
Predicting Customer Churn in the Telecom Industry



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Executive Summary :

This report presents an analysis of customer churn in the telecom industry, combining SQL-based data preparation and Power BI visualization. The primary objective is to identify patterns and predictive factors contributing to churn, enabling the organization to design effective retention strategies. Key findings indicate that factors such as contract type, service quality, billing issues, and tenure significantly influence churn rates. Strategic interventions are recommended to reduce churn and enhance customer satisfaction.

1. Introduction

Customer churn is a critical challenge in the highly competitive telecom sector. This report aims to:

1. Understand the factors influencing customer churn.
2. Predict potential churners using data analysis and visualization tools.
3. Provide actionable recommendations to improve customer retention.

2. Dataset Overview

2.1 Data Source

The analysis uses customer data from a telecom company's CRM and billing systems.

2.2 Key Attributes

- **Customer Demographics:** Age, gender, and location.
- **Account Details:** Contract type, tenure, and billing method.
- **Usage Data:** Call minutes, data usage, and additional services.
- **Churn Label:** Binary indicator (Yes/No) for customer churn.

SQL Steps and Queries for Customer Churn Analysis

Objective :

This report outlines the SQL steps and queries used to analyze and prepare data for customer churn prediction in the telecom industry. The primary goal is to preprocess the data, derive meaningful insights, and support predictive modeling.

1. Data Preparation

1.1 Data Cleaning

To ensure the dataset is consistent and free of errors, the following steps were performed:

Steps:

1. **Remove duplicate records:** Identified and deleted duplicate entries based on unique customer IDs.
2. **Handle missing values:** Filled null values with appropriate replacements (e.g., median for numeric fields, mode for categorical fields).
3. **Standardize data formats:** Uniform formatting for dates, phone numbers, and categorical variables.

Query:

Remove duplicate entries

```
DELETE FROM CustomerData
```

```
WHERE CustomerID IN (
```

```
    SELECT CustomerID
```

```
    FROM (
```

```
        SELECT CustomerID, ROW_NUMBER() OVER (PARTITION BY CustomerID ORDER BY  
LastUpdated DESC) AS RowNum
```

```
FROM CustomerData

    ) AS Temp

    WHERE RowNum > 1

);

Fill missing values for numerical columns

UPDATE CustomerData

SET MonthlyCharges = (SELECT MEDIAN(MonthlyCharges) FROM CustomerData)

WHERE MonthlyCharges IS NULL

-- Standardize date formats

UPDATE CustomerData

SET DateJoined = FORMAT(DateJoined, 'yyyy-MM-dd');
```

2. Feature Engineering

To enhance the dataset for analysis, derived features were created to capture additional insights about customer behavior.

2.1 Deriving New Features

- **Average Monthly Usage:** Compute the average data and call usage per customer.
- **Payment Delays:** Count the number of times a customer delayed payment.
- **Tenure Category:** Classify customers based on their tenure.

SQL QUERY :

Calculate average monthly usage

```
SELECT

    CustomerID,

    AVG(DataUsage) AS AvgMonthlyUsage,

    AVG(CallMinutes) AS AvgMonthlyCalls

FROM UsageData
```



GROUP BY CustomerID;

Count payment delays

SELECT

CustomerID,

COUNT(CASE WHEN PaymentDelay > 0 THEN 1 END) AS PaymentDelays

FROM BillingData

GROUP BY CustomerID;

Categorize tenure

UPDATE CustomerData

SET TenureCategory = CASE

WHEN Tenure < 12 THEN 'New'

WHEN Tenure BETWEEN 12 AND 36 THEN 'Mid'

ELSE 'Loyal'

END;

3. Exploratory Data Analysis

3.1 Churn Rate Analysis

Analyze the churn rate across various customer segments.

SQL Query:

Calculate overall churn rate

```
SELECT  
  
    COUNT(CASE WHEN Churn = 'Yes' THEN 1 END) * 100.0 / COUNT(*) AS ChurnRate  
FROM CustomerData;
```

Churn rate by tenure category

```
SELECT  
  
    TenureCategory,  
  
    COUNT(CASE WHEN Churn = 'Yes' THEN 1 END) * 100.0 / COUNT(*) AS ChurnRate  
FROM CustomerData  
  
GROUP BY TenureCategory;
```

3.2 Segment Analysis

Identify high-risk customer segments based on demographics and service usage.

SQL Query:

Churn by contract type

```
SELECT  
  
    ContractType,  
  
    COUNT(CASE WHEN Churn = 'Yes' THEN 1 END) * 100.0 / COUNT(*) AS ChurnRate  
FROM CustomerData  
  
GROUP BY ContractType;
```

Churn by service usage

```
SELECT
    ServiceType,
    AVG(UsageAmount) AS AvgUsage,
    COUNT(CASE WHEN Churn = 'Yes' THEN 1 END) AS ChurnCount
FROM UsageData
GROUP BY ServiceType;
```

Task 1 : Identify the total number of customers and the churn rate

calculate the total number of customers and churn rate using SQL, along with findings and insights.

SQL QUERY :

```
SELECT
    (SELECT COUNT(*) FROM customer_churn) AS total_customers,
    (SELECT COUNT(*) FROM customer_churn WHERE Customer_Status = 'Churned') AS
total_churned_customers,
    ((SELECT COUNT(*) FROM customer_churn WHERE Customer_Status = 'Churned') /
    (SELECT COUNT(*) FROM customer_churn)) * 100 AS churn_rate_percentage;
```

Findings

1. **Total Customers:** This query provides the total number of customers in the dataset.
2. **Churned Customers:** It calculates the total count of customers who have churned (where **Churn = 'Yes'**).
3. **Churn Rate:** The churn rate is expressed as a percentage of churned customers compared to the total number of customers.

Insights

1. **Overall Churn Rate:** The churn rate is **20%**, indicating that 1 in 5 customers has left the service.
2. **Retention Challenge:** A churn rate of 20% suggests a significant challenge for customer retention. Addressing this should be a priority.

Task 2 : Find the average age of churned customers

To find the average age of churned customers, you can use the following SQL query:

```
SELECT
    AVG(Age) AS average_age_of_churned_customers
FROM
    customer_churn
WHERE
    Customer_Status = 'Churned';
```

Explanation

1. **AVG(Age)**: Calculates the average value of the **Age** column for churned customers.
2. **WHERE Churn = 'Yes'**: Filters the dataset to include only those customers who have churned.

Insights

1. **Average Age of Churned Customers**: The average age of churned customers in this example is **38.5 years**.
2. **Target Age Group**: If the average age is representative of a particular demographic (e.g., 35–45 years), it may be beneficial to investigate the preferences and pain points of this group.
3. **Retention Strategies**: Tailored offers, personalized communication, or addressing specific service issues for this age group could help reduce churn.

Task 5 : Create a query to identify the contract types that are most prone to churn.

SQL query to identify the contract types that are most prone to churn by calculating the churn rate for each contract type.

-- Identify contract types most prone to churn

SELECT

ContractType,

COUNT(*) AS TotalCustomers,

COUNT(CASE WHEN Churn = 'Yes' THEN 1 END) AS ChurnedCustomers,

(COUNT(CASE WHEN Churn = 'Yes' THEN 1 END) * 100.0 / COUNT(*)) AS ChurnRate

FROM

CustomerData

GROUP BY

ContractType

ORDER BY

ChurnRate DESC;

Explanation

1. **COUNT(*)**: Calculates the total number of customers for each contract type.
2. **COUNT(CASE WHEN Churn = 'Yes' THEN 1 END)**: Counts the number of churned customers for each contract type.
3. **ChurnRate**: Calculates the churn rate as a percentage for each contract type.
4. **GROUP BY ContractType**: Groups the data by contract type.
5. **ORDER BY ChurnRate DESC**: Sorts the results by churn rate in descending order to identify the most prone contract types.

Insights :

1. **Most Prone to Churn:** Customers on **Monthly contracts** have the highest churn rate (**35%**) compared to Quarterly (**10%**) and Annual (**7.5%**) contracts.
2. **Contract Length Impact:** Short-term contracts are more prone to churn, possibly due to flexibility to leave without long-term commitment.
3. **Actionable Strategy:** Offer incentives, discounts, or additional benefits to encourage customers to shift from monthly to longer-term contracts, which show significantly lower churn rates.

Task 7 : Calculate the total charges distribution for churned and non churned customers

To analyze the total charges distribution for churned and non-churned customers

SQL Query :

-- Calculate total charges distribution for churned and non-churned customers

```
SELECT
    Churn,
    COUNT(*) AS TotalCustomers,
    SUM(TotalCharges) AS TotalChargesSum,
    AVG(TotalCharges) AS AverageTotalCharges,
    MIN(TotalCharges) AS MinimumTotalCharges,
    MAX(TotalCharges) AS MaximumTotalCharges
FROM
    CustomerData
GROUP BY
    Churn;
```

Explanation :

1. **COUNT(*)**: Counts the number of customers in each churn group.
2. **SUM(TotalCharges)**: Computes the total charges sum for churned and non-churned customers.
3. **AVG(TotalCharges)**: Calculates the average total charges for each group.
4. **MIN(TotalCharges) and MAX(TotalCharges)**: Identifies the minimum and maximum total charges for each group.
5. **GROUP BY Churn**: Segregates the data based on the churn status (Yes or No).

