📊 Executive Summary – Telecom Customer Churn Analysis

This report presents a detailed **exploratory data analysis (EDA)** on the **Telecom Customer Churn dataset**, aiming to uncover patterns and factors contributing to customer attrition. The analysis involved data cleaning, transformation, and visualization across multiple customer dimensions such as demographics, services, and billing preferences.

🧹 Data Overview & Cleaning

- **Dataset Size:** 7,043 customer records with 21 columns.

- **Target Variable:** `Churn` (Yes = customer left, No = customer retained).

- The **`TotalCharges`** column contained blank entries for customers with `tenure = 0`.

    - Blank values were replaced with `0`, and the column was converted from `object` to `float`.

- **Duplicates:** 0 duplicate rows found, confirming data integrity.

- **Missing Values:** None after cleaning.

- **Encoding Adjustments:** `SeniorCitizen` converted from 0/1 to "Yes"/"No" for readability.

📈 Overall Churn Distribution

- **Churned Customers: 1,869 (26.5%)**

- **Retained Customers: 5,174 (73.5%)**

📊 *Insight:* Nearly **1 in 4 customers** have discontinued their service — a significant rate that warrants customer retention measures.

👥 Demographic Insights

👴 Senior Citizens

- **Churned:** 476 out of 1,148 senior citizens → **41.5% churn rate**

- **Non-Seniors:** 1,393 out of 5,895 → **23.6% churn rate**
  ✅ **Insight:** Senior customers are **~75% more likely** to churn compared to non-seniors. This highlights potential issues with pricing, support accessibility, or service usability for older users.

👩 Gender

- Male and Female churn rates are roughly equal (around **26–27%** each).
  ✅ **Insight:** Gender has **no significant impact** on churn behavior.

📡 Service Subscription Insights

💻 Internet Service

- **Fiber optic users:** Highest churn rate (**41%**)

- **DSL users:** Moderate churn (**19%**)

- **No Internet service:** Lowest churn (**7%**)
  ✅ **Insight:** Fiber users show higher dissatisfaction — possibly due to cost or reliability issues.

🔒 Online Services (Value-Added Features)

Service Type	With Service (Churn %)	Without Service (Churn %)
Online Security	15%	42%
Online Backup	18%	38%
Tech Support	17%	42%
Device Protection	20%	36%

✅ **Insight**: Customers lacking support or protection features are 2–2.5× more likely to churn. Bundling these features into base plans could improve retention.

📺 **Streaming Services**

- **StreamingTV & StreamingMovies** do not show a clear relationship with churn.
  ✅ **Insight:** Entertainment add-ons have **neutral retention effect**, acting as complementary perks rather than retention drivers.

💰 Contract, Billing, and Tenure Insights

📅 Contract Type

Contract Type	Churned Customers	Total	Churn Rate
Month-to-Month	1,658	3,875	**42.8%**
One Year	166	1,472	**11.3%**
Two Year	45	1,696	**2.7%**

✅ **Insight:** Month-to-month customers are **15× more likely** to churn than two-year contract holders.
Encouraging long-term commitments through incentives can significantly lower churn.

💳 Payment Method

Payment Method	Churn Rate
Electronic Check	**45.3%**
Mailed Check	19.0%
Bank Transfer (Auto)	15.0%
Credit Card (Auto)	16.0%

✅ **Insight:** Customers using **electronic checks** churn nearly **3× more** than auto-payment users — suggesting convenience and reliability play major roles in retention.

🕐 **Tenure**

- **Average tenure of churned customers:** ~18 months

- **Average tenure of retained customers:** ~38 months
  ✅ **Insight:** The longer a customer stays, the less likely they are to churn. Loyalty programs and early engagement could reduce early dropouts.

🧠 **Key Business Insights**

Area	Observation	Recommendation
Senior Customers	High churn among older users	Introduce senior-friendly plans and dedicated support
Contract Type	Month-to-month users most volatile	Offer discounts on annual subscriptions
Internet Service	Fiber optic users churn more	Review service quality and pricing competitiveness
Add-on Services	Security & Tech Support reduce churn	Bundle these in base plans
Payment Method	Electronic check users churn more	Promote auto-payment options for ease
Tenure	Early-stage customers at risk	Launch loyalty programs within first 6 months

🏁 **Conclusion**

This analysis reveals that **contract duration, service quality, and add-on features** are the most influential factors in customer retention.
A **data-driven retention strategy** focusing on converting short-term users into long-term contracts, improving support services, and optimizing payment convenience could potentially **reduce churn by 20–30%** over time.