PREDICTING CUSTOMER CHURN IN TELECOM INDUSTRY USING POWER BI AND SQL

DATA VISUALIZATION WITH POWER BI

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Introduction: Predicting Customer Churn in the Telecom Industry

Customer churn, the rate at which customers discontinue a service, poses a significant challenge in the telecom industry. With high competition and evolving customer demands, reducing churn is essential for maintaining revenue and ensuring business growth. Retaining existing customers is more cost-effective than acquiring new ones, making churn prediction critical for proactive customer management.

This report focuses on leveraging MySQL and Power BI to predict and analyze churn patterns, enabling telecom providers to identify at-risk customers and take corrective actions. Through data-driven insights, companies can improve retention, optimize marketing, enhance service quality, and ensure long-term revenue stability.

Objective and Scope:

The objective is to analyze customer behavior and identify churn drivers to:

1. Detect high-risk customers and design targeted retention strategies.

2. Optimize marketing campaigns for at-risk customers.

3. Improve service offerings based on churn trends.

4. Enhance revenue by minimizing churn rates.

Using MySQL for data processing and Power BI for visualizations, this project examines demographic profiles, service usage, contract types, and financial contributions to deliver actionable insights and interactive dashboards.

Significance for the Telecom Industry:

Churn prediction helps telecom companies stay competitive by transitioning from reactive to proactive customer management. This report highlights key churn drivers and provides a roadmap for customer retention strategies, helping companies reduce churn, improve customer satisfaction, and secure their market position.

Creating Scheme & Inserting Dataset in Mysql:

- Open new sql scrip page in mysql, create a schema by using the following query (create schema customer_churn_telecom;).

- To insert the data sets right click on Customer_Churn_Telecom schema and select Table import wizard option from the drop down box > select the path where the data set is and click next > Select the destination and click next > in configuration Import settings if any configuration changes need to be done before importing can be done in it and click on next > in import data page click on next so it gets processed and the table will get inserted.

Data Cleaning in excel:

- 1st I imported the **Customer_churn** dataset, while it was importing it popped up two error messages importing of 1366 rows failed due 'incorrect integer value' from 'AVG_monthly_GB_download' and importing of 1265 row failed due to 'data trenched for column'. So only **4835 rows** got imported from the over all dataset of 7043 rows.

- So while manually checking these two columns in the excel these columns were empty , so I replace empty rows were **0** as these rows are of integer type and save that data set as **Customer_churn_edited.**

- Now again I imported the **Customer_churn_edited** dataset and without any error 7043 rows got imported and I took this dataset in further processing.
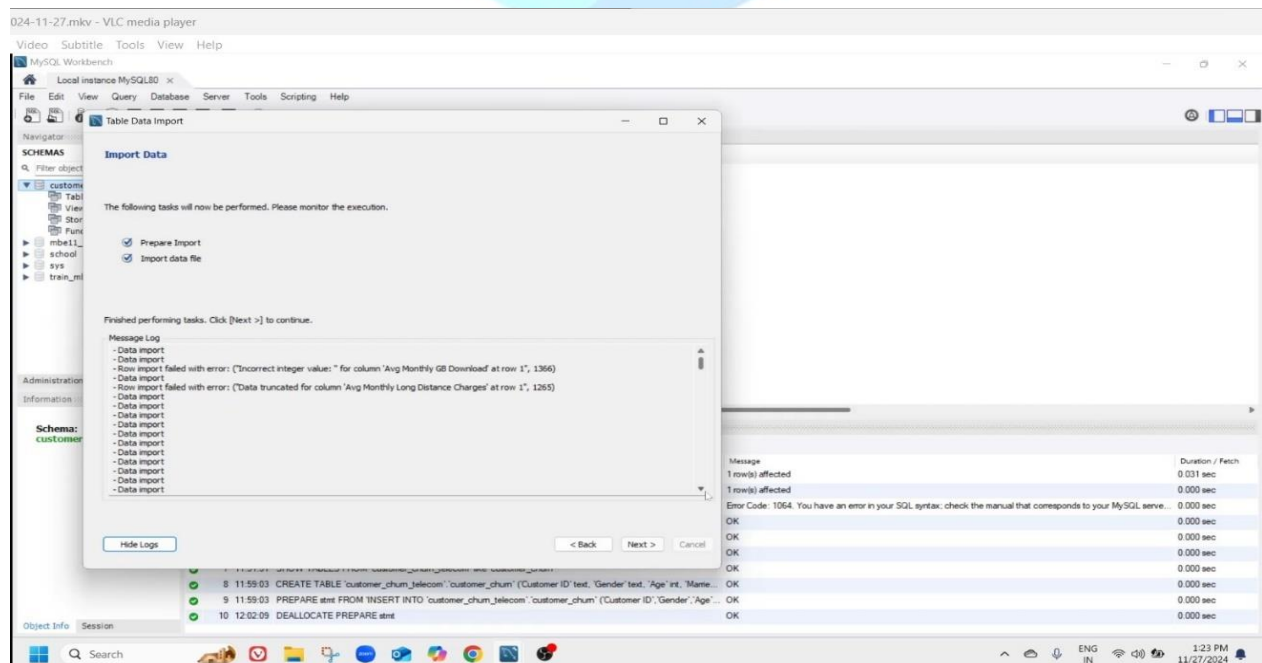
Data cleaning in Mysql:

- **Heading altering of each column:**
    - Initially I replace space in 38 columns heading with _ by using ALTER TABLE and Change query.
    - Eg: ALTER TABLE customer_churn_edited CHANGE `Customer ID` `Customer_ID` VARCHAR(50);

    - The same query is used for the balance 37 columns and the name of all the column was cleaned.

- **Identifying Duplicates from the dataset:**
    - The entire data set is Churn of Customers in telecom industry, so customer_id column plays a major role. So, using this column the duplicate rows can be removed.

    - So, the following query was used using group by and having clause

    - Query: SELECT customer_ID, COUNT(*) AS duplicate_count FROM customer_churn_edited GROUP BY Customer_ID HAVING COUNT(*) > 1;). No duplicate was found.

    - As the next process to identify the empty cells in the table the From and where clause is used with the NULL condition and to do it for all 38 columns the Union All Operator is used.
    - (Eg: of quer : SELECT 'Customer_ID' AS column_name, COUNT(*) AS empty_cells FROM customer_churn_telecom.customer_churn_edited WHERE Customer_ID IS NULL OR Customer_ID = '' UNION ALL
    SELECT 'Gender' AS column_name, COUNT(*) AS empty_cells FROM customer_churn_telecom.customer_churn_edited WHERE Gender IS NULL OR Gender = '' UNION ALL).

    - With this the empty cells in columns were identified where 12 columns has empty cells among the 38 columns and each column wise details as follows below.

Column names and empty cells:

Column_Name	Data_Type	Empty_Cells
Multiple_Lines	Varchar	682
Internet_Type	Varchar	1526
Online_Security	Varchar	1526
Online_Backup	Varchar	1526
Device_Protection_Plan	Varchar	1526
Premium_Tech_Support	Varchar	1526

Streaming_TV	Varchar	1526
Streaming_Movies	Varchar	1526
Streaming_Music	Varchar	1526
Unlimited_Data	Varchar	1526
Churn_Category	Varchar	5174
Churn_Reason	Varchar	5174

- The above details were obtained and from those 12 columns. These 12 columns are of Varchar type. Now I replaced the empty cells with 'Nil' words in varchar type by using the where Clause and OR operator the table is to be updated.
- (Eg: UPDATE customer_churn_telecom.customer_churn_edited SET Multiple_Lines = 'NIL' WHERE Multiple_Lines IS NULL OR Multiple_Lines = '';)
- Now the dataset is cleaned and can be used for identifying the Churn of customers in telecom industries.

Updated:

Column_Name	Data_Type	Empty_Cells
Multiple_Lines	Varchar	0
Internet_Type	Varchar	0
Online_Security	Varchar	0
Online_Backup	Varchar	0
Device_Protection_Plan	Varchar	0
Premium_Tech_Support	Varchar	0
Streaming_TV	Varchar	0
Streaming_Movies	Varchar	0
Streaming_Music	Varchar	0
Unlimited_Data	Varchar	0
Churn_Category	Varchar	0
Churn_Reason	Varchar	0

Tasks using mysql to identify and the churn of Customers in Telecom:

The identification of Churn customers in telecom is done by classifying the tasks into 7 categories:

1. **Churn Specific Analysis.**
2. **Customer Demographics and Characteristics.**
3. **Contract and Service Analysis.**
4. **Financial Analysis.**
5. **Customer Demographics and Characteristics and Financial Analysis.**
6. **Contract, Service Analysis and Financial Analysis.**
7. **Stored Procedures.**

1. Churn Specific Analysis:

a. Identify the total number of customers and the churn rate

Column Used – Customer status

MYSQL codes:
SELECT COUNT(*) AS total_customers, SUM(CASE WHEN Customer_Status = 'Churned' THEN 1 ELSE 0 END) AS churned_customers, ROUND((SUM(CASE WHEN Customer_Status = 'Churned' THEN 1 ELSE 0 END) / COUNT(*)) * 100, 2) AS churn_rate_percentage FROM customer_churn_telecom.customer_churn_edited;

Explanation:
- COUNT(*): Counts all rows to get the total number of customers.
- SUM(CASE WHEN Customer_Status = 'Churned' THEN 1 ELSE 0 END): Counts the number of churned customers.
- ROUND((... / COUNT(*)) * 100, 2): Calculates and rounds the churn rate as a percentage.

Output:

total_customers	churned_customers	churn_rate_percentage
7043	1869	26.54

Findings
- Approximately 26.54% of customers in the dataset have churned.
- This insight emphasizes the need for targeted retention strategies.

b. Identify the customers who have churned and used the most online services

Columns used - customer_id, Gender, Age, Contract, Customer_status, Online_Security, Online_Backup, Device_Protection_Plan, Premium_Tech_Support, Streaming_TV, Streaming_Movies, Streaming_Music and unlimited_data.

MYSQL codes:

SELECT Customer_ID, Gender, Age, Contract, Customer_Status,
   (CASE WHEN Online_Security = 'Yes' THEN 1 ELSE 0 END +
   CASE WHEN Online_Backup = 'Yes' THEN 1 ELSE 0 END +
   CASE WHEN Device_Protection_Plan = 'Yes' THEN 1 ELSE 0 END +
   CASE WHEN Premium_Tech_Support = 'Yes' THEN 1 ELSE 0 END +
   CASE WHEN Streaming_TV = 'Yes' THEN 1 ELSE 0 END +

```
          CASE WHEN Streaming_Movies = 'Yes' THEN 1 ELSE 0 END +
          CASE WHEN Streaming_Music = 'Yes' THEN 1 ELSE 0 END) AS
total_online_services
FROM customer_churn_telecom.customer_churn_edited WHERE Customer_Status =
'Churned' ORDER BY total_online_services DESC LIMIT 5;


#count of churned customers using this service
SELECT COUNT(*) AS customer_count FROM
customer_churn_telecom.customer_churn_edited WHERE Customer_Status =
'Churned'
AND (
   CASE WHEN Online_Security = 'Yes' THEN 1 ELSE 0 END +
   CASE WHEN Online_Backup = 'Yes' THEN 1 ELSE 0 END +
   CASE WHEN Device_Protection_Plan = 'Yes' THEN 1 ELSE 0 END +
   CASE WHEN Premium_Tech_Support = 'Yes' THEN 1 ELSE 0 END +
   CASE WHEN Streaming_TV = 'Yes' THEN 1 ELSE 0 END +
   CASE WHEN Streaming_Movies = 'Yes' THEN 1 ELSE 0 END +
   CASE WHEN Streaming_Music = 'Yes' THEN 1 ELSE 0 END
) = (
   SELECT MAX(
      CASE WHEN Online_Security = 'Yes' THEN 1 ELSE 0 END +
      CASE WHEN Online_Backup = 'Yes' THEN 1 ELSE 0 END +
      CASE WHEN Device_Protection_Plan = 'Yes' THEN 1 ELSE 0 END +
      CASE WHEN Premium_Tech_Support = 'Yes' THEN 1 ELSE 0 END +
      CASE WHEN Streaming_TV = 'Yes' THEN 1 ELSE 0 END +
      CASE WHEN Streaming_Movies = 'Yes' THEN 1 ELSE 0 END +
      CASE WHEN Streaming_Music = 'Yes' THEN 1 ELSE 0 END
   ) FROM customer_churn_telecom.customer_churn_edited WHERE Customer_Status
'Churned');
```

Explanation:

- CASE WHEN ... THEN 1 ELSE 0 END: Assigns 1 for each service the customer has used, otherwise 0.