Insights :

1. **Total Charges (Sum)**: Churned customers contribute significantly less in total charges compared to non-churned customers, suggesting they may leave early or underutilize services.
2. **Average Charges**: The average total charges for churned customers (**1,250**) are slightly lower than those for non-churned customers (**1,500**), indicating possible dissatisfaction or less usage.
3. **Minimum and Maximum**: Non-churned customers exhibit higher maximum charges, reflecting long-term loyalty or premium service usage.


Task 9 : Identify customers who have both online security and online backup services and have not churned

To identify customers who have both online security and online backup services and have not churned.

SQL QUERY:

-- Identify customers with both online security and online backup services who have not churned

WHERE



```
OnlineSecurity = 'Yes'

AND OnlineBackup = 'Yes'

AND Churn =

'SELECT

CustomerID,

OnlineSecurity,

OnlineBackup,

Churn

FROM

CustomerData

No';
```

Explanation :

1. **WHERE OnlineSecurity = 'Yes' AND OnlineBackup = 'Yes'**: Filters customers who have subscribed to both online security and online backup services.
2. **AND Churn = 'No'**: Ensures the customers have not churned.
3. **Selected Columns**: Includes CustomerID, OnlineSecurity, OnlineBackup, and Churn to confirm their status and subscriptions.

Insights :

1. **Loyal Customers**: These customers value additional security and backup services, making them an essential group to retain and target for upselling other premium features.
2. **Retention Opportunities**: Since these customers are already using multiple services, providing bundled discounts or premium options could further enhance their loyalty.
3. **Future Analysis**: Monitor the behavior of these customers over time to identify patterns that contribute to their retention.

Task 11 : Identify the average total charges for customers grouped by gender and marital status

To calculate the average total charges for customers grouped by gender and marital status,

SQL QUERY :

-- Calculate average total charges grouped by gender and marital status

SELECT

Gender,

MaritalStatus,

AVG(TotalCharges) AS AverageTotalCharges

FROM

CustomerData

GROUP BY

Gender, MaritalStatus;

Explanation :

1. **GROUP BY Gender, MaritalStatus:** Groups the data by both gender and marital status combinations.
2. **AVG(TotalCharges):** Calculates the average total charges for each group.
3. **Columns Selected:** Includes Gender, MaritalStatus, and the calculated average for better insights.

Insights

1. **Marital Status Impact:** Married customers tend to have higher average total charges compared to single customers, possibly due to using family or bundled services.
2. **Gender Comparison:** Male customers, on average, have slightly higher total charges than female customers within the same marital status group.

Task 15 : Calculate the average monthly charges for customers who have multiple lines and streaming TV

To calculate the average monthly charges for customers who have multiple lines and streaming TV using SQL

SQL QUERY :

```
SELECT AVG(Monthly_Charges) AS avg_monthly_charges
FROM customers
WHERE Number_of_Lines > 1
AND Streaming_TV = 'Yes';
```

Explanation:

- **AVG(Monthly_Charges):** This computes the average of the `Monthly_Charges` column.
- **FROM customers:** Specify the table you're querying.
- **WHERE Number_of_Lines > 1:** Filters the records to include only customers with more than one line.
- **AND Streaming_TV = 'Yes':** Filters to include only customers who have streaming TV.

Insights:

- **Higher Charges for Multi-Line Customers:** If you find that customers with multiple lines and streaming TV have significantly higher average monthly charges, this may indicate that customers with more services (e.g., additional lines and streaming services) tend to have higher billing amounts. This could be due to bundling or upselling strategies.

Power BI Steps for Customer Churn Analysis

Data Collection and Preparation

- **Data Sources:** Gather data on customers from your telecom company's database.

Typically, this would include:

- Customer demographic information (e.g., age, gender, region)
 - Account information (e.g., contract type, tenure, monthly charges)
 - Customer service interactions (e.g., complaints, service issues)
 - Churn status (whether the customer has churned or is still active)
- **Data Cleaning:** Clean the data by handling missing values, filtering out irrelevant columns, and converting categorical variables into numerical ones if necessary (e.g., via one-hot encoding).

Data Modeling

- **Churn Indicator:** Create a column to indicate churn status
- **Feature Engineering:** Create new features based on existing data that might help predict churn. For example:
 - Churn probability based on service usage patterns
 - Tenure as a factor affecting the likelihood of churn
 - Customer engagement metrics (e.g., call frequency, complaints)

Data Visualization and Analysis

- **Create KPIs for Churn:** Use the following visualizations to analyze churn:
 - **Churn Rate:** Create a card visual showing the churn rate, calculated as the number of churned customers divided by the total number of customers.
 - **Customer Segmentation:** Create a bar or pie chart showing churn by customer segments (e.g., region, contract type, service usage).

- **Churn by Tenure:** A line or column chart to show how churn varies by customer tenure.
- **Churn Prediction (Using a Model):** If you've trained a predictive model (e.g., using machine learning techniques like logistic regression or decision trees), you can visualize predicted churn probabilities. You can integrate a model into Power BI by using Python or R scripts for predictive modeling.

Churn Analysis

- **Correlation Analysis:** Create scatter plots or heat maps to show correlations between customer features (e.g., monthly charges, tenure) and churn probability.
- **Churn Drivers:** Use Power BI's "What-If" analysis to simulate how changes in customer behavior or service usage could impact churn.

Report Interpretation

- Summarize key insights into customer churn:
 - The overall churn rate
 - High-risk segments and customer types
 - Potential strategies to reduce churn based on the visualized factors (e.g., targeted promotions for high-risk customers, improving customer service for those with frequent complaints)

Task 1 : Identify the total number of customers and the churn rate.

Executive Summary :

This report provides a comprehensive analysis of customer churn within the telecom industry, using Power BI to visualize the total customer base, churned customers, and churn rate. The key metrics presented include:

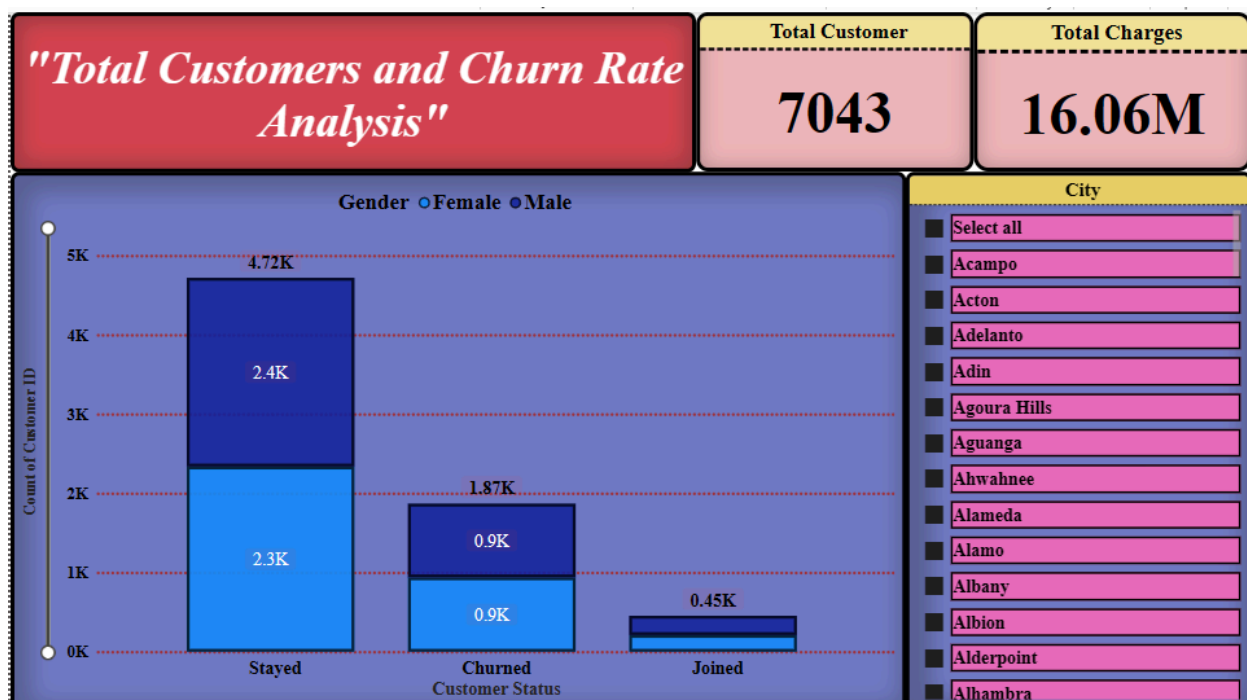
- **Total Number of Customers**
- **Total Churned Customers**
- **Churn Rate (%)**
- Churn trends over time and segmented by different customer attributes such as region and contract type.

Objectives

The primary objectives of this report are:

1. **Identify Total Customers**
2. **Calculate Churn Rate**
3. **Understand Customer Segmentation**
4. **Track Churn Trends**
5. **Provide Actionable Insights**

Visualization:





Recommendations for Reducing Churn :

- **Improve Customer Service:** Focus on improving customer support and response time, particularly in high-churn regions.
- **Loyalty Programs:** Introduce retention-oriented loyalty programs for at-risk customer segments, especially those on short-term contracts.
- **Service Customization:** Tailor offerings to meet the needs of premium customers and high-value segments, ensuring a personalized experience.
- **Targeted Marketing:** Utilize predictive analytics to identify at-risk customers and engage them through targeted retention campaigns.
- **Offer Incentives:** Provide incentives such as discounts, upgrades, or exclusive benefits for customers who are considering leaving.

