

## Logistic\_Regression

## Import Libraries

```
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
from sklearn.tree import DecisionTreeClassifier
from sklearn.metrics import confusion_matrix, ConfusionMatrixDisplay
from sklearn.metrics import accuracy_score
```

## Importing dataset and splitting dataset into training and test sets



```
pd = pd.read_csv('Social_Network_Ads.csv')
X = pd.iloc[:, :-1].values
y = pd.iloc[:, -1].values
x_train, x_test, y_train, y_test = train_test_split(X, y, test_size = 0.25, random_state = 0)
```

## Feature Scaling

```
sc = StandardScaler()
x_train = sc.fit_transform(x_train)
x_test = sc.transform(x_test)
```

## Training the Logistic Regression model on the training set

```
classifier = DecisionTreeClassifier(criterion = 'entropy', random_state = 0)
classifier.fit(x_train, y_train)
```

  DecisionTreeClassifier  
DecisionTreeClassifier(criterion='entropy', random\_state=0)


## Predicting a new result

```
print(classifier.predict(sc.transform([[30,87000]])))
```


 [0]

## Predicting the test set result

```
y_predict = classifier.predict(x_test)
display(y_predict)
```

 array([[0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 1, 0, 1, 1, 0, 1, 0, 0, 1,  
0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0,  
1, 0, 0, 1, 0, 1, 1, 0, 0, 1, 1, 1, 0, 0, 1, 0, 0, 1, 0, 1, 0, 1,  
0, 0, 0, 1, 1, 0, 0, 1, 0, 0, 0, 0, 1, 1, 1, 1, 0, 0, 1, 0, 0, 1,  
1, 0, 0, 1, 0, 0, 0, 1, 0, 1, 1, 1])

```
print(np.concatenate((y_predict.reshape(len(y_predict),1), y_test.reshape(len(y_test),1)),1))
```

 [[0 0]  
[0 0]  
[0 0]  
[0 0]  
[0 0]  
[0 0]  
[0 0]  
[1 1]  
[0 0]  
[0 0]  
[0 0]  
[0 0]  
[0 0]

```
[0 0]
[1 0]
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[1 0]
[1 0]
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```

Making the confusion matrix

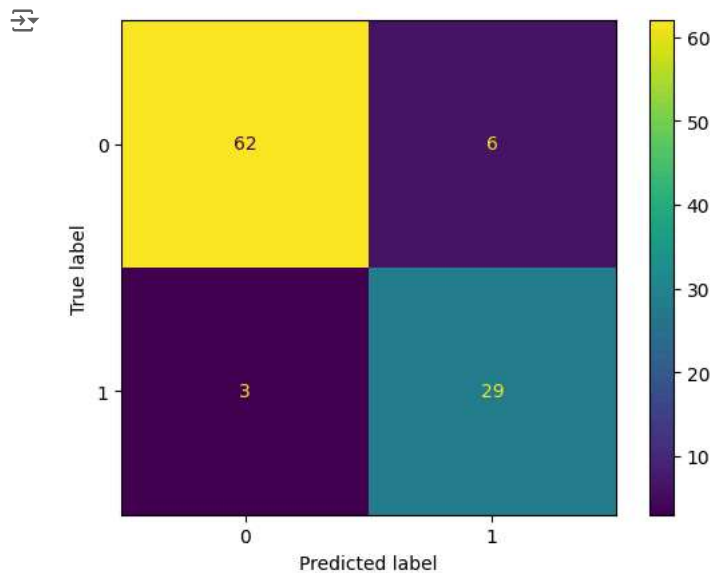
```
confusion_matrix(y_test, y_predict)
```

```
array([[62,  6],
       [ 3, 29]])
```

```
accuracy_score(y_test, y_predict)
```

```
0.91
```

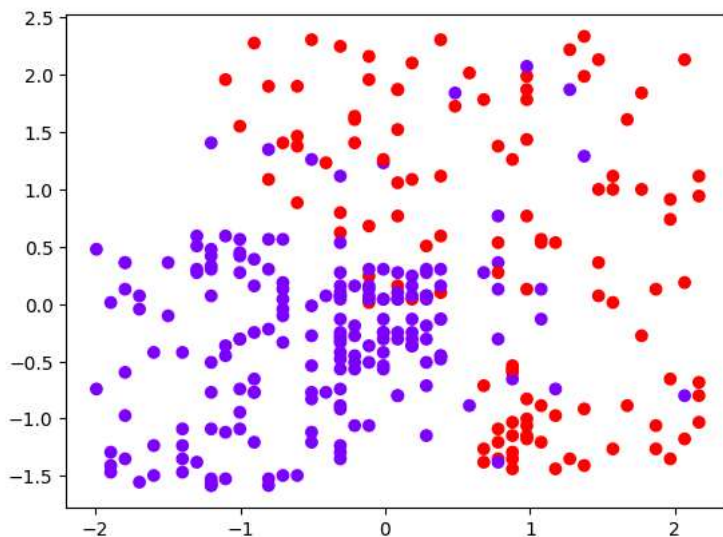
```
cm = confusion_matrix(y_test, y_predict, labels=classifier.classes_)
disp = ConfusionMatrixDisplay(confusion_matrix=cm, display_labels=classifier.classes_)
disp.plot()
plt.show()
```



Visualising the Training set results

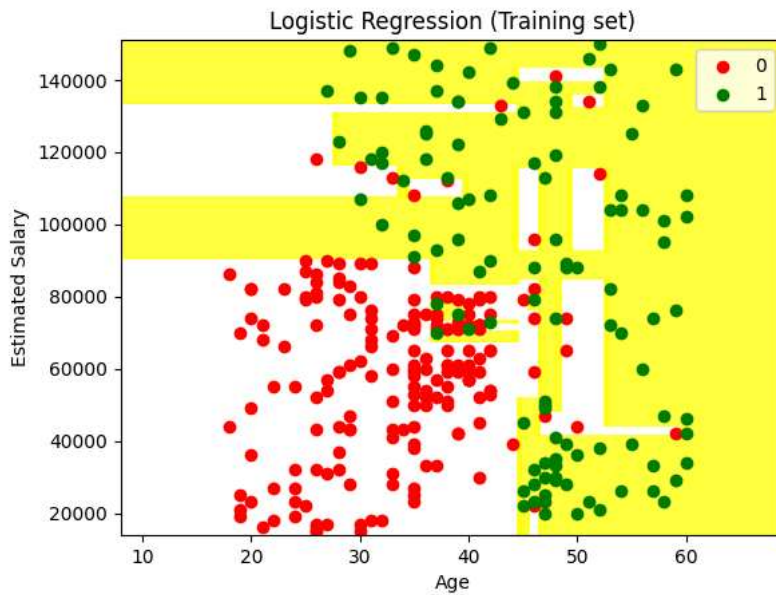
```
plt.scatter(x_train[:, 0], x_train[:, 1], c = y_train, cmap = 'rainbow')
```

<matplotlib.collections.PathCollection at 0x7ed4e78add50>