- + Operator: Sums up the number of services used by each customer.

- WHERE Customer_Status = 'Churned': Filters only churned customers.

- ORDER BY total_online_services DESC: Sorts the results by the total number of online services in descending order.

- LIMIT 5: Limits the output to the top 5 customers.

- COUNT(*): Counts the number of customers who have used all the 7 services and those number of customers are 13.

Output 1:

Customer_ID	Gender	Age	Contract	Customer_Status	total_online_services
9158-VCTQB	Female	41	Month-to-Month	Churned	7
0748-RDGGM	Male	38	One Year	Churned	7
0201-OAMXR	Female	30	One Year	Churned	7
8199-ZLLSA	Male	53	One Year	Churned	7
1555-DJEQW	Female	21	Two Year	Churned	7

Output 2:

Customer_count
13

Findings:

- Customers who churned and used a high number of online services (e.g., 6 or 7 services) may have specific service issues or unmet expectations.

- This can guide targeted actions like personalized retention campaigns or service quality improvements.

2. Customer Demographics and Characteristics:

a. Find the average age of churned customers

Column Used – Customer status and age.

MYSQL codes:

SELECT ROUND(AVG(Age), 2) AS average_age_of_churned_customers FROM customer_churn_telecom.customer_churn_edited WHERE Customer_Status = 'Churned';

Explanation:

- **AVG(Age)**: Calculates the average age of customers.

- **ROUND(..., 2)**: Rounds the result to two decimal places.

- **WHERE Customer_Status = 'Churned'**: Filters only churned customers.

Output:

average_age_of_churned_customers
'49.74'

Findings:

- The average age of churned customers is 49.74 years, indicating that middle-aged customers are more likely to churn.

b. Identify the average total charges for customers grouped by gender and marital status

Columns Used – Gender, Married, Total Charges

MYSQL coding:
SELECT Gender, Married,
ROUND(AVG(Total_Charges), 2) AS average_total_charges
FROM customer_churn_telecom.customer_churn_edited
GROUP BY Gender, Married;

Explanation:
- GROUP BY Gender, Married: Groups customers by their gender and marital status.
- AVG(Total_Charges): Calculates the average total charges for each group.
- ROUND(..., 2): Ensures the result is rounded to two decimal places.

Output:

Gender	Married	Average_Total_Charges
Male	No	1542.05
Male	Yes	3072.71
Female	Yes	2977.25
Female	No	1627.55

Findings:

- Married male have the highest average total charges, while single male have the lowest. Married female have second highest average total charges, while single female have the third highest average total charges.

c. Calculate the average monthly charges for different age groups among churned customers

Columns Used – Customer_status, Monthly_charges, Age

MYSQL coding:
```
SELECT Customer_Status, CASE
WHEN Age < 25 THEN 'Under 25'
 WHEN Age BETWEEN 25 AND 40 THEN '25-40'
 WHEN Age BETWEEN 41 AND 60 THEN '41-60'
   ELSE 'Above 60'
   END AS age_group,  ROUND(AVG(Monthly_Charge), 2) AS average_monthly_charge
FROM customer_churn_telecom.customer_churn_edited
WHERE Customer_Status = 'Churned'GROUP BY age_group;
```

Explanation:

- CASE Statement: Categorizes customers into different age groups.

- AVG(Monthly_Charge): Calculates the average monthly charges for each group.

- GROUP BY age_group: Groups customers by the defined age ranges.

Output:

Customer_Status	age_group	average_monthly_charge
Churned	41-60	71.36
Churned	Above 60	77.62
Churned	25-40	70.95
Churned	Under 25	72.12

Findings:
- The above 60 age group has the highest average monthly charges, suggesting they might prefer higher-end services and the 25- 40 age group have the lowest average monthly charges, suggesting they might prefer and kind offers in the given plans.

d. Identify the contract types with the highest churn rate among senior citizens (age 65 and over)

Columns Used – Customer_status, Contract, Age

MYSQL coding:
```
SELECT Customer_Status, Contract,
    COUNT(*) AS churned_count,
    ROUND((COUNT(*) / (SELECT COUNT(*) FROM
customer_churn_telecom.customer_churn_edited WHERE Age >= 65) * 100), 2) AS
churn_rate_percentage
FROM customer_churn_telecom.customer_churn_edited
WHERE Customer_Status = 'Churned' AND Age >= 65
GROUP BY Contract
ORDER BY churn_rate_percentage DESC;
```

Explanation:

- COUNT(*): Counts the number of senior citizens who have churned.

- ROUND(..., 2): Calculates the churn rate as a percentage.

- GROUP BY Contract: Groups by contract type.

- ORDER BY churn_rate_percentage DESC: Sorts the results to show the highest churn rate first.

Output:

Customer_Status	Contract	churned_count	churn_rate_percentage
Churned	Month-to-Month	441	38.62
Churned	One Year	29	2.54
Churned	Two Year	6	0.53

Findings:
- Senior citizens with Month-to-Month contracts have the highest churn rate.

e. Identify the gender distribution among customers who have churned and are on yearly contracts.

Columns Used – Customer_status, Gender, Contract

MYSQL coding:
```
SELECT Customer_Status, Contract, Gender, COUNT(*) AS churned_count
FROM customer_churn_telecom.customer_churn_edited
WHERE Customer_Status = 'Churned' AND Contract = 'One Year' GROUP BY Gender;
```

Explanation:
- COUNT(*): Counts churned customers grouped by gender.
- WHERE Contract = 'One Year': Filters customers with yearly contracts.
- GROUP BY Gender: Groups the results by gender.

Output:

Customer_Status	Contract	Gender	churned_count
Churned	One Year	Male	91
Churned	One Year	Female	75

Findings:
- More males churned on yearly contracts compared to females.

f. Calculate the average monthly charges and total charges for customers who have churned, grouped by the number of dependents

Columns Used – Customer_Status, Number_of_Dependents, Monthly charges and Total Charges.

MYSQL coding:
```
SELECT Number_of_Dependents, Customer_Status,
ROUND(AVG(Monthly_Charge), 2) AS average_monthly_charge,
ROUND(AVG(Total_Charges), 2) AS average_total_charges
FROM customer_churn_telecom.customer_churn_edited WHERE Customer_Status =
'Churned'GROUP BY Number_of_Dependents;;
```

Explanation:
- **GROUP BY Number_of_Dependents**: Groups customers by the number of dependents they have.
- **AVG(Monthly_Charge)** and **AVG(Total_Charges)**: Calculate the average charges for each group.
- **ROUND(..., 2)**: Ensures the results are rounded to two decimal places.

Output:

Number_of_Dependents	Customer_Status	average_monthly_charge	average_total_charges
0	Churned	74.22	1577.26
1	Churned	64.1	1165.84
2	Churned	60.98	609.53
3	Churned	51.7	543.74
4	Churned	95	655.5
6	Churned	34.5	279.25
7	Churned	19.25	19.25
5	Churned	47.38	266.38

Findings:

- Customers with less dependents tend to have higher monthly and total charges.

3. Contract and Service Analysis:

a. Discover the most common contract types among churned customers

Columns Used – Contract

MYSQL coding:
```
SELECT Contract, COUNT(*) AS churned_customer_count
FROM customer_churn_telecom.customer_churn_edited
WHERE Customer_Status = 'Churned'GROUP BY Contract
ORDER BY churned_customer_count DESC;
```

Explanation:
- Filters the dataset to include only customers who have churned (Customer_Status = 'Churned').
- Groups the data by Contract to find how many churned customers belong to each contract type.
- Orders the results by the number of churned customers, from the most to the least.

Output:

Contract	churned_customer_count
Month-to-Month	1655
One Year	166
Two Year	48

Findings:
- The most common contract type among churned customers is Month-to-Month, which suggests that these customers may be more likely to churn due to higher flexibility or dissatisfaction with service.

b. Create a query to identify the contract types that are most prone to churn

Columns Used – Contract

MYSQL coding:
```
SELECT Contract, COUNT(*) AS churned_customer_count,
(COUNT(*) / (SELECT COUNT(*) FROM
customer_churn_telecom.customer_churn_edited WHERE Contract = c.Contract)) * 100
AS churn_rate_percentage
FROM customer_churn_telecom.customer_churn_edited AS c WHERE
Customer_Status = 'Churned' GROUP BY Contract ORDER BY churn_rate_percentage
DESC;
```

Explanation:

- This query calculates the churn rate percentage for each contract type.

- COUNT(*) gives the number of churned customers for each contract.

- The subquery in the denominator gives the total number of customers with the same contract type.

- The churn rate is calculated as:

  Churn Rate = (Churned Customers/Total Customers in Contract)×100

- The results are ordered by the churn rate, showing the contract types most prone to churn.

Output:

Contract	churned_customer_count	churn_rate_percentage
Month-to-Month	1655	45.8449
One Year	166	10.7097
Two Year	48	2.5491

Findings:

- Month-to-Month contracts have the highest churn rate, which suggests that customers with these contracts are more likely to churn.
- Consider offering incentives or improvements in service quality for Month-to-Month customers.

c. Identify customers who have both online security and online backup services and have not churned

Columns Used – online_security, online_backup, customer_status, customer_id

MYSQL coding:

```
SELECT Customer_ID, Online_Security, Online_Backup, Customer_Status
FROM customer_churn_telecom.customer_churn_edited
WHERE Online_Security = 'Yes' AND Online_Backup = 'Yes'AND Customer_Status =
'Stayed';

SELECT Customer_ID, Online_Security, Online_Backup, Customer_Status
FROM customer_churn_telecom.customer_churn_edited
```

WHERE Online_Security = 'Yes' AND Online_Backup = 'Yes'AND Customer_Status =
'joined';

SELECT Count(*) AS non_churned_customer_count, Online_Security, Online_Backup
FROM customer_churn_telecom.customer_churn_edited
WHERE Online_Security = 'Yes' AND Online_Backup = 'Yes'
AND Customer_Status ='stayed';

SELECT Count(*) AS non_churned_customer_count, Online_Security, Online_Backup
FROM customer_churn_telecom.customer_churn_edited
WHERE Online_Security = 'Yes' AND Online_Backup = 'Yes'
AND Customer_Status ='joined';

Explanation:

- This is a simple select query that lists the Customer_ID, Online_Security, Online_Backup, and Customer_Status for all customers who match the specified conditions.COUNT(*) gives the number of churned customers for each contract and filters customers based on their status ('Stayed')

- The query essentially lists the same columns, but filters customers based on their status ('Joined'), instead of 'Stayed'.

- It counts customers who have Stayed, have both Online Security and Online Backup services, and are grouped by these services.

- It counts customers who have joined, have both Online Security and Online Backup services, and are grouped by these services.

