Customer Churn Analysis – Project Report

Prepared By: *Harsh Belekar*
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Tools Used: Python, Jupyter Notebook, Pandas, NumPy, Matplotlib, Seaborn
Objective:
To analyze customer churn patterns and uncover key drivers behind customer attrition using exploratory data analysis, enabling data-driven retention strategies.

Executive Summary

Customer churn is a major challenge for telecom companies, impacting revenue, profitability, and long-term customer relationships. This project analyzes customer behavior using demographic, service usage, contract, and payment data to understand why customers leave.

The analysis reveals that churn is heavily influenced by factors such as **contract type, tenure, support services, Fiber Optic dissatisfaction, and payment method**.
The insights from this analysis enable the development of data-driven retention strategies to minimize churn and enhance customer loyalty.

Business Problem

Telecom companies experience significant customer churn, which directly affects revenue and increases customer acquisition costs. Because acquiring new customers is far more expensive than retaining existing ones, understanding why customers leave is essential for sustaining long-term business growth.

This project focuses on solving the churn challenge by:

- Identifying customer segments with the highest likelihood of leaving
- Analyzing behavioral, demographic, and service-related factors that influence churn
- Uncovering key patterns that highlight dissatisfaction or risk areas
- Providing actionable, data-backed recommendations to improve customer retention

By transforming raw customer data into meaningful insights, this analysis equips the business with a clear understanding of churn drivers and supports strategic decision-making to reduce churn and enhance customer loyalty.

Dataset Description

The dataset contains information about telecom customers, including:

Key Columns
- **Demographics:** gender, senior citizen, partner, dependents
- **Customer Account Information:** tenure, contract type, billing method, payment method
- **Services Subscribed:** phone service, multiple lines, internet service, tech support, security services

- **Financial Metrics:** monthly charges, total charges
- **Target Variable: Churn** (Yes/No)

Dataset Size
- **Rows:** 7,043 customers
- **Columns:** 21 fields

The dataset is widely used in churn prediction studies and provides a realistic representation of telecom customer behavior. It includes a balanced mix of demographic, service usage, and account information, making it suitable for churn analysis and business insight extraction.
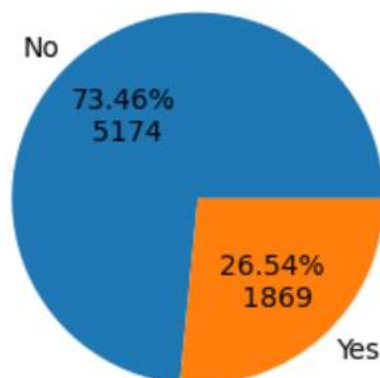
Data Cleaning & Preprocessing

The following steps were performed to prepare the data:

- Checked for missing values and handled incorrect TotalCharges entries
- Converted numerical columns to appropriate data types
- Standardized categorical values
- Added tenure groups for better visualization
- Ensured clean and structured data for accurate analysis

Exploratory Data Analysis (EDA)
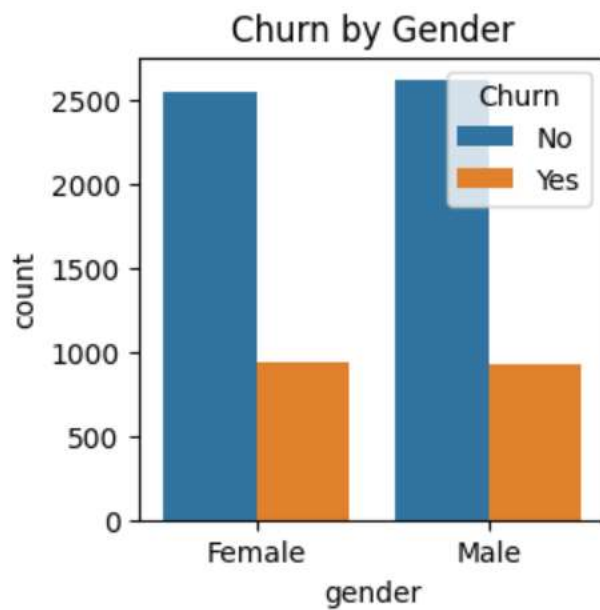
Chart 1: Percentage of Churned Customers

