

Customer Churn Prediction Report

1. Executive Summary

This report presents the development and evaluation of a Churn Prediction System that identifies customers likely to stop using a service.

Retaining existing customers is significantly more cost-effective than acquiring new ones.

Our best models achieved up to 87% accuracy, with key churn drivers including short contract lengths, payment method types, and early customer tenure.

This predictive tool enables proactive retention strategies.

2. Dataset Overview

- Dataset: Churn_Modelling.csv
- Total Customers: 10,000
- Churned (Exited = 1): 2,037 (~20.4%)
- Retained (Exited = 0): 7,963 (~79.6%)

3. Data Preparation and Feature Engineering

- Cleaned missing or inconsistent values
- One Hot encoded categorical features
- Engineered features such as:
 - Tenure
 - Total Charges(Balance, Credit Scores)
 - Contract Type
 - Payment Method
 - Service Subscriptions
 - Active Membership
 - Gender
 - Age
 - Number of products

4. Machine Learning Models and Evaluation

Three classification models were trained and evaluated:

- Logistic Regression:
 - Cross-validation accuracy: 86%
 - Final test accuracy: 84.25%
- Random Forest:
 - Cross-validation accuracy: 87%
 - Final test accuracy: 84.25%
- XGBoost:
 - Cross-validation accuracy: 87%
 - Final test accuracy: 84.25%

5. Final Evaluation Metrics

- Accuracy Score: 0.8425
- Confusion Matrix:

[1491 116]

[199 194]]

Classification Report:

Class	Precision	Recall	F1-Score	Support
0	0.88	0.93	0.90	1607
1	0.63	0.49	0.55	393

- Overall Accuracy: 84%
- Macro Average F1-Score: 0.73

6. Key Insights: Churn Drivers

Top predictors of churn:

- Month-to-month contracts
- Electronic check payment method
- Low tenure
- Not subscribing to multiple services

Loyal customers typically:

- Have long-term contracts
- Use bank transfer or card payments
- Subscribe to bundled services