EXPERIMENT 3

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A PYTHON PROGRAM TO IMPLEMENT LOGISTIC MODEL

AIM:

TO IMPLEMENT A PYTHON PROGRAM WITH LOGISTIC MODEL

CODE:

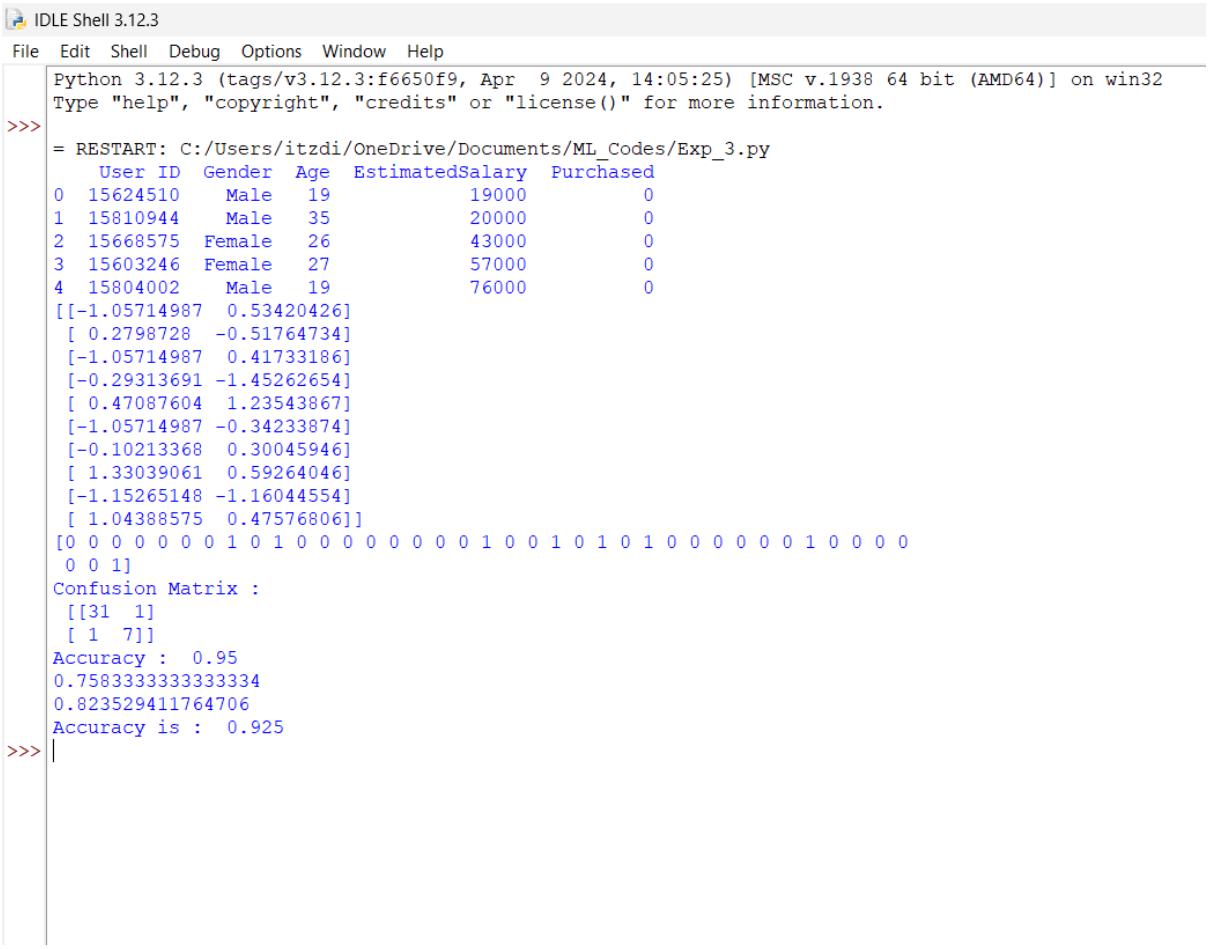
```
import pandas as pd
import numpy as np
from numpy import log,dot,exp,shape
from sklearn.metrics import confusion_matrix
data = pd.read_csv('/content/suv_data.csv')
print(data.head())

x = data.iloc[:, [2, 3]].values
y = data.iloc[:, 4].values
from sklearn.model_selection import train_test_split
x_train, x_test, y_train, y_test=train_test_split(x,y,test_size=0.10,
random_state=0)
from sklearn.preprocessing import StandardScaler
sc=StandardScaler()
x_train=sc.fit_transform(x_train)
x_test=sc.transform(x_test)
print (x_train[0:10,:])

from sklearn.linear_model import LogisticRegression
classifier=LogisticRegression(random_state=0)
classifier.fit(x_train,y_train)
LogisticRegression (random_state=0)
y_pred = classifier.predict(x_test)
print(y_pred)

from sklearn.metrics import confusion_matrix
```

```
cm = confusion_matrix(y_test, y_pred)
print ("Confusion Matrix : \n", cm)

from sklearn.metrics import accuracy_score
print ("Accuracy : ", accuracy_score(y_test, y_pred))


# User Defined function
from sklearn.model_selection import train_test_split
x_train, x_test, y_train, y_test=train_test_split(x,y,test_size=0.10,
random_state=0)

def Std(input_data):
   mean0 = np.mean(input_data[:, 0])
   sd0 = np.std(input_data[:, 0])
   mean1 = np.mean(input_data[:, 1])
   sd1 = np.std(input_data[:, 1])
   return lambda x: ((x[0]-mean0)/sd0, (x[1]-mean1)/sd1)

my_std = Std(x)
my_std(x_train[0])

def standardize(X_tr):
   for i in range(shape(X_tr)[1]):
      X_tr[:,i] = (X_tr[:,i] - np.mean(X_tr[:,i]))/np.std(X_tr[:,i])
def F1_score(y,y_hat):
   tp,tn,fp,fn = 0,0,0,0
   for i in range(len(y)):
      if y[i] == 1 and y_hat[i] == 1:
         tp += 1
      elif y[i] == 1 and y_hat[i] == 0:
