Customer Churn Analysis and Prediction

Project Objective

The main goal of this project is to analyze customer behavior and predict whether a customer will leave (churn) or stay in a telecom company using Machine Learning techniques. Customer churn prediction helps companies reduce customer loss, improve retention strategies, and increase business revenue.

Data Preparation

The dataset contains customer details such as gender, tenure, monthly charges, contract type, internet service, payment method, and churn status. Initial exploration was performed using functions like head(), info(), and value_counts() to understand the dataset.

Data Cleaning

The customerID column was removed as it does not contribute to prediction. The TotalCharges column was converted into numeric format and missing values were handled using median imputation.

Encoding Categorical Variables

The target column Churn was encoded as Yes = 1 and No = 0. Categorical features were converted into numerical format using One-Hot Encoding to make the dataset suitable for machine learning models.

Train-Test Split

The dataset was divided into training and testing datasets in an 80:20 ratio to evaluate model performance on unseen data and prevent overfitting.

Feature Selection

Correlation analysis and Random Forest feature importance techniques were used to identify key features influencing customer churn such as contract type, monthly charges, and tenure.

Model Selection

Multiple machine learning models were implemented including Logistic Regression, Decision Tree, and Random Forest to compare prediction performance.

Model Training

The models were trained using training data and predictions were generated using test data to evaluate performance.

Model Evaluation

Model performance was evaluated using Accuracy Score, Confusion Matrix, and Classification Report including Precision, Recall, and F1-Score.

Final Outcome

The project successfully cleaned and processed telecom customer data, applied feature engineering, trained machine learning models, and predicted customer churn effectively.

Business Insight

The developed model helps telecom companies identify customers likely to leave, provide targeted offers, improve satisfaction, and reduce churn rates.