Output1:
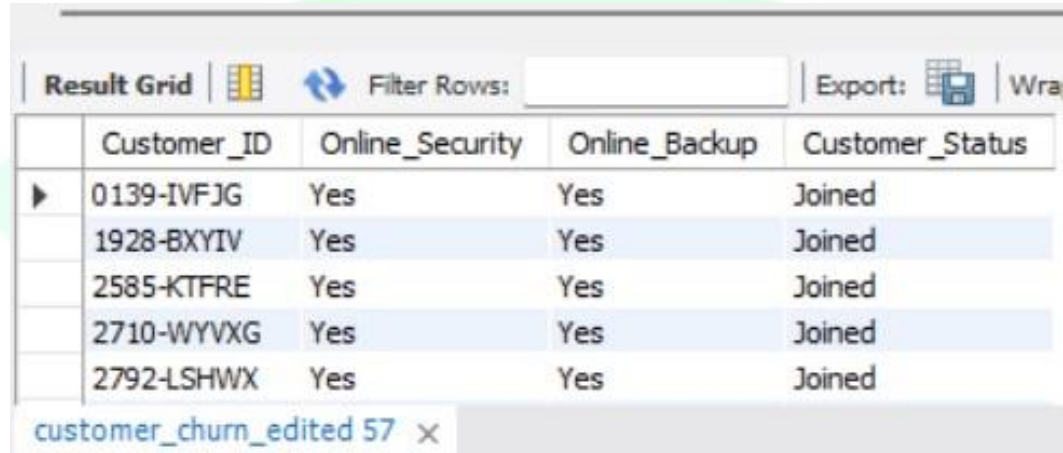
Result Grid	Filter Rows:		Export:	Wrap
Customer_ID	Online_Security	Online_Backup	Customer_Status	
0013-SMEOE	Yes	Yes	Stayed	
0016-QLJIS	Yes	Yes	Stayed	
0017-IUDMW	Yes	Yes	Stayed	
0019-EFAEP	Yes	Yes	Stayed	
0019-GFNTW	Yes	Yes	Stayed	

customer_churn_edited 56 ×

Output2:

Stayed_customer_count	Online_Security	Online_Backup
996	Yes	Yes

Output3:

Customer_ID	Online_Security	Online_Backup	Customer_Status
▶ 0139-IVFJG	Yes	Yes	Joined
1928-BXYIV	Yes	Yes	Joined
2585-KTFRE	Yes	Yes	Joined
2710-WYVXG	Yes	Yes	Joined
2792-LSHWX	Yes	Yes	Joined

customer_churn_edited 57 ×

Output4:

Joined_customer_count	Online_Security	Online_Backup
11	Yes	Yes

Findings:
- Customers who stayed and had both Online Security and Online Backup services are less likely to churn. This indicates that customers who use multiple services are more satisfied and retain their subscriptions.
- The new customers who have both services might indicate that bundling or offering multiple services is an attractive offer to new customers.
- There are **996** stayed_Customer_count with both Online Security and Online Backup services. This shows that these services are valued by long-term customers and contribute to retention.
- There are **11** customers who recently joined and have both services, suggesting these services are also a good attraction point for new customers, possibly through special offers or as part of a bundled service.

d. Determine the most common combinations of services among churned customers

Columns Used – online_security, Online_backup, Device_protection_plan, Premium_tech_support

MYSQL coding:
SELECT Online_Security, Online_Backup, Device_Protection_Plan, Premium_Tech_Support,

```
COUNT(*) AS churned_customer_count
FROM customer_churn_telecom.customer_churn_edited
WHERE Customer_Status = 'Churned'
GROUP BY Online_Security, Online_Backup, Device_Protection_Plan,
Premium_Tech_Support
ORDER BY churned_customer_count DESC;
```

Explanation:
- This query groups churned customers by their service combinations
  (Online_Security, Online_Backup, Device_Protection_Plan,
  Premium_Tech_Support).
- It counts the number of churned customers in each combination and orders them
  by frequency.

Output:

Online_Security	Online_Backup	Device_Protection_Plan	Premium_Tech_Support	count
No	No	No	No	718
No	No	Yes	No	207
No	Yes	No	No	196
No	Yes	Yes	No	129
Yes	No	No	No	92
No	No	No	Yes	75
No	No	Yes	Yes	57
Yes	Yes	No	No	42
No	Yes	No	Yes	40
No	Yes	Yes	Yes	39
Yes	No	Yes	No	32
Yes	Yes	Yes	No	30
Yes	No	Yes	Yes	26
Yes	No	No	Yes	26
Yes	Yes	Yes	Yes	25
Yes	Yes	No	Yes	22

Findings:

- High churn with no services (718): Focus on encouraging service adoption to reduce churn.
- Moderate churn with Device Protection (207+129+57 = 393): Cross-sell additional services.
- Lower churn with service bundles (40+42+39 = 121): Promote bundled service offers.
- Lowest churn with all services (25): Encourage full-service adoption.
- Low engagement needs targeting (92 + 75 + 32 + 30 + 26 + 26 = 281): Offer retention
  incentives to less-engaged customers.

e. Identify the customers who have churned, and their contract duration in months

Columns Used – customer_id, Tenure_in_months, Customer_status

MYSQL coding:
SELECT Customer_ID, Tenure_in_Months, Customer_Status
FROM customer_churn_telecom.customer_churn_edited
WHERE Customer_Status = 'Churned' order by CAST(Tenure_in_Months AS SIGNED INTEGER) DESC limit 10;

Explanation:
- This query selects the Customer_ID, Tenure_in_Months, and Customer_Status for churned customers.
- It provides insights into how long the churned customers stayed with the company before leaving to identify we need to change the data type of Tenure_in_months from varchar to Integer using CAST function.

Output:

Customer_ID	Tenure_in_Months	Customer_Status
8580-QVLOC	72	Churned
3886-CERTZ	72	Churned
2889-FPWRM	72	Churned
8809-RIHDD	72	Churned
6034-ZRYCV	72	Churned
0917-EZOLA	72	Churned
2530-ENDWQ	71	Churned
7317-GGVPB	71	Churned
6559-ILWKJ	71	Churned
5287-QWLKY	71	Churned

Findings:
- Customers with the longest contract duration (**72 months**) are prone to churn, indicating potential dissatisfaction despite long-term engagement.
- High churn at maximum tenure: Customers with 72 months tenure churn frequently. Introduce loyalty rewards and milestone benefits to retain long-term customers.

4. Financial Analysis:

a. Analyze the distribution of monthly charges among churned customers

Columns Used – Customer_status, Monthly_charges

MYSQL coding:
SELECT Monthly_Charge, Customer_Status, COUNT(*) AS customer_count
FROM customer_churn_telecom.customer_churn_edited WHERE Customer_Status =
'Churned' GROUP BY Monthly_Charge ORDER BY Monthly_Charge Desc limit 10;

Explanation:
- Filters the dataset to include only churned customers (Customer_Status = 'Churned').
- Groups customers by Monthly_Charge to count how many customers fall into each charge bucket.

Output:

Monthly_Charge	Customer_Status	customer_count
74.40	Churned	13
74.90	Churned	9
45.30	Churned	8
85.35	Churned	7
-1.00	Churned	7
70.15	Churned	7
70.00	Churned	7
70.30	Churned	7
93.85	Churned	7
74.95	Churned	7

Findings:
- The distribution highlights which monthly charges are most common among churned customers.
- Useful for identifying pricing brackets contributing to churn.

b. Identify customers with high total charges who have

 Columns Used – Customer_status, Customer_ID, Total_charges

MYSQL coding:
SELECT Monthly_Charge, Customer_Status, COUNT(*) AS customer_count
FROM customer_churn_telecom.customer_churn_edited WHERE Customer_Status =
'Churned' GROUP BY Monthly_Charge ORDER BY Monthly_Charge Desc limit 10;

Explanation:
- Filters churned customers and sorts them by Total_Charges in descending order.
- Displays the top 10 customers with the highest charges.

Output:

Customer_Status	Customer_ID	Total_Charges
Churned	5899-MQZZL	999.45
Churned	6328-ZPBGN	997.65
Churned	6227-HWPWX	994.80
Churned	7459-RRWQZ	994.55
Churned	8443-WVPSS	990.90
Churned	4695-VADHF	990.85
Churned	7384-GHBPI	990.75
Churned	0107-YHINA	990.75
Churned	2157-MXBJS	989.45
Churned	7321-PKUYW	987.95

Findings:
- Identifies low-value customers who churned, indicating a potential loss of significant revenue.

c. Calculate the total charges distribution for churned and non-churned customers

 Columns Used – Customer_status

MYSQL coding:
SELECT Customer_Status, COUNT(*) AS customer_count,
MIN(Total_Charges) AS min_total_charges, MAX(Total_Charges) AS
max_total_charges, AVG(Total_Charges) AS avg_total_charges
FROM customer_churn_telecom.customer_churn_edited GROUP BY Customer_Status;

Explanation:
- Groups customers by Customer_Status (Churned vs. Stayed and Joined) and calculates.

- Minimum, maximum, and average Total_Charges for each group.

Output:

Customer_ Status	customer_ count	min_ total_charges	max_ total_charges	avg_ total_charges
Stayed	4720	100.20	999.90	2788.52
Churned	1869	100.25	999.45	1531.80
Joined	454	101.10	98.50	79.29

Findings:
- Non-Churned customers tend to have higher total charges on average than churned customers.

d. Calculate the average monthly charges for different contract types among churned customers

Columns Used – Customer_status, Contract

MYSQL coding:
SELECT Contract, Customer_Status, AVG(Monthly_Charge) AS avg_monthly_charge FROM customer_churn_telecom.customer_churn_edited WHERE Customer_Status = 'Churned' GROUP BY Contract order by avg_monthly_charge desc;

Explanation:
- Filters churned customers and groups them by Contract.
- Calculates the average Monthly_Charge for each contract type.

Output:

Contract	Customer_Status	avg_monthly_charge
Two Year	Churned	86.77708333
One Year	Churned	85.05090361
Month-to-Month	Churned	71.78422961

Findings:
- Two Year contracts show the highest average monthly charges among churned customers.
- Month-to-month contracts show the lowest average monthly charges among churned customers.

e. Calculate the average monthly charges for customers who have multiple lines and streaming TV

Columns Used – Monthly_charges

MYSQL coding:
```
SELECT AVG(Monthly_Charge) AS avg_monthly_charge
FROM customer_churn_telecom.customer_churn_edited
WHERE Multiple_Lines = 'Yes' AND Streaming_TV = 'Yes';
```

Explanation:
- Filters customers who have Multiple_Lines and Streaming_TV.
- Calculates the average Monthly_Charge for this segment.

Output:

avg_monthly_charge
95.63443247

Findings:
- Customers with both multiple lines and streaming TV tend to pay higher monthly charges.

f. Find the customers who have churned and are not using online services, and their average total charges.

Columns Used – Customer_status

MYSQL coding:
```
SELECT Customer_Status, AVG(Total_Charges) AS avg_total_charges
FROM customer_churn_telecom.customer_churn_edited WHERE Customer_Status =
'Churned' AND Online_Security = 'No' AND Online_Backup = 'No'
AND Device_Protection_Plan = 'No' AND Premium_Tech_Support = 'No';
```

Explanation:
- Filters churned customers who do not use any online services (No for all).
- Calculates the average Total_Charges.

Output:

Customer_Status	avg_total_charges
Churned	738.86539

Findings:
- Customers with no online services contribute less revenue on average compared to those using services.

g. Create a view to find the customers with the highest monthly charges in each contract type

Columns Used – Contract, Customer_id, Monthly_charges

MYSQL coding:
```
SELECT c1.Contract, c1.Customer_ID, c1.Monthly_Charge
FROM customer_churn_telecom.customer_churn_edited AS c1
JOIN (SELECT Contract, MAX(Monthly_Charge) AS Max_Charge
FROM customer_churn_telecom.customer_churn_edited
GROUP BY Contract)
AS c2 ON c1.Contract = c2.Contract
AND c1.Monthly_Charge = c2.Max_Charge;
```

Explanation:
- Subquery: Finds the maximum Monthly_Charge for each Contract.
- Outer Query: Matches each Contract with its highest Monthly_Charge and retrieves the corresponding Customer_ID.
- This ensures we get one customer for each contract type with the highest monthly charge.

Output:

Contract	Customer_ID	Monthly_Charge
Month-to-Month	0089-IIQKO	99.95
Two Year	0356-OBMAC	99.90
Month-to-Month	1254-IZEYF	99.95
Month-to-Month	1571-SAVHK	99.95
Month-to-Month	3440-JPSCL	99.95
One Year	3511-APPBJ	99.95
Month-to-Month	5883-GTGVD	99.95
Two Year	6234-RAAPL	99.90

Findings:
- Customers with the highest monthly charges vary significantly across contract types.
- Month-to-Month contracts tend to have higher charges, likely due to flexible but premium pricing.

h. Create a view to identify customers who have churned and the average monthly charges compared to the overall average

Columns Used – Contract, Customer_id, Monthly_charges

MYSQL coding:
```
SELECT 'Overall Average' AS category, AVG(Monthly_Charge) AS avg_monthly_charge
FROM customer_churn_telecom.customer_churn_edited
UNION ALL SELECT 'Churned Customers Average' AS category,
AVG(Monthly_Charge) AS avg_monthly_charge
FROM customer_churn_telecom.customer_churn_edited
WHERE Customer_Status = 'Churned';
```

Explanation:
- Overall Average: Calculates the overall average Monthly_Charge for all customers. The category field assigns a label 'Overall Average' to this result.
- Churned Customers Average: Filters customers with Customer_Status = 'Churned' and calculates the average Monthly_Charge for churned customers. The category field assigns a label 'Churned Customers Average' to this result.
- UNION ALL: Combines both results into a single table, with the averages labeled appropriately.

