

# Executive Summary and Recommendations

This project undertakes an in-depth analysis of customer churn patterns to determine the critical factors impacting retention rates. Using a dataset containing customer demographics, account information, and service usage, the study explores potential predictors of churn, aiming to equip the business with actionable insights for targeted retention strategies. Through data cleaning, visualization, and statistical analysis, this study reveals significant patterns and correlations that contribute to customer churn.

## Key Analysis Steps and Findings

### 1. Data Cleaning and Preprocessing:

- **Handling Missing Values:** Missing values in the **TotalCharges** column were filled with zeroes, particularly in instances where customer tenure was zero, ensuring data consistency.
- **Data Transformation:** Binary variables, such as **SeniorCitizen**, were converted from 0/1 to "No" and "Yes," respectively, making demographic analysis easier and more intuitive.
- **Data Integrity:** The dataset showed no duplicated **customerID** entries, confirming data integrity across all records.

### 2. Churn Distribution and Overall Rate:

- **Churn Rate:** Analysis reveals a churn rate of **26.54%**, meaning over a quarter of the customer base has discontinued services.
- **Visual Breakdown:** Pie charts and bar plots provide a clear view of the proportion of churned vs. retained customers, offering a baseline understanding of churn prevalence.

### 3. Demographic Insights:

- **Gender Influence:** Gender-wise analysis showed negligible difference in churn rates, indicating that gender is not a strong predictor of churn in this dataset.
- **Senior Citizen Segment:**
  - **Churn Among Senior Citizens:** Senior citizens represented a higher proportion of churned customers, suggesting that older customers may be more likely to leave. In fact, **42%** of senior citizen customers have churned, compared to **23%** for non-senior customers.
  - **Visualization:** A stacked bar chart effectively displays these percentages, underscoring the disparity in churn rates based on age demographics.

### 4. Service Usage and Tenure:

- **Contract Type:** Initial exploration suggests that customers with month-to-month contracts tend to churn more frequently than those with longer-term contracts (e.g., annual), highlighting the stability that long-term commitments bring.

- **Total Charges and Tenure:** There is a notable trend where customers with lower cumulative charges and shorter tenure show higher churn rates. This suggests a correlation between service longevity and customer loyalty.
  - **Additional Services:** Insights indicate that customers who subscribe to multiple services (e.g., internet and phone bundles) have lower churn rates, suggesting a higher commitment to the service provider among multi-service users.
5. **Financial Factors:**
- **Payment Method:** Customers using electronic checks have a churn rate of around **36%**, which is significantly higher than those using other payment methods, such as credit cards or automatic bank transfers. This finding suggests that payment convenience may play a role in retention.

## Visualizations and Statistical Analysis

- **Churn by Gender:** A count plot with churn segmentation indicates no substantial gender disparity in churn behavior.
- **Senior Citizen Churn:** A stacked bar chart with percentages highlights the higher churn rate among senior citizens, suggesting a possible area for targeted retention efforts.
- **Contract Type and Churn:** Preliminary analysis suggests a strong correlation between contract type and churn rate, with month-to-month customers showing much higher churn rates than those on yearly contracts.

## Conclusion and Recommendations

This churn analysis reveals that **26.54%** of the customer base is at risk, with specific segments, such as senior citizens and those on month-to-month contracts, being more susceptible. Key takeaways for retention strategies include:

1. **Focus on Senior Citizens:** With a **42%** churn rate among this group, offering tailored retention incentives, such as loyalty discounts or personalized services, may improve retention.
2. **Encourage Long-Term Contracts:** The higher retention rate among annual contract holders suggests promoting these options with incentives (e.g., discounts or added benefits) to month-to-month customers.
3. **Payment Method Improvement:** Shifting customers from electronic checks to more automated, convenient payment methods may help reduce churn, given the high churn rate associated with electronic check users.