TITLE: - Iris Flower Classification – Classify flower species based on petal and sepal dimensionsusing the Iris dataset.

INTRODUCTION

Objective: The objective of this project is to build a machine learning model capable of classifying iris flowers into three species (Setosa, Versicolour, Virginica) based on their physical attributes: sepal length, sepal width, petal length, and petal width. The model aims to achieve high accuracy and generalization using Logistic Regression while also providing useful visualizations to understand the classification process.

DATA SET DESCRIPTION:

The Iris dataset is a well-known dataset introduced by Ronald Fisher in 1936. It contains 150 samples of iris flowers, equally distributed among three classes:

- Setosa (0)
- Versicolour (1)
- Virginica (2)

Features:

- Sepal Length (cm)
- Sepal Width (cm)
- Petal Length (cm)

- Petal Width (cm).

METHODOLOGY

The code works in the following manner: -

1. **Data Collection:** The Iris dataset was loaded using the `load_iris` function from the Scikit-learn library. This dataset contains 150 samples, each with four features (sepal length, sepal width, petal length, and petal width) and a target variable indicating the species of the iris flower.

2. **Data Preprocessing:** Before training the model, the dataset was split into training and testing sets using the `train_test_split` function. This ensures that the model can be evaluated on unseen data. The training set consisted of 80% of the data, while the testing set consisted of the remaining 20%.

3. **Feature Standardization:** To ensure that the features are on a similar scale, standardization was performed using the `StandardScaler` class from Scikit-learn. This step is crucial for algorithms like KNN, which rely on distance calculations.

4. **Model Training:** The K-Nearest Neighbors (KNN) classifier was chosen for this classification task. The classifier was initialized with `n_neighbors` set to 3. The model was then trained on the standardized training data using the `fit` method.

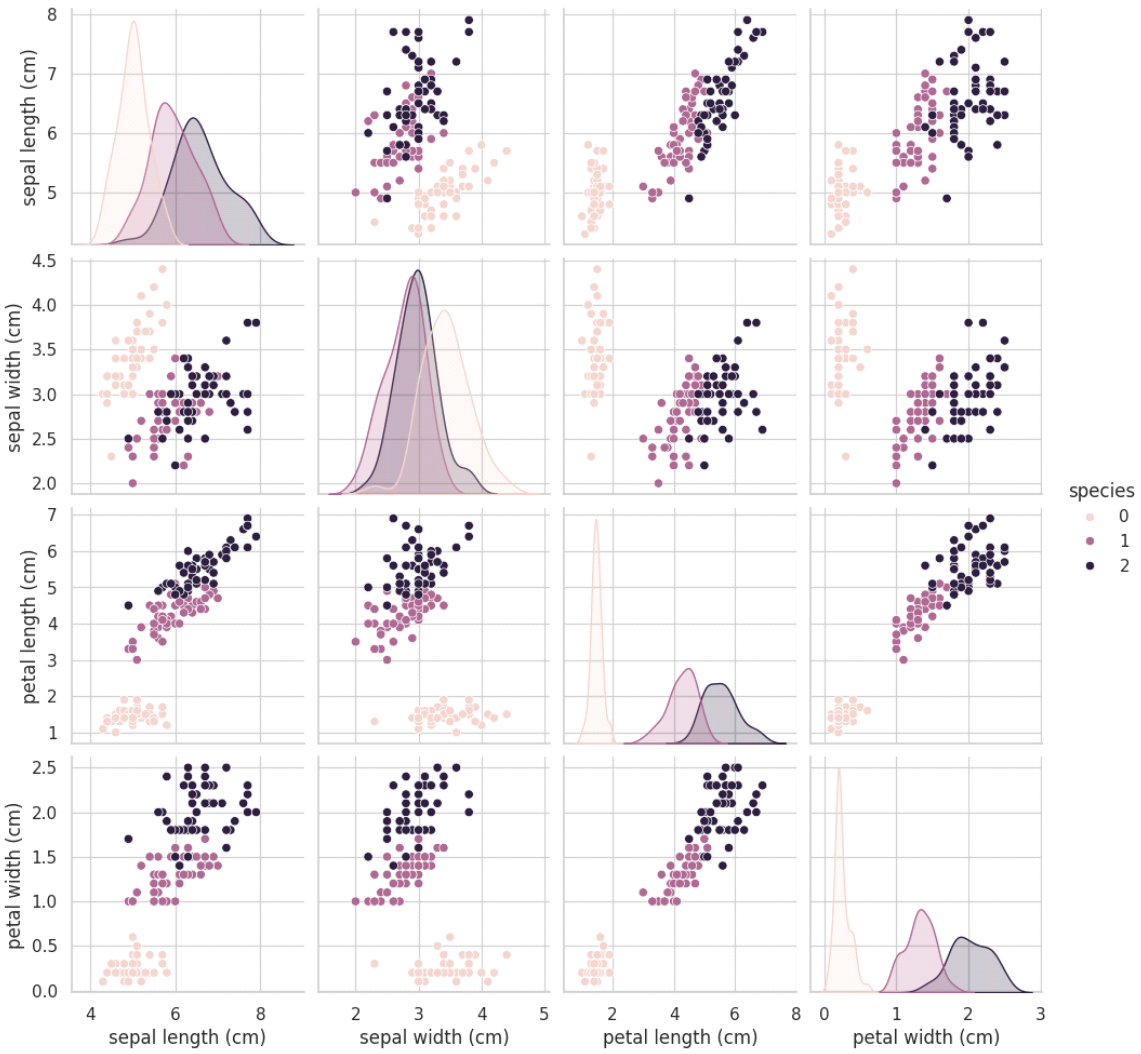
5. **Model Evaluation:** After training the model, predictions were made on the testing set using the `predict` method. The accuracy of the model was then calculated using the `accuracy_score` function, which compares the predicted labels with the true labels of the testing set.

CODE

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn import datasets
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import accuracy_score, classification_report, confusion_matrix


iris = datasets.load_iris()
X = iris.data
y = iris.target


# Convert to DataFrame for visualization
iris_df = pd.DataFrame(X, columns=iris.feature_names)
```

```
iris_df['species'] = iris.target

sns.pairplot(iris_df, hue='species')

plt.show()

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2,
random_state=42)


scaler = StandardScaler()

X_train = scaler.fit_transform(X_train)

X_test = scaler.transform(X_test)


model = LogisticRegression(max_iter=200)

model.fit(X_train, y_train)


y_pred = model.predict(X_test)


accuracy = accuracy_score(y_test, y_pred)

report = classification_report(y_test, y_pred, target_names=iris.target_names)


print(f"Accuracy: {accuracy * 100:.2f}%")

print("\nClassification Report:\n", report)


cm = confusion_matrix(y_test, y_pred)

sns.heatmap(cm, annot=True, fmt='d', cmap='Blues', xticklabels=iris.target_names,
yticklabels=iris.target_names)

plt.title('Confusion Matrix')

plt.xlabel('Predicted Labels')

plt.ylabel('True Labels')

plt.show()
```

OUTPUT



Accuracy: 100.00%

Classification Report

	precision	recall	f1-score	support
setosa	1.00	1.00	1.00	10
versicolor	1.00	1.00	1.00	9
virginica	1.00	1.00	1.00	11
accuracy			1.00	30

macro avg	1.00	1.00	1.00	30
weighted avg	1.00	1.00	1.00	30