**📘 Customer Churn Analysis – Project Report**

**📌 Objective**

The goal of this project is to understand the **factors influencing customer churn** in a telecom company. By identifying patterns and correlations in customer behavior and service usage, the business can take **proactive steps to reduce churn** and improve customer retention.

**🧹 Data Cleaning & Preparation**

**✅ Steps Performed:**

1. **Handled Missing Values**:
   * TotalCharges had blanks → replaced with 0, then converted to float.
   * Verified no other columns had significant nulls.
2. **Data Type Conversion**:
   * SeniorCitizen converted from 0/1 to Yes/No for clarity.
   * Ensured correct types for numerical features (MonthlyCharges, TotalCharges, tenure).
3. **Duplicates**:
   * Checked for duplicated rows and customer IDs.
   * Result: ✅ No duplicates found.
4. **Data Transformation**:
   * Categorical values standardized for visualization.

**📊 Exploratory Data Analysis (EDA)**

**1. Overall Churn Rate**

* **Churned Customers**: **1,869 out of 7,043** → **26.5%**
* **Non-Churned**: **5,174** → **73.5%**

🔍 **Insight**: The dataset is imbalanced, with significantly more non-churners.

**2. Demographic Insights**

| **Feature** | **Churn Rate (Yes)** | **Notable Patterns** |
| --- | --- | --- |
| **Gender** | Female: 26.5%, Male: 26.1% | Gender has **no significant effect** on churn. |
| **Senior Citizen** | Yes: **41.7%**, No: 24.1% | Seniors churn **~1.7x more** than non-seniors. |
| **Partner** | No: 32.1%, Yes: 20.4% | No partner → Higher churn. |
| **Dependents** | No: 31.0%, Yes: 15.7% | Customers without dependents are **2x more** likely to churn. |

**3. Service Subscription Behavior**

| **Service Feature** | **Churn Rate (Yes)** | **Observations** |
| --- | --- | --- |
| **Phone Service** | No: 7.1%, Yes: 27.2% | No phone = low churn, but small sample size. |
| **Internet Service** | DSL: 19.0%, Fiber optic: **42.4%**, No internet: 7.5% | Fiber optic users churn the most. |
| **Online Security** | No: **36.9%**, Yes: 15.2% | Strong correlation with churn. |
| **Tech Support** | No: **37.3%**, Yes: 14.0% | Customers with tech support churn **much less**. |
| **Streaming Services** | No clear effect. Both TV & Movies churn rates ~27%. | Entertainment features don’t influence churn much. |

**4. Contract & Billing Insights**

| **Feature** | **Churn Rate (Yes)** | **Observations** |
| --- | --- | --- |
| **Contract Type** | Month-to-month: **43.9%**, One year: 11.0%, Two year: 2.8% | Major driver! Long-term contracts = high retention. |
| **Paperless Billing** | Yes: 33.7%, No: 16.1% | Paperless billing customers churn **2x more**. |
| **Payment Method** | Electronic check: **45.2%**, Other methods: ~15-22% | Highest churn from electronic check users. |

**5. Tenure & Charges**

| **Metric** | **Churn Tendency** |
| --- | --- |
| **Tenure** | Lower tenure → higher churn. Most churners are <10 months. |
| **Monthly Charges** | Churn increases with higher charges. |
| **Total Charges** | Churners have significantly lower total charges, indicating shorter retention. |

**📌 Executive Summary**

This churn analysis reveals **contract type**, **senior status**, and **support services** as the most influential churn drivers. Customers on **month-to-month plans**, those **without technical support**, and **senior citizens** exhibit significantly higher churn rates.

Moreover, **billing type** and **payment method** strongly influence retention. Customers using **electronic checks** and **paperless billing** churn at much higher rates.

**🔑 Key Risk Segments:**

* Month-to-month subscribers without online support or bundled services.
* Senior citizens without dependents or partners.
* Customers paying via electronic checks.

**📌 Recommendations**

1. 🎯 **Targeted Retention Campaigns**:
   * Focus on month-to-month and new users (<6 months tenure).
   * Offer incentives for long-term contract upgrades.
2. 🛡️ **Promote Security & Tech Support Services**:
   * Bundle with plans to improve perceived value and stickiness.
3. 🏦 **Improve Payment Flexibility**:
   * Discourage use of electronic checks; promote auto-pay methods.
4. 📬 **Paperless Billing Evaluation**:
   * Examine UX and comms for digital billing – possibly a friction point.