

# Customer Churn EDA Analysis

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# Exploratory Data Analysis

## Business Understanding and Overview

In the telecom industry, preventing customer churn is crucial for a company's long-term success. This data analysis focuses on understanding why customers might leave a telecom company. We'll be doing Exploratory Data Analysis (EDA) using Python on the provided data. This helps us uncover patterns and insights to guide the company in making informed decisions.

Telecom churn analysis is essential because customer's needs and technology keep evolving. EDA is the first step in understanding the data we have. In this presentation, we'll look at the challenges faced by telecom companies and use Python to explore the data, aiming to find valuable insights. EDA unveils nuanced patterns within customer data. Understanding these patterns empowers the company to tailor strategies, enhance customer satisfaction, and ultimately, reduce churn rates.

Our goal is to delve into the underlying data points contributing to this churn, leveraging exploratory data analysis (EDA) to identify patterns and insights that will inform strategic measures for reducing churn and enhancing customer retention.

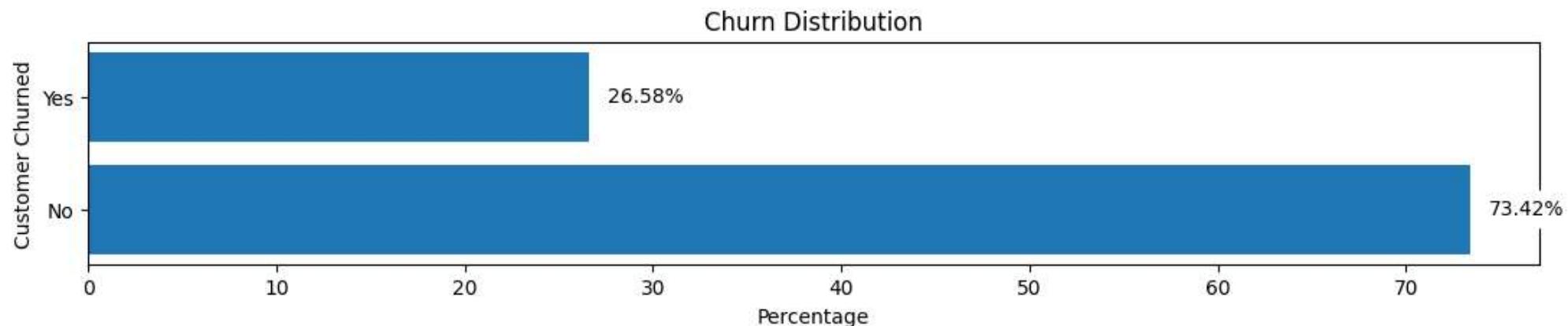
# Understanding the data

# Exploratory Data Analysis

## Target Variable

Initial findings show the overall churn rate is 26.58 %

- The customer churn rate, determined from the given data, is 26.58%, reflecting the proportion of customers discontinuing services.
- This will serve as our base target value to compare and evaluate the impact of categorical and numerical data.



# Exploratory Data Analysis

## Missing Data Analysis

### Data Type Correction:

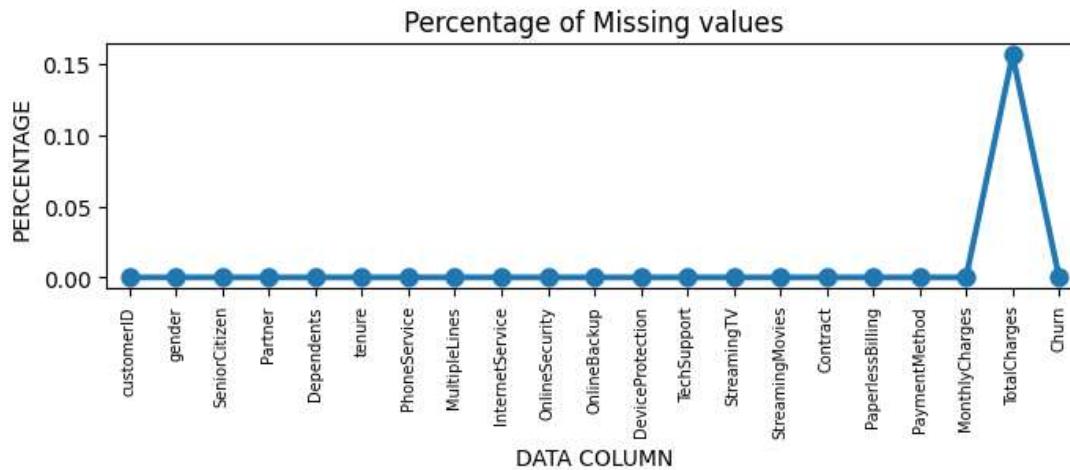
Issue: The data type of the "Total Charges" column was incorrect (object instead of float64).

Resolution: The data type was changed to numerical (float64) to ensure accurate analysis.

### Handling Null Values:

Issue: 11 null records were identified in the "Total Charges" column, constituting 0.15% of the dataset.

Resolution: As this percentage is very small compared to the overall data as represented on the graph below, those 11 records were dropped, resulting in a new dataset with 7032 records.



# Exploratory Data Analysis

## Data Cleaning

### Tenure Grouping for Visualization:

Issue: To improve visualization, the "Tenure Months" entries (ranging from 1 to 72) were grouped into six bins: 1-12, 13-24, 25-36, 37-48, 49-60, and 61-72. The new data column, "tenure\_group," was created.

### Irrelevant Column Removal:

Issue: "Customer ID" and "Tenure" were identified as irrelevant for data analysis.

Resolution: Both columns were dropped, resulting in a dataset that is ready for more focused EDA.

# Univariate Analysis

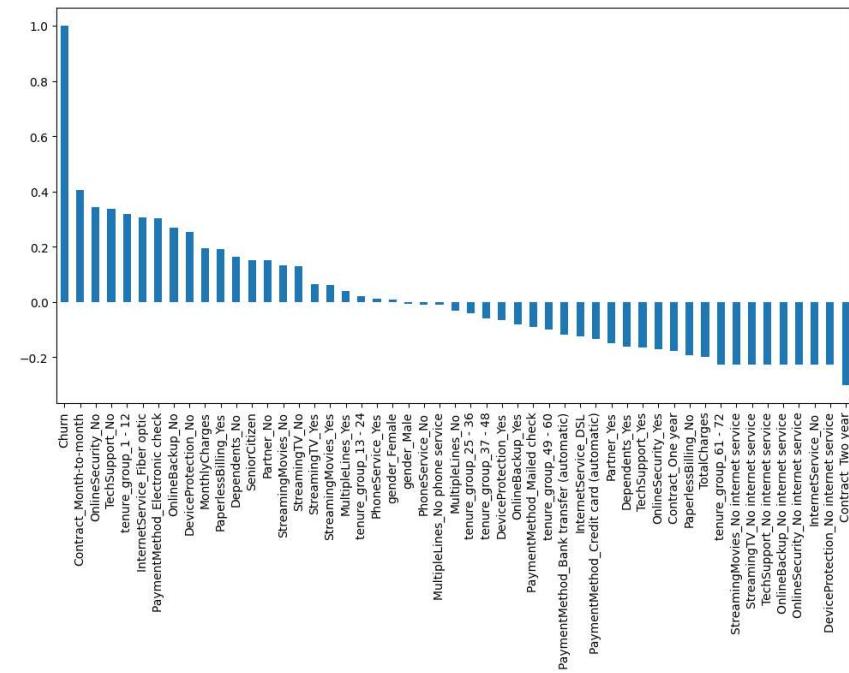
# Exploratory Data Analysis

## Initial Findings of Univariate Analysis

To find out the overall univariate analysis, we converted all categorical values to numerical representations using the `get_dummies` method. Subsequently, we conducted a correlation analysis, examining the relationship between these numerical features and the "Churn" column.

