Ex. No.: 8 Write a program for Logistics Regression

1. Construct the Logistics Regression model for the following data and also predict the match outcome if run scored and overs played are 180 and 22 respectively.

Runs Scored	Overs Played	Match Outcome (1 = Win, 0 = Loss)
100	15	0
150	20	1
80	10	0
200	25	1
120	18	1

AIM:

To write a Python program to calculate the Logistics Regression by using the given data.

Program:

```
import numpy as np
from sklearn.linear_model import LogisticRegression
X = np.array([[100, 15], [150, 20], [80, 10], [200, 25], [120, 18]])
y = np.array([0, 1, 0, 1, 1])
model = LogisticRegression()
model.fit(X, y)
new_data = np.array([[180, 22]])
prediction = model.predict(new_data)
prediction_proba = model.predict_proba(new_data)
accuracy=model.score(X,y)
print("Accuracy",accuracy)
print(f"Runs Scored: {new_data[0, 0]}, Overs Played: {new_data[0, 1]}")
print(f"Prediction: {'Win' if prediction[0] == 1 else 'Loss'}")
print(f"Prediction Probability: {prediction_proba[0]}")
```

OUTPUT:

Accuracy 1.0**[This will give you the accuracy of the model on the training data]**
Runs Scored: 180, Overs Played: 22
Prediction: Win
Prediction Probability: [1.48259183e-12 1.00000000e+00]

Logistic regression aims to solve classification problems. It does this by predicting categorical outcomes, unlike linear regression that predicts a continuous outcome.

In the simplest case there are two outcomes, which is called binomial, an example of which is predicting if a tumor is malignant or benign. Other cases have more than two outcomes to classify, in this case it is called multinomial. A common example for multinomial logistic regression would be predicting the class of an iris flower between 3 different species.

Here we will be using basic logistic regression to predict a binomial variable. This means it has only two possible outcomes.

2. Construct the Logistics Regression model for the following data and also predict if tumor is cancerous where the size is 3.46mms:

X	3.78	2.44	2.09	0.14	1.72	1.65	4.92	4.37	4.96	4.52	3.69	5.88
y	0	0	0	0	0	0	1	1	1	1	1	1

Here X represents the size of a tumor in millimeters.
Y represents whether or not the tumor is cancerous (0 for "No", 1 for "Yes").

AIM:

To write a Python program to calculate the Logistics Regression by using the given data.

Program:

```
import numpy
from sklearn import linear_model
X = numpy.array([3.78, 2.44, 2.09, 0.14, 1.72, 1.65, 4.92, 4.37, 4.96, 4.52,
3.69, 5.88]).reshape(-1,1)
y = numpy.array([0, 0, 0, 0, 0, 0, 1, 1, 1, 1, 1, 1])
logr = linear_model.LogisticRegression()
logr.fit(X,y)
predicted = logr.predict(numpy.array([3.46]).reshape(-1,1))
accuracy=logr.score(X,y)
print("Accuracy",accuracy)
print(predicted)
```

OUTPUT:

Accuracy 0.9166666666666666**[This will give you the accuracy of the model on the training data]**
[0]
We have predicted that a tumor with a size of 3.46mm will not be cancerous.