Title: Predictive Churn Modeling & ROI Analysis for a Telecom Provider

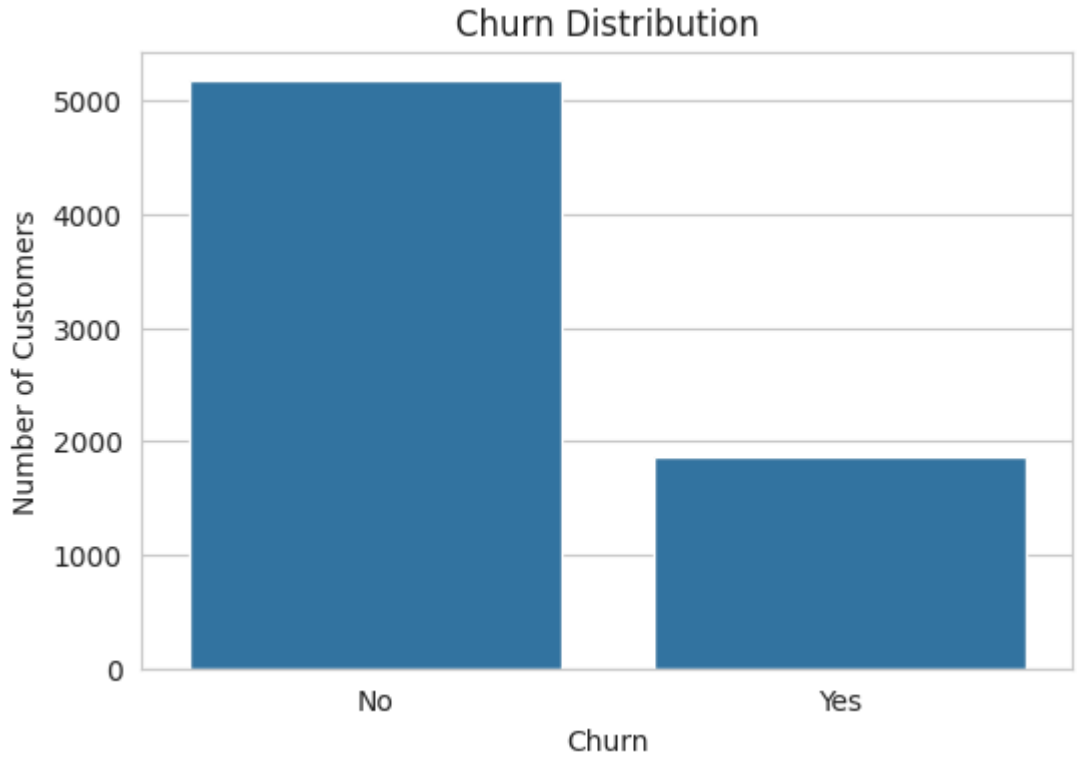
Executive Summary

This project tackled the critical business problem of customer churn by developing a machine learning model to predict which customers are at high risk of leaving. The model achieved an accuracy of **78.25%** and identified key churn drivers, such as InternetService_Fiber Optic,Paperless billing_Yes,PaymentMethod_Electronic Check. Based on these insights, I designed a targeted retention campaign with a calculated **Net Monthly Benefit of 3000$,** demonstrating a clear, data-driven path to increasing revenue.

The Business Problem

Customer churn, or attrition, is a major challenge for subscription-based businesses. High churn rates lead to significant revenue loss and increased marketing costs to acquire new customers. The objective of this analysis was to move from a reactive to a proactive retention strategy by answering three key questions:

1. Can we accurately predict which customers will churn?
2. What are the primary factors driving customers to leave?
3. What is the financial ROI of a targeted retention campaign?



My Approach & Tools

I followed a structured, end-to-end data analysis workflow:

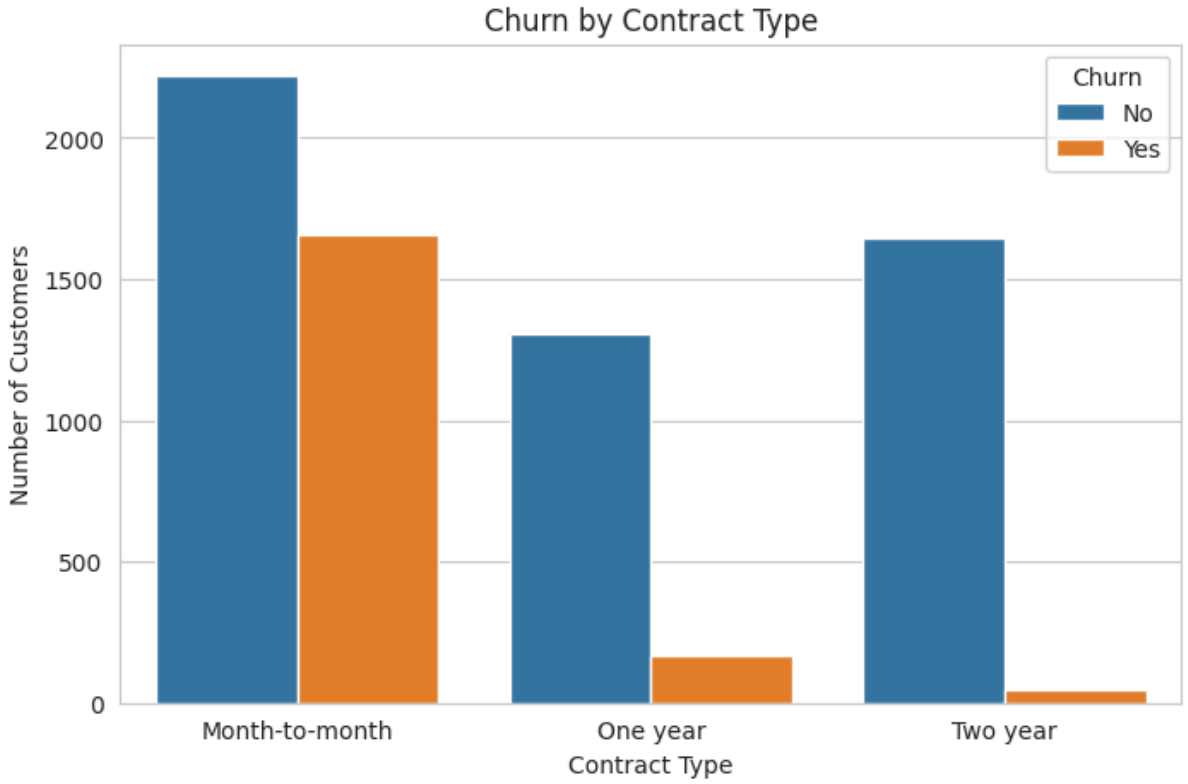
- **Data Exploration (EDA):** Analyzed customer demographics, tenure, and service data to uncover initial trends.
- **Predictive Modeling:** Built and trained a Logistic Regression model to classify customers as 'Churn' or 'No Churn'.
- **Insight Generation:** Interpreted the model's coefficients to identify the most significant churn drivers.
- **Financial Impact Analysis:** Modeled the ROI of a proactive retention strategy based on the model's predictions.