According to the analysis, customers with the following attributes tend to exhibit higher churn rates as shown in the graph:

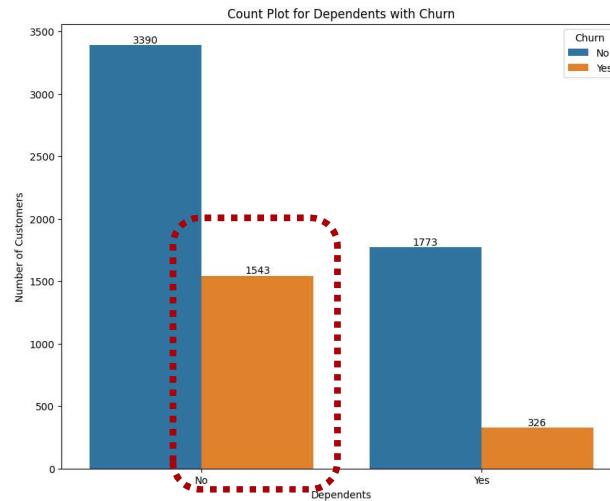
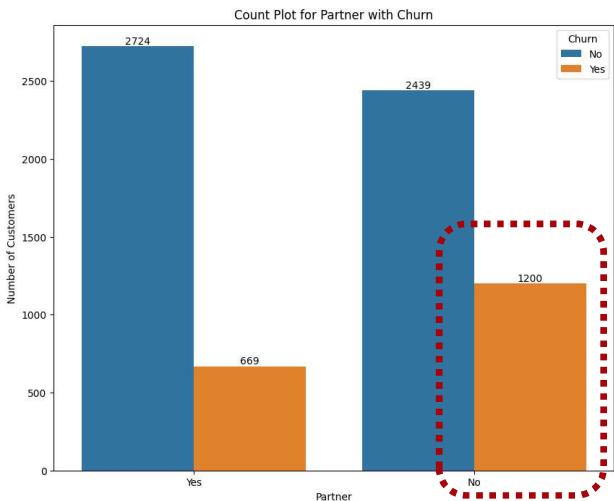
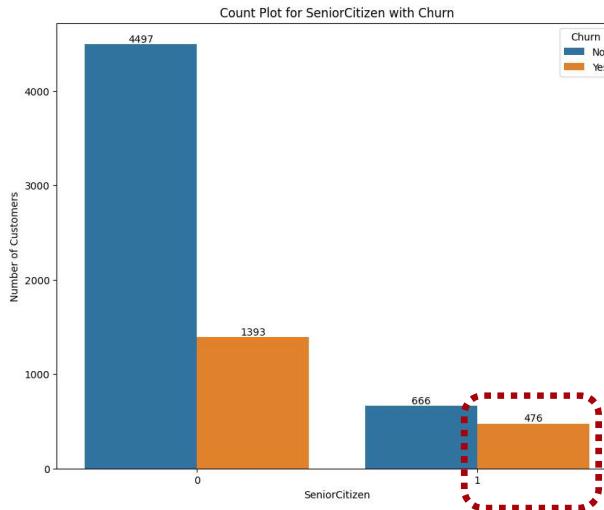
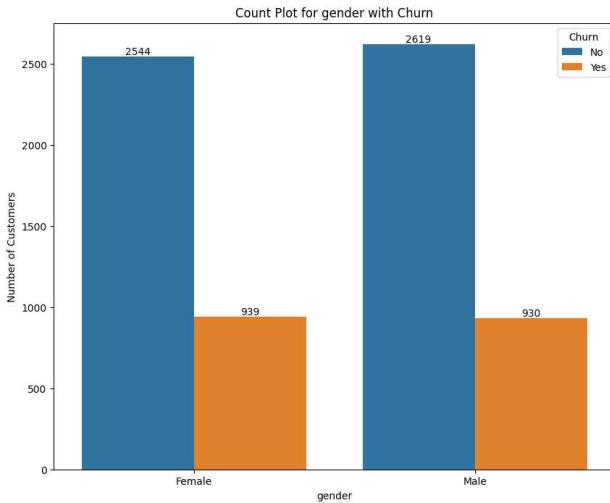
- Month-to-month contract
- No online security or tech support
- With a tenure of less than a year
- Fiber optic internet service
- Electronic check payment
- No online backup or device protection
- High monthly charges
- Opting for paperless billing
- Having partners and dependents
- Not utilizing streaming services for TV and movies



# Univariate Analysis (Categorical)

# Exploratory Data Analysis

## Based on Personal Attributes of Customers



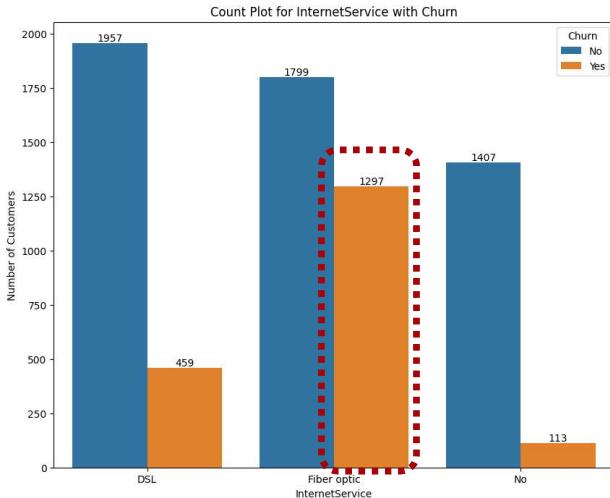
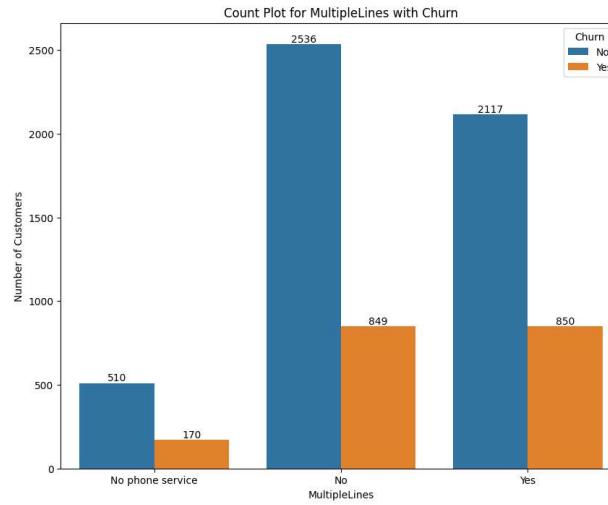
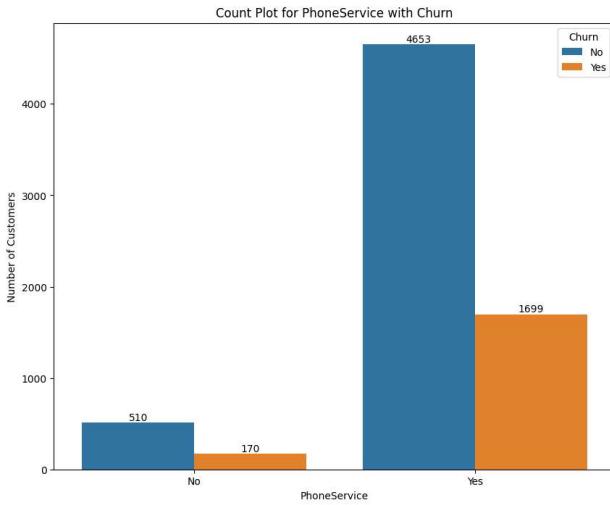
Important Observations [Original Churn Rate : 26.58 %] :

