EXP NO: 2	**SUPPORT VECTOR MACHINE (SVM) AND RANDOM FOREST FOR BINARY & MULTICLASS CLASSIFICATION**
DATE: 14/08/2025	

AIM:

To build classification models using **Support Vector Machines (SVM)** and **Random Forest**, apply them to a dataset, and evaluate the models using performance metrics like accuracy and confusion matrix.

ALGORITHM:

- **PART A: SVM MODEL**

  STEP 1: Import **necessary libraries**

  STEP 2: Load and explore the dataset

  STEP 3: Handle missing values if any

  STEP 4: Encode categorical variables

  STEP 5: Split dataset into training and testing sets

  STEP 6: Build SVM classifier using **SVC()**

  STEP 7: Train and predict

  STEP 8: Evaluate the model using accuracy and confusion matrix

- **PART B: RANDOM FOREST MODEL**

  STEP 1: Initialize Random Forest using **RandomForestClassifier()**

  STEP 2: Train and predict

  STEP 3: Evaluate and compare with SVM

CODE:

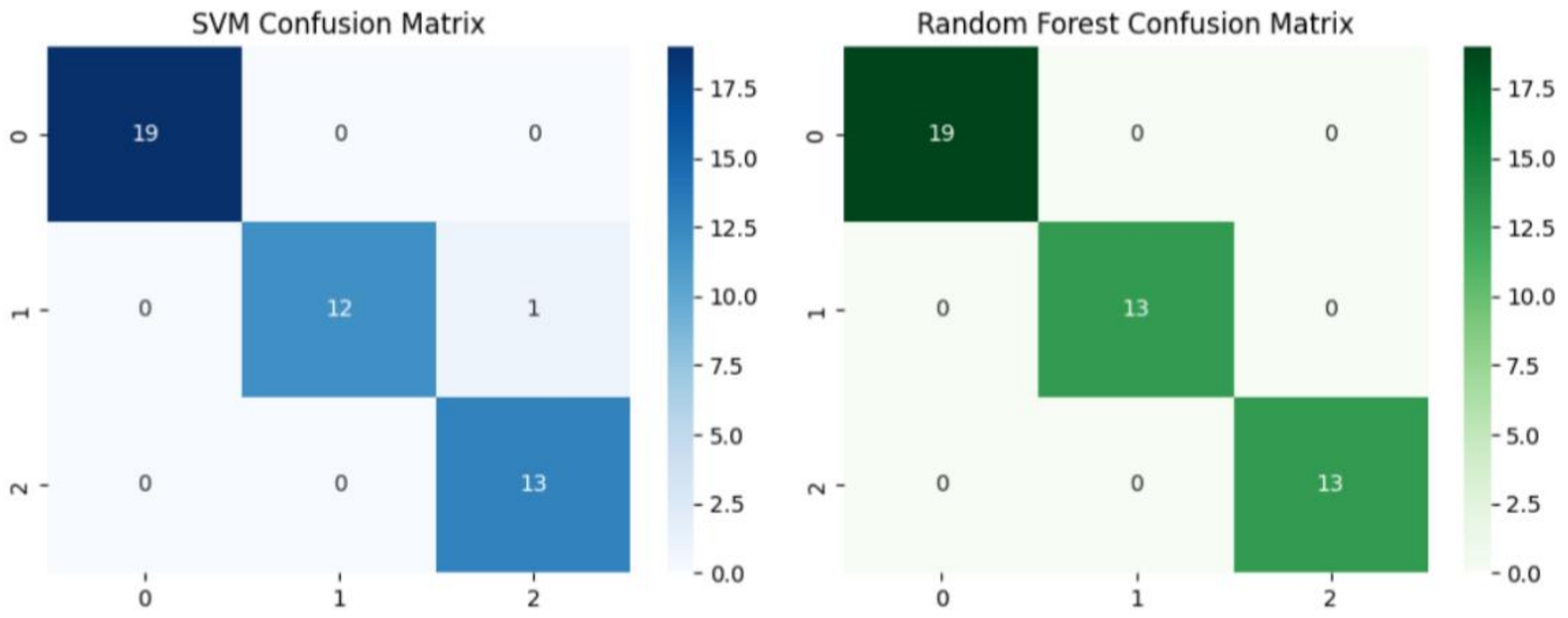
```
# 1. Import libraries
```

```python
import pandas as pd
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.ensemble import RandomForestClassifier
from sklearn.metrics import accuracy_score, confusion_matrix
import seaborn as sns
import matplotlib.pyplot as plt

# 2. Load dataset
iris = load_iris()
X = iris.data
y = iris.target

# 3. Feature scaling
scaler = StandardScaler()
X_scaled = scaler.fit_transform(X)

# 4. Train-test split
X_train, X_test, y_train, y_test = train_test_split(X_scaled, y,
test_size=0.3, random_state=42)

# Part A: SUPPORT VECTOR MACHINE

# 5. Initialize and train SVM
svm_model = SVC(kernel='linear')  # You can also try 'rbf', 'poly'
svm_model.fit(X_train, y_train)

# 6. Predict and evaluate SVM
y_pred_svm = svm_model.predict(X_test)
print("SVM Accuracy:", accuracy_score(y_test, y_pred_svm))
print("SVM Confusion Matrix:\n", confusion_matrix(y_test, y_pred_svm))

# Part B: RANDOM FOREST

# 7. Initialize and train Random Forest
rf_model = RandomForestClassifier(n_estimators=100, random_state=42)
rf_model.fit(X_train, y_train)

# 8. Predict and evaluate Random Forest
y_pred_rf = rf_model.predict(X_test)
print("Random Forest Accuracy:", accuracy_score(y_test, y_pred_rf))
print("Random Forest Confusion Matrix:\n", confusion_matrix(y_test,
y_pred_rf))
```

```
# 9. Visual comparison using seaborn heatmap

plt.figure(figsize=(10, 4))

plt.subplot(1, 2, 1)
sns.heatmap(confusion_matrix(y_test, y_pred_svm), annot=True, cmap='Blues',
fmt='d')
plt.title("SVM Confusion Matrix")

plt.subplot(1, 2, 2)
sns.heatmap(confusion_matrix(y_test, y_pred_rf), annot=True, cmap='Greens',
fmt='d')
plt.title("Random Forest Confusion Matrix")
plt.tight_layout()
plt.show()
```

OUTPUT:

```
SVM Accuracy: 0.9777777777777777
SVM Confusion Matrix:
 [[19  0  0]
 [ 0 12  1]
 [ 0  0 13]]
Random Forest Accuracy: 1.0
Random Forest Confusion Matrix:
 [[19  0  0]
 [ 0 13  0]
 [ 0  0 13]]
```



RESULT:

Thus, the execution successfully built and evaluated classification models using **Support Vector Machines (SVM)** and **Random Forest**, and the models' performance was assessed using **accuracy** and **confusion matrix**, demonstrating effective classification capability.