Output:

Category	avg_monthly_charge
Overall Average	63.59613091
Churned Customers Average	73.3475923

Findings:
- The average monthly charge for churned customers is higher than the overall average.
- This suggests customers paying higher charges may feel dissatisfied, necessitating targeted retention efforts.

i. Create a view to find the customers who have churned and their cumulative total charges over time

Columns Used – Customer_status, Customer_id, Total_charge

MYSQL coding:
```
SELECT Customer_Status, Customer_ID, Total_Charges,
SUM(Total_Charges) OVER (ORDER BY Total_Charges) AS cumulative_total_charges
FROM customer_churn_telecom.customer_churn_edited
WHERE Customer_Status = 'Churned'
ORDER BY Total_Charges Desc limit 10;
```

Explanation:
- Filters for Churned Customers: The WHERE Customer_Status = 'Churned' condition ensures only churned customers are included.
- Cumulative Sum: The SUM(Total_Charges) OVER (ORDER BY Total_Charges) calculates the cumulative sum of Total_Charges for churned customers. The OVER clause orders the charges incrementally using ORDER BY Total_Charges.
- Ordering: The ORDER BY Total_Charges in the main query ensures the output is sorted by Total_Charges for logical cumulative aggregation.

Output:

Customer_Status	Customer_ID	Total_Charges	cumulative_total_charges
Churned	5899-MQZZL	999.45	2862926.9
Churned	6328-ZPBGN	997.65	2861927.45
Churned	6227-HWPWX	994.8	2860929.8
Churned	7459-RRWQZ	994.55	2859935
Churned	8443-WVPSS	990.9	2858940.45
Churned	4695-VADHF	990.85	2857949.55
Churned	7384-GHBPI	990.75	2856958.7
Churned	0107-YHINA	990.75	2856958.7
Churned	2157-MXBJS	989.45	2856759.2
Churned	7321-PKUYW	987.95	2855769.75

Findings:
- The cumulative charges highlight the financial impact of customer churn over time, helping prioritize retention strategies for high-value customers.

5. **Customer Demographics and Characteristics and Financial Analysis:**

   a. **Determine the average age and total charges for customers with multiple lines and online backup**

      Columns Used – Multiple_Lines, Online_Backup

      MYSQL coding:

      SELECT AVG(Age) AS average_age, AVG(Total_Charges) AS average_total_charges,
      Multiple_Lines, Online_Backup
      FROM customer_churn_telecom.customer_churn_edited
      WHERE Multiple_Lines = 'Yes' AND Online_Backup = 'Yes';

      Explanation:
      - Filter Criteria: Filters customers who have both Multiple Lines and Online Backup services ('Yes' for both).
      - Aggregation: Calculates the average age and average total charges for the filtered group using AVG().

      Output:

average_age	average_total_charges	Multiple_Lines	Online_Backup
48.6115	4865.712914	Yes	Yes

      Findings:
      - Customers with Multiple Lines and Online Backup have an average age of 48.61 years and have contributed 4865.71 in total charges on average.

   b. **Calculate the average age and total charges for customers with different combinations of streaming services**

      Columns Used – Streaming_TV, Streaming_Music, Streaming_Movies

      MYSQL coding:

      SELECT Streaming_TV, Streaming_Music, Streaming_Movies,
      AVG(Age) AS average_age, AVG(Total_Charges) AS average_total_charges
      FROM customer_churn_telecom.customer_churn_edited

GROUP BY Streaming_TV, Streaming_Movies, Streaming_Music ORDER BY
average_total_charges DESC;

Explanation:
- Grouping: Groups customers by Streaming_TV , Streaming_music and Streaming_Movies combinations.
- Aggregation: Calculates the average age and average total charges for each combination using AVG().
- Sorting: Orders the results by average_total_charges in descending order to highlight the most valuable groups.

Output:

Streaming_TV	Streaming_Music	Streaming_Movies	average_age	average_total_charges
Yes	Yes	Yes	43.9605	4261.373653
Yes	No	Yes	73.337	4230.52963
No	Yes	Yes	44.2533	2559.785808
Yes	No	No	48.1252	2519.031565
No	No	Yes	73.0476	2453.695714
Yes	Yes	No	23.25	1958.628125
No	No	No	48.2022	1439.939187
No	Yes	No	24.1818	968.9424242

Findings:
- Customers with Streaming TV, Streaming Music and Streaming Movies have the highest average total charges of 4261.37 and a relatively average age (43.96 years).
- Customers with no streaming services have the second lowest total charges and are generally are of average age category.

c. Determine the average age and total charges for customers who have churned, grouped by internet service and phone service

Columns Used – Customer_status, Internet_service, Phone_service

MYSQL coding:

```
SELECT Customer_Status, Internet_Service, Phone_Service,
AVG(Age) AS average_age, AVG(Total_Charges) AS average_total_charges
FROM customer_churn_telecom.customer_churn_edited WHERE Customer_Status = 'Churned'
```

GROUP BY Internet_Service, Phone_Service ORDER BY average_total_charges DESC;

Explanation:

- Filter Criteria: Filters customers who have churned (Customer_Status = 'Churned').

- Grouping: Groups customers by Internet Service and Phone Service combinations.

- Aggregation: Calculates the average age and average total charges for each group.

Output:

Customer_Status	Internet_Service	Phone_Service	average_age	average_total_charges
Churned	Yes	Yes	50.1658	1719.08512
Churned	Yes	No	49.8882	687.0879412
Churned	No	Yes	43.469	173.9199115

Findings:
- Churned customers with Internet Service and Phone Service have the highest average total charges of 1719.08 and a relatively average age (50.16 years), indicating these customers are high-value but may require attention to improve retention.
- Customers with no internet service generally have lower total charges and are on average age (43.46 years).

6. Contract and Service Analysis and Financial Analysis:

a. Calculate the average monthly charges and total charges for customers who have churned, grouped by contract type and internet service type.

Columns Used – Customer_status, Internet_service, Internet_type, Contract

MYSQL coding:

```
SELECT Contract, Internet_Service, Internet_Type,
AVG(Monthly_Charge) AS average_monthly_charge, AVG(Total_Charges) AS
average_total_charges
FROM customer_churn_telecom.customer_churn_edited WHERE Customer_Status =
'Churned'GROUP BY Contract, Internet_Service, Internet_Type
ORDER BY average_total_charges DESC;
```

Explanation:
- Filter Criteria: Filters only churned customers (Customer_Status = 'Churned'). Ensures the query focuses on churned customers to analyze their charges by contract and internet service type.
- Grouping: Groups the dataset by Contract, Internet_Type and Internet Service to calculate averages for each combination.
- Aggregations: Uses AVG() to calculate: average_monthly_charge: The average monthly charge for each group. Average_total_charges: The average total charges for each group.
- Sorting: Orders the results by average_total_charges in descending order to prioritize the most valuable groups.

Output:

Contract	Internet_Service	Internet_Type	average_monthly_charge	average_total_charges
Two Year	Yes	Fiber Optic	104.71	6565.19
One Year	Yes	Fiber Optic	101.80	5275.77
Two Year	Yes	DSL	69.07	4400.36
Two Year	Yes	Cable	61.37	4239.27
One Year	Yes	Cable	74.77	3119.13
One Year	Yes	DSL	62.01	2262.04
Month-to-Month	Yes	Fiber Optic	85.01	1481.63
Month-to-Month	Yes	Cable	58.19	821.08
Month-to-Month	Yes	DSL	45.42	471.49

Findings:
- High churn with Fiber Optic and Two-Year contracts: This group contributes the highest revenue loss. Focus retention efforts and offer incentives for longer contracts to reduce churn.
- Month-to-Month contracts are risky: These have higher charges but higher churn. Encourage switching to longer-term contracts through discounts or added benefits.

7. Stored Procedures:

a. Stored Procedure to Calculate Churn Rate

Columns Used – Customer_status

MYSQL coding:

```
DELIMITER $$
CREATE PROCEDURE CalculateChurnRate()
BEGIN SELECT
COUNT(*) AS total_customers,
SUM(CASE WHEN Customer_Status = 'Churned' THEN 1 ELSE 0 END) AS
churned_customers,
(SUM(CASE WHEN Customer_Status = 'Churned' THEN 1 ELSE 0 END) / COUNT(*)) *
100 AS churn_rate_percentage
FROM customer_churn_telecom.customer_churn_edited;
END $$
DELIMITER ;

#execute
CALL CalculateChurnRate();
```

Explanation:
- Procedure Name: CalculateChurnRate calculates the total number of customers, churned customers, and churn rate percentage.
- Calculations: COUNT(*): Calculates the total number of customers.
- SUM(CASE WHEN Customer_Status = 'Churned' THEN 1 ELSE 0 END): Counts churned customers using a conditional sum.
- Churn rate percentage: Churn Rate (%)=(Churned Customers / Total Customers)×100
- Displays the total number of customers, churned customers, and churn rate percentage.

Output:

total_customers	churned_customers	churn_rate_percentage
7043	1869	26.537

Findings:

- The churn rate is approximately **26.537%**, indicating a significant percentage of customers leave, requiring focused retention strategies.

b. Stored Procedure to Identify High-Value Customers at Risk of Churning

Columns Used – Customer_ID, Total_Charges, Monthly_Charge, Contract, Tenure_in_Months, Customer_Status

MYSQL coding:

```
DELIMITER $$
CREATE PROCEDURE IdentifyHighValueChurnRisk()
BEGIN SELECT
Customer_ID, Total_Charges, Monthly_Charge, Contract, Tenure_in_Months, Customer_Status
FROM customer_churn_telecom.customer_churn_edited WHERE Customer_Status = 'Churned'
AND Total_Charges > (SELECT AVG(Total_Charges) FROM
    customer_churn_telecom.customer_churn_edited)
ORDER BY Total_Charges DESC limit 10;
END $$
DELIMITER ;

#execute
CALL IdentifyHighValueChurnRisk();
```
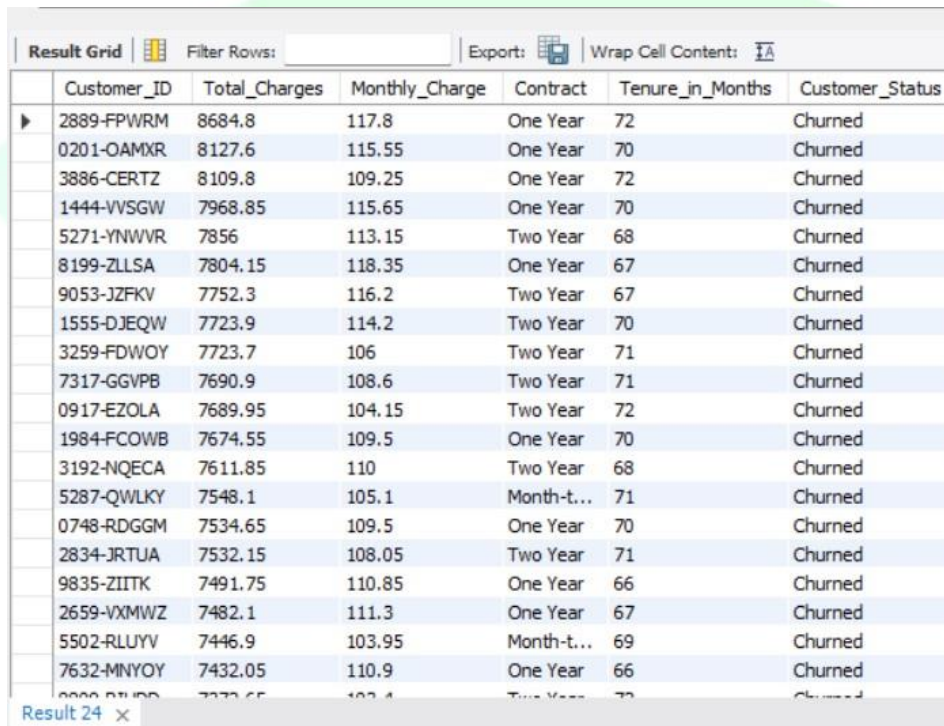
Explanation:

- Procedure Name:The procedure is named IdentifyHighValueChurnRisk.

