

# 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.

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## 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
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## Tools & Technologies

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

### 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%**

## Contract Type Impact

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

## 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%**)

## 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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