



Presented By:
Pyanshu Shaw

July 31, 2025

TELECOM CHURN

Data Analysis

Research / Churn analysis for Customers



PRESENTATION OBJECTIVES

The objective of this project is to analyze customer churn in the telecom sector using MySQL. By querying and exploring customer data, the goal is to identify key factors contributing to customer churn that can help telecom companies improve customer retention strategies. The project involves data cleaning and the application of MySQL queries to extract meaningful information related to customer behavior, service usage, and contract features.



Project Agenda

01 Set-Up the Environment

02 Download Telecom_Churn Data

03 Merging multiple datasets

04 Data Cleaning

05 Feature Engineering

06 Load Data into MySQL

07 SQL Analysis Queries

08 Project Publishing



Judging from the Dataset, project excels in MySQL analysis but could enhance predictive power with machine learning.



Project Requirements



- 01 Kaggle API Key (for data download)
- 02 SQL Databases : MySQL Workbench
- 03 Power Query Editing (PowerBI)
- 04 Dashboard Making

Know Your Columns

| | |
|------------------|-----------------|
| CustomerID | Tenure |
| PhoneService | Contract |
| PaperlessBilling | PaymentMethod |
| MonthlyCharges | TotalCharges |
| Churn | Gender |
| SeniorCitizen | Partner |
| Dependents | Day |
| Year | Month |
| MultipleLines | InternetService |
| OnlineSecurity | OnlineBackup |
| DeviceProtection | TechSupport |
| StreamingTV | StreamingMovies |



Business Problems

01

Calculate the overall churn rate from the main customer data.

Purpose : to calculate the overall churn rate—the percentage of customers who have discontinued the service—using the main customer dataset.

```
• SELECT
    (COUNT(*) / (SELECT
                  COUNT(*)
                  FROM
                    telecom) * 100) AS Churn_Rate
  FROM
    telecom
  WHERE
    churn = 'Yes';
```

Insights : The overall churn rate is approximately 26.58%, indicating that more than one-fourth of the customers have discontinued the service.

Results:

| Result Grid | |
|-------------|------------|
| | Churn_Rate |
| ▶ | 26.5785 |

Business Problems

02

Find the average monthly charges for churned vs non-churned customers.

Purpose : Identify whether higher charges contribute to customer churn.
Understand the billing pattern of customers who leave the service versus those who stay.

```
SELECT  
    Churn,  
    ROUND(AVG(MonthlyCharges), 2) AS Average_MonthlyCharges  
FROM  
    telecom  
GROUP BY Churn;
```

Insights : This indicates a positive correlation between higher billing amounts and churn behavior, suggesting that cost sensitivity could be a key reason for customer dissatisfaction or cancellation.

Results:

| | Churn | Average_MonthlyCharges |
|---|-------|------------------------|
| ▶ | No | 61.31 |
| ▶ | Yes | 74.44 |

Business Problems

03

List the top 5 payment methods with the highest churn rates.

Purpose : Detect whether certain payment methods are linked to poor customer retention.

Insights : This suggests that Electronic Check payments may be associated with customer dissatisfaction, possibly due to inconvenience, errors, or lack of automation.

```
SELECT
    t.PaymentMethod,
    (COUNT(*) / total.total_count) * 100 AS churn_rate_percentage
FROM
    telecom t
    JOIN
        (SELECT
            PaymentMethod, COUNT(*) AS total_count
        FROM
            telecom
        GROUP BY PaymentMethod) AS total
        ON t.PaymentMethod = total.PaymentMethod
WHERE
    t.churn = 'Yes'
GROUP BY t.PaymentMethod , total.total_count
ORDER BY churn_rate_percentage DESC
LIMIT 5;
```

Results:

| | PaymentMethod | churn_rate_percentage |
|---|---------------------------|-----------------------|
| ▶ | Electronic check | 45.2854 |
| | Mailed check | 19.2020 |
| | Bank transfer (automatic) | 16.7315 |
| | Credit card (automatic) | 15.2531 |

Business Problems

04

Display the number of customers on each contract type who have churned.

