Title: Apply appropriate ML algorithm on a dataset collected in a cosmetics shop showing details of customers to predict customer response for special offers.

S/W Packages and H/W apparatus used: Linux OS: Ubuntu/Windows ,

Jupyter notebook.

Theory :

Logistic regression:

Logistic regression is used for binary classification where we use sigmoid function, that takes input as independent variables and produces a probability value between 0 and 1.

For example, we have two classes Class 0 and Class 1 if the value of the logistic function for an input is greater than 0.5 (threshold value) then it belongs to Class 1 it belongs to Class 0. It's referred to as regression because it is the extension of linear regression but is mainly used for classification problems.

Logistic Function – Sigmoid Function

The sigmoid function is a mathematical function used to map the predicted values to probabilities.

It maps any real value into another value within a range of 0 and 1. The value of the logistic regression must be between 0 and 1, which cannot go beyond this limit, so it forms a curve like the "S" form.

The S-form curve is called the Sigmoid function or the logistic function.

In logistic regression, we use the concept of the threshold value, which defines the probability of either 0 or 1. Such as values above the threshold value tends to 1, and a value below the threshold values tends to 0.
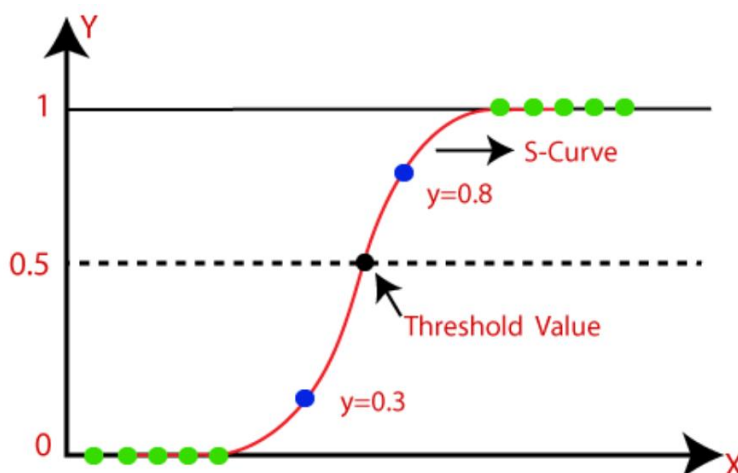
Advantages:

- Logistic Regression is a simple and interpretable algorithm.

- It works well for binary classification problems like this.

- Easy to implement and understand.

Limitations:

- Logistic Regression may not capture complex relationships between features.

- It assumes linear decision boundaries, which may not always be appropriate for the data.

Working:

1. Load the dataset and preprocess it.

2. Split the data into features (X) and target variable (y).

3. Split the data into training and testing sets.

4. Initialize and train a Logistic Regression model using the training data.

5. Evaluate the model's performance using metrics such as accuracy, precision, recall, or F1-score.

6. Use the trained model to predict customer responses for new data.

Conclusion:

By applying machine learning algorithms like Logistic Regression to the dataset collected in the cosmetics shop, we can predict customer responses for special offers. While Logistic Regression offers simplicity and interpretability, it's essential to consider other algorithms for potentially better performance, especially for more complex datasets. Additionally, careful evaluation of the model's performance and tuning of parameters can lead to improved predictions.