- Filters: Customer_Status = 'Churned': Selects customers who have churned. Total_Charges > (SELECT AVG(Total_Charges)): Selects customers with total charges above the average, marking them as high-value customers.

- Fields Selected: Customer_ID: Identifies the customer, Total_Charges: Indicates their total contribution, Monthly_Charge: Shows their monthly payment, Contract: Identifies the contract type (e.g., Month-to-Month, One Year, etc.), Tenure_in_Months: Indicates how long they were with the company.

- Sorting: Orders by Total_Charges DESC to prioritize the highest-value churned customers at the top.

- Output: A list of churned customers with details about their payments and contracts.

Output:

Customer_ID	Total_Charges	Monthly_Charge	Contract	Tenure_in_Months	Customer_Status
2889-FPWRM	8684.8	117.8	One Year	72	Churned
0201-OAMXR	8127.6	115.55	One Year	70	Churned
3886-CERTZ	8109.8	109.25	One Year	72	Churned
1444-VVSGW	7968.85	115.65	One Year	70	Churned
5271-YNWVR	7856	113.15	Two Year	68	Churned
8199-ZLLSA	7804.15	118.35	One Year	67	Churned
9053-JZFKV	7752.3	116.2	Two Year	67	Churned
1555-DJEQW	7723.9	114.2	Two Year	70	Churned
3259-FDWOY	7723.7	106	Two Year	71	Churned
7317-GGVPB	7690.9	108.6	Two Year	71	Churned
0917-EZOLA	7689.95	104.15	Two Year	72	Churned
1984-FCOWB	7674.55	109.5	One Year	70	Churned
3192-NQECA	7611.85	110	Two Year	68	Churned
5287-QWLKY	7548.1	105.1	Month-t...	71	Churned
0748-RDGGM	7534.65	109.5	One Year	70	Churned
2834-JRTUA	7532.15	108.05	Two Year	71	Churned
9835-ZIITK	7491.75	110.85	One Year	66	Churned
2659-VXMWZ	7482.1	111.3	One Year	67	Churned
5502-RLUYV	7446.9	103.95	Month-t...	69	Churned
7632-MNYOY	7432.05	110.9	One Year	66	Churned
0000-DTUDD	7272.65	102.4	Two Year	72	Churned

Result 24 ✕

Findings:

- Customers with Month-to-Month contracts and high total charges are at risk of churning due to contract flexibility. Month -to-Month count 300 among 496 and high value charges is 8684.80.
- Longer-tenure customers (e.g., 65–72 months) indicate potential dissatisfaction despite being loyal contributors.

Procedure to Import MySQL Data into Power BI:

- Open Power BI Desktop: Launch Power BI and click Get Data.

- Connect to MySQL: Select MySQL Database as the data source.Enter Server Name (e.g., localhost) and Database Name (customer_churn_telecom). Provide your MySQL username and password, then click Connect.

- Select Tables: Choose the tables customer_churn and customer_churn_edited from the database, then click Load.

- Verify Data: Check the imported tables in the Data View for accuracy.

- Ensure Setup: Install the MySQL connector if needed. Confirm the MySQL server is running and accessible.

- **Reason why I used 7043 instead of 4835 datasets:**Used Left Anti Join to identify the missing rows from Customer_churn first table as customer_churn_edited in power editor used merge query to second table customer_churn where 2028 rows were missing, So using the 1st table will give us more accurate findings comparatively.

- **Adding new Condition columns:**
    - Column name **age_category**, where age column is used for categorizing this new column condition applied – where age >=30 years young, >= 45 years middle age, >= 60 years elder people and > than 60 senior citizen.
    - Column name **Tenure_months_category** where tenure in months column is used for categorizing this new column condition applied – where tenure of months <= 6 months then its 0 – 6 months, <= 12 months then its 6 – 12 months, <= 24 months then its 12 – 24 months, <= 36 months then its 24 – 36 months, <= 48 months then its 36 – 48 months, <= 60 months then its 48 – 60 months, if its > 60 months then its 60 + months.
    - Column name **High_Value_MC,** this column is created with reference to Monthly_Charges column, The purpose of this column is to categoric the data in Monthly_charge as high value and regular, so the average of Monthly_charge (i.e – 63.60/-) is used. Transform data > Home > Add column > Condition Column, in this add a condition if [Monthly_Charges] > 63.60 then "High-Value" else "Regular", click on ok the column is created.
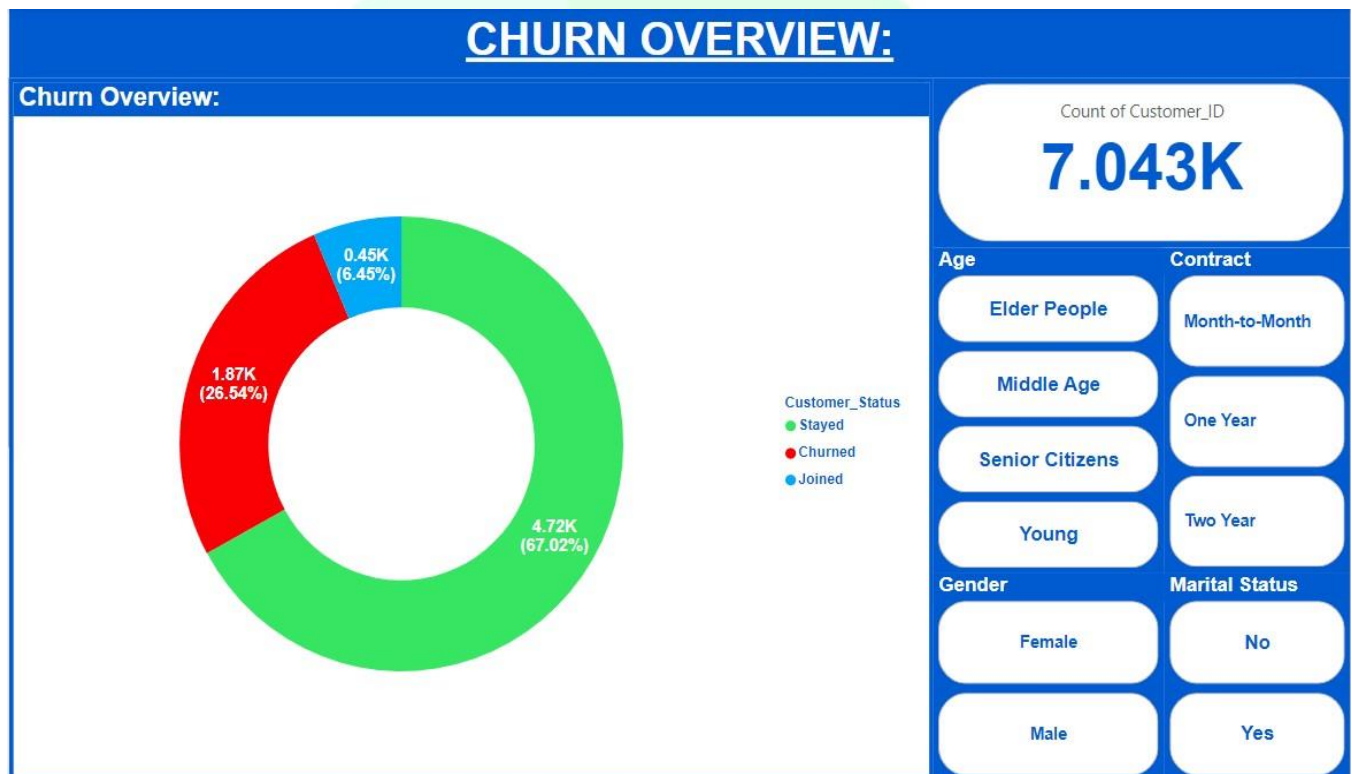
1. Churn Overview:

Objective:

To understand the proportion of churned vs. non-churned customers in the dataset.

Visualizations:

- Type: Donut Chart, Fields – Legend: Customer_Status, Values: Customer_ID (Count)
- Type: Cards, Fields – Customer id (Count).
- Type: Title silcers, Fields – Age Category, Gender, Marital Status and Contract.

Findings:

- Churned customers make up 26.54% i.e 1869 customers of the customer base.
- Whereas senior citizen (i.e: Customer age > 60) are of high 36.46% i.e 606 customers.
- Whereas Male customers are of high 36.27% i.e 305 customers.
- Whereas unmarried customers are of high 40.91% i.e 162 customers.
- Whereas month on month customers are of high 67.69% i.e 155 customers.

Suggestions:

- Retain Senior Citizens: Senior citizens (36.46% churn rate) need tailored services, discounts, or loyalty programs. Analyze their needs and address service or pricing issues to improve retention.
- Target Male Customers: Male Senior Citizens make up 36.27% of churned customers. Offer male-specific promotions or services, and investigate dissatisfaction points to reduce churn.
- Engage Unmarried Customers: Unmarried Male Senior Citizen customers (40.91% churn rate) may prefer flexible, cost-effective plans. Introduce pay-as-you-go options or discounts for long-term contracts to improve retention.
- Encourage Month-to-Month Customers: Encourage Long-Term Contracts -Provide significant discounts, free months, or additional benefits (e.g., free streaming subscriptions) for customers transitioning from month-to-month contracts to one-year or two-year contracts.
- Enhance Customer Experience: Optimize customer experience with better support, personalized communications, and loyalty programs to reduce churn across all groups.

2. Tenure and Churn Analysis:

Objective: To analyze the relationship between Tenure and churn.

Visualization:

- Type: Stacked Column Chart, Fields: X-Axis: Tenure Range (e.g., 0-6 months, 6-12 months, etc.), Y-Axis: Count of CustomerID, Legend: Tenure Range, Drill Drown: Customer status - churned.

- Type: Cards, Fields – Customer id (Count).

- Type: Title silcers, Fields – Age Category, Gender, Marital Status and Contract.

Methods:

- Create tenure buckets from the Tenure field (e.g., 0-6 months, 6-12 months, etc.).