Purpose : Understand which contract types are most vulnerable to customer loss. Evaluate the effectiveness of long-term contracts in retaining customers.

```
SELECT  
    Contract, COUNT(*) AS Number_of_Customers_Churned  
FROM  
    telecom  
WHERE  
    Churn = 'Yes'  
GROUP BY Contract;
```

Insights : This suggests that short-term contracts lead to higher customer turnover, possibly due to their flexibility to exit without penalty.

Results:

| Result Grid | | |
|-------------|----------------|-----------------------------|
| | Contract | Number_of_Customers_Churned |
| | Month-to-month | 1655 |
| | Two year | 48 |
| | One year | 166 |

Business Problems

05

Count how many customers have tenure less than 12 months and have churned.

Purpose : Detect issues related to early-stage customer experience or onboarding.
Understand whether new customers are more likely to churn.

```
SELECT  
    COUNT(*) AS No_of_Customers  
FROM  
    telecom  
WHERE  
    Churn = 'Yes' AND Tenure < 12;
```

Insights : This indicates that early-stage customers (new users within their first year) are more prone to churn

Results:

| Result Grid | |
|-------------|-----------------|
| | No_of_Customers |
| ▶ | 999 |

Business Problems

06

Identify how many customers have paperless billing and are paying through electronic check.

Purpose : Understand the overlap between digital billing and specific payment preferences.

Analyze whether certain digital payment behaviors correlate with other trends, such as churn or satisfaction.

```
SELECT  
    COUNT(*) AS Number_of_Customers  
FROM  
    telecom  
WHERE  
    PaperlessBilling = 'Yes'  
        AND PaymentMethod = 'Electronic check'
```

Insights : This overlap highlights a significant portion of users engaging in digital billing while using a specific digital payment method.

Results:

| | Number_of_Customers |
|---|---------------------|
| ▶ | 1742 |

Business Problems

07

Calculate the total revenue generated from non-churned customers only.

Purpose : Measure the financial value of retained customers.
Understand how much of the company's revenue is tied to ongoing, loyal users.

```
SELECT  
    ROUND(SUM(TotalCharges), 2) AS Total_Revenue_Generated  
FROM  
    telecom  
WHERE  
    Churn = 'No';
```

Insights : It shows that a large portion of company revenue depends on loyal customers who continue using the service.

Results:

| | Total_Revenue_Generated |
|---|-------------------------|
| ▶ | 13193241.8 |

Business Problems

08

- Find the number of customers with 'Month-to-month' contracts and no online security.

Purpose : Pinpoint a potentially vulnerable customer segment that may be more likely to churn.
Understand adoption rates of security-related add-on services among short-term users.

```
SELECT  
    COUNT(*) AS Number_of_Customers  
FROM  
    telecom  
WHERE  
    Contract = 'Month-to-month'  
    AND OnlineSecurity = 'No';
```

Insights : On short-term plans, which are easier to cancel.
Not subscribed to any online security, indicating a possible lack of commitment or awareness.

Results:

| Result Grid | |
|-------------|---------------------|
| | Number_of_Customers |
| ▶ | 3155 |

Business Problems

09

Determine the average customer age for churned vs non-churned customers.

Purpose : Identify whether age plays a role in customer churn behavior.
Understand which age groups may require more attention, support, or tailored offers.

```
SELECT  
    Churn, AVG(YEAR(CURRENT_DATE()) - Year) AS Avg_Age  
FROM  
    telecom  
GROUP BY Churn;
```

Insights : There is a small difference in the average age between churned and retained users.

This suggests that age has minimal direct impact on churn in this dataset.

Results:

| | Churn | Avg_Age |
|---|-------|---------|
| ▶ | No | 29.0711 |
| | Yes | 28.6736 |

Business Problems

10

- Identify the top 5 customers who have paid the highest total charges but still churned.

Purpose : Understand the loss of high-value customers, which has a significant impact on revenue.