Percentage of Churned Customeres

Insight:
The overall churn rate is **26.5%**. This means **more than one in four customers** are leaving the company, highlighting a significant and critical retention problem.
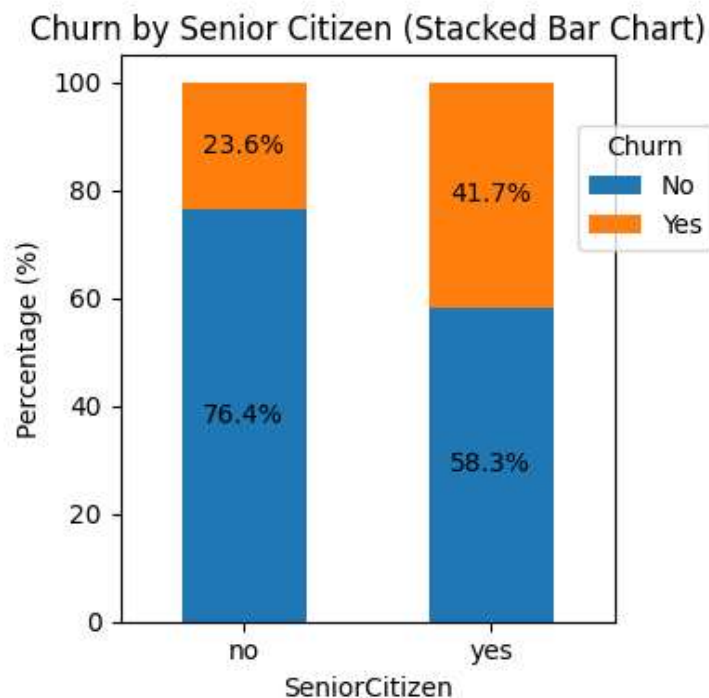
Chart 2: Churn by Gender

Insight:
Gender is not a factor in churn; both male and female customers leave at roughly the same rate.Retention strategies should focus on service and contract variables, not gender.

Chart 3: Count of Customers by Senior Citizen

Insight:
Senior Citizens are a high-risk group; they churn at a much higher rate (nearly 50%) than non-senior customers.Targeted retention efforts are needed for this demographic.
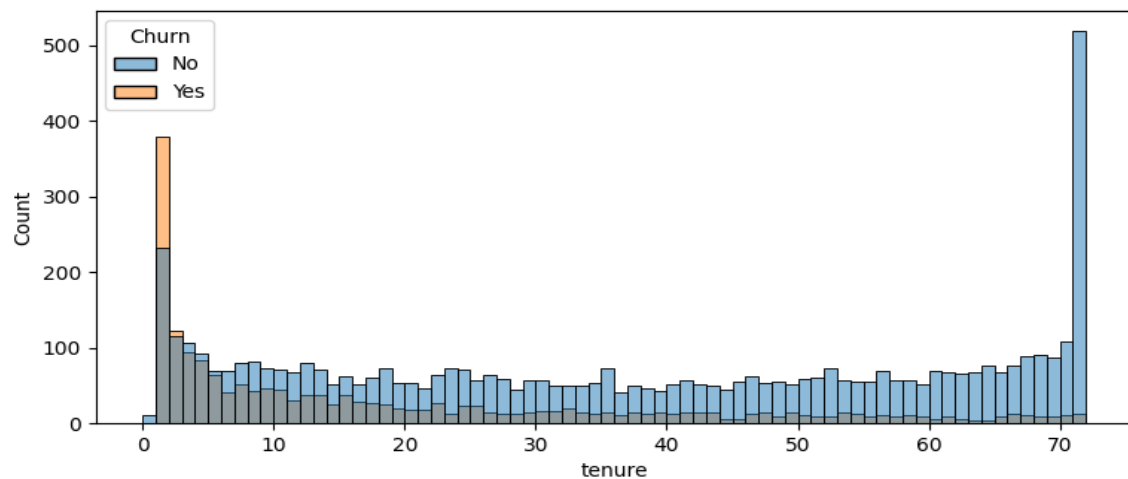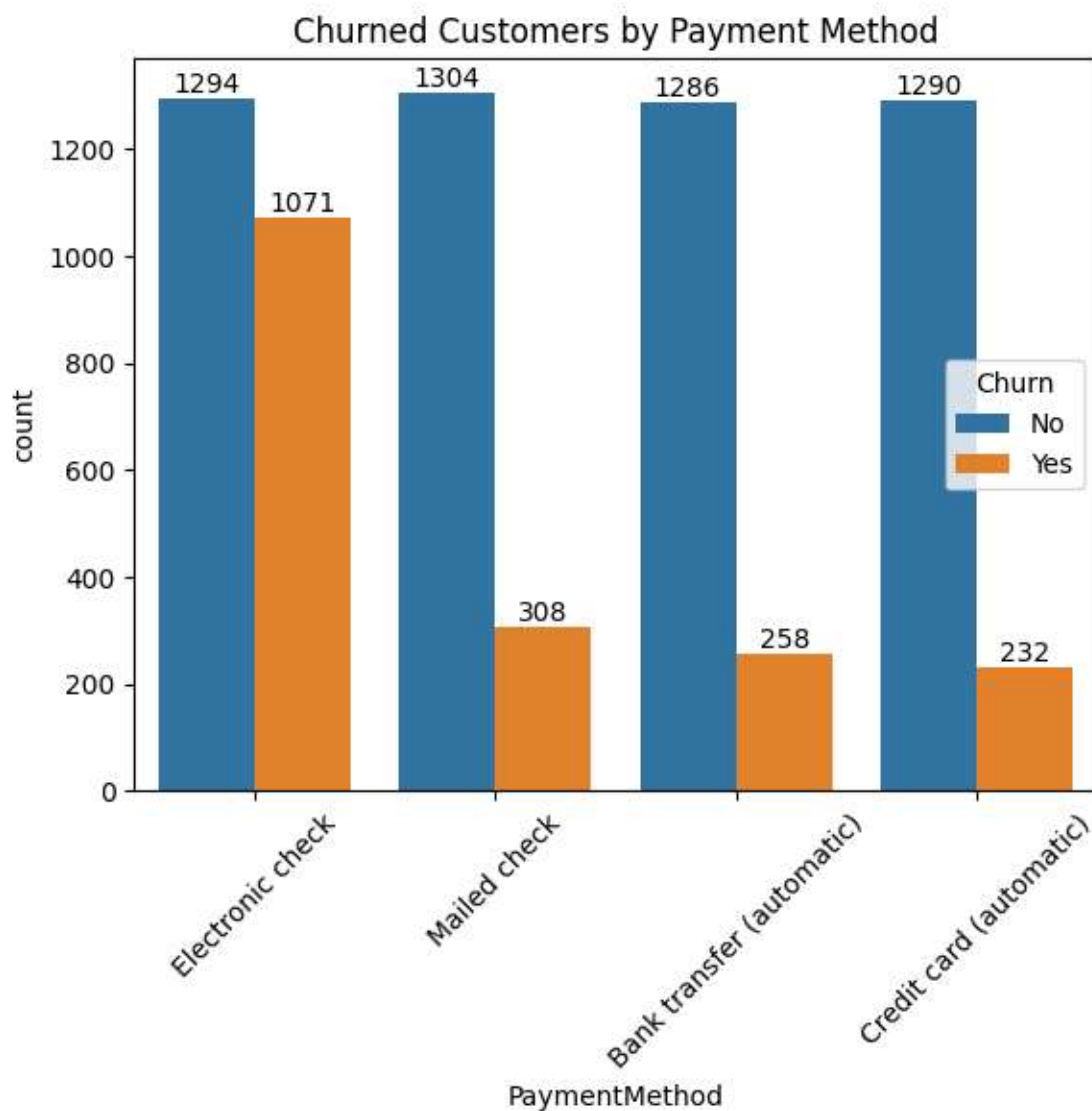
Chart 4: Churn by Tenure

Insight:
New customers (0-10 months) are the most likely to churn, indicating a major issue with the early customer experience and onboarding.Loyalty increases significantly with time.

Chart 5: Churn by Contract Type

Insight:
Contract type is the single biggest driver of churn. Customers on a **Month-to-month contract** are overwhelmingly the ones who leave; longer contracts (One year, Two year) ensure high customer loyalty.

Chart 6: Churn by Payment Method
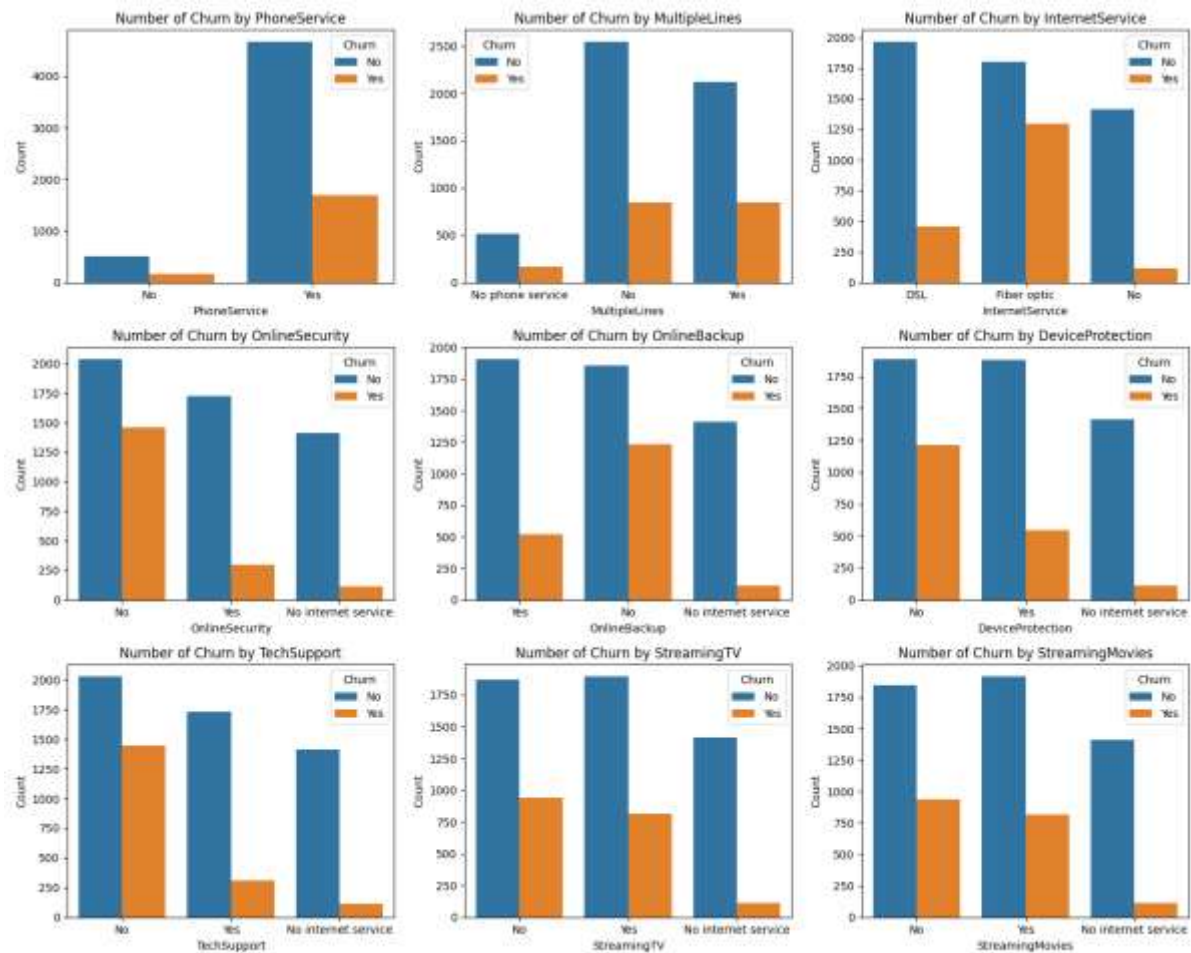

Churned Customers by Payment Method

Insight:

The **Electronic Check** payment method has the highest churn rate.**Automatic payment methods** (Bank Transfer and Credit Card) create better customer stickiness and have the lowest churn.

Chart 7: Number of Churn by

'PhoneService', 'MultipleLines', 'InternetService', 'OnlineSecurity', 'OnlineBackup', 'DeviceProtection', 'TechSupport', 'StreamingTV', 'StreamingMovies'

Insight:

PhoneService : Having Phone Service or not makes **little difference** in churn rate.

MultipleLines : Having multiple lines or not makes **little difference** in churn rate.

InternetService : Fiber Optic customers churn at a **very high rate**, indicating dissatisfaction with this premium service.

OnlineSecurity : Customers **without Online Security** are far more likely to churn; this service is a **key retention factor**.

OnlineBackup : Customers **without Online Backup** are slightly more likely to churn.

DeviceProtection : Customers **without Device Protection** are slightly more likely to churn.

TechSupport : Customers **without Tech Support** are far more likely to churn; this service is a **critical retention factor**.

StreamingTV : Customers **without Streaming TV** are slightly more likely to churn.

StreamingMovies : Customers **without Streaming Movies** are slightly more likely to churn.

Key Insights Summary

- High churn rate (~26%).
- Senior citizens churn more than younger customers.
- Month-to-month contracts are the biggest churn driver.
- Low-tenure customers (0–12 months) are most sensitive to leaving.
- Electronic check payment users are more likely to churn.
- Customers with Internet service but no security/tech support churn more.

These insights highlight customer segments to target for retention.

Business Recommendations

1. **Migrate month-to-month customers to long-term contracts**
   - Offer discounts, exclusive benefits, or loyalty programs
   - Reduce churn dramatically by increasing commitment

2. **Improve first-year customer experience**
   - Personalized onboarding
   - Early support calls
   - Service reliability checks

3. **Bundle Online Security + Tech Support**
   - These two services drastically reduce churn
   - Offer as add-ons or free for first 3 months

4. **Investigate Fiber Optic service issues**
   - Improve reliability
   - Offer compensation or speed upgrades

5. **Convert Electronic Check customers to auto-pay**
   - Provide cashback/discounts
   - Auto-pay customers show high loyalty

6. **Focus on high-risk groups like Senior Citizens**
   - Provide simplified support
   - Offer special senior-friendly plans

Conclusion

This Customer Churn Analysis highlights critical churn patterns and identifies the most influential factors behind customer loss. The overall churn rate of **26.5%** indicates a major retention problem. By implementing the recommended strategies—especially focusing on contract migration, early customer experience, support/security bundles, and payment method improvements—the company can significantly reduce churn and enhance overall customer satisfaction and profitability.