- Overlay churn segmentation on these buckets.
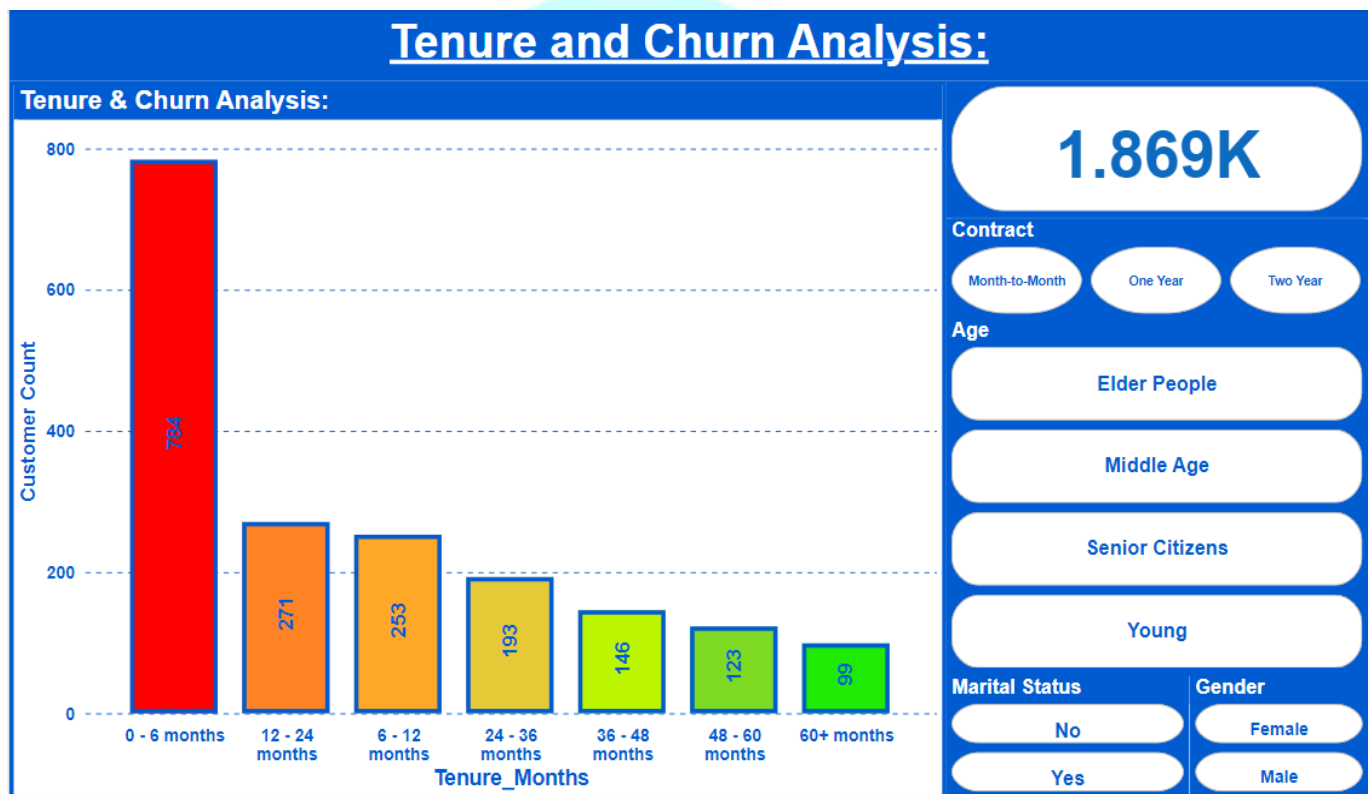
Findings:

- Churn rate is highest during the first 6 months count of customer is 784, from this the churned rate of customers based on contract type month on month is significantly high 780 count, from that senior citizen (age above 60) i.e. – 217 count and elder people (age between 45 to 60) i.e. – 200 count churned rates are significantly high, compare to male female in senior citizen are high in count i.e. – 118, and from that unmarried women are highly churned i.e. 93 count.

- Customers with tenure over 60 + months show significantly lower churn rates count id 99.

Suggestions:

- Enhance Onboarding: Address the high churn in the first 6 months (784 customers, 780 churned) with structured onboarding programs, educational resources, and personalized support.

- Retain Senior Citizens: Senior citizens (217 churned) need tailored benefits like discounts, personalized plans, and user-friendly interfaces to improve retention.

- Focus on Month-to-Month Contracts: Offer incentives like loyalty rewards or discounts to encourage customers with month-to-month contracts to switch to yearly plans.

- Target Unmarried Women: Address the churn among unmarried women (93 churned) with personalized plans, flexible options, and exclusive perks to meet their needs.

- Gender-Based Retention: Reduce churn among male senior citizens (118 churned) with targeted promotions and improved service satisfaction.

- Reward Long-Term Customers: Promote loyalty among 60+ month tenure customers (99 churned) with referral programs, rewards, and exclusive deals to maintain satisfaction.

## 3. Churn Reasons and Financial Impact:

Objective: To understand reasons for churn and their financial impact.

Visualization:

- Type: Horizontal Bar Chart, Fields- X-Axis: Count of CustomerID, Y-Axis: Churn Reason.

- Type: Clustered Column Chart. Fields - X-Axis: Churn Reason, Y-Axis: Total Charges.

- Type: Cards, Fields – Customer id (Count).

- Type: Title slicers, Fields –Gender,

Methods:

- Categorize customers by the Churn Reason column.

- Aggregate total charges lost (Total Charges) for each churn reason.
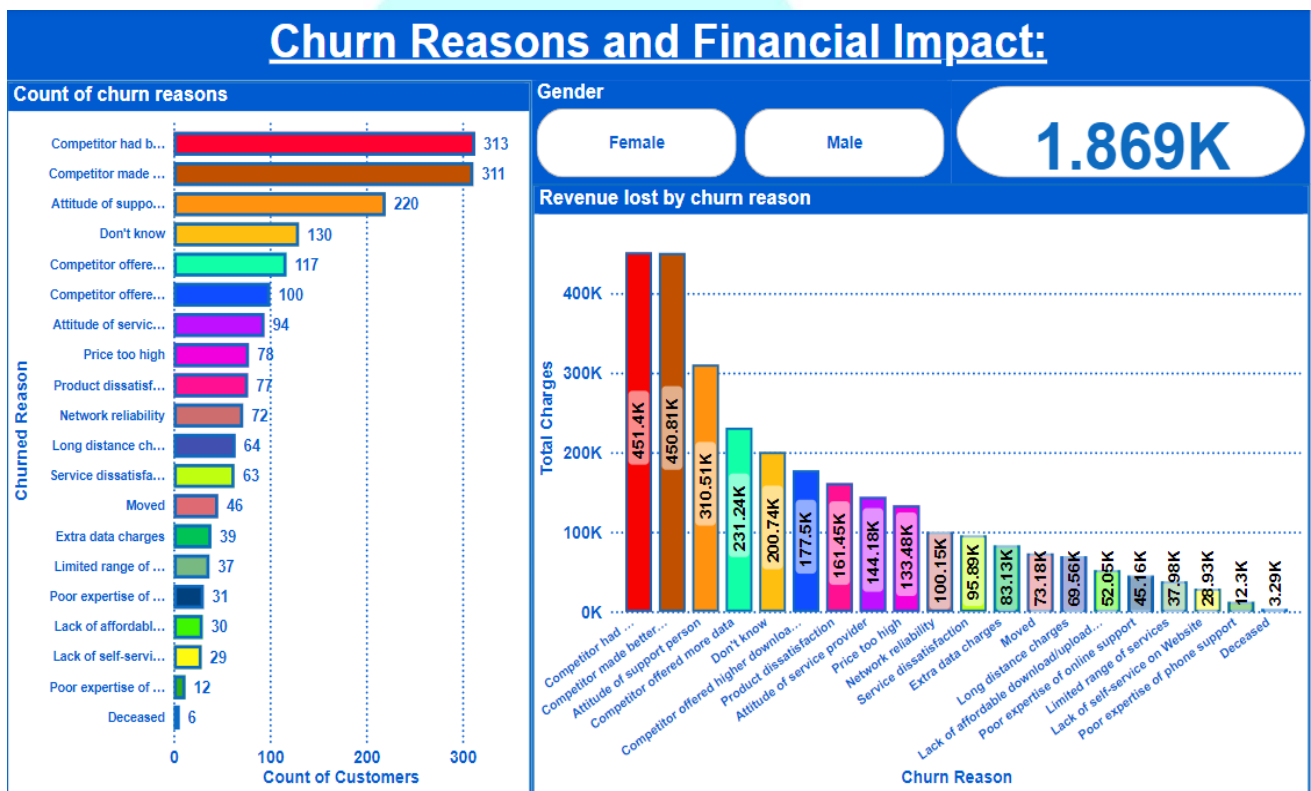
Findings:

- Among the 20 reasons the top three major churn reasons are competitors provides better device are 313 counts, competitors provide better pricing are 311 counts and customer because of attitude of support person are 220 count a total count of 844 Customers i.e. 45.15% among the total 1869 churned customers. Among this whereas female customers counts are of 427 and male customer counts are of 417.

- The highest revenue loss has also occurred due to the same 3 reasons only i.e. competitors provide better device ($451,400.30), competitors provide better pricing ($450,809.60) and attitude of support person ($310,508.35).

Suggestions:

- Improve Competitiveness: Address device and pricing gaps by enhancing product features and offering competitive pricing plans to retain customers.
- Focus on Support Quality: Train support staff to improve customer interactions and reduce churn caused by negative experiences.
- Segmented Retention Offers: Target male and female customers specifically impacted by these reasons with customized retention offers.
- Proactive Interventions: Use analytics to identify at-risk customers early and provide solutions to prevent churn for top reasons.
- Monitor Competitor Strategies: Regularly evaluate competitor offerings to stay aligned with market expectations.

4. Impact of Online and Streaming Services on Churn:

Objective: To analyze the impact of services on churn.

Visualization:

- Type: Cluster Bar Chart, Fields: Y-Axis: Services (e.g., Streaming TV, Streaming Movies, Streaming Music Online Backup, Online Security and Premium Tech Support), Y-Axis: Percentage of CustomerID.

- Type: Table, Columns – Streaming TV, Streaming Movies, Streaming Music Online Backup, Online Security and Premium Tech Support.

- Type: Cards, Fields – Customer id (Count).

Methods:

- Analyze service usage data from fields like Streaming TV, Streaming Movies, Streaming Music, Online Backup, Online Security and Premium Tech Support.

- Compare churn percentages across each service type.
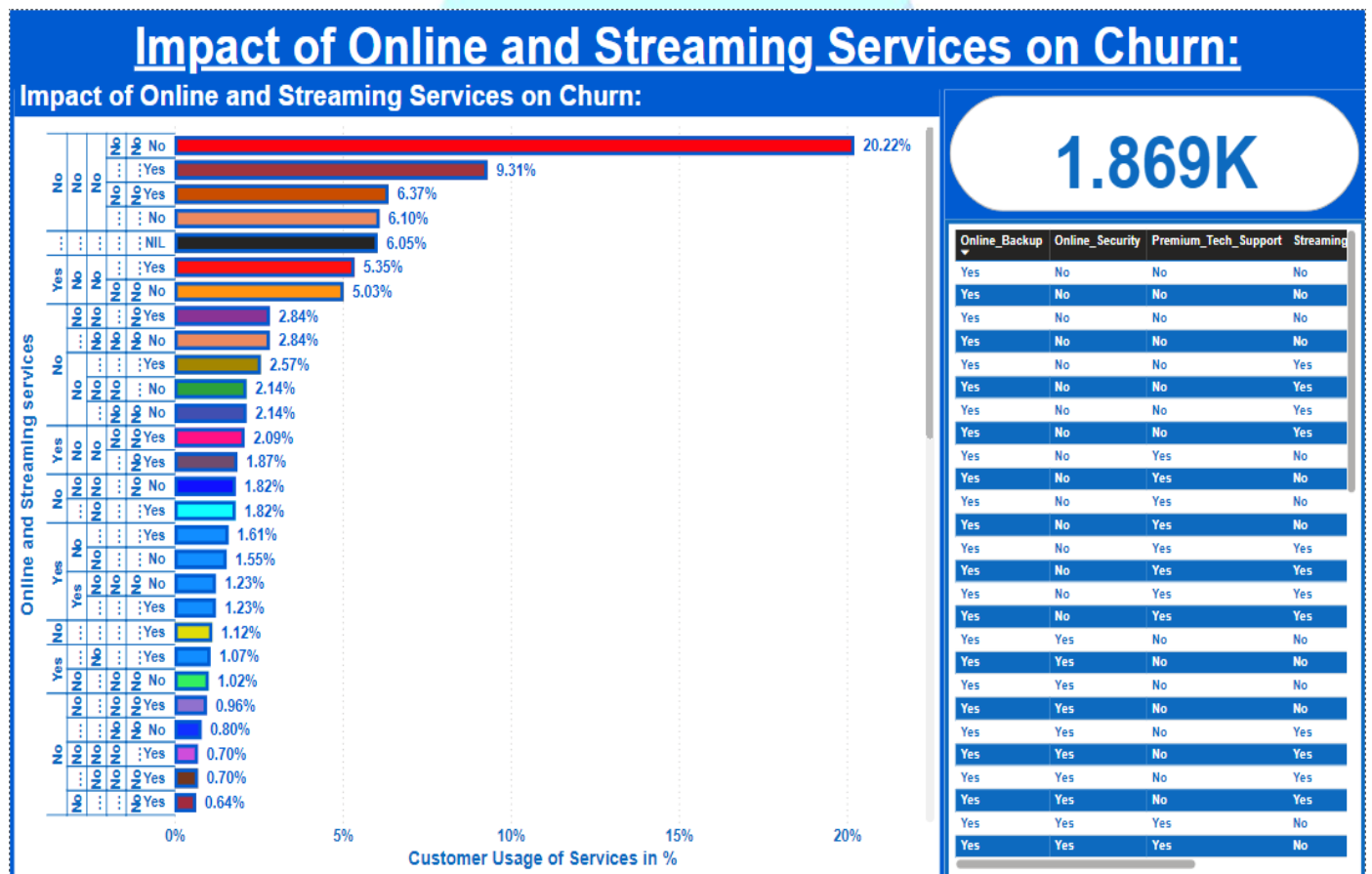
Findings:

- Among the Churned customers near to 20.22% of customers (i.e.378 customers) didn't prefer any type of online service and streaming service.

