📊Detailed Data Analysis Report: Exploratory Data Analysis on Customer Churn

Project Overview

This report presents a comprehensive exploratory data analysis (EDA) of customer churn data. The objective of this analysis is to uncover key patterns and factors that influence churn, enabling data-driven strategies to improve customer retention and reduce churn rates.

🛠️ Data Cleaning & Preparation

- Loaded raw dataset and conducted initial inspection.
- **TotalCharges** column contained blank values in about 0.2% of records; these were replaced with zero and converted to float to facilitate accurate numerical analysis.
- Converted **SeniorCitizen** column from binary numeric values (0/1) to categorical labels: `"yes"` and `"no"`.
- Verified data integrity:
- No duplicate records found in the dataset.
- After cleaning, dataset had **no null values**, ensuring data consistency for further analysis.

📈Churn Overview & Distribution

- The overall churn rate was approximately **26–27%**.
- Visual analysis:
- Countplot displayed a clear imbalance: ~26% churned vs. ~74% retained.
- Pie chart reinforced these proportions, showing that about a quarter of the customer base left the service.

Key Observations:

- The churn rate highlights a significant business concern, as over one-fourth of the customers discontinued the service.

Demographic Insights

- **Gender Distribution:**
- Churn rates among male and female customers were nearly identical (≈ 26% each), indicating gender neutrality in churn behavior.
- **Senior Citizens:**
- Senior citizens exhibited a much higher churn rate (**~42%**) compared to non-senior citizens (**~24%**).
- This suggests that senior customers are almost **twice as likely** to churn.

Business Implication:

- Age-related preferences and service needs may not be adequately addressed, leading to higher churn among older customers.

📅 Tenure & Contract Type Analysis

- **Tenure:**
- Customers with tenure below 12 months had churn rates exceeding **40%**.
- Long-tenure customers (>60 months) showed churn rates under **10%**.
- **Contract Type:**
- **Month-to-month contracts:** highest churn (~43%).
- **One-year contracts:** churn reduced to ~11%.
- **Two-year contracts:** lowest churn (~3%).

Insight:

- Longer contract commitments strongly correlate with lower churn, suggesting stability in customer relationships over time.

📦 Services & Add-On Features

Service Feature	Trend
Online Security	Customers without online security had ~42% churn vs ~15% with it
Tech Support	Churn was ~37% among those without tech support vs ~14% among those who had it
Internet Service	Fiber optic users had higher churn (~41%) compared to DSL (~19%)
Streaming Services	Slightly higher churn among users with streaming services than those without

Observation:

- Value-added services like security and tech support significantly reduce churn.
- Fiber optic customers' higher churn suggests potential dissatisfaction or unaddressed service quality issues.

📊 Visualization Highlights

- Used professional visual techniques:
- Countplots, pie charts, stacked bar charts, and histograms.
- Applied dark background themes and professional color palettes (e.g., `inferno`, `viridis`).
- Percentage labels on plots provided direct interpretability (e.g., senior citizen churn ~42%).
- Visualization confirmed numeric findings and added depth to the narrative.

🔗Conclusions & Recommendations

- Senior citizens and month-to-month customers are most at risk of churn; prioritize them in retention campaigns.
- Incentivize customers to switch from month-to-month to yearly contracts to reduce churn from ~43% to ~11%.
- Promote add-on services like online security and tech support, which correlate with a **60%+ decrease in churn**.
- Investigate and address churn among fiber optic users through targeted service quality improvements.
- Develop targeted engagement for new customers (tenure <12 months) to reduce initial drop-offs.

📌Next Steps

- Conduct predictive modeling to identify churn probability at an individual customer level.
- Perform cohort and segmentation analysis to tailor strategies to specific customer groups.
- Collaborate with business and customer service teams to translate findings into actionable strategies.

📄**Prepared as part of an exploratory data analysis to inform data-driven decision-making and improve customer retention.**