Customer Churn Analysis Project

Project Overview

Customer churn refers to the percentage of customers who stop using a company's products or services during a specific time period. Retaining existing customers is often more cost-effective than acquiring new ones, making churn analysis a critical business problem.

This project focuses on analyzing customer churn using exploratory data analysis (EDA) techniques. The goal is to identify patterns, trends, and key factors that influence customer churn and to derive actionable insights that can help improve customer retention strategies.

Objectives of the Project

- Analyze customer churn distribution and overall churn rate
- Identify key factors influencing churn behavior
- Understand the impact of services, contracts, and payment methods on churn
- Visualize insights using meaningful charts and graphs
- Provide business-oriented recommendations based on data analysis

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Dataset Description

- **Dataset Name:** Customer Churn Dataset
- **File Used:** `Customer Churn.csv`
- **Source:** Publicly available telecom churn dataset
- **Size:** Contains customer-level records with demographic, service, and billing details

Key Features in the Dataset

- **Demographic Information:** Gender, Senior Citizen status
- **Service Details:** Phone service, Internet service, Online security, Backup, Tech support, Streaming services
- **Contract Information:** Contract type (Month-to-month, One year, Two year)
- **Payment Details:** Payment method, Monthly charges, Total charges
- **Target Variable:** `Churn` (Yes / No)

Tools & Technologies Used

- **Programming Language:** Python
- **Libraries:**
    - Pandas – data manipulation and analysis
    - NumPy – numerical operations
    - Matplotlib & Seaborn – data visualization
- **Environment:** Jupyter Notebook

Data Preprocessing Steps

- Loaded the dataset using Pandas
- Checked for missing and null values
- Converted categorical values into appropriate formats
- Ensured data consistency and correctness
- Verified data types for numerical and categorical columns

Exploratory Data Analysis (EDA)

The following analyses and visualizations were performed:

1️⃣ Overall Churn Distribution

- Calculated overall churn rate
- **26.54% of customers churned**, while **73.46% remained active**
- Visualized churn distribution using bar and pie charts

2️⃣ Demographic Analysis

- Analyzed churn by gender
- Found nearly equal churn contribution from male and female customers
- Concluded demographics alone are not strong churn predictors

3️⃣ Service Usage Analysis

- Evaluated churn impact based on internet service types
- **Fiber optic users showed the highest churn (~42%)**
- Customers without value-added services had significantly higher churn

Key Observations:

- Over **60% of churned customers lacked online security**
- Nearly **64% of churned customers did not use tech support**
- Customers with multiple services were more engaged and less likely to churn

4️⃣ Contract Type Analysis

- **Month-to-month contracts accounted for over 88% of churn**
- Long-term contracts (1-year and 2-year) showed much lower churn

5️⃣ Payment Method Analysis

- **Electronic check users contributed ~45% of total churn**
- Customers using automatic payment methods had better retention

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Visualizations

The project includes multiple visualizations such as:

- Bar charts for churn comparison
- Pie charts for percentage distribution
- Count plots for service usage
- Comparative charts for contract and payment analysis

These charts help in clearly understanding churn patterns and trends.

Key Insights

- Churn rate is significantly influenced by service engagement
- Customers with fewer subscribed services are more likely to churn
- Payment convenience plays a critical role in retention
- Long-term contracts greatly reduce churn probability

Business Recommendations

- Encourage customers to opt for long-term contracts through incentives
- Promote bundled service packages (security, backup, tech support)
- Motivate users to switch to automated payment methods
- Focus retention strategies on high-risk segments such as fiber optic and month-to-month users

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Project Structure

Customer-Churn-Analysis/

```
│
├── Customer Churn.csv          # Dataset file
├── Customer_churn.ipynb        # Jupyter Notebook with analysis
├── README.md                   # Project documentation
```

Conclusion

This customer churn analysis provides valuable insights into customer behavior and highlights actionable areas to improve retention. By leveraging data-driven strategies focused on service value, payment methods, and contract types, organizations can significantly reduce churn and enhance customer satisfaction.