Customer with following personal characteristics are bound to churn out more:

1. Senior citizens – 41.68% (churn rate)
2. Customers without partners – 32.98% (churn rate)
3. Customers without dependents – 31.28% (churn rate)

# Exploratory Data Analysis

## Based on Service Type



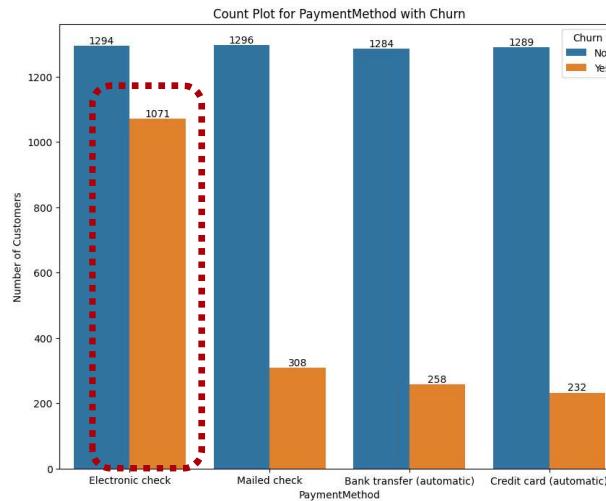
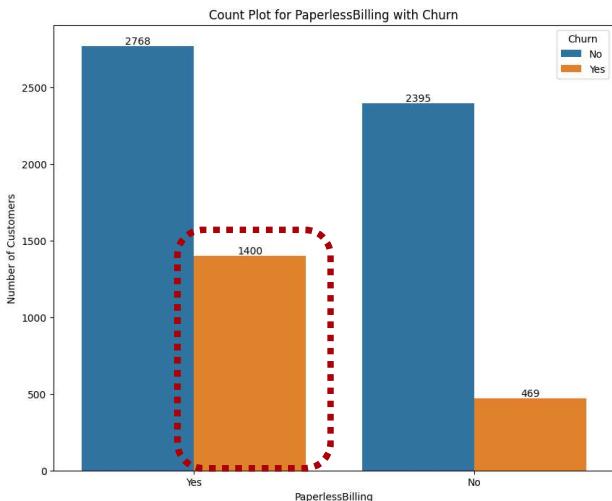
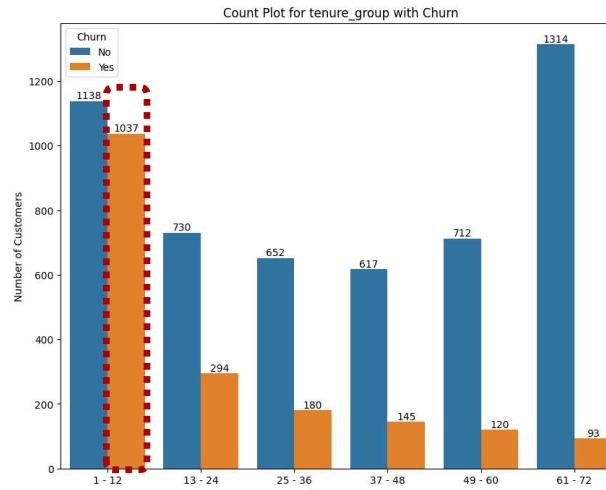
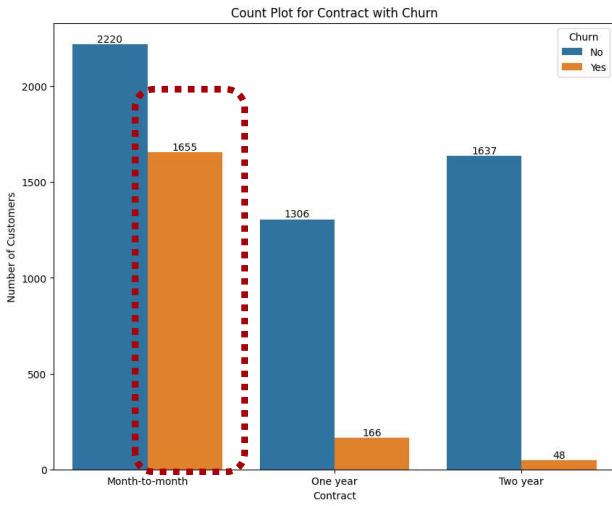
Important Observations [Original Churn Rate : 26.58 %] :

Customer with following service type are bound to churn out more:

1. Fiber Optic Internet Service – 41.89% (churn rate)

# Exploratory Data Analysis

## Based on Type of Contract and Payment Method



Important Observations [Original Churn Rate : 26.58 %] :

Customer with following contract type are bound to churn out more:

1. Month to Month – 42.71 % (churn rate)
2. Less than one year contract – 47.68 % (churn rate)

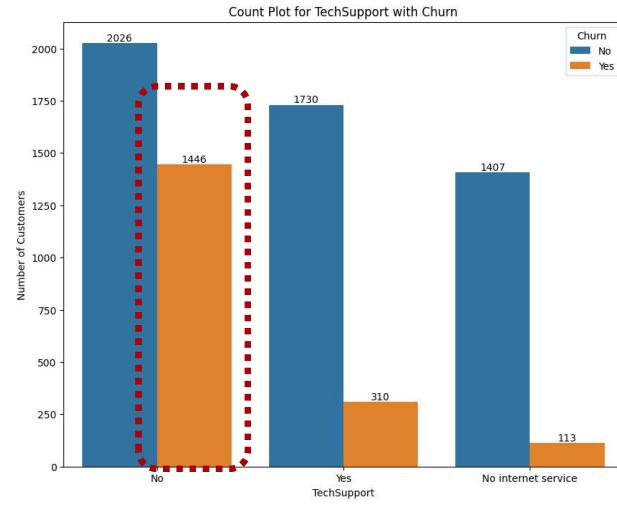
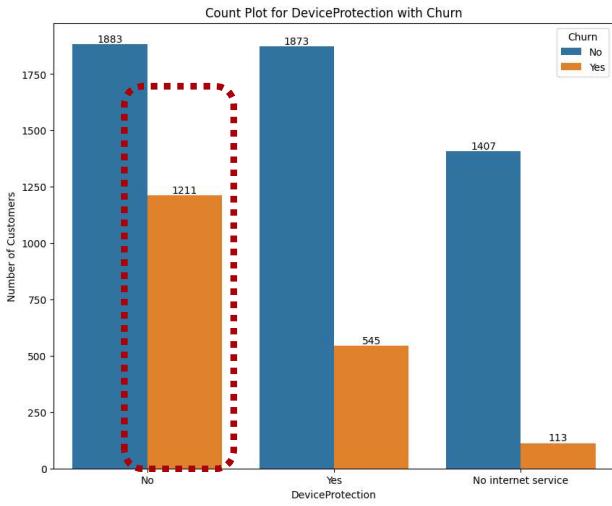
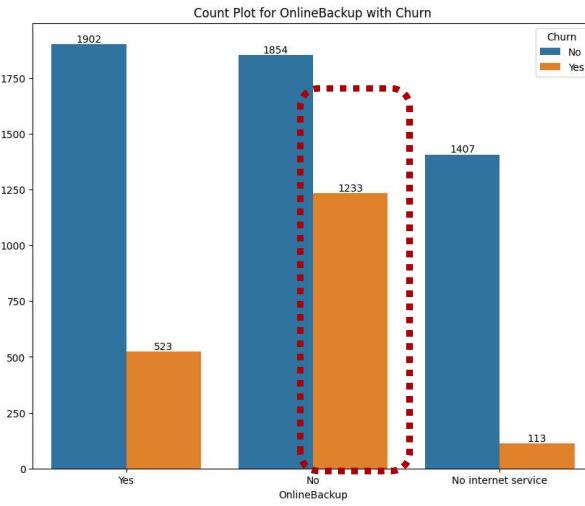
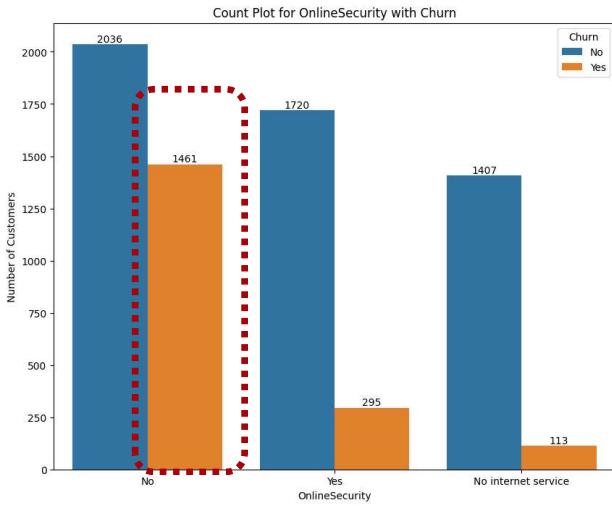
Important Observations [Original Churn Rate : 26.58 %] :

Customer with following payment type are bound to churn out more:

1. Paperless Billing – 33.59 % (churn rate)
2. Electronic Check – 45.29 % (churn rate)

# Exploratory Data Analysis

## Based on Add-on Services



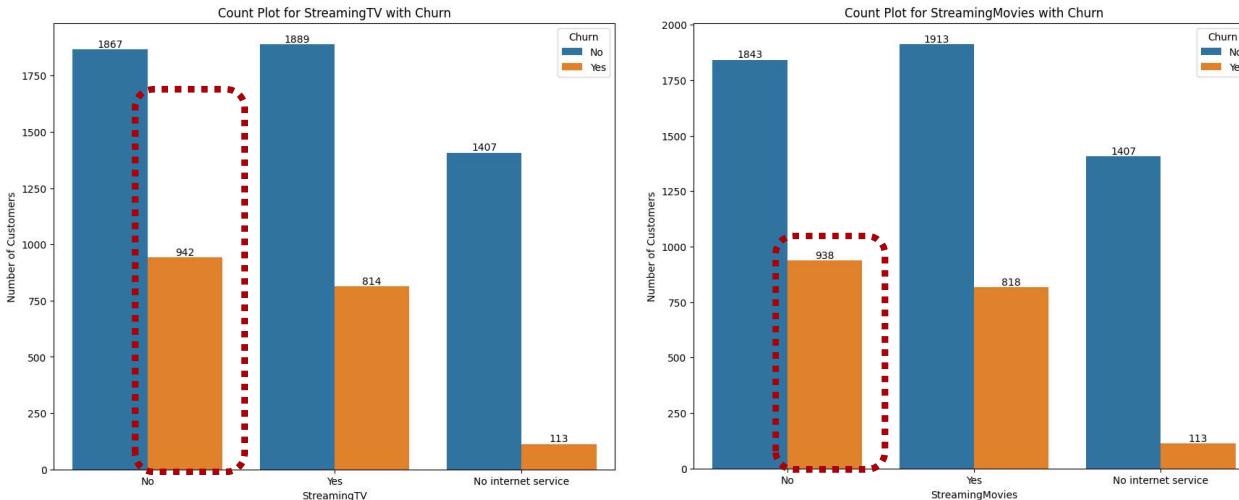
Important Observations [Original Churn Rate : 26.58 %] :

Customer without following add on services are bound to churn out more:

1. No Online Security – 41.78% (churn rate)
2. No Online Backup – 39.94% (churn rate)
3. No Device Protection – 39.14% (churn rate)
4. No Tech Support – 41.65% (churn rate)

# Exploratory Data Analysis

## Based on Add-on Streaming Services



Important Observations [Original Churn Rate : 26.58 %] :

Customer without following streaming services are bound to churn out more:

1. No Streaming TV – 33.54% (churn rate)
2. No Streaming Movies – 33.73% (churn rate)

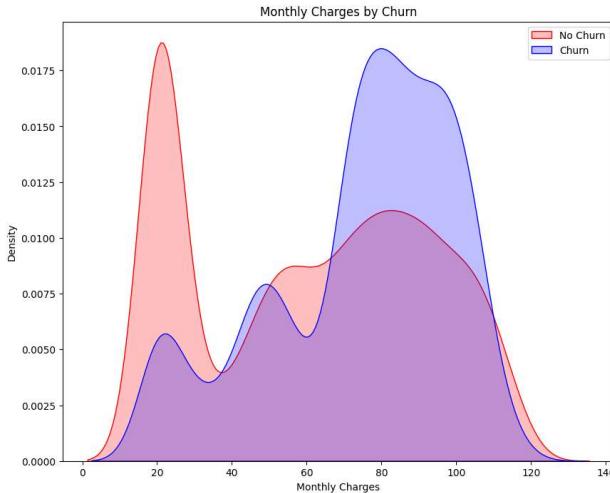
Another important observation, people using the following services are also likely to churn out:

1. Yes- Streaming TV – 30.11 % (churn rate)
2. Yes - Streaming Movies – 29.95 % (churn rate)

# Univariate Analysis (Numerical)

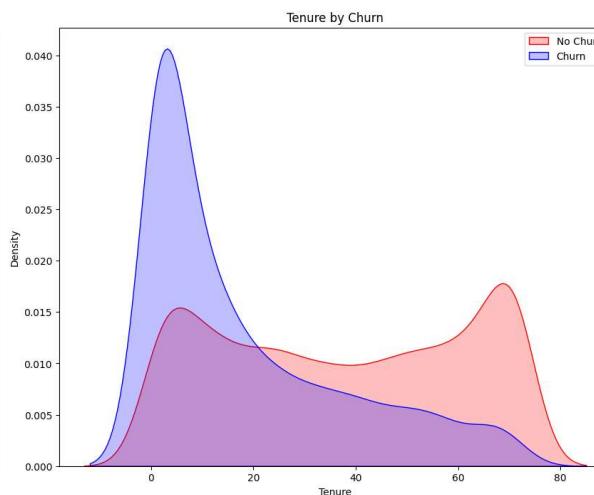
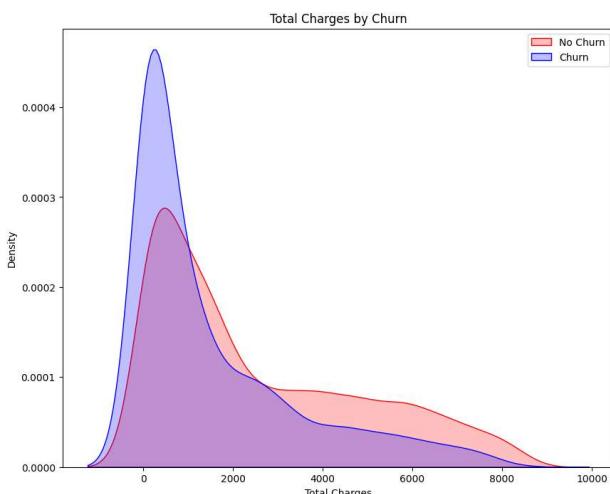
# Exploratory Data Analysis

## Based on Charges



Important Observations [Original Churn Rate : 26.58 %] :

The monthly charges correlation clearly proves that, the higher the charges, customers are more likely to churn.



Important Observations [Original Churn Rate : 26.58 %] :

The total charges has a correlation that shows the lower the total charges, customers are more likely to churn.

As we already know, customers are highly likely to churn out for lower tenures and higher monthly charges, this graph proves the same.

# Univariate Insights

# Exploratory Data Analysis

## Univariate Insights

Original Churn Rate : 26.58 %

Following are the customers more likely to churn based on univariate analysis

1. Customers with less than 1 year of tenure have a churn rate of 47.68%.
2. Users who choose electronic check as their payment method show a higher likelihood of churn at 45.29%.
3. Month-to-month contract subscribers exhibit a higher churn rate of 42.71%.
4. Customers using Fiber Optic (41.89%) instead of DSL (19.00%) are more prone to churn.
5. Senior Citizens have a relatively higher churn rate of 41.68%.
6. Customers without the following features Online Security (41.78%), Tech Support (41.65%), Online Backup (39.94%), and Device Protection (39.14%) are more likely to churn.
7. Paperless Billing Method users have a churn rate of 33.59%, surpassing conventional paper billing at 16.38%.
8. Customers without partners (32.98%) are more likely to churn than those with partners (19.72%).
9. Customers without dependents (31.28%) are more likely to churn than those with dependents (15.53%).
10. Not streaming Movies (33.73%) and not streaming TV (33.54%) contribute to a higher likelihood of churn.

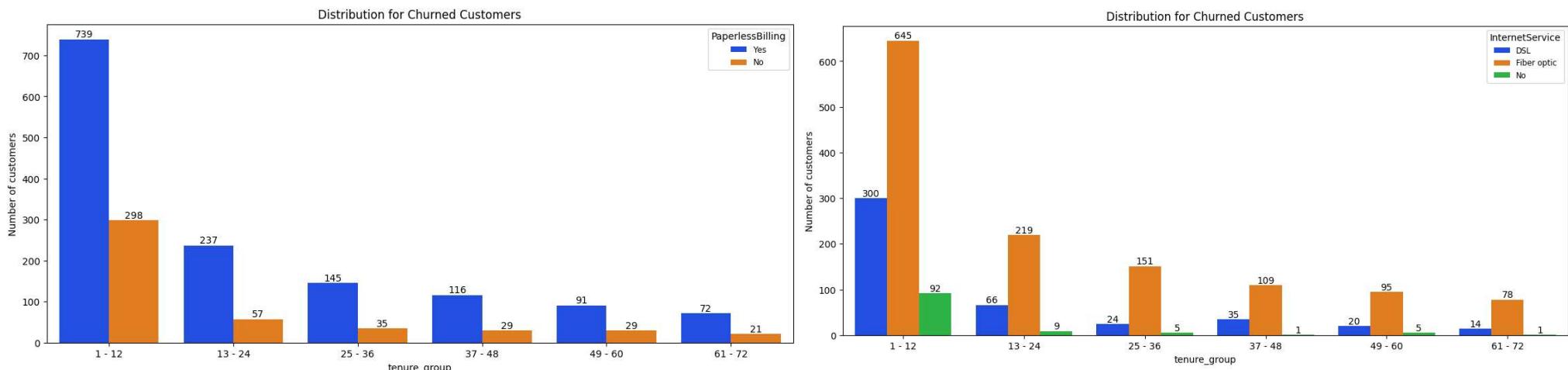
# Bivariate Analysis

# Exploratory Data Analysis

## Bivariate Insights on Customers with <1 Year Tenure (47.68%)

Original Churn Rate : 26.58 %

- Fiber optic users in this group face a 29.61% higher chance of churning than DSL users, leading to an actual churn rate of 69.88%.
- Paperless billing among users in this category is associated with a 24.19% higher chance of churning, with an actual churn rate of 57.60%.
- Senior citizens in this category exhibit a 23.61% higher likelihood of churning, resulting in an actual churn rate of 67.81%.