Investigate potential reasons behind why premium-paying customers are leaving.

```
SELECT  
    CustomerID , TotalCharges , Churn  
FROM  
    telecom  
WHERE Churn = 'Yes'  
ORDER BY TotalCharges DESC  
LIMIT 5;
```

Insights : This suggests a need to investigate potential reasons, such as service issues or dissatisfaction, behind the departure of these premium-paying customers

Results:

| | CustomerID | TotalCharges | Churn |
|---|------------|--------------|-------|
| ▶ | 2889-FPWRM | 8684.8 | Yes |
| | 0201-OAMXR | 8127.6 | Yes |
| | 3886-CERTZ | 8109.8 | Yes |
| | 1444-WSGW | 7968.85 | Yes |
| | 5271-YNWVR | 7856 | Yes |

Business Problems

11

Get a list of customers who are using all possible services (phone, internet, backup, security, streaming, tech support).

Purpose : Recognize their most engaged and high-value customers.

Target these customers for loyalty rewards, premium plans, or referral programs.

Insights : This highlighting the most engaged and high-value users. These customers could be targeted for loyalty rewards, premium plans, or referral programs to maximize their value.

```
SELECT  
    CustomerID  
FROM  
    telecom  
WHERE  
    PhoneService = 'Yes'  
        AND InternetService IN ('Fiber optic' , 'DSL')  
        AND OnlineBackup = 'Yes'  
        AND OnlineSecurity = 'Yes'  
        AND StreamingMovies = 'Yes'  
        AND StreamingTV = 'Yes'  
        AND TechSupport = 'Yes';
```

Results:

Result Grid | Filter Rows: □

| | CustomerID |
|---|------------|
| ▶ | 3655-SNQYZ |
| | 5248-YGIJN |
| | 3146-MSEGF |
| ▶ | 9073-ZZIAY |
| | 5997-OPVFA |
| | 0945-TSONX |
| | 2651-ZCBXV |
| | 7017-VFHAY |
| | 6655-LHBYW |

Business Problems

12

Calculate the churn rate by age group: <30, 30–50, 51–64, 65+.

Purpose : Understand how churn behavior varies by age.
Identify which age groups are more likely to leave the service.

```
SELECT
CASE
    WHEN YEAR(CURRENT_DATE()) - Year < 30 THEN '<30'
    WHEN YEAR(CURRENT_DATE()) - Year BETWEEN 30 AND 50 THEN '30-50'
    WHEN YEAR(CURRENT_DATE()) - Year BETWEEN 51 AND 64 THEN '51-64'
    ELSE '65+'
END AS Age_group,
SUM(Churn = 'Yes') * 100 / COUNT(*) AS Churn_Rate
FROM telecom
GROUP BY Age_group
;
```

Insights : This suggests that younger customers, particularly those under 30, are more likely to leave the service, warranting further investigation into age-specific retention strategies.

Results:

| | Age_group | Churn_Rate |
|---|-----------|------------|
| ▶ | <30 | 27.1144 |
| | 30–50 | 26.0105 |

Business Problems

Purpose : Compare current customer spending to that of those who have already churned.
Spot high-value customers who may be at risk if similar patterns emerge.

13

Using a subquery, find customers whose total charges are above the average of all churned customers.

Insights : Highlighting high-value customers who may be at risk of churning if similar spending patterns emerge. This suggests a need to monitor these customers for potential retention strategies.

```
SELECT  
    CustomerID, TotalCharges  
FROM  
    telecom  
WHERE  
    TotalCharges > (SELECT  
        AVG(TotalCharges)  
    FROM  
        telecom  
    WHERE  
        Churn = 'Yes')
```

Results:

| | CustomerID | TotalCharges |
|---|------------|--------------|
| ▶ | 5575-GNVDE | 1889.5 |
| | 7795-CFOCW | 1840.75 |
| | 1452-KIOWK | 1949.4 |
| | 7892-POOKP | 3046.05 |
| | 6388-TABGU | 3487.95 |
| | 8091-TTVAX | 5681.1 |
| | 0280-XJGEX | 5036.3 |
| | 5129-JLPIS | 2686.05 |
| | 3655-SNQYZ | 7895.15 |

Business Problems

14

Create a report showing monthly churn trend – how many customers churned each month.