Tech Stack: Python (Pandas, Matplotlib, Scikit-learn), **Google Colab**.

Key Findings & Insights

The analysis revealed a specific, high-risk customer persona:

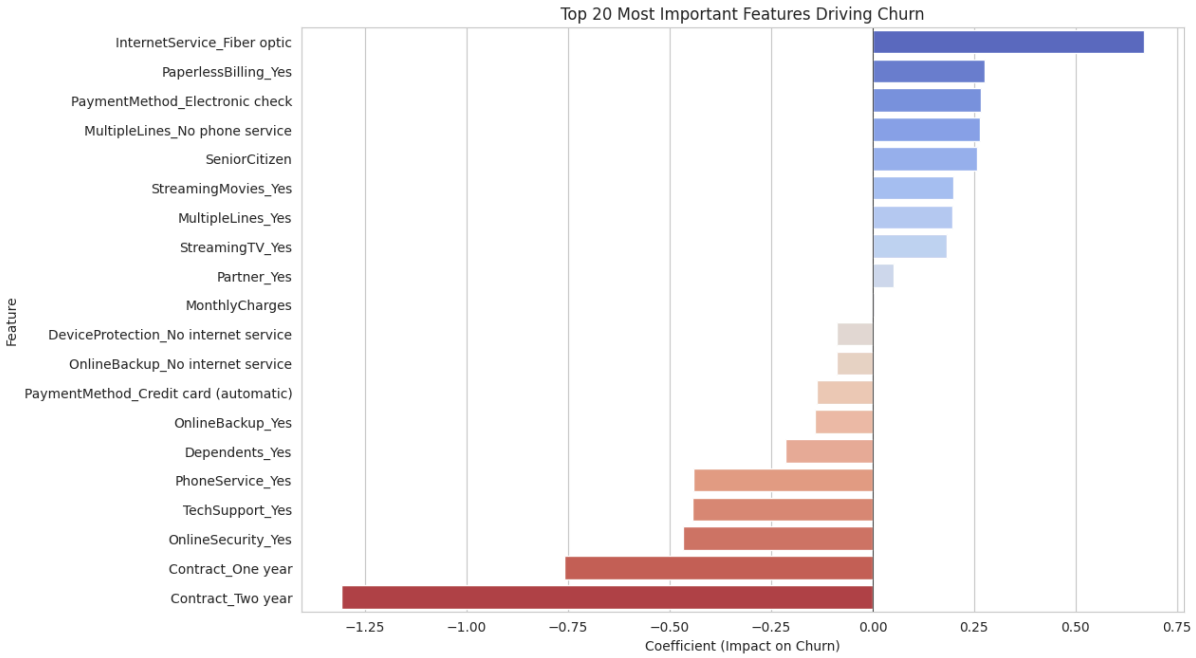
- **Finding 1: Contract is King.** Customers on a flexible **Month-to-Month contract** were dramatically more likely to churn than those on one or two-year contracts.



- **Finding 2: The "Digital-First" Persona.** The model identified a strong churn correlation with customers who use **Fiber Optic** internet, **Paperless Billing**, and pay

via **Electronic Check**. This suggests a tech-savvy but less "sticky" customer segment with high expectations.

- **Finding 3: Loyalty is Earned Over Time.** Customer **tenure** was a powerful indicator of loyalty. The longer a customer stayed, the less likely they were to leave.



The Solution: A Data-Driven Recommendation

Based on the findings, I recommend a proactive and targeted retention campaign.

- **Action:** Use the predictive model to automatically flag customers with a high churn probability.
- **Offer:** Proactively engage this segment with a targeted retention offer (e.g., a one-time $10 service discount) to reinforce value and build loyalty.
- **Goal:** Reduce churn within this high-risk group and retain valuable monthly revenue.

Financial Impact & ROI

The business case for this strategy is compelling. Using the test data as a sample:

- **Estimated Monthly Revenue at Risk: $24234.53**
- **Proposed Campaign Cost: $3110**
- **Projected Monthly Revenue Retained: $6045**
- **Projected Net Monthly Benefit (ROI): $2935**

This demonstrates that for a small, targeted investment, we can retain significant revenue that would otherwise be lost.