

# Predictive Analysis of Customer Retention in the Telecom Industry

## Project Overview

Customer retention is a critical challenge in the telecommunications industry, where customer churn directly impacts profitability and long-term growth. This project analyzes telecom customer data to identify key churn drivers and builds predictive models to support data-driven retention strategies.

## Objectives

- Understand behavioral and service-related factors contributing to customer churn
- Analyze contract, service usage, and payment patterns
- Build a predictive model to identify customers at high risk of churn
- Translate analytical insights into actionable business recommendation

## Dataset

- **Source:** Telco Customer Churn Dataset (Kaggle)
- **Records:** 7,043 customers
- **Target Variable:** Customer Churn (Yes / No)
- **Data Quality:** No missing values

## Key Features Include:

- Demographics (e.g., gender)
- Service subscriptions (internet, streaming, security, tech support)
- Contract type and tenure
- Payment methods and monthly charges

## Tools & Technologies

- **Python:** Pandas, NumPy
- **Visualization:** Matplotlib, Seaborn
- **Statistics & ML:** SciPy, scikit-learn
- **Modeling:** Logistic Regression

## Key Findings

### 1 Service Features & Churn

- Month-to-month contracts show the highest churn rate (**42.7%**)
- Fiber optic internet users exhibit **41.9%** churn
- Customers without online security or tech support show churn rates above **41%**

## 2 Contract Type Impact

- Month-to-month contracts: **42.7% churn**
- One-year contracts: **11.3% churn**
- Two-year contracts: **2.8% churn**

## 3 Service Subscription Patterns

- Streaming services show higher churn (~**30%**)
- Protection services show moderate churn (**22–24%**)
- Core services (tech support, online security) show lowest churn (~**15%**)

## 4 Predictive Model Performance

- **Model:** Logistic Regression
  - **Accuracy:** 80%
  - **Non-churn prediction:** 83% precision, 91% recall
  - **Churn prediction:** 66% precision, 48% recall
  - **Strongest predictor:** Customer tenure
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## ↗ Business Recommendations

- Encourage long-term contracts through targeted incentives
  - Improve technical support and online security offerings
  - Launch early-tenure retention programs
  - Use predictive insights to personalize retention strategies
  - Conduct quality reviews for fiber optic services
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## 📌 Conclusion

This project demonstrates how predictive analytics and machine learning can help telecom providers proactively reduce churn by identifying high-risk customers and implementing targeted retention strategies.

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## 👤 Author

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