Purpose : Visualize churn patterns over time and identify peak churn months. Understand the impact of seasonal or promotional periods on customer retention.

```
SELECT  
    Tenure AS Tenure_Month, COUNT(*) AS Customers_Churn  
FROM  
    telecom  
WHERE  
    Churn = 'Yes'  
GROUP BY Tenure  
ORDER BY Tenure;
```

Insights : This indicates a peak churn pattern early in the customer lifecycle, suggesting a need to investigate the impact of onboarding or initial promotional periods on retention.

Results:

| | Tenure_Month | Customers_Churn |
|---|--------------|-----------------|
| ▶ | 1 | 380 |
| | 2 | 123 |
| | 3 | 94 |
| | 4 | 83 |
| | 5 | 64 |
| | 6 | 40 |
| | 7 | 51 |
| | 8 | 42 |
| | 9 | 46 |
| | 10 | 45 |

Business Problems

Insights : This allows for better targeting and personalized engagement based on customer value within each contract category.

15

- Rank customers by revenue (total charges) within each contract type using window functions.

Purpose : Identify the top revenue-generating customers in each contract category (e.g., Month-to-month, One year, Two year).

Analyze customer value by contract type for better targeting and personalized engagement.

```
SELECT CustomerID , Contract ,  
       RANK() OVER (PARTITION BY Contract  
                   ORDER BY TotalCharges DESC) AS Rankings  
  FROM telecom;
```

Results:

| | CustomerID | Contract | Rankings |
|---|-------------|----------------|----------|
| ▶ | 9481-IEBZY | Month-to-month | 1 |
| | 2615-YVMYX | Month-to-month | 2 |
| | 5804-HYIEZ | Month-to-month | 3 |
| | 2889-FPWWRM | One year | 1 |
| | 0186-CAERR | One year | 2 |
| | 0201-OAMXR | One year | 3 |
| | 7569-NMZYOQ | Two year | 1 |
| | 9739-JLPQJ | Two year | 2 |
| | 9788-HNGUT | Two year | 3 |

Dashboard - Churn



CHURN ANALYSIS - DASHBOARD

KPIs

| Total Customers | 7,043 |
|------------------|-------|
| Total Churn | 1,869 |
| Churn Rate % | 26.5% |
| Retention Rate % | 73.5% |
| CLV | 2.28K |

DEMOGRAPHIC SECTION

Total Customers by Married

| Married | Count | Percentage |
|---------|-------|------------|
| No | 3.64K | (51.7%) |
| Yes | 3.40K | (48.3%) |

Total Customers by Gender

| Gender | Count | Percentage |
|--------|-------|------------|
| Male | 3.56K | (50.48%) |
| Female | 3.49K | (49.52%) |

Total Customers by Dependents

| Dependents | Count | Percentage |
|------------|-------|------------|
| No | 4.93K | (70.04%) |
| Yes | 2.11K | (29.96%) |

Customers & Churn rate by

Age_Range Tenure_range Contract PaymentMethod InternetService

Age_Range

| Age_Range | Total Customers | Churn Rate |
|----------------|-----------------|------------|
| Month-to-mo... | 3.9K | 0.43 |
| Two year | 1.7K | 0.03 |
| One year | 1.5K | 0.11 |

Tenure_range

| Tenure_range | Churned Customer | Retained Customer |
|--------------|------------------|-------------------|
| <15 Months | 1099 | 1272 |
| 15-30 Months | 310 | 888 |
| 30-45 Months | 206 | 762 |
| 45-60 Months | 155 | 868 |
| >60 Months | 99 | 1384 |
| Total | 1869 | 5174 |