- 9.31% customers (i.e. 174 customers) among the churned customers prefer only the streaming service.

- Among all the churned customers only 1.61% of customers (i.e. 30 customers) prefer 2 service from online services and all 3 from streaming services.

Suggestions:

- Target Non-Users: Introduce trials or bundles to engage the 20.22% churned customers who don't use any services.

- Boost Streaming Appeal: Enhance quality, variety, and pricing for the 9.31% churned customers using only streaming services.

- Promote Bundles: Offer attractive deals combining online and streaming services to retain the 1.61% churned customers using multiple services.

- Increase Awareness: Highlight the value of online services like security and backup through targeted campaigns.

- Use Feedback: Survey churned customers to refine and improve service offerings.

5. Geographical Mapping of Customer Status (Area-Wise Categorization)

Objective:

Visualize the distribution of customer status (e.g., Churned, Stayed, Joined) across different geographical locations.

Visualization:

- Type: Map Chart, Fields: Location: City & Zip_Code for more granular data, Legend: Customer_Status, Size: Customer_ID (Count).

- Type: Title silcers, Fields – Customer_Status.

- Type: Table, Fields: Columns – City, Customer status and Count of Customer.

- Type: Cards, Fields – Customer id (Count).

Method:

- Drag a Map Chart onto the canvas.

- Location: Drag City and Zip_Code., Legend: Drag Customer_Status. and Size: Drag Customer_ID (Count).

- Customize the title to "Geographical Distribution of Customer Status".
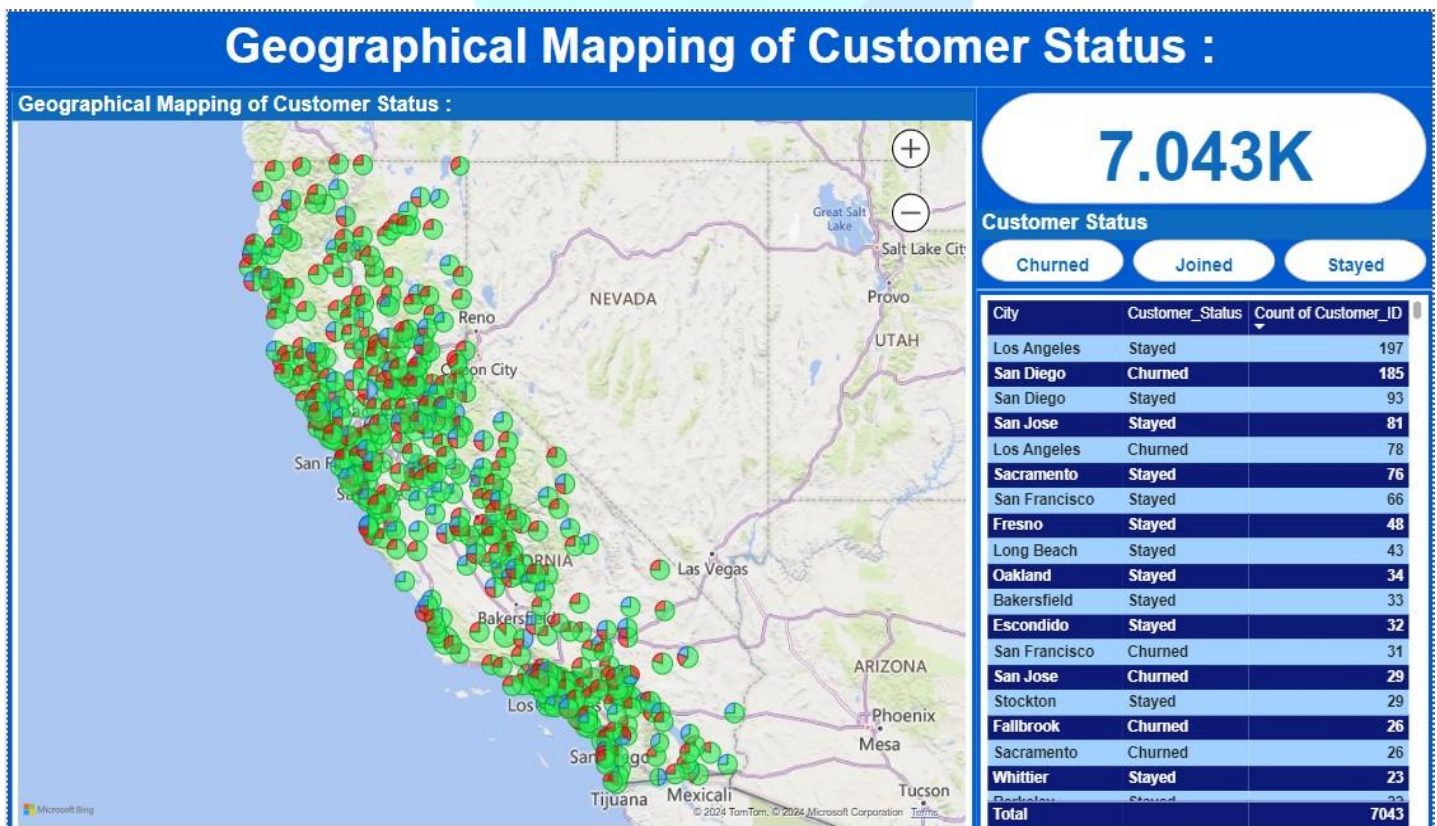
Findings:

- San Diego shows higher concentration of churned customers i.e. – 185 customers, indicating specific regional issues.

- Los Angles shows higher rate of customers staying with the service i.e. – 197 customers.

Suggestions:

- Regional Strategies: Focus on regions with higher churn rates for targeted retention efforts.

- Analyze Regional Trends: Investigate whether local competitors or service quality issues contribute to churn.
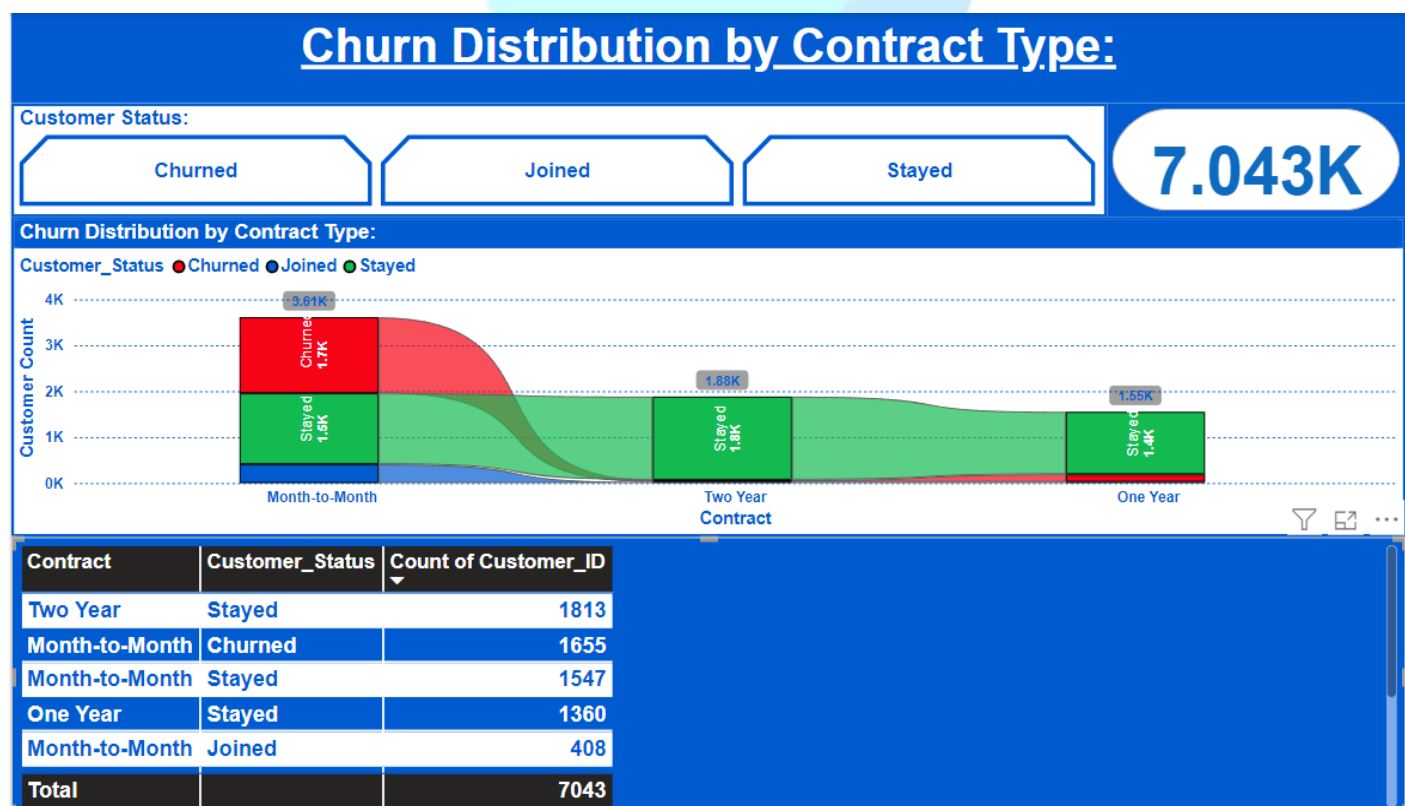
6. Churn Distribution by Contract Type:

Objective:

To understand churn distribution across different contract types.

Visualization:

- Type: Ribbon Chart, Fields Used: X-Axis: Contract_Type, Y-Axis: Count of Customer_ID, Legend: Customer_Status.

- Type: Table – Contract, Customer status and Customer id_ count.

- Type: Cards, Fields – Customer id (Count).

- Type: Slicer – Customer Status.

Method:

- Insert Ribbon Chart: Drag and drop onto the Power BI canvas.

- Add X-Axis: Drag Contract_Type.

- Add Y-Axis: Drag Customer_ID (Count).

- Add Legend: Use Customer_Status to differentiate churned and non-churned customers.

- Format the chart title as "Churn Distribution by Contract Type."

Contract	Customer_Status	Count of Customer_ID
Two Year	Stayed	1813
Month-to-Month	Churned	1655
Month-to-Month	Stayed	1547
One Year	Stayed	1360
Month-to-Month	Joined	408
Total		7043

Findings:

- Month-to-month contracts show significantly higher churn rates compared to yearly contracts.

- Highest customers stay in 2 years contract type.

Suggestions:

- Promote Long-Term Contracts: Provide incentives to encourage customers to switch from month-to-month to yearly contracts.

- Retention Programs: Focus on month-to-month customers with higher churn risk.

