

Customer Churn Analysis - Detailed Summary

1. Data Loading & Initial Exploration

Dataset Overview

- The dataset is loaded from a CSV file "**Customer Churn.csv**" using **Pandas**.
- The first few rows are displayed using `.head()`, providing an initial look at the structure.
- `.info()` is used to inspect the number of columns, data types, and presence of missing values.

Key Observations

- The dataset contains various customer-related features, including demographics, service usage, and contract details.
 - The **target variable** is `Churn`, indicating whether a customer left the service (**Yes** or **No**).
 - Some columns, such as `TotalCharges`, need cleaning due to inconsistent data types.
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2. Data Preprocessing & Cleaning

Handling Missing & Blank Values

- The `TotalCharges` column had **blank values for customers with 0 tenure**.
- Solution Implemented:
 - **Replaced blank values with 0.**
 - Converted the `TotalCharges` column to **float** for numerical analysis.
- **Missing Value Summary:**
 - Used `.isnull().sum()` to count missing values per column.
 - Used `.isnull().sum().sum()` to check overall missing values in the dataset.
 - Result: **No missing values remain after cleaning.**

Duplicate Values Check

- Checked for duplicate rows and duplicate `customerIDs`.
- **Results:**
 - **0% duplicates found** in customer records.
 - The dataset does not contain repeated customer IDs.

Categorical Data Transformation

- The column `SeniorCitizen` was stored as **binary (0 or 1)**.
 - It was **converted to readable categories**:
 - `0` → "No"
 - `1` → "Yes"
 - This makes analysis and visualization more intuitive.
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3. Exploratory Data Analysis (EDA)

Churn Distribution

- The churn rate was visualized using `sns.countplot(x="Churn", data=df)`.
- **Key Findings:**
 - **Percentage of customers who churned: ~27%.**
 - **Percentage of customers retained: ~73%.**
- This suggests that **almost 1 in 4 customers leave the company**, highlighting the need for churn prevention strategies.

Tenure and Churn Relationship

- Customers with shorter tenure are **more likely to churn**.
- **Average tenure of retained customers: 37-40 months.**
- **Average tenure of churned customers: 10-15 months.**
- **Observations:**
 - Customers who **leave within the first year** contribute significantly to the churn rate.
 - **Customers with long-term contracts churn less.**

Contract Type & Churn

- **Customers with month-to-month contracts have the highest churn rate (~45%).**
- **Customers with annual contracts have significantly lower churn (~11%).**

- **Reason:** Monthly contracts have no long-term commitment, making switching providers easier.

Internet Service Type & Churn

- **Customers using Fiber Optic Internet have the highest churn (~42%).**
- **Customers using DSL Internet have a churn rate of ~20%.**
- **Customers without internet service churn the least (~10%).**
- **Possible reason:**
 - Fiber optic customers may experience more competitive offers from other providers.
 - DSL users may have fewer options for switching.

Payment Method & Churn

- **Electronic check users churn the most (~40%).**
 - **Customers using automatic bank transfers or credit card payments have much lower churn (~12-15%).**
 - **Reason:**
 - Auto-pay customers are more consistent with payments.
 - Manual payment methods may increase the likelihood of churn.
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4. Business Insights & Recommendations

Customer Retention Strategies

- **Focus on first-year customers:**
 - **A loyalty program for first-year users** could help reduce churn.
 - **Incentivize long-term contracts:**
 - **Discounts for annual plans** could reduce churn for month-to-month customers.
 - **Improve customer experience for Fiber Optic users:**
 - Address potential **service quality issues** that may cause high churn.
 - **Encourage auto-pay options:**
 - Offer **discounts or benefits for auto-pay users**, as they have **lower churn rates**.
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Conclusion

- **Churn Rate: ≈27%**
- **Key factors affecting churn:**
 - **Contract type**
 - **Internet service type**

- **Payment method**
 - **Customer tenure**
- **Actionable Insights:**
 - **Convert more customers to long-term contracts.**
 - **Reduce churn for first-year customers with engagement incentives.**
 - **Encourage auto-pay options.**
 - **Investigate fiber optic service issues.**