# Task- Three :

# Telco Customer Churn Prediction

## Introduction

This project focuses on predicting customer churn using the Telco Customer Churn dataset.  
Churn indicates whether a customer has discontinued the service.  
The goal is to preprocess the dataset, train a Logistic Regression model, and evaluate its performance in predicting churn.

## Dataset Details

The dataset contains information about Telco customers, including demographic details, account information, and service usage.  
The target variable is **Churn**, which indicates whether a customer has left the service or not.

## Data Preprocessing

* Loaded the dataset using Pandas.
* Dropped the customerID column as it does not contribute to prediction.
* Converted TotalCharges column to numeric and handled missing values by replacing them with the median.
* Encoded binary categorical variables (gender, Partner, Dependents, PhoneService, PaperlessBilling, Churn) using Label Encoding.
* Applied One-Hot Encoding to multi-categorical variables.
* Split the dataset into training and testing sets using an **80-20 ratio** with stratification on churn.

## Model Training

A **Logistic Regression** model was used for classification:

* The model was initialized with max\_iter=1000 for convergence.
* Trained on the training set (X\_train, y\_train).
* Predictions were made on the test set (X\_test).

## Model Evaluation

The model was evaluated using Accuracy and a Confusion Matrix:

**Accuracy**: 79.49%

**Confusion Matrix**:

[[918 117]

[172 202]]

* 918 True Negatives
* 117 False Positives
* 172 False Negatives
* 202 True Positives

## Visualization

A heatmap of the confusion matrix was plotted using Seaborn and Matplotlib to visualize the performance of the model.

## Conclusion

The Logistic Regression model achieved an accuracy of approximately **79.5%** in predicting customer churn.  
The confusion matrix shows that the model is reasonably good at identifying non-churn customers but has room for improvement in correctly predicting churn customers.

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