EXPT NO : 3. A python program to implement Logistic Model

DATE: 06/09/2024

AIM:

To write a python program to implement a Logistic Model.

PROCEDURE:

Implementing Logistic method using the iris dataset involve the following steps:

Step 1: Import Necessary Libraries

First, import the libraries that are essential for data manipulation, visualization, and model building.

```
# Step 1: Import Necessary Libraries

import numpy as np

import pandas as pd

import matplotlib.pyplot as plt

from sklearn.model_selection import train_test_split

from sklearn.linear_model import LogisticRegression

from sklearn.metrics import accuracy_score, confusion_matrix,
classification_report
```

Step 2: Load the Iris Dataset

The iris dataset can be loaded.

```
# Step 2: Load the Dataset

# For this example, we'll use a built-in dataset from sklearn. You can
replace it with your dataset.

from sklearn.datasets import load_iris
# Load the iris dataset
```

```
data = load_iris()

X = data.data

y = (data.target == 0).astype(int) # For binary classification (classifying
Iris-setosa)
```

Step 3: Data Preprocessing

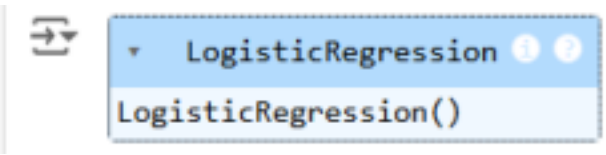
Ensure the data is clean and ready for modeling. Since the Iris dataset is clean, minimal preprocessing is needed.

```
# Step 3: Prepare the Data

# Split the dataset into training and testing sets

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

Step 4 : Train a Model

```
# Step 4: Create and Train the Model

model = LogisticRegression()

model.fit(X_train, y_train)
```

OUTPUT :



Step 5 : Make Predictions

Use the model to make predictions based on the independent variable.

```
# Step 5: Make Predictions

y_pred = model.predict(X_test)
```

Step 6 : Evaluate the Model

Evaluate the model performance.

```
# Step 6: Evaluate the Model

accuracy = accuracy_score(y_test, y_pred)

conf_matrix = confusion_matrix(y_test, y_pred)

class_report = classification_report(y_test, y_pred)

# Print evaluation metrics

print(f"Accuracy: {accuracy}")

print("Confusion Matrix:")

print(conf_matrix)

print("Classification Report:")

print(class_report)
```

OUTPUT :

```
Accuracy: 1.0
Confusion Matrix:
[[20  0]
 [ 0 10]]
Classification Report:
              precision    recall  f1-score   support

           0       1.00      1.00      1.00        20
           1       1.00      1.00      1.00        10

    accuracy                           1.00        30
   macro avg       1.00      1.00      1.00        30
weighted avg       1.00      1.00      1.00        30
```

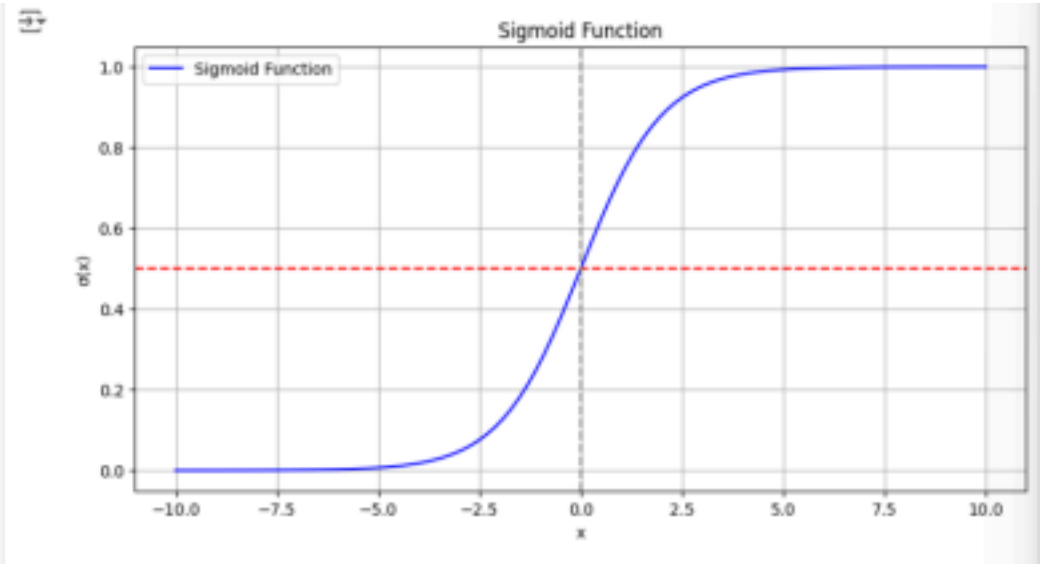
Step 7 :Visualize the Results

Plot the original data points and the fitted regression line.

```
 # Step 7: Visualize Results (Optional)

x_values = np.linspace(-10, 10, 100)
sigmoid_values = 1 / (1 + np.exp(-x_values))
```

```
# Plot the sigmoid function

plt.figure(figsize=(10, 5))

plt.plot(x_values, sigmoid_values, label='Sigmoid Function', color='blue')

plt.title('Sigmoid Function')

plt.xlabel('x')

plt.ylabel('σ(x)')

plt.grid()

plt.axhline(0.5, color='red', linestyle='--') # Line at y=0.5

plt.axvline(0, color='gray', linestyle='--') # Line at x=0

plt.legend()

plt.show()
```

OUTPUT :



RESULT:

This step-by-step process will help us to implement Logistic models using the Iris dataset and analyze their performance.