iris

February 19, 2025

[1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.datasets import load_iris
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
from sklearn.svm import SVC
from sklearn.metrics import accuracy_score, confusion_matrix,␣
  ↪classification_report
```

[20]:
```
df = pd.read_csv(r"C:\Users\apvis\Downloads\archive (5)\iris.csv")
print(df.head())
```

```
   sepal_length  sepal_width  petal_length  petal_width      species
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
```

[22]:
```
print(df.isnull().sum())
print(df.describe())
```

```
sepal_length    0
sepal_width     0
petal_length    0
petal_width     0
species         0
dtype: int64
       sepal_length  sepal_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
```

[24]:

```python
from sklearn.preprocessing import LabelEncoder
le = LabelEncoder()
df['species'] = le.fit_transform(df['species'])
print(df.head())
```

```
   sepal_length  sepal_width  petal_length  petal_width  species
0           5.1          3.5           1.4          0.2        0
1           4.9          3.0           1.4          0.2        0
2           4.7          3.2           1.3          0.2        0
3           4.6          3.1           1.5          0.2        0
4           5.0          3.6           1.4          0.2        0
```

[26]:

```python
X = df.drop('species', axis=1)
y = df['species']
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2,␣
 ↪random_state=42)
print(f"Training data shape: {X_train.shape}")
print(f"Testing data shape: {X_test.shape}")
```

```
Training data shape: (120, 4)
Testing data shape: (30, 4)
```

[28]:

```python
scaler = StandardScaler()
X_train_scaled = scaler.fit_transform(X_train)
X_test_scaled = scaler.transform(X_test)
print("Scaled training data:")
print(X_train_scaled[:5])
```

```
Scaled training data:
[[-1.47393679  1.22037928 -1.5639872  -1.30948358]
 [-0.13307079  3.02001693 -1.27728011 -1.04292204]
 [ 1.08589829  0.09560575  0.38562104  0.28988568]
 [-1.23014297  0.77046987 -1.21993869 -1.30948358]
 [-1.7177306   0.32056046 -1.39196294 -1.30948358]]
```

[30]:

```python
svc = SVC(kernel='linear', random_state=42)
svc.fit(X_train_scaled, y_train)
y_pred = svc.predict(X_test_scaled)
print(f"Predicted labels: {y_pred[:5]}")
```

```
Predicted labels: [1 0 2 1 1]
```

[34]:

```python
species_names = df['species'].unique()
accuracy = accuracy_score(y_test, y_pred)
print(f"Model Accuracy: {accuracy:.2f}")
cm = confusion_matrix(y_test, y_pred)
```

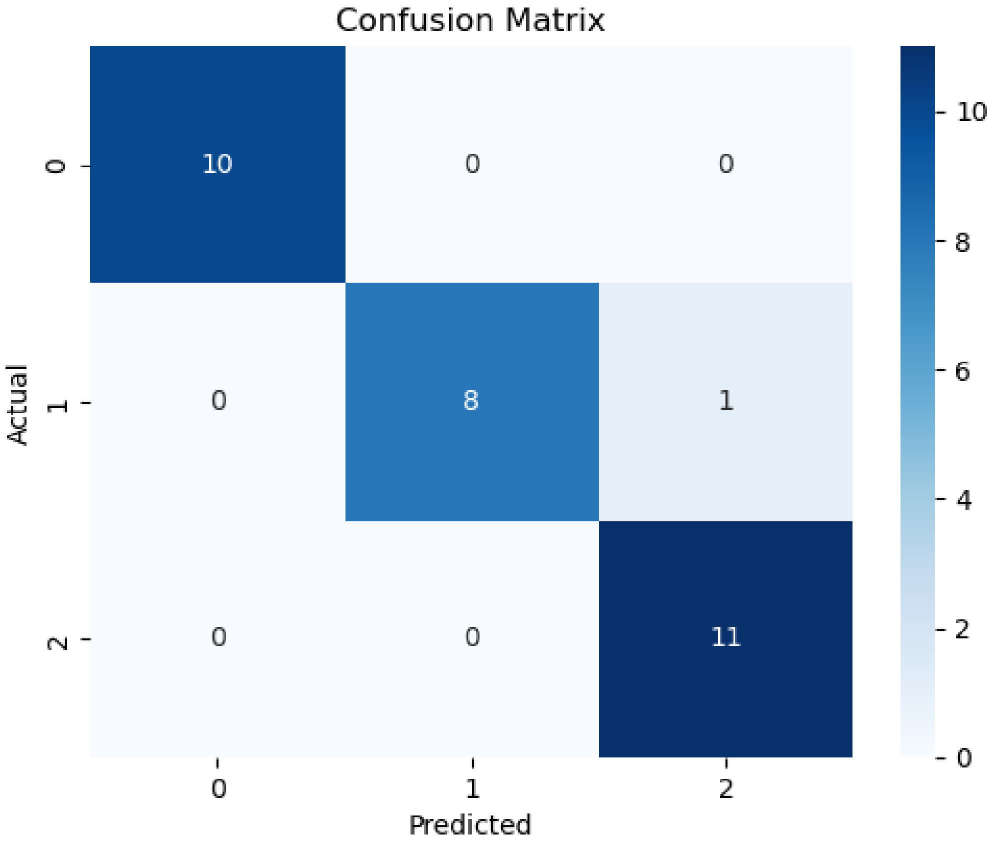
```
print("Confusion Matrix:")
print(cm)
cr = classification_report(y_test, y_pred)
print("\nClassification Report:")
print(cr)
sns.heatmap(cm, annot=True, fmt='d', cmap='Blues', xticklabels=species_names, yticklabels=species_names)
plt.ylabel('Actual')
plt.xlabel('Predicted')
plt.title('Confusion Matrix')
plt.show()
```

```
Model Accuracy: 0.97
Confusion Matrix:
[[10  0  0]
 [ 0  8  1]
 [ 0  0 11]]

Classification Report:
              precision    recall  f1-score   support

           0       1.00      1.00      1.00        10
           1       1.00      0.89      0.94         9
           2       0.92      1.00      0.96        11

    accuracy                           0.97        30
   macro avg       0.97      0.96      0.97        30
weighted avg       0.97      0.97      0.97        30
```



[36]:

```
svc_improved = SVC(C=10, kernel='rbf', random_state=42)
svc_improved.fit(X_train_scaled, y_train)
y_pred_improved = svc_improved.predict(X_test_scaled)
accuracy_improved = accuracy_score(y_test, y_pred_improved)
print(f"Improved SVC Model Accuracy: {accuracy_improved:.2f}")
```

```
Improved SVC Model Accuracy: 0.97
```