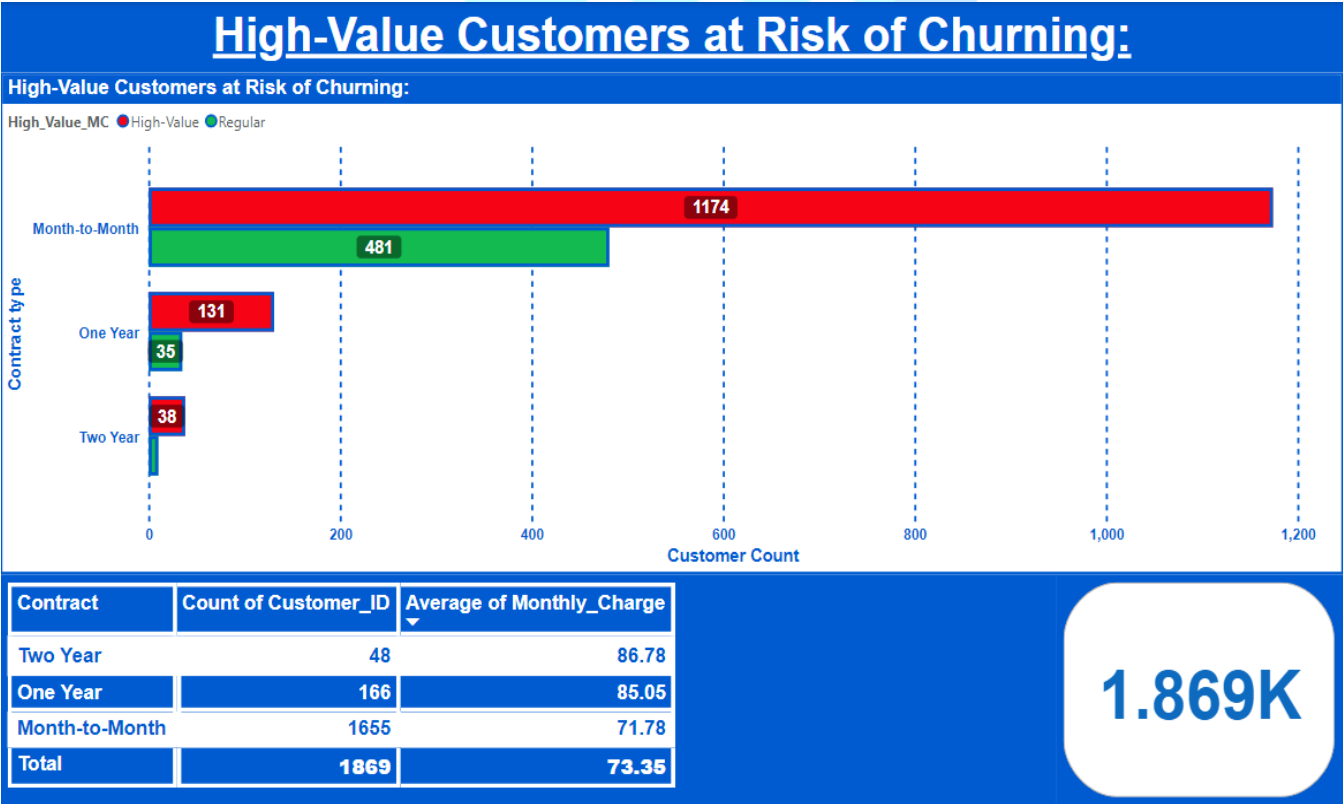# 7. High-Value Customers at Risk of Churning:

Objective:

To segment high-value customers who are at risk of churning based on thresholds.

Visualization:

- Type: Matrix, Fields Used: Customer_ID, Monthly_Charges, Contract_Type, Customer_Status and High-Value.

- Type: Cluster Bar Chart, Fields Used: Y-Axis – Contract, X-axis- Customer_ID in count, Legent – High_Value_MC, Filter – Customer_staus – Churned.

- Type: Cards, Fields – Customer id (Count).

Method:

- Insert Chart: Add the Cluster Bar chart.

- Add Fields: Drag Customer_ID, Monthly_Charges, Contract_Type, and Customer_Status to the table.

- Apply Filters: Add the High-Value Customers measure as a filter. Set it to show only "High-Value" customers.

High-Value Customers at Risk of Churning:

High-Value Customers at Risk of Churning:

High_Value_MC ● High-Value ● Regular

| Contract	Count of Customer_ID	Average of Monthly_Charge
Two Year	48	86.78
One Year	166	85.05
Month-to-Month	1655	71.78
Total	1869	73.35

1.869K

Findings:

- Customers with month-to-month contracts and high monthly charges are at a greater risk of churning.
- Since this is reference to the 1174 churned customers who are in month to month contract type customers with high value monthly charges (above the average of 63.60 which is the total average of monthly charges).

Suggestions:

- Proactive Retention: Engage with high-value customers early to prevent churn.
- Exclusive Offers: Provide premium services or loyalty perks to retain high-value customers.

Final Dashboard Layout (Analysis of Customer churn):
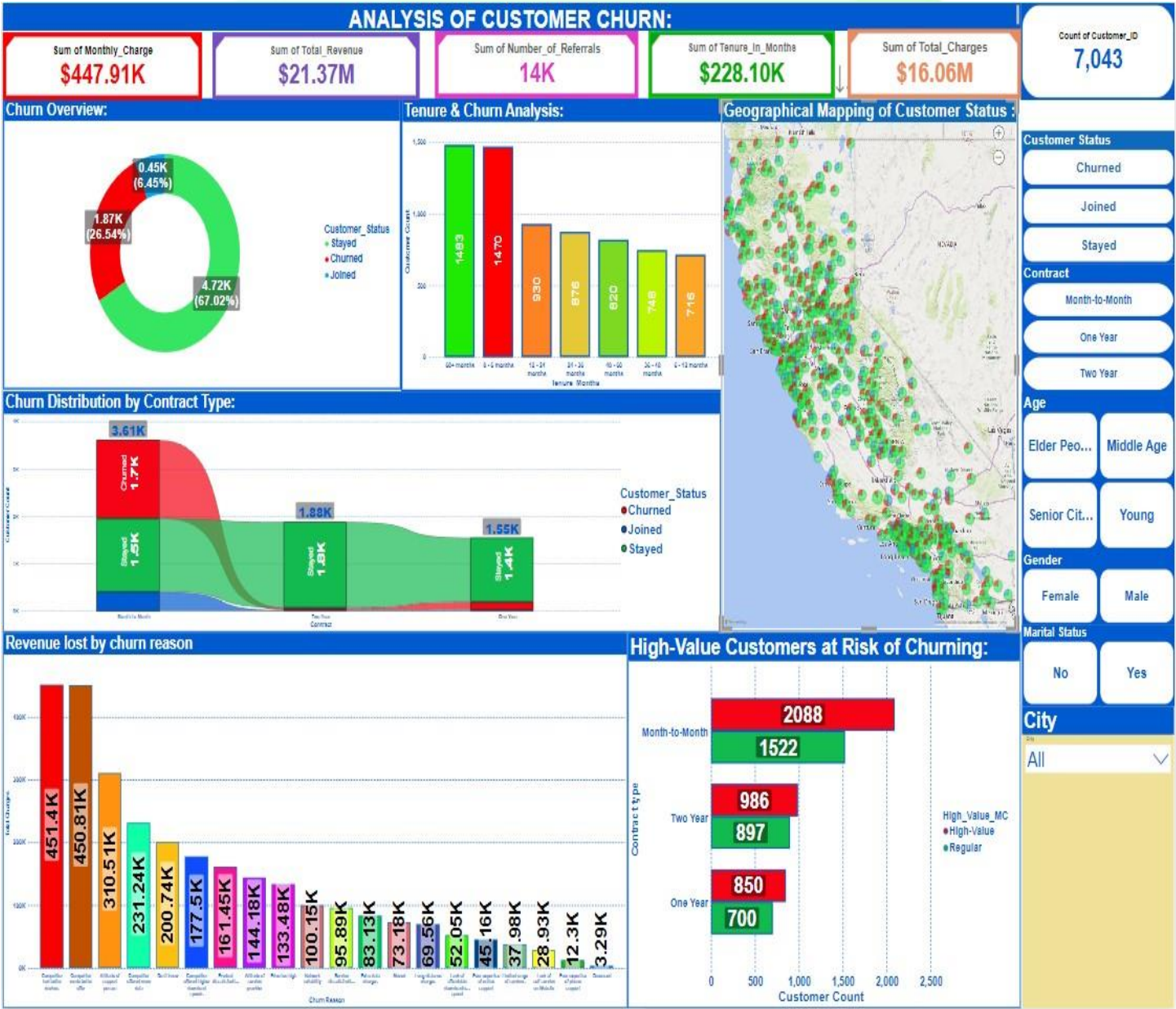
Recommendations to Reduce Churn with Numerical Insights:

1. **Churn rate by Category:**
   - Churned customers make up 26.54% (1,869) of the total base, with key high-risk groups identified: Senior Citizens at 36.46% (606), Male Customers at 36.27% (305), Unmarried Customers at 40.91% (162), and Month-to-Month Contract users at 67.69% (155).
   - Action: To reduce churn, tailored retention strategies are needed: offer discounts, loyalty programs, and targeted services for senior citizens and male customers; introduce flexible, cost-effective plans like pay-as-you-go for unmarried customers; and incentivize month-to-month customers with discounts, free months, or added benefits to transition to long-term contracts. Improving customer experience through better support, personalized communication, and loyalty rewards will further enhance retention across all groups.

2. **Convert Month-to-Month Contracts:**
   - Issue: 1,174 customers on Month-to-Month contracts are at churned. So similarly, there are high chances of staying customers to be churned from this contract type.
   - Action: So better we can move them to one year or two-year contract by providing them better offer. Offer discounts or rewards to joined customers in month-on-month contract type for better retention.

3. **Improve New Customer Onboarding:**
   - Insight: 784 customers churned within the first 6 months.
   - Action: Provide welcome offers, proactive support, and targeted communication in this period.

4. **Address Churn Reasons:**
   - Competitor Services:
     - Top churn reason causing a revenue loss of $451.40K.
     - Action: Offer price-matching plans and emphasize unique service benefits.
   - Customer Service Issues:
     - Responsible for $450.81K revenue loss.
     - Action: Improve response times, resolve complaints quickly, and conduct feedback surveys.
   - Attitude of support person:
     - Causes $310.15K revenue loss.

o Action: Improve place well train executives in customer support and provide various kind of personality development training for customers to attend customers in much better manner.

5. **Focus on High-Value Customers:**

- Insight: Customers at high risk of churn (particularly on Month-to-Month plans) since 1,174 customers are churned.

- Action: Implement personalized outreach, loyalty rewards, and exclusive perks to retain high-value customers.

6. **Target High-Churn Regions:**

- Observation: Significant churn across specific regions (Eg: San Diago – 185 churned customers).

- Action: Launch region-specific offers and enhance service availability in these areas.

7. **Engage Customers in Key Tenure Segments:**

- Observation: Churn remains high between 6-12 months (253 customers) and 12-24 months (271 customers).

- Action: Focus on targeted retention strategies during these critical time periods.

8. **Service Usage Analysis and Retention Strategies:**

- Among churned customers, 20.22% (378 customers) did not prefer any type of online or streaming services, while 9.31% (174 customers) opted only for streaming services. Additionally, a small group, 1.61% (30 customers), preferred two online services and all three streaming services, indicating limited multi-service adoption among churned users.

- Action: To retain customers, offer trials or bundles for the non-users and improve quality, variety, and pricing for the users using only streaming services. Engage the multi-service users with exclusive online-streaming bundle deals. Promote online services like security and backup through targeted campaigns and gather feedback to enhance offerings.

9. **Collect & Act on Feedback:**

- Insight: Competitor provide better device ($451.40K), Competitor made better offers ($450.81K) and attitude of support person ($310.51K) issues together lead to a combined revenue loss of over $1.2M.

- Action: Conduct post-churn surveys and analyze reasons to create actionable improvements.

Conclusion: Predicting Customer Churn in Telecom Industry

- **Churn Insights**: Churn rate is **26.54%**, with early churn (within 6 months) and month-to-month contracts posing the highest risk.

- **Key Drivers**: Competitor pricing, device offerings, and poor customer support are the main churn reasons.

- **Customer Patterns**: Senior citizens, unmarried customers, and those with fewer services are more likely to churn. Two-year contracts and bundled services show better retention rates.

- **Recommendations**: Focus on retaining high-risk groups with targeted offers, loyalty programs, and improved support. Promote long-term contracts and bundled services for higher customer loyalty.

- **Business Impact**: Predictive analysis helps reduce churn, stabilize revenue, and enhance customer satisfaction.

With data-driven strategies, telecom companies can proactively address churn and drive long-term growth.