```
from matplotlib.colors import ListedColormap
x_set, y_set = sc.inverse_transform(x_train), y_train
X1, X2 = np.meshgrid(np.arange(start = x_set[:, 0].min() - 10, stop = x_set[:, 0].max() + 10, step = 1),
                     np.arange(start = x_set[:, 1].min() - 1000, stop = x_set[:, 1].max() + 1000, step = 1))
plt.contourf(X1, X2, classifier.predict(sc.transform(np.array([X1.ravel(), X2.ravel()])).T).reshape(X1.shape),
             alpha = 0.75, cmap = ListedColormap(('white', 'yellow')))
plt.xlim(X1.min(), X1.max())
plt.ylim(X2.min(), X2.max())
for i, j in enumerate(np.unique(y_set)):
    plt.scatter(x_set[y_set == j, 0], x_set[y_set == j, 1], c = ListedColormap(('red', 'green'))(i), label = j)
plt.title('Logistic Regression (Training set)')
plt.xlabel('Age')
plt.ylabel('Estimated Salary')
plt.legend()
plt.show()
```

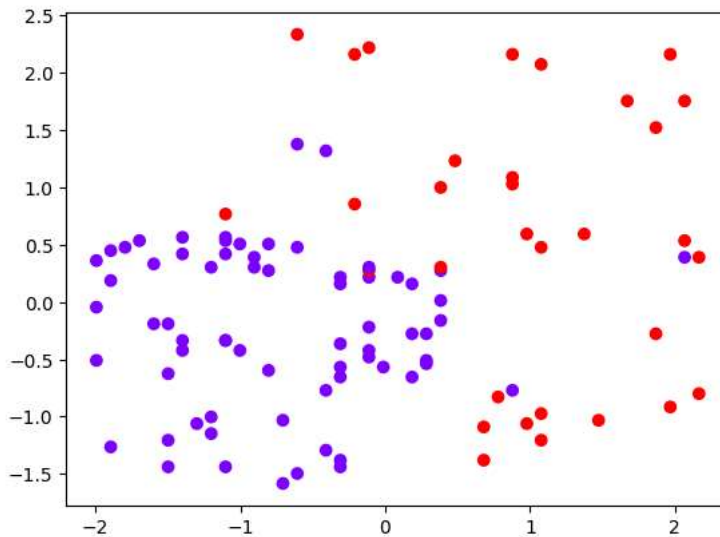
```
<ipython-input-14-ac20f31602f7>:10: UserWarning: *c* argument looks like a single numeric RGB or RGBA sequence, which should be avoided
plt.scatter(x_set[y_set == j, 0], x_set[y_set == j, 1], c = ListedColormap(('red', 'green'))(i), label = j)
```



Visualising the Test set results

```
plt.scatter(x_test[:, 0], x_test[:, 1], c = y_test, cmap = 'rainbow')
```

```
<matplotlib.collections.PathCollection at 0x7ed52a3ca860>
```



```
from matplotlib.colors import ListedColormap
x_set, y_set = sc.inverse_transform(x_test), y_test
X1, X2 = np.meshgrid(np.arange(start = x_set[:, 0].min() - 10, stop = x_set[:, 0].max() + 10, step = 1),
                     np.arange(start = x_set[:, 1].min() - 1000, stop = x_set[:, 1].max() + 1000, step = 1))
plt.contourf(X1, X2, classifier.predict(sc.transform(np.array([X1.ravel(), X2.ravel()])).T).reshape(X1.shape),
             alpha = 0.75, cmap = ListedColormap(('white', 'yellow')))
plt.xlim(X1.min(), X1.max())
plt.ylim(X2.min(), X2.max())
for i, j in enumerate(np.unique(y_set)):
    plt.scatter(x_set[y_set == j, 0], x_set[y_set == j, 1], c = ListedColormap(('red', 'green'))(i), label = j)
plt.title('Logistic Regression (Training set)')
plt.xlabel('Age')
plt.ylabel('Estimated Salary')
plt.legend()
plt.show()
```

```
<ipython-input-16-edea852c2b2b>:10: UserWarning: *c* argument looks like a single numeric RGB or RGBA sequence, which should be avoided  
plt.scatter(x_set[y_set == j, 0], x_set[y_set == j, 1], c = ListedColormap(('red', 'green'))(i), label = j)
```