         fn += 1
      elif y[i] == 0 and y_hat[i] == 1:
         fp += 1
      elif y[i] == 0 and y_hat[i] == 0:
         tn += 1
   precision = tp/(tp+fp)
```

```
    recall = tp/(tp+fn)
    f1_score = 2*precision*recall/(precision+recall)
    return f1_score
class LogisticRegression:
    def sigmoid(self,z):
        sig = 1/(1+exp(-z))
        return sig
    def initialize(self,X):
        weights = np.zeros((shape(X)[1]+1,1))
        X = np.c_[np.ones((shape(X)[0],1)),X]
        return weights,X
    def fit(self,X,y,alpha=0.001,iter=400):
        weights,X = self.initialize(X)

        def cost(theta):
            z = dot(X,theta)
            cost0 = y.T.dot(log(self.sigmoid(z)))
            cost1 = (1-y).T.dot(log(1-self.sigmoid(z)))
            cost = -((cost1 + cost0))/len(y)
            return cost
        cost_list = np.zeros(iter,)
        for i in range(iter):
            weights = weights - alpha*dot(X.T,self.sigmoid(dot(X,weights))-
np.reshape(y,(len(y),1)))
            cost_list[i] = cost(weights)
        self.weights = weights
        return cost_list
    def predict(self,X):
        z = dot(self.initialize(X)[1],self.weights)
        lis = []
        for i in self.sigmoid(z):
            if i>0.5:
                lis.append(1)
            else:
                lis.append(0)
        return lis
standardize(x_train)
```

```
standardize(x_test)
obj1 = LogisticRegression()
model= obj1.fit(x_train,y_train)
y_pred = obj1.predict(x_test)
y_trainn = obj1.predict(x_train)
f1_score_tr = F1_score(y_train,y_trainn)
f1_score_te = F1_score(y_test,y_pred)
print(f1_score_tr)
print(f1_score_te)
conf_mat = confusion_matrix(y_test, y_pred)
accuracy = (conf_mat[0, 0] + conf_mat[1, 1]) / sum(sum(conf_mat))
print("Accuracy is : ",accuracy)
```

OUTPUT:



***RESULT*:**

A PYTHON PROGRAM TO IMPLEMENT SIMPLE LINEAR REGRESSION USING LEAST SQUARE METHOD AS BEEN ANALYSED AND VERIFIED