In [121]:

```
import numpy as np
from sklearn.datasets import load_iris
import pandas as pd
from sklearn.linear_model import LogisticRegression
from sklearn.multiclass import OneVsRestClassifier
```

In [122]:

```
iris = load_iris()
iris.target_names
df = pd.DataFrame(data = iris.data,columns = iris.feature_names)
df['target'] = iris.target
df.sample(10)
```

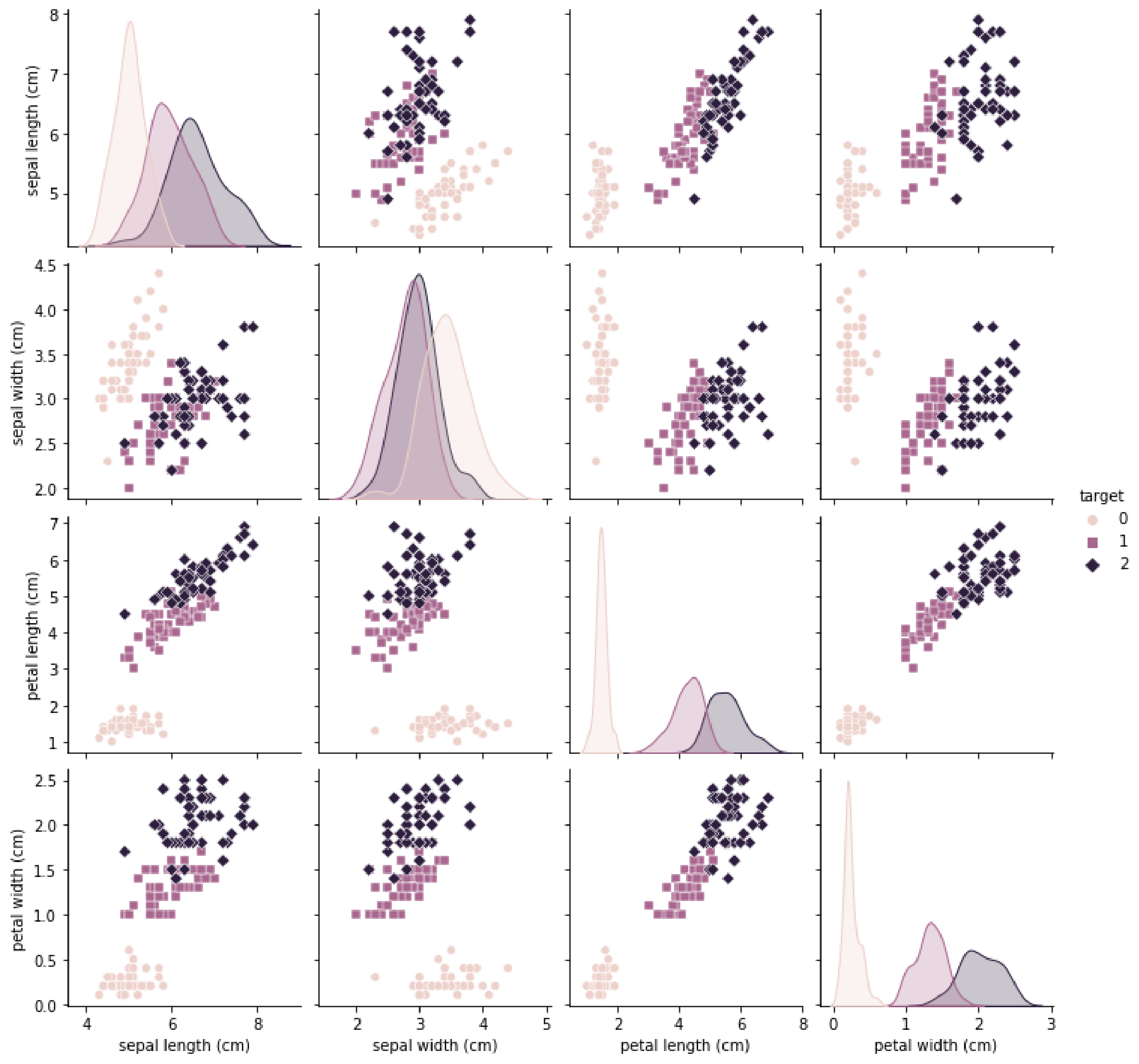
Out[122]:

	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)	target
12	4.8	3.0	1.4	0.1	0
62	6.0	2.2	4.0	1.0	1
75	6.6	3.0	4.4	1.4	1
113	5.7	2.5	5.0	2.0	2
86	6.7	3.1	4.7	1.5	1
58	6.6	2.9	4.6	1.3	1
51	6.4	3.2	4.5	1.5	1
10	5.4	3.7	1.5	0.2	0
28	5.2	3.4	1.4	0.2	0
11	4.8	3.4	1.6	0.2	0

In [123]:

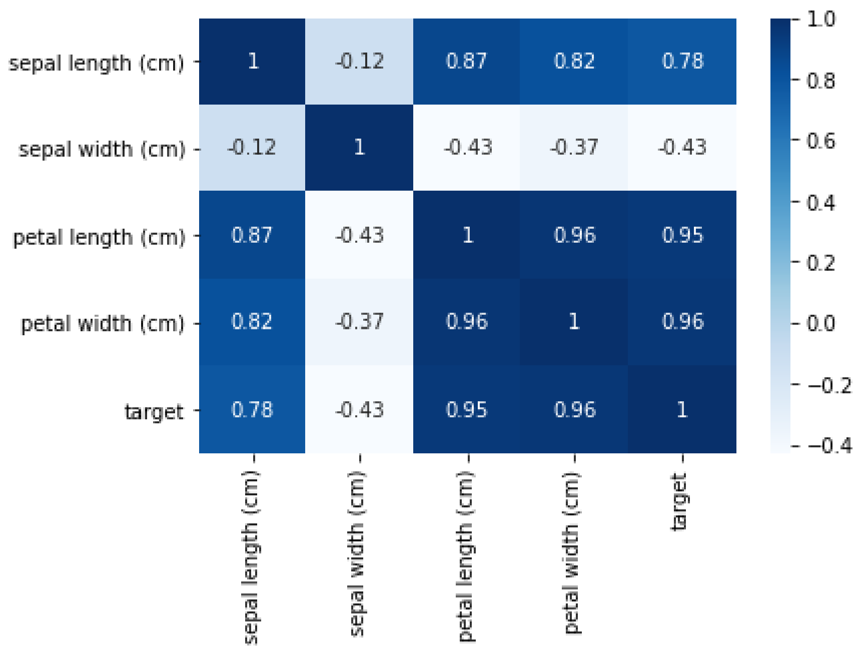
```
import  matplotlib.pyplot as plt
import seaborn as sns

sns.pairplot(df,hue='target',markers=["o", "s", "D"])
plt.show()
```



In [124]:

```
sns.heatmap(df.corr(),annot = True,cmap = 'Blues')
plt.show()
```



In [125]:

```
from sklearn.model_selection import train_test_split as tts
from sklearn.preprocessing import label_binarize
X = df.drop('target',axis = 1)
y = df.target
y = label_binarize(y, classes=[0, 1, 2])
n_classes = 3
X_train,X_test,y_train,y_test = tts(X,y,test_size = 0.25 , random_state = 67)
```

In [126]:

```
# clf = LogisticRegression(multi_class ='ovr')
# clf.fit(X_train,y_train)
clf = OneVsRestClassifier(LogisticRegression())
clf.fit(X_train,y_train)
```

Out[126]:

```
OneVsRestClassifier(estimator=LogisticRegression())
```

In [127]:

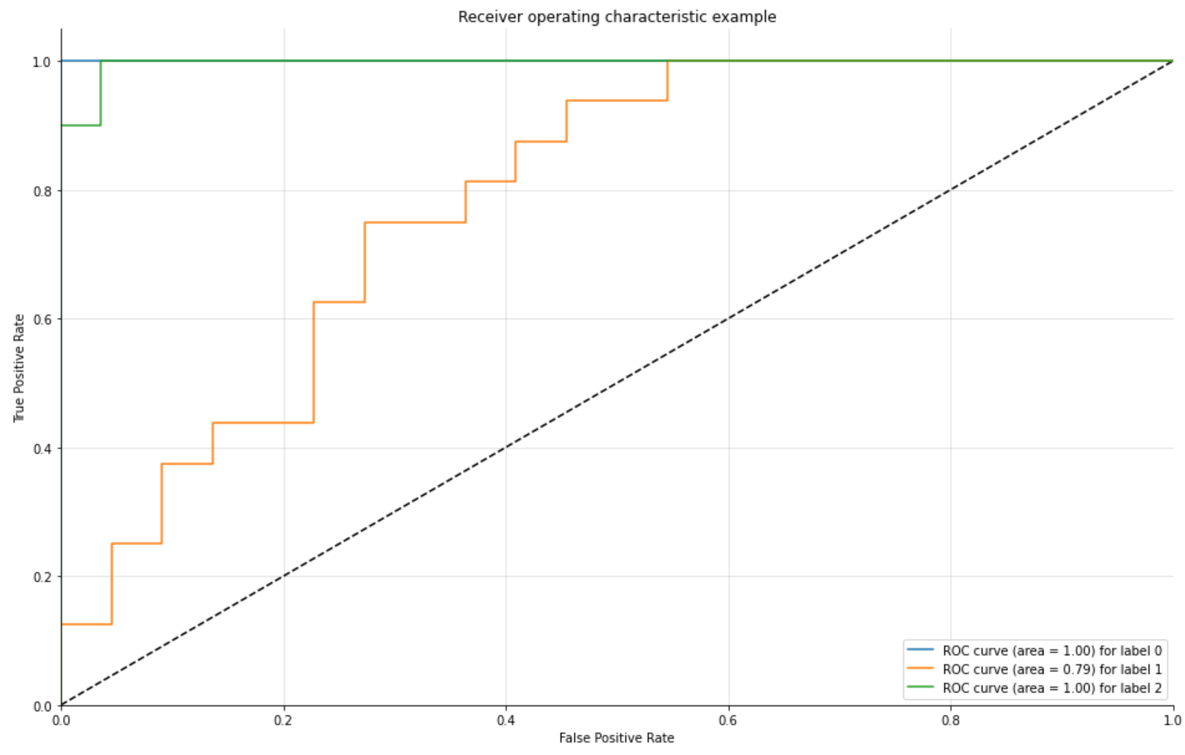
```python
from sklearn.metrics import roc_curve,auc,roc_auc_score
def plot_multiclass_roc(clf, X_test, y_test, n_classes, figsize=(17, 6)):
    y_score = clf.decision_function(X_test)

    # structures
    fpr = dict()
    tpr = dict()
    roc_auc = dict()

    # calculate dummies once
    y_test_dummies = y_test
    for i in range(n_classes):
        fpr[i], tpr[i], _ = roc_curve(y_test_dummies[:, i], y_score[:, i])
        roc_auc[i] = auc(fpr[i], tpr[i])

    # roc for each class
    fig, ax = plt.subplots(figsize=figsize)
    ax.plot([0, 1], [0, 1], 'k--')
    ax.set_xlim([0.0, 1.0])
    ax.set_ylim([0.0, 1.05])
    ax.set_xlabel('False Positive Rate')
    ax.set_ylabel('True Positive Rate')
    ax.set_title('Receiver operating characteristic example')
    for i in range(n_classes):
        ax.plot(fpr[i], tpr[i], label='ROC curve (area = %0.2f) for label %i' % (roc_auc[i]
    ax.legend(loc="best")
    ax.grid(alpha=.4)
    sns.despine()
    plt.show()

plot_multiclass_roc(clf, X_test, y_test, n_classes=3, figsize=(16, 10))
```



In [128]:

```
y_pred = clf.predict(X_test)
# y_pred
```

In [129]:

```
roc_auc_score(y_test, y_pred, multi_class='ovr', average='weighted')
```

Out[129]:

```
0.8231373889268627
```

In [130]:

```
from sklearn.metrics import accuracy_score
accuracy_score(y_pred,y_test)*100
```

Out[130]:

```
60.526315789473685
```

In [131]:

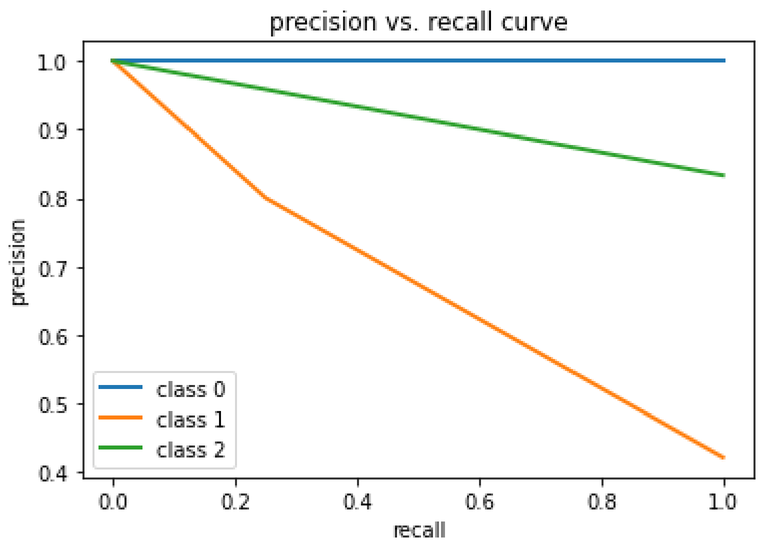
```
from sklearn.metrics import PrecisionRecallDisplay,precision_recall_curve

# #
# precision, recall, _ = precision_recall_curve(y_test, y_pred)
# disp = PrecisionRecallDisplay(precision=precision, recall=recall)
# disp.plot()

# plt.show()
# #
# display = PrecisionRecallDisplay.from_estimator(
#     clf, X_test, y_test, name="Logistic Regression"
# )
# _ = display.ax_.set_title("2-class Precision-Recall curve")

precision = dict()
recall = dict()
for i in range(n_classes):
    precision[i], recall[i], _ = precision_recall_curve(y_test[:, i],
                                                        y_pred[:, i])
    plt.plot(recall[i], precision[i], lw=2, label='class {}'.format(i))

plt.xlabel("recall")
plt.ylabel("precision")
plt.legend(loc="best")
plt.title("precision vs. recall curve")
plt.show()
```



In [ ]: