EXPERIMENT:9 LOGISTICS REGRESSION

Aim:

To classify data points using the K-Nearest Neighbors (KNN) algorithm and evaluate its performance on a sample dataset.

Procedure :

1. Import libraries: pandas, numpy, matplotlib.pyplot, and sklearn modules (KNeighborsClassifier, train_test_split, metrics).
2. Load the dataset (e.g., Iris dataset) and perform preprocessing like handling missing values and encoding categorical features.
3. Split the dataset into training and testing sets using train_test_split.
4. Create and train a KNN model using KNeighborsClassifier with an appropriate value of **k**.
5. Make predictions on the test set and evaluate the model using accuracy, confusion matrix, and classification report.

In [15]:

```
import numpy as np
import pandas as pd
df=pd.read_csv("C:\\Users\\kaviy\\Downloads\\Social_Network_Ads.csv")
df
```

Out[15]:

	User ID	Gender	Age	EstimatedSalary	Purchased
0	15624510	Male	19	19000	0
1	15810944	Male	35	20000	0
2	15668575	Female	26	43000	0
3	15603246	Female	27	57000	0
4	15804002	Male	19	76000	0
...	...	...	...	...	...
395	15691863	Female	46	41000	1
396	15706071	Male	51	23000	1
397	15654296	Female	50	20000	1
398	15755018	Male	36	33000	0

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	User ID	Gender	Age	EstimatedSalary	Purchased
399	15594041	Female	49	36000	1

400 rows × 5 columns

In [16]:

```
df.head()
```

Out[16]:

	User ID	Gender	Age	EstimatedSalary	Purchased
0	15624510	Male	19	19000	0
1	15810944	Male	35	20000	0
2	15668575	Female	26	43000	0
3	15603246	Female	27	57000	0
4	15804002	Male	19	76000	0

In [17]:

```
features=df.iloc[:,[2,3]].values
label=df.iloc[:,4].values
features
```

Out[17]:

```
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       [    49,  36000]], dtype=int64)
```

In [18]:

```
label
```

Out[18]:

```
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       1, 1, 1, 1, 1, 1, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
       0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0,
       0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0,
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       0, 0, 0, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 1, 0, 0, 0, 1, 0, 0, 0, 1,
```

```
       0, 1, 1, 1, 0, 0, 1, 1, 0, 1, 1, 0, 1, 1, 0, 1, 0, 0, 0, 1, 1, 0,
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       0, 1, 0, 0, 1, 1, 0, 1, 1, 1, 1, 1, 1, 0, 1, 1, 1, 1, 1, 1, 0, 1,
       1, 1, 0, 1], dtype=int64)
```

In [33]:

```
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LogisticRegression
for i in range(1,401):
    for i in range(1,401):

x_train,x_test,y_train,y_test=train_test_split(features,label,test_size=0.2
,random_state=42)
model=LogisticRegression()
model.fit(x_train,y_train)
train_score=model.score(x_train,y_train)
test_score=model.score(x_test,y_test)
if test_score>train_score:
    print("Test {} Train{} Random State
{}".format(test_score,train_score,i))
model=LogisticRegression()
model.fit(x_train,y_train)
train_score=model.score(x_train,y_train)
test_score=model.score(x_test,y_test)
if test_score>train_score:
    print("Test {} Train{} Random State
{}".format(test_score,train_score,i))
Test 0.65 Train0.640625 Random State 400
Test 0.65 Train0.640625 Random State 400
```

In [34]:

```
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LogisticRegression
for i in range(1,401):

x_train,x_test,y_train,y_test=train_test_split(features,label,test_size=0.2
,random_state=42)
model=LogisticRegression()
model.fit(x_train,y_train)
train_score=model.score(x_train,y_train)
test_score=model.score(x_test,y_test)
if test_score>train_score:
    print("Test {} Train{} Random State
{}".format(test_score,train_score,i))
Test 0.65 Train0.640625 Random State 400
```

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In [35]:

```
x_train,x_test,y_train,y_test=train_test_split(features,label,test_size=0.2
,random_state=42)
finalModel=LogisticRegression()
finalModel.fit(x_train,y_train)
```

Out[35]:

```
LogisticRegression
LogisticRegression()
```

In [36]:

```
print(finalModel.score(x_train,y_train))
print(finalModel.score(x_test,y_test))
0.640625
0.65
```

In [37]:

```
from sklearn.metrics import classification_report
print(classification_report(label,finalModel.predict(features)))
              precision    recall  f1-score   support

           0       0.64      1.00      0.78       257
           1       0.00      0.00      0.00       143

    accuracy                           0.64       400
   macro avg       0.32      0.50      0.39       400
weighted avg       0.41      0.64      0.50       400
```

Result :

- The KNN model classified data points based on the nearest neighbors.
- Model accuracy depends on the chosen **k** and distance metric.
- Confusion matrix and classification report show the model's performance and misclassifications.