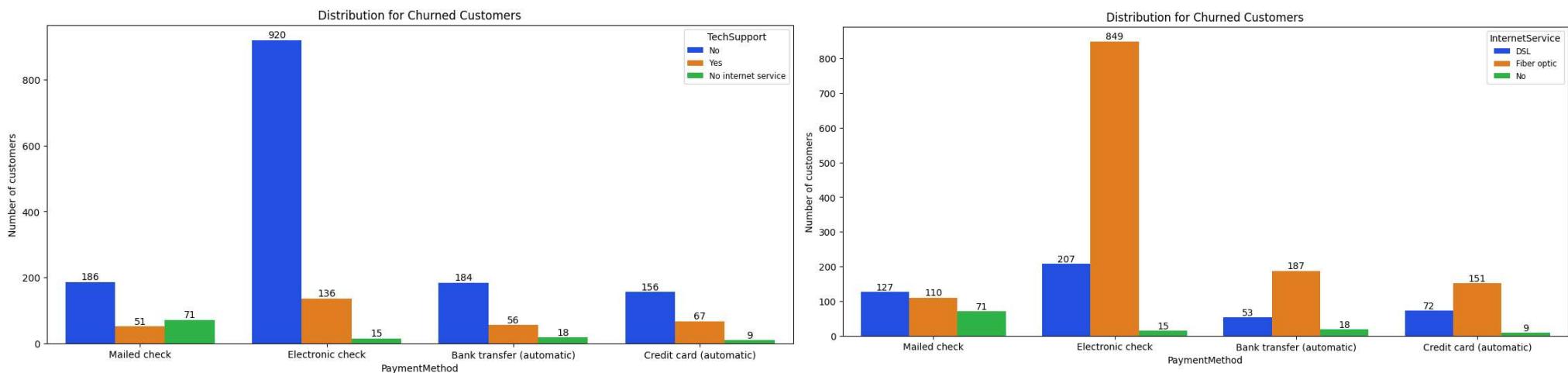


# Exploratory Data Analysis

## Bivariate Insights on Users Opting for Electronic Check Payments (45.29%)

Original Churn Rate : 26.58 %

- Non-utilization of tech support in this group is linked to a 26.67% higher likelihood of churning, resulting in an actual churn rate of 53.18%.
- Fiber optic users within this category experience a 21.28% higher likelihood of churning compared to DSL users, contributing to an actual churn rate of 53.23%.

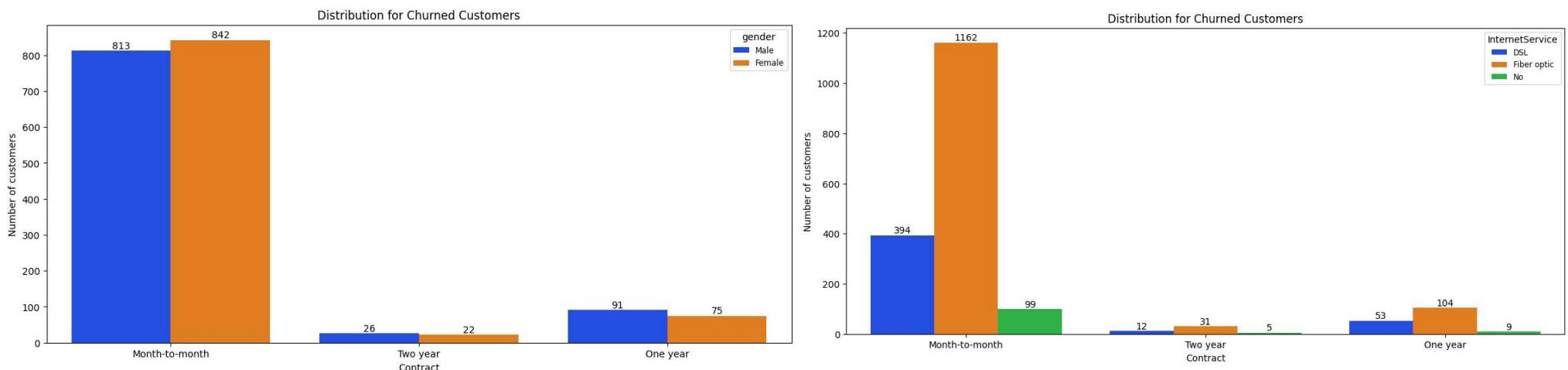


# Exploratory Data Analysis

## Bivariate Insights for Month-to-Month Contract Subscribers (42.71%)

Original Churn Rate : 26.58 %

- Fiber optic users in this group have a 22.39% higher likelihood of churning compared to DSL users, leading to an actual churn rate of 54.61%
- Females in this category display a 2.05% higher likelihood of churning compared to males, resulting in an actual churn rate of 43.74%.

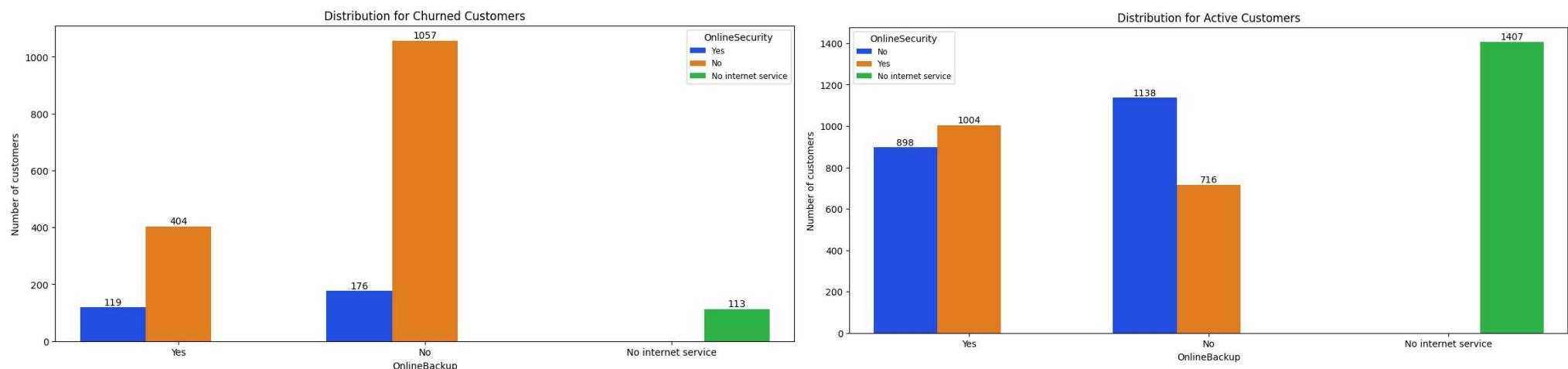


# Exploratory Data Analysis

## Bivariate Insights among Users without Online Backup (39.94%)

Original Churn Rate : 26.58 %

- Non-utilization of online security among users without online backup is associated with a 28.42% higher likelihood of churning, resulting in an actual churn rate of 48.15%.