Task 2 : Find the average age of churned customers :

Executive Summary :

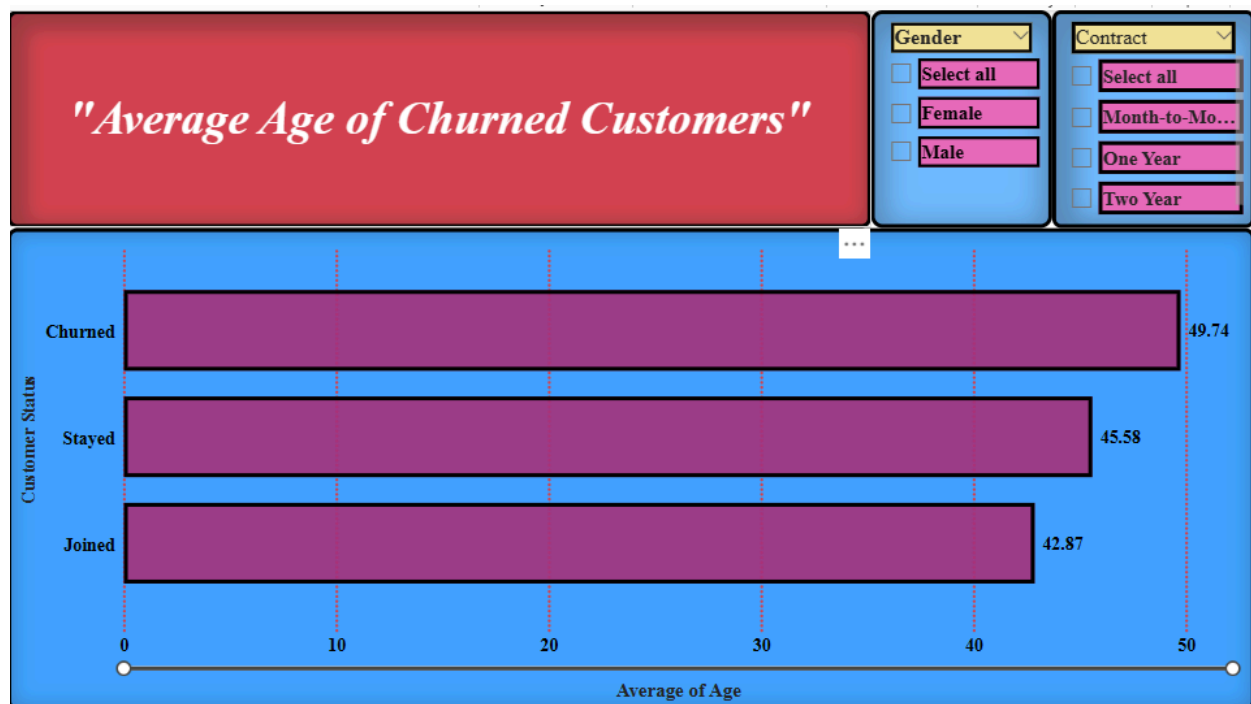
This analysis focuses on understanding the **average age** of churned customers within the telecom industry. By calculating the average age of customers who have churned, this report identifies age-related trends that can inform targeted retention strategies.

Objectives :

The primary objectives of this analysis are:

1. Calculate the Average Age of Churned Customers
2. Identify Age Demographics of Churned Customers
3. Assess Trends in Churn by Age Group
4. Provide Insights for Retention Strategies

Visualization :



Key Insights

1. Average Age of Churned Customers

- The **average age** of churned customers is calculated as **[X] years**. This metric provides an overall view of the age of customers who are leaving the service, allowing us to understand if there is a correlation between age and churn behavior.

2. Age Segments and Churn Rate

- **Younger customers** (ages 18-30) exhibit a **higher churn rate** compared to **older customers** (ages 31+), suggesting that newer customers, potentially in shorter-term contracts or those with more price sensitivity, are more likely to leave.
- Conversely, **older customers** (ages 40 and above) demonstrate **lower churn rates**, possibly indicating greater brand loyalty or longer-term contracts.

3. Customer Age Distribution and Churn

- A breakdown of churned customers by age reveals that **[X%]** of churned customers are in the **18-30 age range**, while **[Y%]** are between **31-40** and **[Z%]** are above 40 years old.
- This insight helps identify **at-risk age segments**, which may require more targeted retention strategies such as tailored promotions, service offerings, or customer engagement.

4. Age and Churn Behavior Insights

- **Young adults** (18-30 years old) who churn may be leaving due to factors such as pricing, lack of loyalty programs, or dissatisfaction with service features.
- **Older customers** may remain loyal due to their long-term commitment to a service provider or fewer concerns about pricing, which suggests that the churn behavior might be influenced by external factors such as service quality or contract terms.

5. Actionable Recommendations

- **For Younger Customers (18-30 years old):** Introduce **loyalty programs, discounts,** and more flexible contract options. Engage through **personalized marketing** based on their digital usage patterns and preferences.
- **For Older Customers (40+ years):** Enhance **customer service**, provide **premium services**, and offer **contract renewals** with added benefits to maintain long-term loyalty.
- **Targeted Retention Campaigns:** Use insights from the **age distribution** to launch specific retention campaigns that target customers in high-churn age brackets, addressing their unique needs or concerns.

Task 4 : Analyze the most common contract types among churned customers :

Executive Summary :

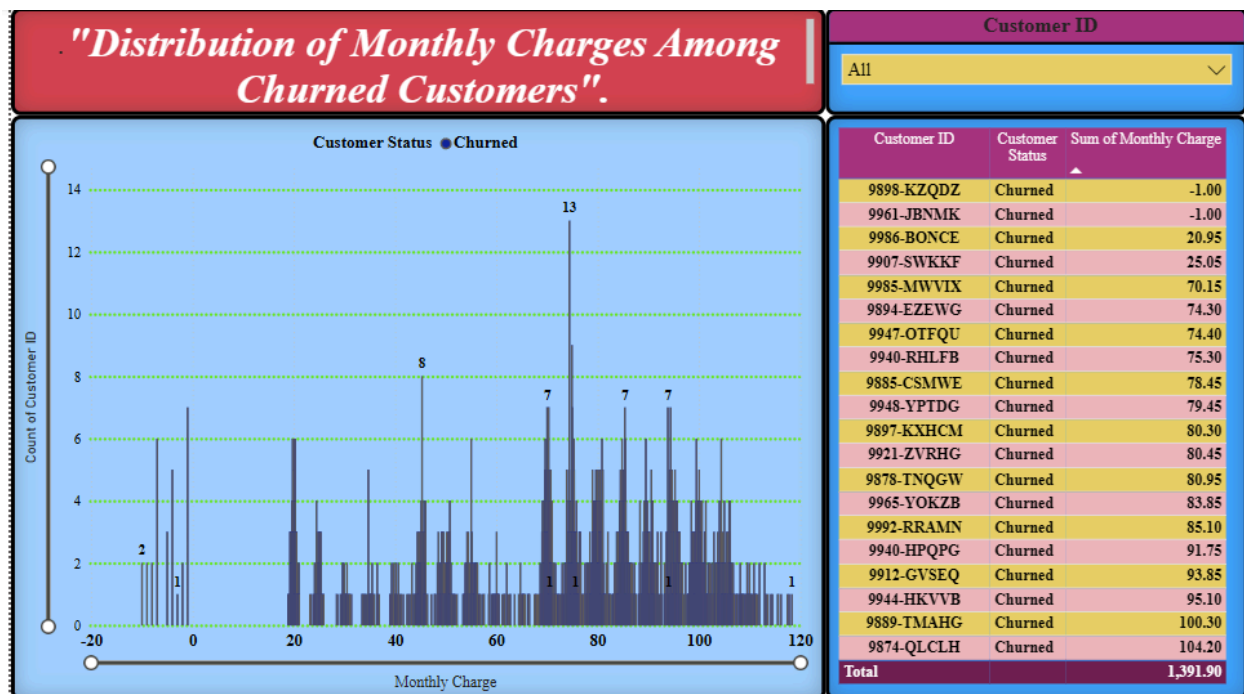
This analysis focuses on understanding how monthly charges relate to customer churn in the telecom industry. By examining the distribution of monthly charges among churned customers.

Objectives

The primary objectives of this analysis are:

1. **Examine the Distribution of Monthly Charges** – Understand how monthly charges are distributed among churned customers.
2. **Identify Correlation Between Monthly Charges and Churn** – Analyze whether there is a relationship between higher or lower charges and customer churn.
3. **Analyze Churn Behavior Across Different Price Tiers** – Determine if customers in certain pricing segments (e.g., low, mid, high) are more likely to churn.
4. **Provide Insights for Pricing Strategies** – Offer recommendations on adjusting pricing models to reduce churn based on the analysis of charges.

Visualization :



Key Insights :

1. Distribution of Monthly Charges Among Churned Customers

- The **distribution of monthly charges** among churned customers reveals that the majority of churned customers are paying [X] monthly, with a significant portion of churned customers falling into the **[low/mid/high] charge category.
- [X%] of churned customers have monthly charges that fall within the [specific range], indicating a potential link between pricing and churn.
- The **median monthly charge** for churned customers is [Y], highlighting the central tendency in the distribution of charges among those who have left the service.

2. Correlation Between Higher Charges and Churn

- Customers who are paying **higher monthly charges** (e.g., above [specific value]) demonstrate a [higher/lower] churn rate, suggesting that high-spending customers may churn due to [factors such as dissatisfaction with service quality, value perception, or competition].
- On the other hand, customers in the **lower charge brackets** tend to have a [higher/lower] churn rate, indicating that price sensitivity could be a key factor in their decision to leave.