Contract

PaymentMethod

InternetService

Services

| Services | No | Yes |
|------------------|--------|--------|
| DeviceProtection | 70.84% | 29.16% |
| MultipleLines | 54.52% | 45.48% |
| OnlineBackup | 72.02% | 27.98% |
| OnlineSecurity | 84.22% | 15.78% |
| StreamingMovies | 56.23% | 43.77% |
| StreamingTV | 56.45% | 43.55% |
| TechSupport | 83.41% | 16.59% |

Dashboard - Revenue



REVENUE ANALYSIS - DASHBOARD

KPIs

Total Revenue

16.06M

Avg Revenue
 2.28K

Revenue Retenti...
 82.2%

ARR
 5.47M

MRR
 456.12K

Churn

Revenue

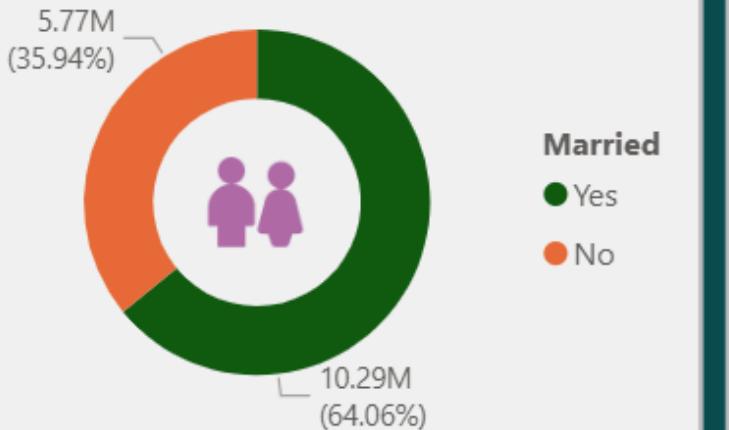
Services

Churned

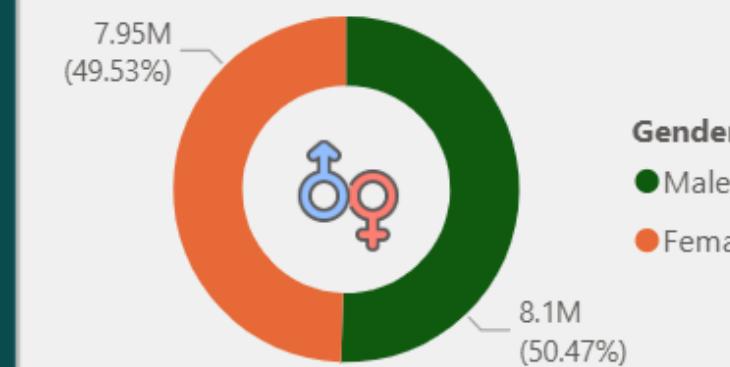
Retained

DEMOGRAPHIC SECTION

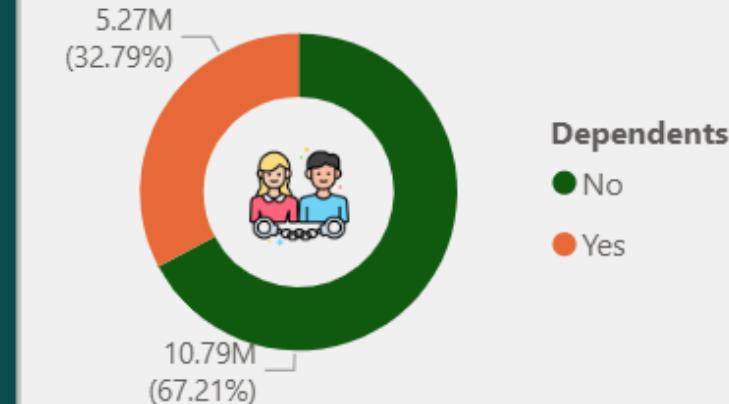
Total Revenue by Married



Total Revenue by Gender



Total Revenue by Dependents



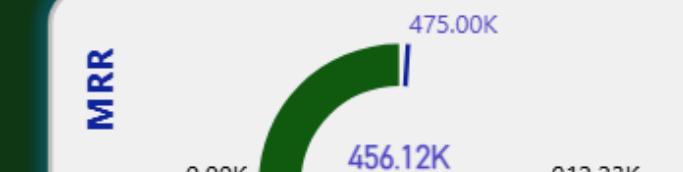
CATEGORICAL SECTION

Customers & Total Revenue by Age

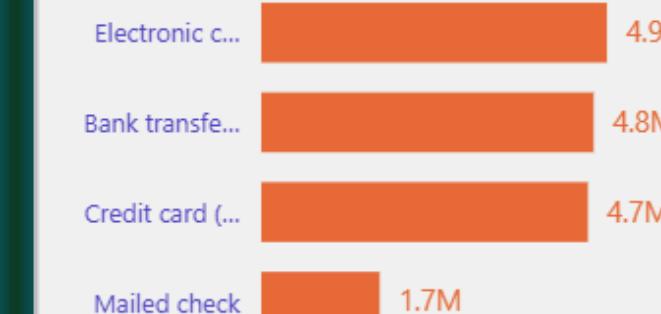
Age

Tenure

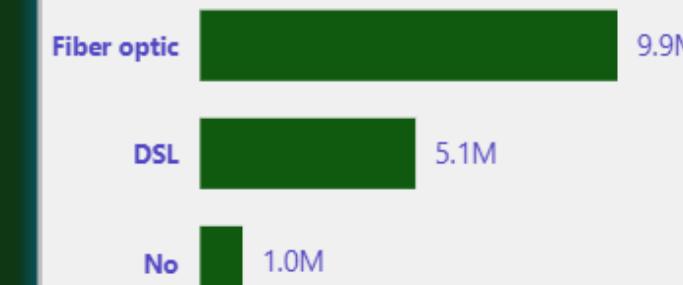
Contract



Total Revenue by PaymentMethod



Total Revenue by InternetService



Dashboard - Services



SERVICE ANALYSIS - DASHBOARD