Question

1. What is the overall churn rate, and how does it vary by customer tenure?

Answer:
The overall churn rate is calculated as:

(Number of churned customers ÷ Total customers) × 100

In this dataset, the churn rate is approximately **26.5%**, meaning more than **1 in 4 customers leave the service**.

When segmented by tenure:

- **0–6 months:** Highest churn rate (early-stage drop-off)
- **6–12 months:** Moderate churn
- **1–2 years:** Lower churn
- **2+ years:** Lowest churn

This pattern indicates that **early tenure customers are the most vulnerable**, highlighting the importance of onboarding experience and early engagement programs.

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2. Which customer demographics are most likely to churn?

Answer:
Demographic variables such as **gender and senior citizen status** are analyzed using cross-tabulation with churn.

Findings show:

- Churn distribution is **nearly equal across genders**
- No strong demographic variable independently predicts churn

This suggests churn is **not driven primarily by demographics**, but rather by **behavioral and service-related factors**, shifting focus toward engagement and value perception.

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3. How do service usage patterns correlate with churn?

Answer:
Service adoption and engagement show a strong correlation with churn:

- Customers using **fewer services** are significantly more likely to churn
- Customers with **multiple active services** demonstrate stronger retention

For example:

- Customers with **minimal service usage** show churn rates above **30%**
- Customers with **bundled or multiple services** show churn closer to **10–15%**

Low engagement is a key early warning signal and can be addressed with targeted upsell or education campaigns.

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4. What is the relationship between contract type and churn?

Answer:
Churn rates vary sharply by contract type:

- **Month-to-month contracts:** Account for **~88% of total churn**

- **One-year contracts:** Much lower churn
- **Two-year contracts:** Lowest churn overall

Month-to-month customers exhibit churn rates **3–4 times higher** than long-term contract customers, proving that **contract commitment is one of the strongest churn predictors**.

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5. How does pricing impact customer churn?

Answer:
Customers are segmented by **monthly charges**:

- Higher monthly charges correlate with **higher churn probability**
- Churn increases sharply beyond certain pricing thresholds

For example:

- Lower charge segments show churn around **15–20%**
- Higher charge segments exceed **30–35% churn**

This indicates **price sensitivity**, especially when customers do not perceive proportional value for cost.

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6. What role does customer support quality play in churn?

Answer:
Support-related indicators such as **tech support availability and service issues** are highly influential:

- Customers **without tech support** represent nearly **64% of churned users**
- Customers receiving consistent support show improved retention

This suggests that **support accessibility and issue resolution** directly influence customer satisfaction and loyalty.

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7. Which add-on services or features reduce churn the most?

Answer:
Value-added services significantly reduce churn:

- Over **60% of churned customers** lack:
    - Online Security
    - Online Backup
    - Tech Support

Customers with **3 or more add-on services** show churn rates as low as **10–12%**, compared to **30%+** for customers with no add-ons.
This confirms that **service bundling increases customer stickiness**.

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8. How does internet service type affect churn rates?

Answer:
Churn varies notably by internet service type:

- **Fiber optic users** show the **highest churn contribution (~40%+)**
- **DSL users** show relatively lower churn
- Customers without internet service show minimal churn

Higher churn among fiber users may indicate **pricing issues, service expectations, or competition**, requiring closer investigation.

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9. What is the difference in customer lifetime value (CLV) between churned and retained customers?

Answer:
Customer Lifetime Value (CLV) is calculated as:

Average Monthly Charges × Customer Tenure (months)

Results show:

- Retained customers have **2–3× higher CLV**
- Churned customers leave before generating long-term revenue

This highlights that **retention efforts deliver strong ROI**, even when incentives or discounts are offered.

10. Which combination of factors creates the highest-risk churn segment?

Answer:
The highest-risk churn segment typically includes customers with:

- Month-to-month contracts
- High monthly charges
- Few or no add-on services
- No tech support
- Fiber optic internet

This segment can exhibit churn rates **exceeding 50–60%**, making it the **top priority for proactive retention campaigns** such as personalized offers, service upgrades, or contract incentives.