (status=1):
STOP: TOTAL NO. of ITERATIONS REACHED LIMIT.

Increase the number of iterations (max_iter) or scale the data as shown in:
    https://scikit-learn.org/stable/modules/preprocessing.html (https://scik
it-learn.org/stable/modules/preprocessing.html)
Please also refer to the documentation for alternative solver options:
    https://scikit-learn.org/stable/modules/linear_model.html#logistic-regre
ssion (https://scikit-learn.org/stable/modules/linear_model.html#logistic-re
gression)
  n_iter_i = _check_optimize_result(
C:\ProgramData\anaconda3\Lib\site-packages\sklearn\linear_model\_logistic.p
y:460: ConvergenceWarning: lbfgs failed to converge (status=1):
STOP: TOTAL NO. of ITERATIONS REACHED LIMIT.

Increase the number of iterations (max_iter) or scale the data as shown in:
    https://scikit-learn.org/stable/modules/preprocessing.html (https://scik
it-learn.org/stable/modules/preprocessing.html)
Please also refer to the documentation for alternative solver options:
    https://scikit-learn.org/stable/modules/linear_model.html#logistic-regre
```

```
ssion (https://scikit-learn.org/stable/modules/linear_model.html#logistic-re
gression)
  n_iter_i = _check_optimize_result(
C:\ProgramData\anaconda3\Lib\site-packages\sklearn\linear_model\_logistic.p
y:460: ConvergenceWarning: lbfgs failed to converge (status=1):
STOP: TOTAL NO. of ITERATIONS REACHED LIMIT.

Increase the number of iterations (max_iter) or scale the data as shown in:
    https://scikit-learn.org/stable/modules/preprocessing.html (https://scik
it-learn.org/stable/modules/preprocessing.html)
Please also refer to the documentation for alternative solver options:
    https://scikit-learn.org/stable/modules/linear_model.html#logistic-regre
ssion (https://scikit-learn.org/stable/modules/linear_model.html#logistic-re
gression)
  n_iter_i = _check_optimize_result(
C:\ProgramData\anaconda3\Lib\site-packages\sklearn\linear_model\_logistic.p
y:460: ConvergenceWarning: lbfgs failed to converge (status=1):
STOP: TOTAL NO. of ITERATIONS REACHED LIMIT.

Increase the number of iterations (max_iter) or scale the data as shown in:
    https://scikit-learn.org/stable/modules/preprocessing.html (https://scik
it-learn.org/stable/modules/preprocessing.html)
Please also refer to the documentation for alternative solver options:
    https://scikit-learn.org/stable/modules/linear_model.html#logistic-regre
ssion (https://scikit-learn.org/stable/modules/linear_model.html#logistic-re
gression)
  n_iter_i = _check_optimize_result(
```

In [21]:
```
fig = plt.figure()
fig.suptitle("Algorithm comparison0")
ax = fig.add_subplot(111)
plt.boxplot(result)
ax.set_xticklabels(models.keys())
plt.show()
```



In [22]:
```
#importing libraries

from sklearn.metrics import classification_report
from sklearn.metrics import confusion_matrix
from sklearn.metrics import accuracy_score
```

In [23]:
```
svm = SVC()
svm.fit(x_train,y_train)
predictions = svm.predict(x_test)
print("accuracy : ",accuracy_score(y_test,predictions))
print("confusion matrix:\n",confusion_matrix(y_test,predictions))
print("classification_report:\n",classification_report(y_test,predictions))
```

```
accuracy :  0.9666666666666667
confusion matrix:
 [[ 9  0  0]
 [ 0 10  1]
 [ 0  0 10]]
classification_report:
               precision    recall  f1-score   support

           0       1.00      1.00      1.00         9
           1       1.00      0.91      0.95        11
           2       0.91      1.00      0.95        10

    accuracy                           0.97        30
   macro avg       0.97      0.97      0.97        30
weighted avg       0.97      0.97      0.97        30
```

In [ ]:
```

```