Churn

Revenue

Services

Churned

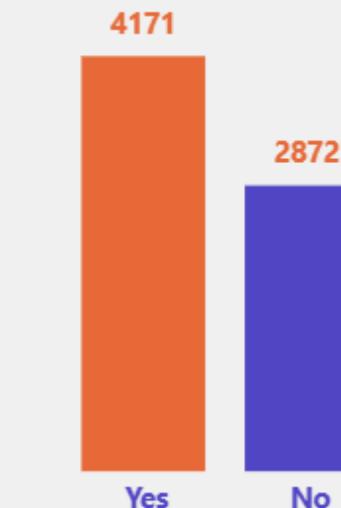
Retained

BAR GRAPHS

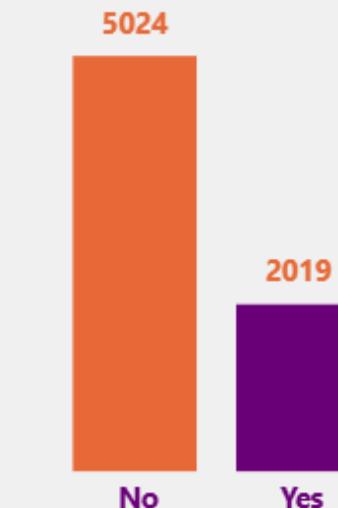
Total Customers by Multiple Lines



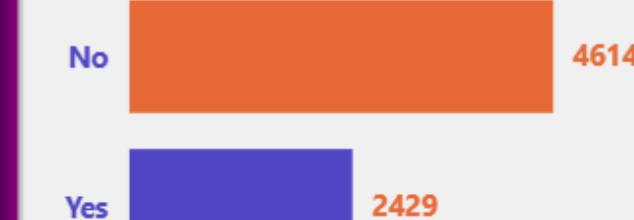
Total Customers by Paperless Billing



Total Customers by Online Security

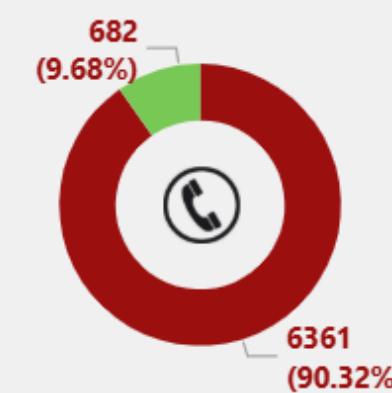


Total Customers by Online Backup

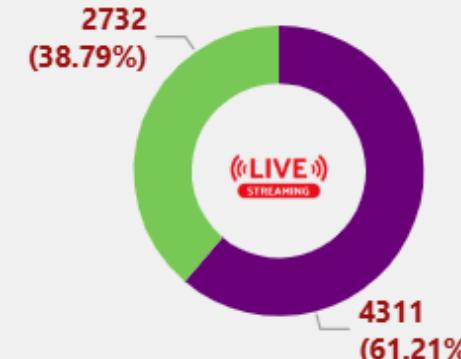


DONUT CHARTS

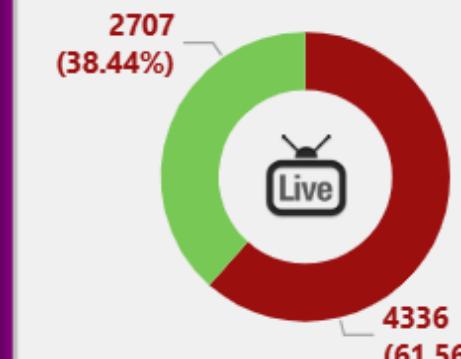
Total Customers by Phone Service



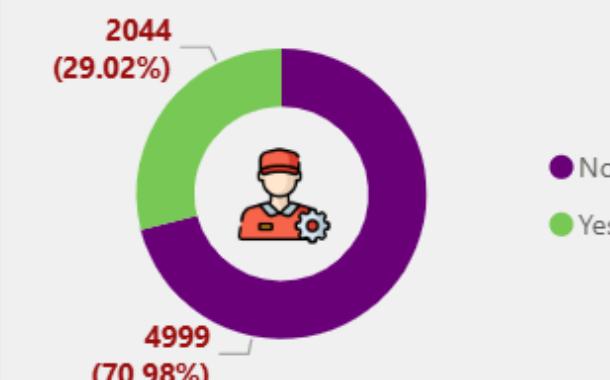
Total Customers by Streaming Movies



Total Customers by Streaming TV



Total Customers by Tech Support



Results & Insights



01

Overall Churn Rate : A significant portion of customers have churned, highlighting the need for stronger customer retention strategies.

02

Service Usage Patterns : Customers using all services (phone, internet, backup, tech support, etc.) are more likely to stay

03

Customer Demographics and Churn : Younger customers (age < 30) and older customers (65+) showed different churn behaviors, helping identify which age groups need better targeting.

04

Contract Type & Retention : Customers on long-term contracts (1 or 2 years) churn less compared to month-to-month, showing that longer commitments improve retention.

05

Revenue and Customer Segmentation : customers were ranked by revenue within contract types, allowing identification of top revenue contributors per group.

CHALLENGES FACED WHILE MAKING THIS PROJECT

01

It is difficult to determine the right approach because sometimes the problem topic chosen is suitable for several methods.

02

Performance Issues
Although not critical in small test projects, inefficient queries (e.g., nested subqueries) could be slow with large datasets.

03

Writing Complex SQL Queries
Understanding and implementing correlated subqueries

CONCLUSION

This project provided valuable insights into customer churn behavior using SQL-based analysis on telecom customer data. By examining patterns across demographics, contract types, service usage, billing methods, and monthly trends, we identified key factors contributing to customer loss.

Presented By:
Pyanshu Shaw

July 31, 2025