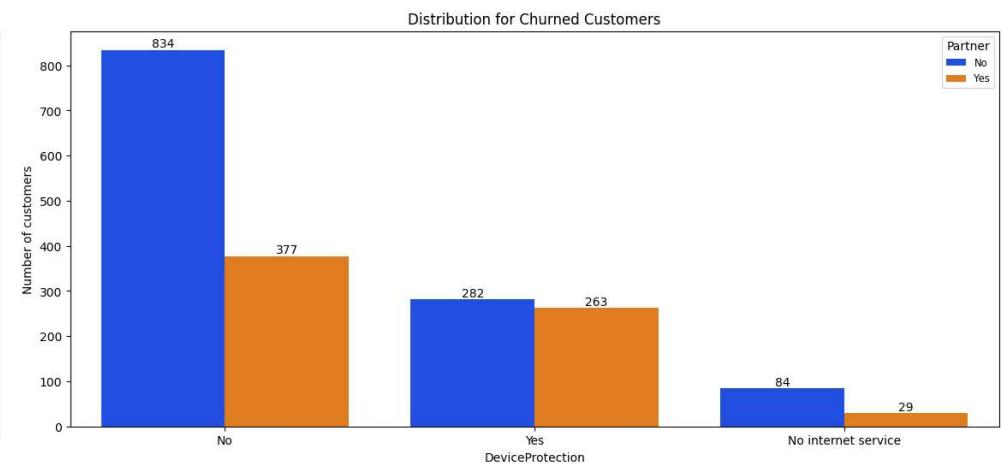
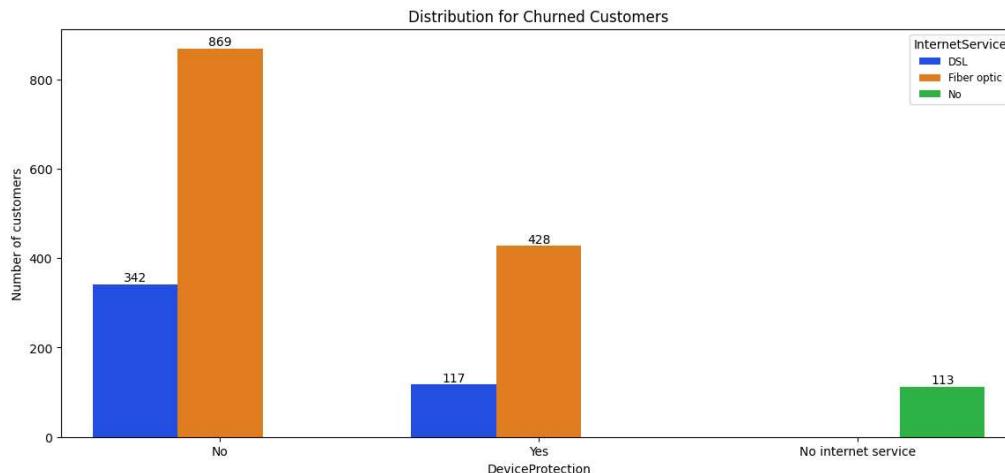


# Exploratory Data Analysis

## Bivariate Insights among Users without Device Protection (39.14%)

Original Churn Rate : 26.58 %

- Fiber optic users without device protection experience a 24.73% higher likelihood of churning compared to DSL users, contributing to an actual churn rate of 49.97%.
- Users without partners and lacking device protection show a 14.43% higher likelihood of churning compared to users with partners, resulting in an actual churn rate of 44.91%.
- Users without dependents and without device protection exhibit a 16.75% higher likelihood of churning compared to users with dependents, contributing to an actual churn rate of 43.03%.

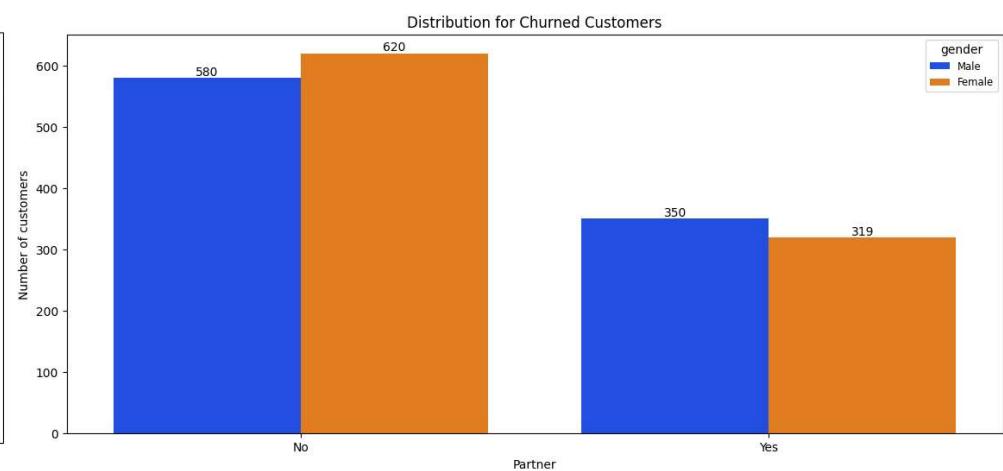
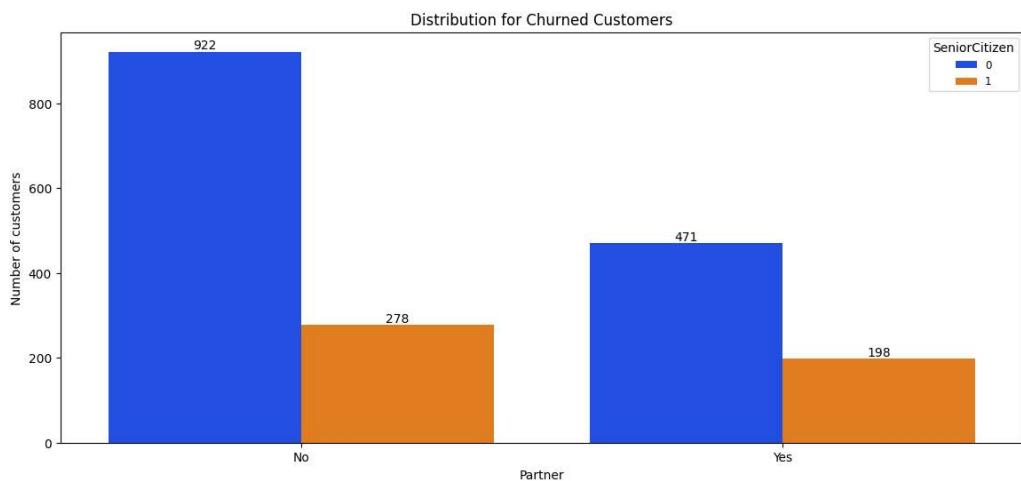


# Exploratory Data Analysis

## Bivariate Insights for Customers without Partners (32.98%)

Original Churn Rate : 26.58 %

- Senior citizens within this category show an 18.83% higher likelihood of churning, contributing to an actual churn rate of 48.86%.
- Females in this category display a 2.91% higher likelihood of churning compared to males, resulting in an actual churn rate of 34.44%.

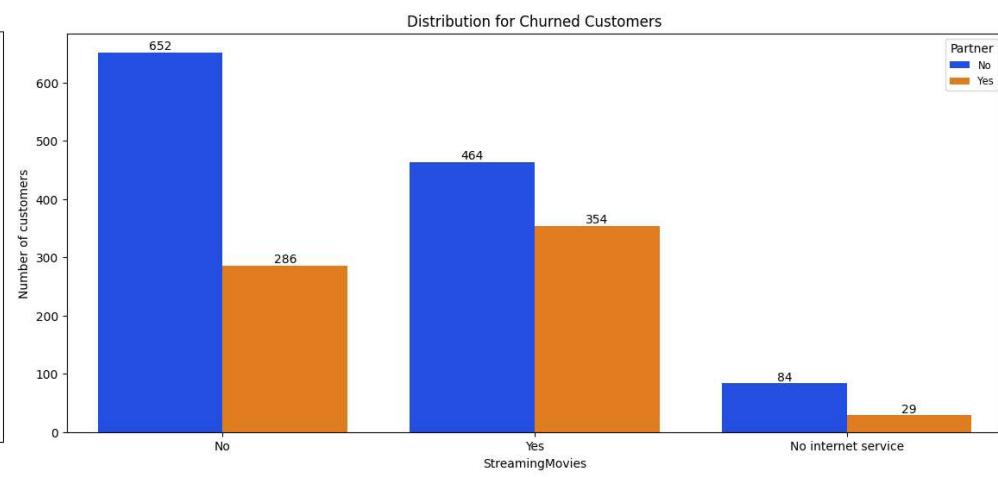
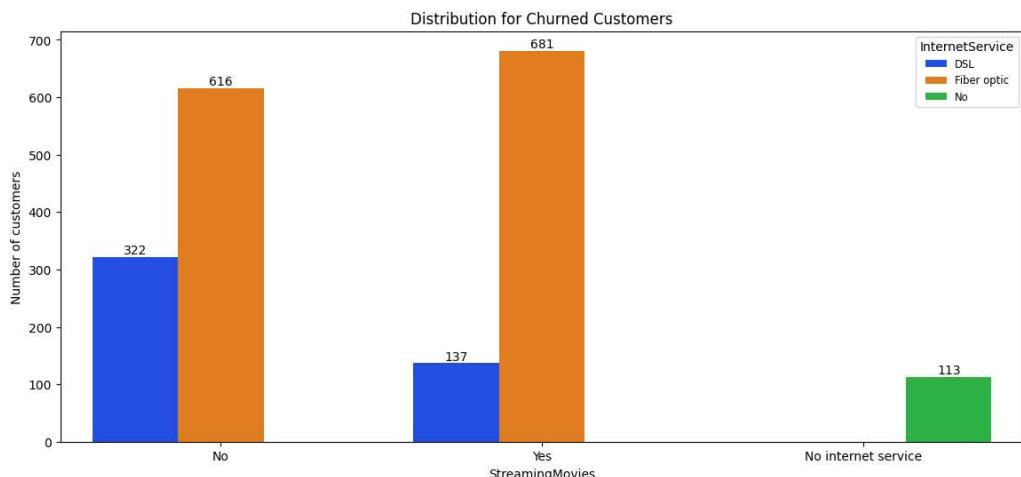


# Exploratory Data Analysis

## Bivariate Insights for Non-Movie Streamers (33.73%)

Original Churn Rate : 26.58 %

- Fiber optic users within this group exhibit a 23.38% higher likelihood of churning compared to DSL users, contributing to an actual churn rate of 45.80%.
- Users without partners in this category demonstrate a 14.64% higher likelihood of churning compared to users with partners, resulting in an actual churn rate of 39.73%.
- Users within this category, who do not engage in TV streaming, exhibit a 2.65% higher likelihood of churning, leading to an actual churn rate of 34.46%.



# Bivariate Insights

# Exploratory Data Analysis

## Bivariate Insights

Original Churn Rate : 26.58 %

Key Insights: Unveiling Churn Patterns through Bivariate Analysis

- Customers with less than 1 year of tenure (47.68%), especially with fiber optic services (29.61% more) and paperless billing (24.19% more), are more likely to churn.
- Users selecting electronic check payments (45.29%), particularly without tech support (26.67% more) and choosing fiber optic, amplify vulnerability.
- Month-to-month contract subscribers (42.71%), especially with fiber optic services, reveal a increasing churn pattern, females in this group are 2.05% more likely to churn than males.
- Senior Citizens exhibit a relatively higher churn rate of 41.68%, particularly with a contract less than a year and in the absence of a partner.
- Customers without online backup (39.94%) and security (41.78%) play a major role in churn, with a 28.42% higher likelihood compared to users with online security and no online backup.
- Customers without device protection (39.14%), especially with fiber optic services, and without partners (14.43% more) and dependents (16.75% more), are more inclined to churn.
- Customers without partners (32.98%), females in this group are 2.91% more likely to churn than males.
- Customers not streaming movies (33.73%), particularly with fiber optic services (23.38% more) and without partners (14.64% more), are more likely to churn. Additionally, customers not streaming both movies and TV have a 2.65% higher likelihood of churning compared to users streaming TV and not movies.

\* Fiber Optic customers are compared with DSL customers to find out the trend.

# Final Thoughts

# Exploratory Data Analysis

## Final Thoughts

Our exploratory data analysis (EDA) delved into telecom customer churn, revealing a substantial overall churn rate of 26.58%.

- Customers with less than 1 year of tenure (47.68%), especially with fiber optic services (29.61% more) and paperless billing (24.19% more), stand out as a segment prone to churn.
- Users opting for electronic check payments (45.29%), particularly without tech support (26.67% more) and choosing fiber optic, amplify the vulnerability, emphasizing the need for payment-related interventions.
- Month-to-month contract subscribers (42.71%), especially with fiber optic services, exhibit a concerning churn pattern. Females in this group are 2.05% more likely to churn than males, signifying contract choices influence customer loyalty.
- Senior Citizens (41.68%) show a relatively higher churn rate, especially with a contract less than a year and without a partner, underscoring the unique considerations for this demographic.
- Customers without online backup (39.94%) and security (41.78%) play a pivotal role in churn, with a 28.42% higher likelihood compared to users with online security and no online backup. This emphasizes the importance of ensuring customers are more focused on security.
- Customers without device protection (39.14%), particularly with fiber optic services, and without partners (14.43% more) and dependents (16.75% more), are more inclined to churn, highlighting the need for comprehensive service packages.
- Customers without partners (32.98%), especially females in this group (2.91% more likely to churn than males), underscore the influence of relationship status on churn dynamics.
- Customers not streaming movies (33.73%), particularly with fiber optic services (23.38% more) and without partners (14.64% more), demonstrate a higher likelihood of churn. Additionally, those not streaming both movies and TV have a 2.65% higher likelihood of churning, emphasizing the significance of entertainment preferences.

## Next Steps: Predictive Analytics

Utilizing Machine Learning: Dive into constructing a robust machine learning model to leverage the insights gathered.

Proactive Retention Strategies: Apply predictive analytics to forecast potential churners, facilitating the implementation of proactive retention strategies.



# Thank You