📊 *Telco Customer Churn Analysis – Exploratory Data Analysis (EDA)*

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1. Objective of the Analysis

The primary objective of this exploratory data analysis (EDA) is to:

- Understand **customer churn behavior**
- Identify **key demographic, service, and billing factors** influencing churn
- Provide **business insights** to help reduce churn and improve customer retention

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2. Data Preparation & Cleaning

- The dataset was checked for **missing and inconsistent values**
- `TotalCharges` column:
    - Initially contained blank entries
    - Converted from object type to numeric
- After preprocessing:
    - **No missing values** remained
    - Dataset was fully prepared for analysis and visualization

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3. Overall Churn Distribution

- Approximately **73–74%** of customers **did not churn**
- Around **26–27%** of customers **churned**
- This indicates that **about 1 in 4 customers leave**, making churn a significant business issue

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4. Demographic Insights

4.1 Gender vs Churn

- Churn distribution is **almost equal** across genders
- Male and Female customers show **nearly identical churn rates**
- **Conclusion:** Gender has **minimal impact** on churn

4.2 Senior Citizen vs Churn

- Senior citizens represent a **smaller portion of customers**
- However, their churn rate is **noticeably higher**
    - Senior Citizens: **~40% churn rate**
    - Non-Senior Citizens: **~23% churn rate**
- **Conclusion:** Senior citizens are a **high-risk churn segment**

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5. Service-Based Analysis

5.1 Internet Service Type

- Customers with **Fiber Optic Internet** show the **highest churn**
    - Fiber Optic users: **~42–45% churn**
    - DSL users: **~18–20% churn**
    - No Internet service: **Lowest churn**
- **Conclusion:** Fiber optic service requires **better pricing or service quality improvements**

5.2 Add-on Services Impact

Customers **without** additional services show significantly higher churn:

Service Type	Churn Trend
Online Security	Higher churn when not subscribed
Tech Support	Non-users churn ~2x more
Online Backup	Lower churn with service
Device Protection	Improves retention

- Customers **with add-on services** tend to stay longer
- **Conclusion:** Bundled services improve customer retention

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6. Contract & Billing Insights

6.1 Contract Type

Contract duration is one of the **strongest churn indicators**:

- **Month-to-Month Contract**

    - Churn rate: **~43–45%**

- **One-Year Contract**
    - Churn rate: **~11%**
- **Two-Year Contract**
    - Churn rate: **~3–4%**

Conclusion: Long-term contracts drastically reduce churn

6.2 Payment Method

- Customers paying via **Electronic Check** have the **highest churn**
    - Electronic Check: **~45% churn**
- Credit Card / Bank Transfer:
    - Much lower churn (**~15–18%**)

Conclusion: Payment convenience and trust play a role in retention

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7. Charges & Tenure Analysis

7.1 Monthly Charges

- Customers with **higher monthly charges** churn more frequently
- High-paying customers on **short tenure** are most at risk

7.2 Tenure

- New customers (tenure < 12 months):

    - Highest churn rate
- Long-tenure customers:
    - Much lower churn

Conclusion:

Customers who are **new and paying more** are the **most vulnerable churn group**

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8. Visualization & EDA Strength

- Count plots and grouped bar charts clearly show churn trends
- Subplots allow **multi-feature comparison** at once
- Hue-based plots effectively highlight churn differences across categories
- Visualizations make patterns **easy to interpret for business decisions**

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9. Key Business Insights

- Churn is **not random**; it is driven by:
    - Contract type
    - Tenure
    - Internet service type
    - Monthly charges
    - Value-added services
- Retention strategies should focus on:
    - Encouraging long-term contracts

    - Promoting add-on services
    - Improving fiber optic customer experience
    - Targeting high-risk new customers

10. Conclusion

This EDA successfully identifies the **primary drivers of customer churn** using meaningful visualizations and data patterns. The insights obtained provide a solid foundation for:

- Building **predictive churn models**
- Designing **targeted customer retention strategies**
- Supporting **data-driven business decisions**