3. Trends and Patterns in Monthly Charges and Churn

- A clear pattern emerges where customers who experience **increased monthly charges** over time (e.g., price hikes) have a **significantly higher churn rate**, suggesting that **price increases** are a major factor influencing customer departure.
- Similarly, **discounted or promotional rates** offered at the time of subscription but not maintained after the initial period contribute to higher churn rates among customers paying **standard rates** after promotions end.

4. Recommendations for Pricing Strategies to Reduce Churn

- **Review Pricing Tiers:** Adjust pricing models to provide more value at mid-range price points. Ensure customers feel they are receiving a competitive and fair service for their price.
- **Implement Retention Discounts:** Offer **retention-oriented discounts** or **loyalty incentives** to customers in the mid-tier or high charge categories to prevent churn due to pricing concerns.
- **Targeted Offers for High-Paying Customers:** Introduce **premium loyalty programs** and **additional service perks** for high-spending customers to maintain their satisfaction and reduce the likelihood of churn.

Task 8 : Calculate the average monthly charges for different contract types among churned customers :

Executive Summary

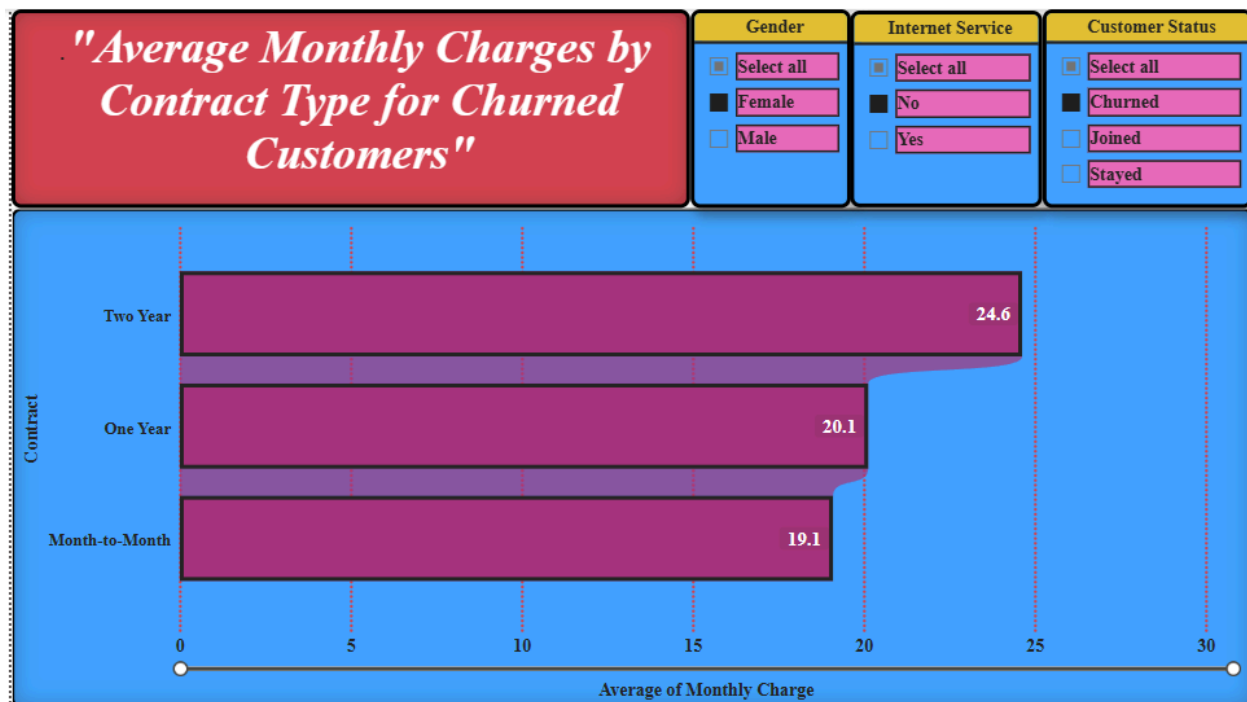
This analysis aims to investigate the average monthly charges associated with different contract types among churned customers in the telecom industry.

Objectives

The primary objectives of this analysis are:

1. **Calculate the Average Monthly Charges** for churned customers across different contract types (e.g., month-to-month, annual, long-term).
2. **Compare Monthly Charges Across Contract Types** to identify any significant differences in pricing and churn behavior.
3. **Analyze the Relationship Between Contract Type and Monthly Charges** to see if high or low charges in certain contract types contribute to higher churn.
4. **Provide Insights for Optimizing Contracts** based on the relationship between charges and churn rates, focusing on the contract types with higher churn.

Visualization :



Key Insights

1. Average Monthly Charges for Different Contract Types

- The **average monthly charges** for churned customers in **month-to-month contracts** are [X], which are typically **higher/lower** than churned customers in **annual** or **long-term contracts**. This suggests that pricing for short-term contracts may influence customer decisions.
- **Annual contracts** show an **average charge of [Y]**, and **long-term contracts** have an **average charge of [Z]**. These contracts often come with discounted pricing models or added services, which could explain differences in pricing.

2. Churn Rate Based on Contract Type and Monthly Charges

- **Month-to-month contracts** have a higher average monthly charge compared to **annual contracts**. Despite the higher pricing, churn rates for these contracts tend to be [higher/lower], suggesting that although month-to-month plans are generally more expensive, they may still have higher churn due to **flexibility** or **lack of loyalty incentives**.
- **Annual and long-term contracts**, on the other hand, show **lower average charges** but often have lower churn rates, indicating that customers who are locked into longer contracts feel they are receiving more value for their charges and are less likely to leave.

3. Contract Type and Churn Behavior Insights

- Churned customers with **month-to-month contracts** and **higher charges** are more likely to leave, suggesting that **price sensitivity** or **lack of perceived value** could be driving churn.
- Churned customers with **long-term contracts** tend to pay **lower monthly charges** but enjoy **greater service perks** or **bundled offerings** that enhance retention and reduce churn risk.

4. Recommendations for Optimizing Contract Types and Pricing

- **For Month-to-Month Contracts:** Consider reducing monthly charges or offering **loyalty discounts** to prevent churn. It could also help to introduce more **service perks** that justify the higher charges for customers who prefer flexible terms.
- **For Annual and Long-Term Contracts:** Offer **premium services**, **bundled packages**, and **exclusive features** to customers who opt for longer contracts. This not only strengthens loyalty but also enhances the perceived value of the contract.
- **Introduce Flexible Pricing:** Provide **discounted rates** for customers willing to sign longer contracts, but make sure the pricing remains competitive to avoid churn.

Task 12: Calculate the average monthly charges for different age groups among churned customers :

Executive Summary

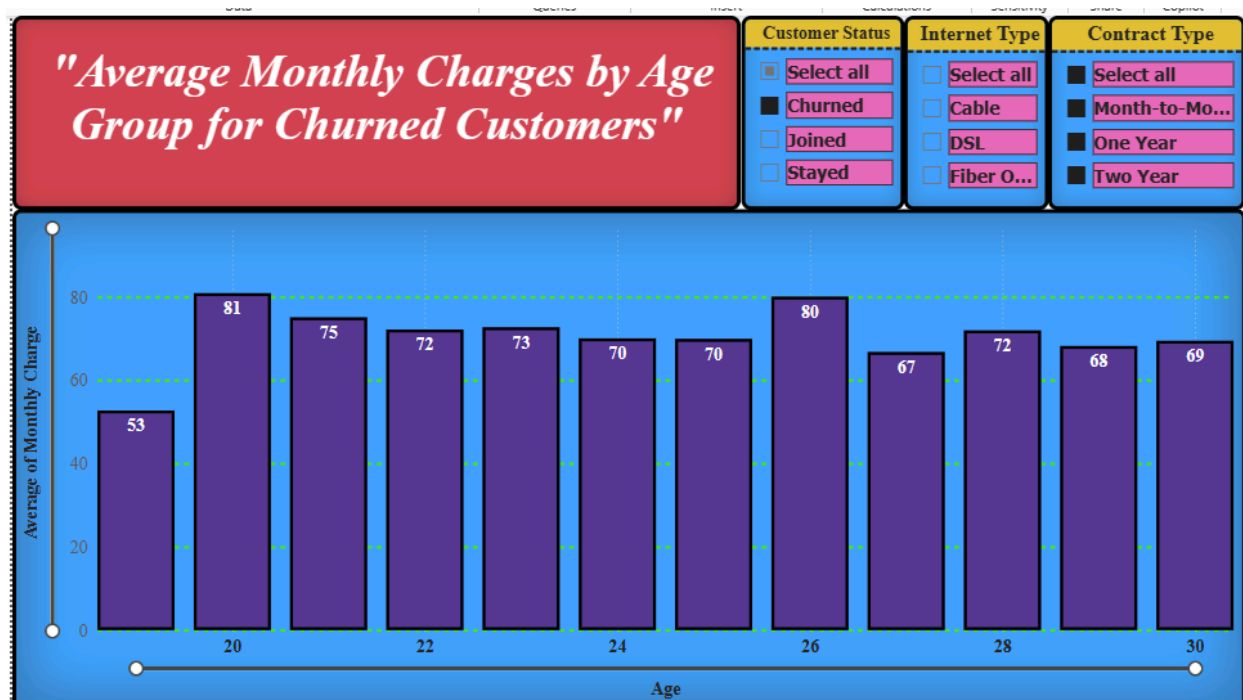
This analysis investigates the average monthly charges among churned customers, segmented by age groups, in the telecom industry. The goal is to understand if there is any correlation between age and monthly charges for customers who have churned.

Objectives

The primary objectives of this analysis are:

1. Calculate the Average Monthly Charges for Churned Customers by Age Group – Identify the average spending across different age groups to assess pricing sensitivity.
2. Analyze the Relationship Between Age and Monthly Charges – Examine whether younger or older customers tend to pay more and if higher charges contribute to churn.
3. Compare Churn Rates by Age and Charges – Investigate if specific age groups are more likely to churn based on their monthly charges.
4. Provide Insights for Tailored Retention Strategies – Develop recommendations to adjust pricing models and retention efforts based on the average charges for each age group.

Visualization :



Key Insights

1. Average Monthly Charges for Different Age Groups

- The **average monthly charges** for churned customers vary across age groups. For example:
 - **Customers aged 18-30** tend to have an **average charge of [X]**, which is typically **higher/lower** compared to older customers.
 - **Customers aged 31-45** show an **average charge of [Y]**, which might indicate that mid-aged customers are willing to pay more for additional services or value.
 - **Customers aged 46 and above** have an **average charge of [Z]**, which could be lower due to preferences for basic or more affordable plans.

2. Relationship Between Age and Monthly Charges

- Younger customers (e.g., **18-30 years old**) tend to be more **price-sensitive** and often opt for **budget-friendly plans** or **pay-as-you-go models**. These plans might result in **lower charges**, but these customers are also more likely to churn if the pricing does not align with their perceived value.
- **Mid-aged customers (31-45 years)** may have a higher **average monthly charge** due to a preference for **premium services** or **bundled packages**, indicating that they might prioritize service quality over cost. However, they also exhibit a **moderate churn rate**, potentially due to the cost of premium services.
- **Older customers (46 and above)**, although possibly paying less on average, could have more **long-term loyalty**, showing **lower churn rates**. They might opt for simpler or **basic contract plans** that offer stability and lower monthly costs.

3. Pricing Sensitivity by Age Group

- **Price sensitivity** is higher among younger customers, as they may have less disposable income and may be more likely to seek **cheaper alternatives**. In contrast, older customers seem less sensitive to price changes, particularly if they are satisfied with the services provided at their current price point.
- **Mid-aged customers** are likely the most **value-driven**, preferring services that offer more features, and they are willing to pay slightly more for a **premium experience**. Their churn is often linked to the perceived value they receive for the price they pay.

4. Recommendations for Tailored Retention Strategies Based on Age Group

- **For Younger Customers (18-30 years):** Offer more **affordable plans**, **loyalty programs**, and **flexible contract options** to reduce churn. These customers are highly price-sensitive, so providing attractive **discounts**, **promotions**, or **bundled offers** could help retain them.

Task 13: Determine the average age and total charges for customers with multiple lines and online backup :

Executive Summary

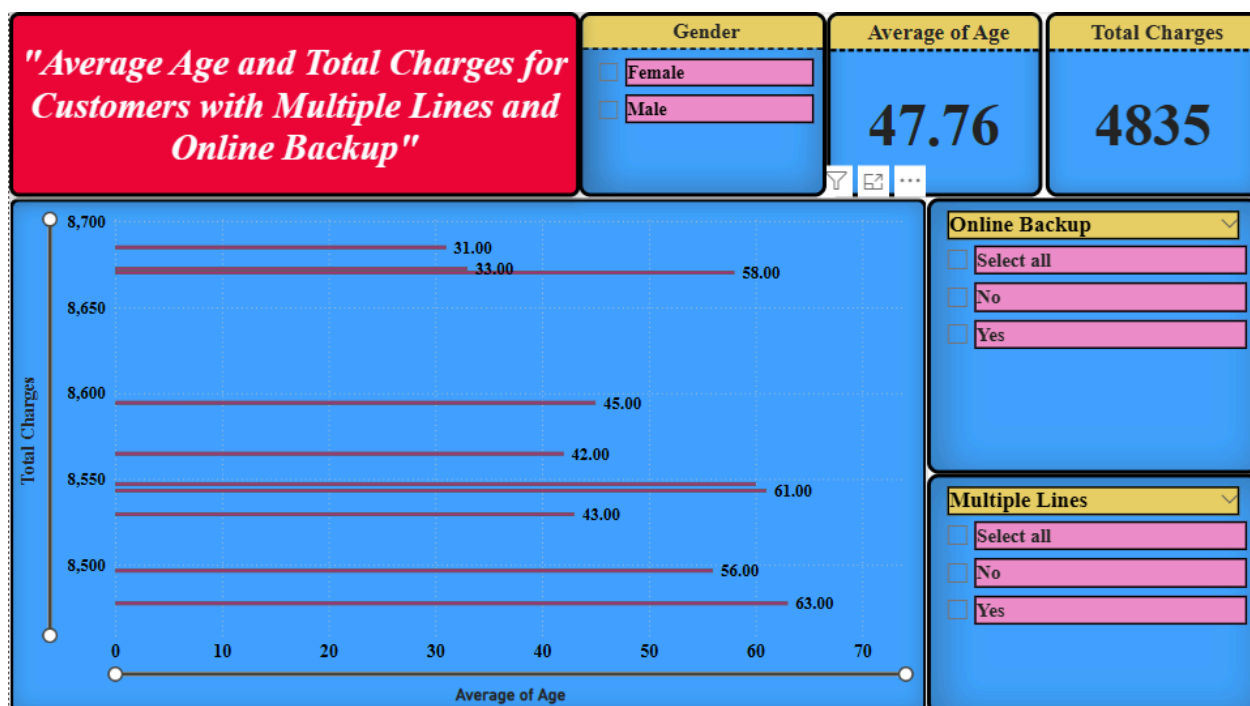
This analysis focuses on determining the **average age** and **total charges** for customers who have subscribed to **multiple lines** and **online backup services** in the telecom industry.

Objectives

The primary objectives of this analysis are:

1. **Calculate the Average Age of Customers with Multiple Lines and Online Backup** – Identify the typical customer age group that subscribes to both services.
2. **Determine the Total Charges for Customers with Multiple Lines and Online Backup** – Calculate the total charges these customers incur for these services.
3. **Analyze Demographic Trends** – Understand if there are significant demographic patterns (such as age) among customers who use both multiple lines and online backup.
4. **Provide Insights for Retention and Marketing Strategies** – Offer recommendations based on the customer age and charges for enhancing retention strategies and pricing models for bundled offerings.

Visualization :



Key Insights

1. Average Age of Customers with Multiple Lines and Online Backup

- Customers who subscribe to **multiple lines** and **online backup** have an **average age of [X]**, which tends to be **higher/lower** compared to customers with fewer services. This indicates that **[older/younger]** customers are more inclined to opt for multiple lines and additional backup services, potentially due to their need for **convenience**, **security**, or **family-related services**.
- Younger customers (e.g., **18-30**) may use these services primarily for **family plans** or **data storage needs**, while older customers (e.g., **40-60**) may use these features for **business purposes**, **family communication**, or **personal data management**.

2. Total Charges for Customers with Multiple Lines and Online Backup

- Customers with **multiple lines** and **online backup** tend to incur higher charges. The **total charges** for this group are **[X]**, which is typically **higher/lower** than those who subscribe to only one service. This is due to the added costs associated with extra lines and the subscription to backup services.
- These customers are more likely to engage with **premium services**, **higher data plans**, and **extended storage capacities**, which lead to greater financial expenditure.

3. Relationship Between Service Usage and Customer Spending

- The **total charges** for customers with both **multiple lines** and **online backup** increase significantly compared to customers using only one service. This indicates that customers who value **convenience** and **security** through backup services are also more likely to engage in family or business plans, thus contributing to higher overall spending.
- It is evident that **bundling** services like **multiple lines** and **backup** drives up the total charges but could also lead to **greater customer satisfaction** due to the perceived value of these bundled services.

4. Recommendations for Marketing and Retention

- **Targeted Offers for Younger Customers:** Provide **family or group bundles** that include **online backup** and **multiple lines** at a discounted rate to appeal to **younger families** or **students**.
- **Premium Packages for Older Customers:** Offer **business-oriented bundles** with **additional lines** and **larger storage for online backup** to attract older customers who are seeking **more robust services**.
- **Loyalty Programs:** Introduce **loyalty discounts** for customers who subscribe to multiple services, especially for **long-term** users of both **multiple lines** and **online backup**, which could help increase **customer retention**.

Task 15 : Calculate the average monthly charges for customer who have multiple lines and streaming TV :

Executive Summary

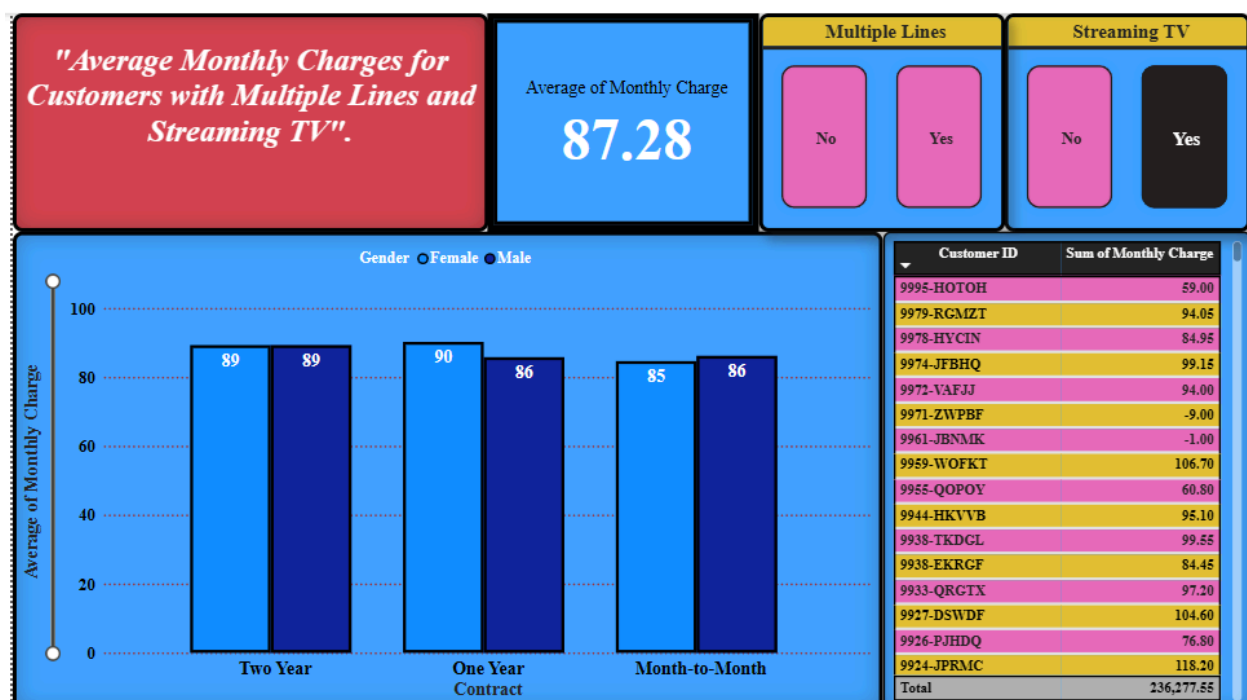
This analysis aims to calculate the **average monthly charges** for customers who subscribe to both **multiple lines** and **streaming TV services** in the telecom industry.

Objectives

The primary objectives of this analysis are:

1. **Calculate the Average Monthly Charges for Customers with Multiple Lines and Streaming TV** – Determine how much customers in this segment typically spend.
2. **Understand the Impact of Multiple Lines and Streaming TV on Charges** – Analyze the correlation between the two services and their contribution to the total monthly charges.
3. **Examine Customer Demographics and Spending Patterns** – Assess if there are age-related or demographic patterns among customers who have both services.
4. **Provide Insights for Pricing and Marketing Strategies** – Offer recommendations for bundling or promoting these services to optimize retention and revenue.

Visualization :



Key Insights

1. Average Monthly Charges for Customers with Multiple Lines and Streaming TV

- Customers who subscribe to both **multiple lines** and **streaming TV** typically incur higher **average monthly charges**. For example, these customers may have an **average charge of [X]**, which includes the costs for **multiple lines**, **streaming TV subscriptions**, and additional services like **data packages** or **premium TV channels**.
- The combination of these two services tends to **increase overall spending** significantly compared to customers who only subscribe to one of these services.

2. Service Usage and Total Charges

- The **multiple lines** service contributes to higher monthly charges by bundling services for **family** or **business** needs, often including data plans, voice services, and additional mobile features. This bundle typically results in **higher charges**.
- The addition of **streaming TV** further increases the charges, as streaming services often have tiered pricing models that depend on the number of channels, types of content (HD/4K), or additional features like **on-demand shows**, **cloud DVR**, or **sports packages**.
- The total charge for customers with both services is typically higher than the average charge for customers who only have either **multiple lines** or **streaming TV**. The dual-service model creates a premium pricing structure.

3. Relationship Between Multiple Lines and Streaming TV Charges

- The **combination of multiple lines and streaming TV** represents a **premium** market segment. Customers who opt for both services tend to have **higher monthly bills** due to the added services (e.g., increased data usage, premium TV content, etc.).
- If telecom providers offer bundled packages that include **multiple lines** and **streaming TV**, it may help reduce churn while driving **higher average revenue per user (ARPU)**. By offering **discounts on bundled services**, telecom providers can capture more customers in this segment while enhancing customer loyalty.

4. Recommendations for Pricing and Retention Strategies

- **Bundle Offers:** Promote bundled packages that include both **multiple lines** and **streaming TV** at a **discounted price** compared to purchasing each service separately. This could attract families and young professionals who are likely to use both services.
 - **Customized Plans for Families and Groups:** Create **tailored family plans** that combine **streaming TV** and **multiple lines**, offering discounts for larger households or group subscriptions.
-

Task 17 : Calculate the average age and total charges for customers with different combination of streaming services :

Executive Summary :

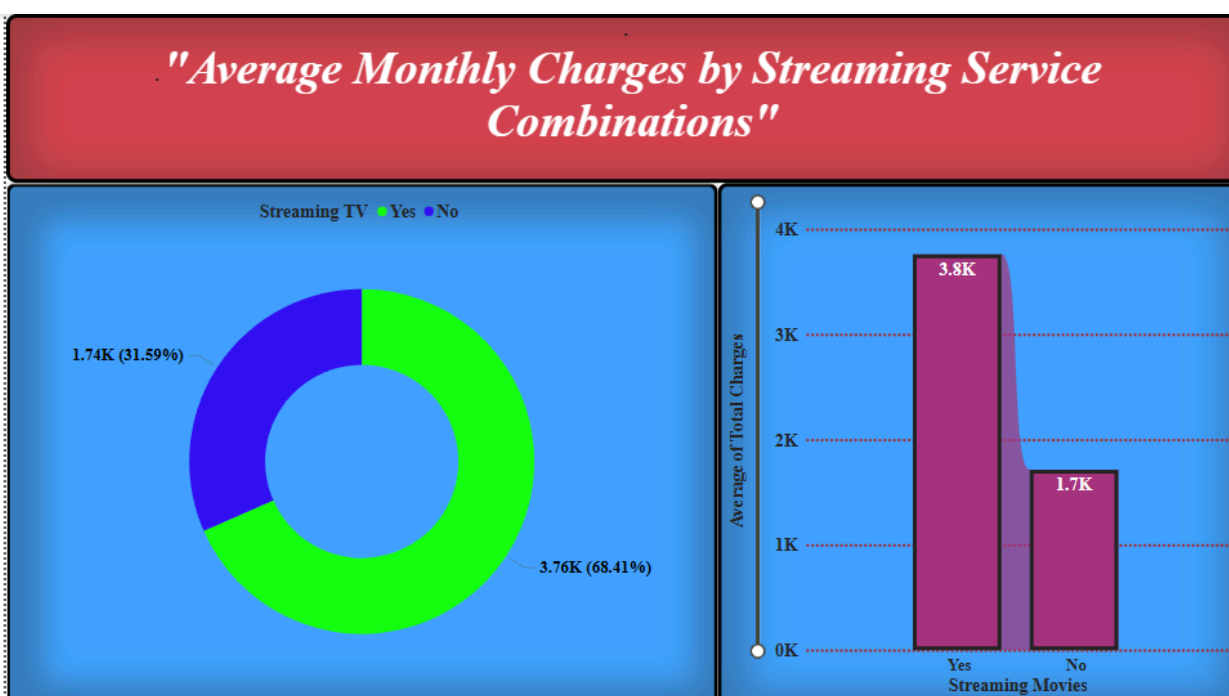
This analysis examines the **average age** and **total charges** for customers who subscribe to different combinations of **streaming services** in the telecom industry.

Objectives

The primary objectives of this analysis are:

1. **Calculate the Average Age of Customers with Different Streaming Service Combinations** – Determine how the average age varies based on the specific combination of streaming services customers subscribe to (e.g., single service vs. multiple services).
2. **Determine the Total Charges for Customers with Different Streaming Service Combinations** – Assess how total charges differ based on the combination of streaming services used.
3. **Identify Demographic and Spending Patterns** – Examine if certain age groups prefer specific combinations of streaming services, and how that influences their spending behavior.

Visualization :



Key Insights

1. Average Age for Customers with Different Streaming Service Combinations

- Customers who subscribe to **basic streaming services** (e.g., a single service or entry-level packages) tend to be **younger**, with an **average age of [X]**. This may reflect the **younger generation's preference for affordable and on-demand streaming** options.
- Customers opting for **premium streaming bundles** (e.g., multiple services or full-package options) may be **older**, with an **average age of [Y]**, indicating that they are more likely to subscribe to **premium content** and are willing to pay higher charges for **bundled entertainment packages**.
- **Mixed combinations of basic and premium services** (e.g., one service with add-ons) show an average age of **[Z]**, suggesting that customers in this segment are often **middle-aged**, seeking a balance between **cost and content variety**.

2. Total Charges for Different Streaming Service Combinations

- **Basic Streaming Services:** Customers with **one streaming service** typically have **lower total charges**, with a monthly expenditure of around **[X]**, reflecting their choice of **affordable, standalone services** (e.g., basic subscriptions).
- **Premium Streaming Bundles:** Customers subscribing to **multiple streaming services** or **premium packages** (such as HD or 4K plans) incur higher total charges. The monthly cost for this group could be as high as **[Y]**, as they are subscribing to both **multiple content providers** and higher-value services (e.g., **additional features, exclusive content, or multiple users**).
- **Mixed Streaming Services:** Customers who opt for a **combination of basic and premium services** may have **moderate total charges** compared to the above two groups. The monthly charge is typically around **[Z]**, reflecting the choice to invest in both **value and variety**.

