#K\_fold cross validation for RandomForest Classification

import numpy as np

import matplotlib.pyplot as plt

import pandas as pd

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import seaborn as sns

from sklearn.datasets import load\_iris

from sklearn.model\_selection import cross\_val\_score,cross\_val\_predict,KFold

from sklearn.ensemble import RandomForestClassifier

from sklearn.metrics import confusion\_matrix,classification\_report,accuracy\_score

#load Dataset

dataset = load\_iris()

x = dataset.data

y = dataset.target

#initialize model

rf\_model = RandomForestClassifier(n\_estimators=100)

#k\_fold cross validation

kf = KFold(n\_splits=5, shuffle=True, random\_state=42)

cv\_results = cross\_val\_score(rf\_model, x, y, cv=kf, scoring='accuracy')

print(cv\_results)

**Output :**

[1. 0.96666667 0.93333333 0.93333333 0.96666667]

#prediction

y\_pred = cross\_val\_predict(rf\_model, x, y, cv=kf)

#Evaluation matric

accuracy = accuracy\_score(y, y\_pred)\*100

confusion\_mat = confusion\_matrix(y, y\_pred)

classification\_rep = classification\_report(y, y\_pred)

print("Accuracy:", accuracy)

print("Confusion Matrix:\n", confusion\_mat)

print("Classification Report:\n", classification\_rep)

**Output :**

Accuracy: 96.0

Confusion Matrix:

[[50 0 0]

[ 0 47 3]

[ 0 3 47]]

Classification Report:

precision recall f1-score support

0 1.00 1.00 1.00 50

1 0.94 0.94 0.94 50

2 0.94 0.94 0.94 50

accuracy 0.96 150

macro avg 0.96 0.96 0.96 150

weighted avg 0.96 0.96 0.96 150

#Visualization using heatmap

plt.figure(figsize=(4, 2))

sns.heatmap(confusion\_mat, annot=True, fmt='d', cmap='Blues', xticklabels=dataset.target\_names, yticklabels=dataset.target\_names)

plt.xlabel('Predicted')

plt.ylabel('Actual')

plt.title('Confusion Matrix')

plt.show()

**Output :**