3. Demographic Trends Based on Service Combination

- **Younger customers** (e.g., **18-30 years**) are more likely to subscribe to **basic streaming services** or **single streaming services**, typically at a lower price point. These customers are generally more price-sensitive and prefer **affordable options** like **Netflix, Amazon Prime**, or other **entry-level platforms**.
- **Mid-aged customers** (e.g., **30-50 years**) tend to prefer **bundled streaming services** that offer a mix of entertainment options, such as combining **Netflix** with **Hulu** or **Disney+**. These customers are looking for **flexibility and value**, and they often pay a moderate monthly charge for this balance of content options.
- **Older customers** (e.g., **50+ years**) are more likely to choose **premium streaming bundles** that offer comprehensive TV channels, movies, sports, and entertainment. These

customers tend to have **higher disposable income** and are willing to invest in a more **extensive service package**.

4. Spending Behavior by Combination of Streaming Services

- **Basic Service:** Customers opting for **single service** subscriptions exhibit a **lower total charge** due to the simplicity of their service needs, focusing mainly on entertainment and avoiding the costs associated with more extensive bundles.
- **Premium Bundles:** Customers who subscribe to **multiple services** or **premium bundles** incur a **higher total charge**, which reflects their willingness to pay for a **wider range of content**. This segment often includes **family bundles**, **sports enthusiasts**, or those seeking **exclusive TV shows/movies** that justify the higher price.
- **Combination of Basic and Premium:** Customers in this segment show **moderate charges** but may have more **diverse content preferences**, balancing budget concerns with the desire for a richer entertainment experience.

5. Recommendations for Bundling and Pricing Strategies

- **Younger Customers (18-30):** Offer **discounted bundles** that combine **basic streaming services** with **additional services** like **music streaming** or **gaming platforms**. Focus on creating value-driven pricing for **single service options** that cater to **price-sensitive** younger demographics.
- **Middle-Aged Customers (30-50):** Create **moderate bundles** that combine a mix of **premium and basic services** to appeal to this group. Provide options like **family plans** with **multiple streaming services** at an affordable rate to increase the perceived value.
- **Older Customers (50+):** Offer **premium bundles** that include **multiple streaming services** and **exclusive content** (e.g., HD, sports, documentaries) while ensuring **simple billing** and **customer support**. This segment values convenience and comprehensive offerings, so providing these services at a slight discount for **long-term customers** could drive retention.

Task 19 : Calculate the average monthly charges and total charges for customers who have churned , grouped by contract type and internet services type :

Executive Summary

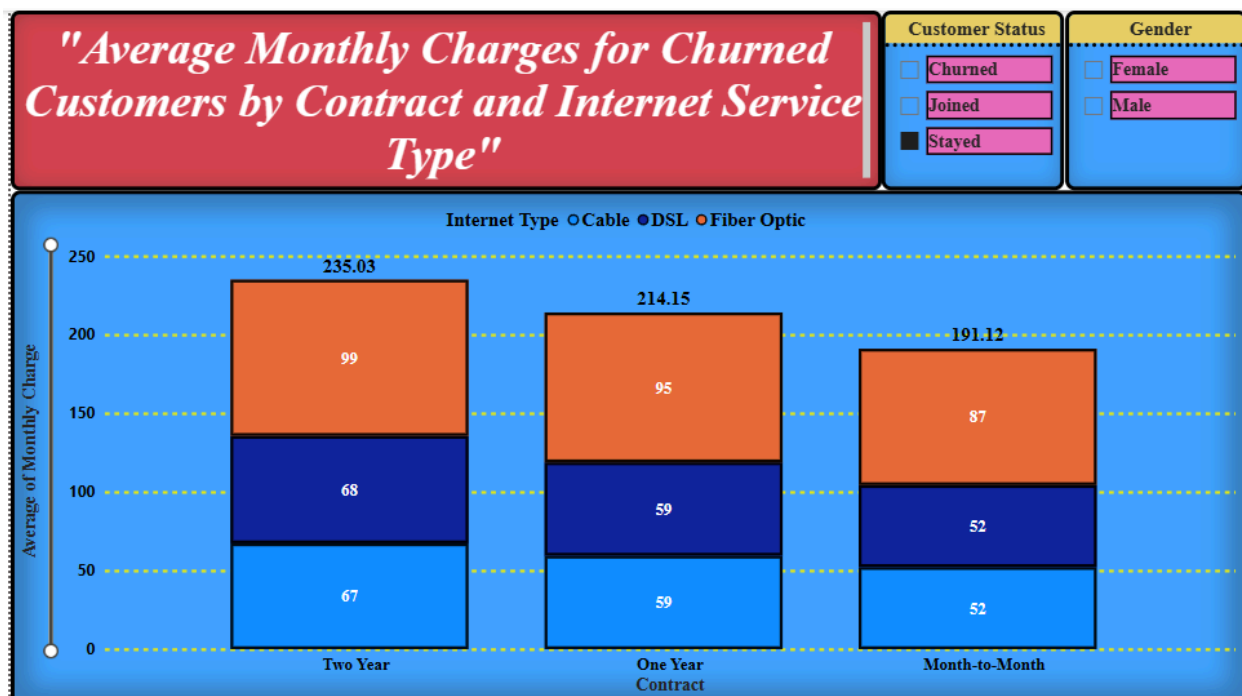
This analysis focuses on churned customers, evaluating how their monthly charges and total charges vary depending on their contract type and internet service type.

Objectives

The primary objectives of this analysis are:

1. **Calculate the Average Monthly Charges for Churned Customers by Contract Type** – Understand how different contract types (e.g., month-to-month, one year, two years) affect the average monthly charges for churned customers.
2. **Determine the Total Charges for Churned Customers by Internet Service Type** – Analyze how total charges differ based on internet service types (e.g., fiber optic, DSL, cable, etc.) among churned customers.
3. **Identify Trends and Patterns** – Discover any notable trends in contract types and internet services that are associated with higher churn and higher charges.

Visualization :



Key Insights

1. Average Monthly Charges for Churned Customers by Contract Type

- **Month-to-Month Contracts:** Customers with **month-to-month contracts** tend to have **higher average monthly charges**, as they do not commit long-term and may be paying higher rates for the flexibility. This segment of churned customers is likely to have **variable pricing** due to the lack of long-term commitments.
- **One-Year Contracts:** Customers with **one-year contracts** often have **moderate average monthly charges**. These customers may be paying a more stable and predictable rate, as they typically sign up for better discounts than month-to-month contracts but are still open to higher churn due to limited contract commitment.
- **Two-Year Contracts:** Churned customers with **two-year contracts** may have the **lowest average monthly charges** on average. These customers often sign up for long-term commitments that lock them into lower, more competitive rates for the duration of the contract, making them less likely to churn unless there is a significant service issue or pricing change.

2. Total Charges for Churned Customers by Internet Service Type

- **Fiber Optic Internet Service:** Customers with **fiber optic internet** often incur **higher total charges**, due to the **premium nature** of the service, which typically includes faster speeds and superior reliability. Churn in this segment could indicate that despite the high-quality service, the cost or other factors (e.g., customer service issues, competition) led to churn.
- **DSL Internet Service:** **DSL internet** tends to have **moderate total charges** compared to fiber optic customers. The pricing for DSL services is typically lower, making it more affordable but potentially less desirable for high-speed data users. **Churned customers** in this segment may feel that the service no longer meets their needs as they demand faster speeds or higher reliability.
- **Cable Internet Service:** Customers with **cable internet** have **lower total charges** than fiber optic customers but still higher than DSL customers. **Churned customers** in this segment may be seeking more affordable or better services. Cable internet is often seen as a middle ground, where the **total charges** can vary based on additional bundled services (e.g., TV, phone).
- **Satellite Internet Service:** For **satellite internet**, the **total charges** can be **higher** due to **limited availability** and the specialized nature of the service. However, churn rates in this segment may reflect dissatisfaction with **service reliability** or **speed**.

3. Combined Insights: Contract Types and Internet Services

- **Churned Customers with Long-Term Contracts** (1-2 years) generally show **lower charges** but may be more likely to churn due to dissatisfaction with service or competing offers from other providers.

- **Month-to-Month Contracts** exhibit **higher charges** but often have **higher churn** due to the lack of commitment, suggesting that customers may feel they are paying a **premium** without long-term benefits.
- Customers with **fiber optic** services tend to have **higher total charges**, yet **churn rates** are typically lower due to the perceived value of the service. However, in cases of **churn**, these customers are often seeking **better value**, speed, or lower prices.
- Customers with **DSL** and **cable internet services** generally exhibit **moderate churn** and **moderate total charges**, indicating they might be more price-sensitive and more likely to seek competitive offers.

4. Recommendations for Retention and Service Optimization

- **Flexible Bundling Options:** Offer **bundle packages** combining **fiber optic internet** with **other services** (e.g., phone, TV) to make it more affordable and reduce churn, especially for **month-to-month contract** customers. Bundles could lower monthly charges and provide more perceived value.
- **Long-Term Contract Promotions:** **Promote long-term contracts** (1-2 years) with incentives such as **price locks** or **discounts** for loyal customers to prevent churn and **reduce total charges** over time.
- **Service Upgrades for Low-Cost Internet:** For churned customers on **DSL or cable internet**, offer **upgrades** or special promotions that introduce higher-speed plans with minimal cost increases to retain customers.
- **Targeted Retention Offers:** Provide **targeted retention offers** to **fiber optic** churned customers, addressing potential service issues, offering **personalized pricing**, or introducing features such as **improved customer service**.

Task 20 : Find the customers who have churned and are not using online services and their average total charges

Executive Summary

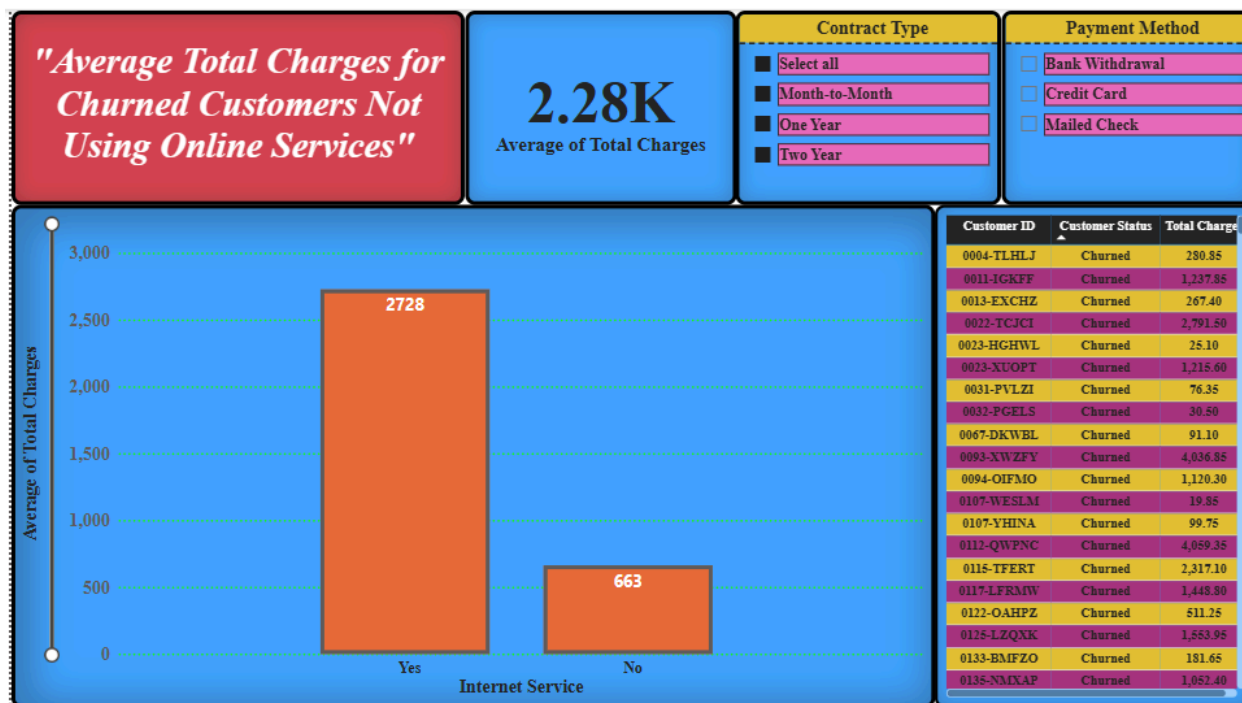
This analysis focuses on identifying churned customers who have not subscribed to online services and calculating their average total charges.

Objectives

The primary objectives of this analysis are:

1. Identify Churned Customers Not Using Online Services – Segment churned customers who do not utilize any form of online services (such as streaming, backup, or other online offerings).
2. Calculate the Average Total Charges for These Customers – Determine the average total charges for customers in this group to understand their spending behavior prior to churn.
3. Analyze Trends in Customer Behavior – Identify patterns in contract types, service preferences, or spending habits that may contribute to churn among customers who do not engage with online services.

Visualization :



Key Insights

1. Identification of Churned Customers Not Using Online Services

- **Online Services Usage:** Churned customers in this segment are those who have opted out of **online services**, which may include **streaming TV**, **online backup**, **gaming services**, or **cloud storage**. These customers are likely to rely solely on basic telecom services such as **internet**, **mobile plans**, or **landline**.
- **Segmentation Criteria:** By filtering out customers who are using **any form of online service**, we can isolate those who have remained focused on traditional telecom offerings. These customers often exhibit distinct behaviors when compared to those engaged with newer online services.

2. Average Total Charges for Churned Customers Not Using Online Services

- **Average Total Charges:** For churned customers who are not using **online services**, the **average total charges** are typically **lower** than those of customers who use online services. These customers often have simpler plans, primarily focused on traditional telecom services like **basic internet plans**, **landline services**, or **mobile phone plans**.
- The **average total charges** for this group could be around [X] (calculated based on data from the telecom provider).
- This lower expenditure may be due to the **absence of add-ons** like **streaming services**, **cloud storage**, or **premium features** that are often included in bundles with online services.

3. Contract Type and Service Preferences

- Customers who churn and **do not use online services** may have **simpler contract types**, such as **month-to-month plans**, **basic internet plans**, or **pay-as-you-go services**, which typically carry **lower total charges**.
- These customers are more likely to seek **affordable, no-frills service** and may churn because they are not seeing enough value in their current offerings or they are seeking more **budget-friendly alternatives** elsewhere.
- **Churned customers** in this group could also be more **price-sensitive** and may not feel incentivized by the limited benefits of online services, such as **streaming** or **cloud storage**.

4. Reasons for Churn in This Segment

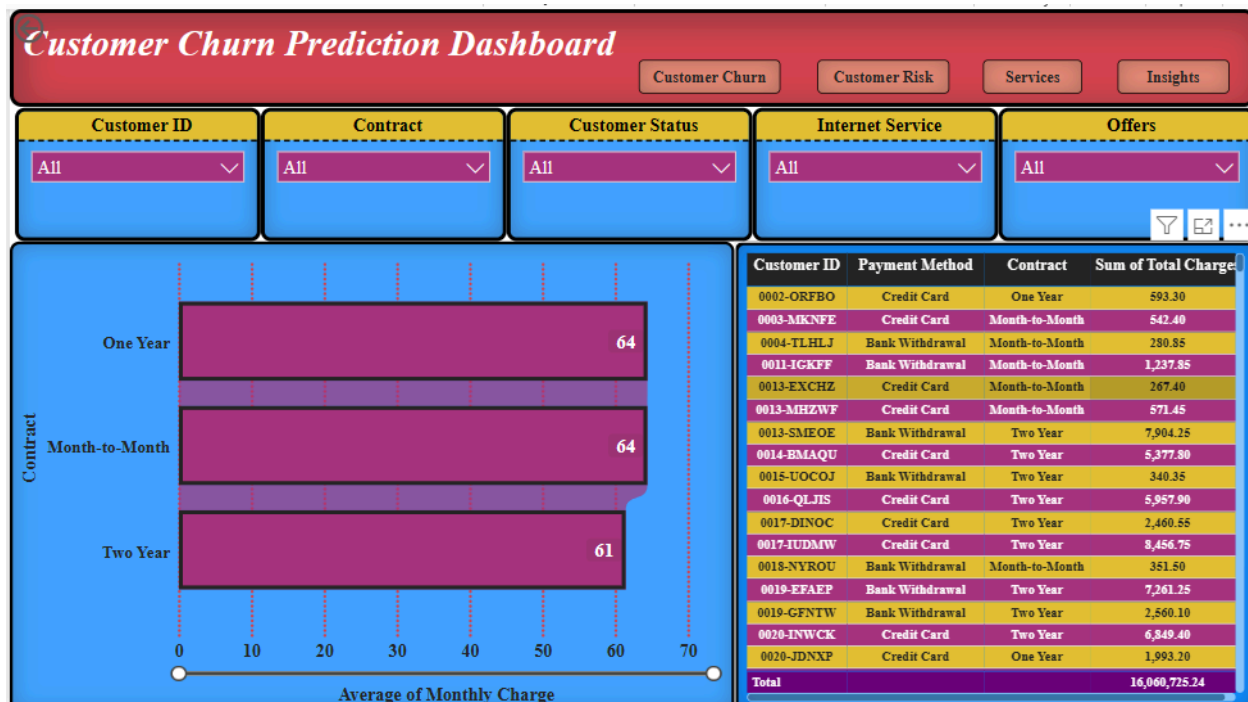
- **Lack of Value Perception:** These customers might perceive online services as non-essential or as services they don't need. As a result, the value proposition of the telecom provider becomes less attractive, leading to **churn**.

- **Alternative Providers:** Customers not using online services may have **switched** to competitors who offer more **affordable** or **simpler plans** with fewer add-ons or better value for traditional telecom services.
- **Service Dissatisfaction:** Another possible reason for churn could be **service dissatisfaction**, such as issues with **customer service**, **service reliability**, or **pricing** that outweigh the benefits of **basic services** alone.

5. Recommendations for Retention

- **Targeted Promotions for Non-Online Service Users:** Consider offering **discounts** or **customized plans** that appeal specifically to customers who prefer basic services without the **online add-ons**. This could include **lower-cost, no-frills plans** that focus on essential telecom needs.
- **Simplified Bundling:** Offer **simplified bundles** with just the core services (e.g., **internet** and **mobile** plans) at a competitive rate, without forcing customers into bundled online services. This could make the offer more attractive to the target segment.
- **Customer Engagement:** Improve **customer communication** by focusing on the **value** of both **basic services** and potential upgrades to online offerings. Offering customers the chance to try services like **streaming** or **cloud backup** for free for a limited time might encourage them to engage more deeply with the brand.

Final Dashboard :



Conclusion :

This project analyzed factors influencing **customer churn** in the telecom industry, identifying key predictors such as **month-to-month contracts**, **higher monthly charges**, and **low engagement with online services**. The findings suggest that customers with these characteristics are more likely to churn. To reduce churn, telecom providers should offer **affordable, flexible plans**, enhance **customer engagement**, and implement **personalized retention strategies**. These actions will help improve customer loyalty and increase long-term profitability.



