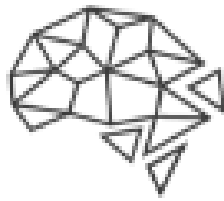




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SDBI | School of
Data Science &
Business Intelligence

**“TELECOM CHURN ANALYSIS”
DATA VISUALIZATION USING POWER BI**

By
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Under the Guidance of
Prof. Awesh Bhornya

Acknowledgement

We would like to sincerely thank everyone who supported and guided us throughout the completion of our project, ***“Telecom Churn Analysis: Data Visualization Using Power BI.”*** This project has been both challenging and insightful, and we are deeply grateful to all those who contributed to its success.

First, we would like to express our heartfelt gratitude to Prof. Awesh Bhornya , our project supervisor, for his invaluable guidance, continuous support, and helpful feedback. His expertise, dedication, and encouragement were instrumental in shaping this project. His mentorship inspired us to push boundaries and refine our understanding of data analysis and visualization.

We also want to acknowledge the efforts of our entire project team. The dedication, creativity, and collaborative spirit of each team member played a crucial role in the successful execution of this project. The diverse skill sets and ideas brought by every individual allowed us to dive deep into the complexities of telecom churn analysis and extract meaningful insights from the data.

Lastly, we would like to thank our friends and peers for their constant support, motivation, and constructive feedback. Their encouragement helped us stay focused and work through the challenges we encountered along the way.

In conclusion, we are immensely grateful to everyone who contributed to the success of this project. The lessons learned through this experience have not only enriched our knowledge but have also strengthened our ability to work effectively as a team.

Thank you.

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Executive Summary

The telecommunications industry faces a significant challenge in managing customer churn, the process by which customers stop using services. Churn not only affects revenue but also incurs costs related to acquiring new customers to replace those who leave. This project, **Telecom Churn Analysis**, aims to provide a data-driven approach to understanding customer churn patterns. By creating a Power BI dashboard that visualizes customer data, including demographic information, service usage, and reasons for leaving, we offer telecom operators actionable insights to enhance customer retention.

This project focuses on answering key questions:

- Which customers are most likely to churn?
- What are the primary reasons for churn?
- How can telecom companies reduce churn using this data?

The dashboard features multiple components, including **Customer Profiles**, **Churner Profiles**, **Customer Details** and **Churn Reason Analysis**, allowing users to drill down into specific data segments. Additionally, it offers an **Ask a Question** feature, where users can input natural language queries to interactively explore the data.

Introduction

In the highly competitive telecom industry, customer retention is crucial for maintaining profitability and sustaining long-term growth. Customer churn—when clients discontinue their services—is a significant challenge that telecom companies must address proactively. Understanding the factors leading to churn and identifying high-risk customers are key components in reducing churn and improving customer loyalty.

This project, "**Telecom Churn Analysis: Data Visualization Using Power BI**" is designed to provide a comprehensive, interactive exploration of customer churn data. The project leverages multiple dashboards to visualize customer profiles, churn behavior, and churn reasons, enabling telecom companies to identify trends and implement data-driven strategies to enhance customer retention.

The following dashboards have been developed as part of this analysis:

1. **HOME Page:** This central hub provides intuitive navigation, allowing users to seamlessly access all other dashboards for a complete view of the analysis.
2. **Customer Profile:** This dashboard offers insights into the demographic and behavioral characteristics of the customer base, such as tenure, contract type, phone service, and internet usage. It also highlights patterns in monthly and total charges, giving a broad overview of customer preferences.
3. **Churner Profile:** This dashboard focuses on customers who have churned, allowing for a comparative analysis against the overall customer base. It identifies key factors such as tenure, service usage, and demographics that contribute to churn, helping to pinpoint at-risk customers.
4. **Customer Details:** This dashboard provides a drill-down view of individual customer data, enabling users to closely examine specific customer attributes, behaviors, and service histories.
5. **Churn Reasons:** This dashboard delves into the root causes of customer churn, visualizing the primary reasons for service cancellation. By understanding why customers leave, telecom companies can tailor strategies to mitigate churn.

6. **Ask a Question:** This interactive feature allows users to ask questions directly within the data, facilitating real-time insights and data exploration using natural language queries.

By utilizing these dashboards, telecom companies can better understand the dynamics of their customer base, identify at-risk customers, and craft personalized retention strategies. The goal of this analysis is to transform churn-related data into actionable insights, ultimately reducing churn rates and enhancing customer satisfaction.

Dataset Overview

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
	customerID	gender	SeniorCitizen	Partner	Dependents	tenure	PhoneService	MultipleLine	InternetService	OnlineSecurity	OnlineBackup	DeviceProtection	TechSupport	StreamingTV	StreamingMovie	Contract	PaperlessBilling	PaymentMethod	MonthlyCharges	TotalCharges	Churn
1	7590-VHVEG	Female	0	Yes	No	1	No	No phone servic	DSL	No	Yes	No	No	No	No	Month-to-month	Yes	Electronic check	29.85	29.85	No
2	5575-GNVEDE	Male	0	No	No	34	Yes	No	DSL	Yes	No	Yes	No	No	No	One year	No	Mailed check	56.95	1889.5	No
3	3668-QPYBK	Male	0	No	No	2	Yes	No	DSL	Yes	Yes	No	No	No	No	Month-to-month	Yes	Mailed check	53.85	108.15	Yes
4	7795-CFOCW	Male	0	No	No	45	No	No phone servic	DSL	Yes	No	Yes	Yes	No	No	One year	No	Bank transfer (auto	42.3	1840.75	No
5	9237-HQITU	Female	0	No	No	2	Yes	No	Fiber optic	No	No	No	No	No	No	Month-to-month	Yes	Electronic check	70.7	151.65	Yes
6	9305-CDSKC	Female	0	No	No	8	Yes	Yes	Fiber optic	No	No	Yes	No	Yes	Yes	Month-to-month	Yes	Electronic check	99.65	820.5	Yes
7	1452-KIOVK	Male	0	No	Yes	22	Yes	Yes	Fiber optic	No	Yes	No	No	Yes	No	Month-to-month	Yes	Credit card (automa	89.1	1949.4	No
8	6713-KOIMC	Female	0	No	No	10	No	No phone servic	DSL	Yes	No	No	No	No	No	Month-to-month	No	Mailed check	29.75	301.9	No
9	7892-POOK9	Female	0	Yes	No	28	Yes	Yes	Fiber optic	No	No	Yes	Yes	Yes	Yes	Month-to-month	Yes	Electronic check	104.8	3046.05	Yes
10	6388-TABGU	Male	0	No	Yes	62	Yes	No	DSL	Yes	Yes	No	No	No	No	One year	No	Bank transfer (auto	56.15	3487.95	No
11	9763-GRSKD	Male	0	Yes	Yes	13	Yes	No	DSL	Yes	No	No	No	No	No	Month-to-month	Yes	Mailed check	49.95	587.45	No
12	7469-LKBCI	Male	0	No	No	16	Yes	No	No	No internet serv	No internet serv	No internet service	No internet ser	No internet ser	No internet service	Two year	No	Credit card (automa	18.95	326.8	No
13	8091-TTAX	Male	0	Yes	No	58	Yes	Yes	Fiber optic	No	No	Yes	No	Yes	Yes	One year	No	Credit card (automa	100.35	5681.1	No
14	0280-XJGEX	Male	0	No	No	49	Yes	Yes	Fiber optic	No	Yes	Yes	No	Yes	Yes	Month-to-month	Yes	Bank transfer (auto	103.7	5036.3	Yes
15	5129-JLPIS	Male	0	No	No	25	Yes	No	Fiber optic	Yes	No	Yes	Yes	Yes	Yes	Month-to-month	Yes	Electronic check	105.5	2686.05	No
16	3655-SNOYZ	Female	0	Yes	Yes	69	Yes	Yes	Fiber optic	Yes	Yes	Yes	Yes	Yes	Yes	Two year	No	Credit card (automa	113.25	7895.15	No
17	8191-XWSZG	Female	0	No	No	52	Yes	No	No	No internet serv	No internet serv	No internet service	No internet ser	No internet ser	No internet service	One year	No	Mailed check	20.65	1022.95	No
18	9959-WOFKT	Male	0	No	Yes	71	Yes	Yes	Fiber optic	Yes	No	Yes	No	Yes	Yes	Two year	No	Bank transfer (auto	106.7	7382.25	No
19	4190-MFLUW	Female	0	Yes	Yes	10	Yes	No	DSL	No	No	Yes	Yes	No	Yes	Month-to-month	No	Credit card (automa	55.2	528.35	Yes
20	4183-MYFRB	Female	0	No	No	21	Yes	No	Fiber optic	No	Yes	Yes	No	No	Yes	Month-to-month	Yes	Electronic check	90.05	1862.9	No
21	8779-QRDMV	Male	1	No	No	1	No	No phone servic	DSL	No	No	Yes	No	No	Yes	Month-to-month	Yes	Electronic check	39.65	39.65	Yes
22	1680-VDCWW	Male	0	Yes	No	12	Yes	No	No	No internet serv	No internet serv	No internet service	No internet ser	No internet ser	No internet service	One year	No	Bank transfer (auto	19.8	202.25	No
23	1066-KXGK	Male	0	No	No	1	Yes	No	No	No internet serv	No internet serv	No internet service	No internet ser	No internet ser	No internet service	Month-to-month	No	Mailed check	20.15	20.15	Yes
24	3638-WEABW	Female	0	Yes	No	58	Yes	Yes	DSL	No	Yes	No	Yes	No	No	Two year	Yes	Credit card (automa	59.9	3505.1	No
25	6322-HRFFA	Male	0	Yes	Yes	49	Yes	No	DSL	Yes	Yes	No	Yes	No	No	Month-to-month	No	Credit card (automa	59.6	2970.3	No
26	6865-JZKNO	Female	0	No	No	30	Yes	No	DSL	Yes	Yes	No	No	No	No	Month-to-month	Yes	Bank transfer (auto	55.3	1530.6	No
27	6467-CHFZW	Male	0	Yes	Yes	47	Yes	Yes	Fiber optic	No	Yes	No	No	Yes	Yes	Month-to-month	Yes	Electronic check	99.35	4749.15	Yes
28	8665-LFDHZ	Male	0	Yes	Yes	1	No	No phone servic	DSL	No	Yes	No	No	No	No	Month-to-month	No	Electronic check	30.2	30.2	Yes
29	5248-YGUN	Male	0	Yes	No	72	Yes	Yes	DSL	Yes	Yes	Yes	Yes	Yes	Yes	Two year	Yes	Credit card (automa	90.25	6369.45	No
30	8773-HHUOZ	Female	0	No	Yes	17	Yes	No	DSL	No	No	No	No	Yes	Yes	Month-to-month	Yes	Mailed check	64.7	1093.1	Yes
31	3841-NFECK	Female	1	Yes	No	71	Yes	Yes	Fiber optic	Yes	Yes	Yes	Yes	No	No	Two year	Yes	Credit card (automa	96.35	6766.95	No

The dataset titled Telecom Customer Churn contains information about customers of a telecommunications company, focusing on their demographics, services used, and whether they have churned (i.e., stopped using the service). The dataset consists of **5,129 rows and 21 columns**, with each row representing a unique customer. Below is a summary of the key attributes in the dataset:

- **CustomerID:** Unique identifier for each customer.
- **Gender:** Gender of the customer (Male/Female).
- **SeniorCitizen:** Indicates if the customer is a senior citizen (1 = Yes, 0 = No).
- **Partner:** Indicates if the customer has a partner (Yes/No).
- **Dependents:** Indicates if the customer has dependents (Yes/No).
- **Tenure:** Number of months the customer has been with the company.

- **PhoneService:** Indicates if the customer has phone service (Yes/No).
- **MultipleLines:** Indicates if the customer has multiple lines (Yes/No/No phone service).
- **InternetService:** Type of internet service (DSL/Fiber optic/No internet service).
- **OnlineSecurity,OnlineBackup,DeviceProtection, TechSupport, StreamingTV, and StreamingMovies:** Indicate whether the customer subscribes to these additional services.
- **Contract:** Type of contract (Month-to-month/One year/Two year).
- **PaperlessBilling:** Indicates if the billing is paperless (Yes/No).
- **PaymentMethod:** Method of payment (e.g., Electronic , Credit card).
- **MonthlyCharges:** Monthly charges for the service.
- **TotalCharges:** Total charges incurred by the customer.
- **Churn:** Indicates whether the customer has churned (Yes/No).

Data Exploration

Descriptive Statistics

To understand the dataset better, we can perform some descriptive statistics:

Demographics:

Gender distribution can be analyzed to see if there is a significant difference in churn rates between males and females.

The percentage of senior citizens versus non-senior citizens.

Service Usage:

Breakdown of customers using different types of internet services.

Analysis of additional services subscribed to by customers who have churned versus those who have not.

Contract Types:

Comparison of churn rates based on contract types to determine which contracts are more likely to retain customers.

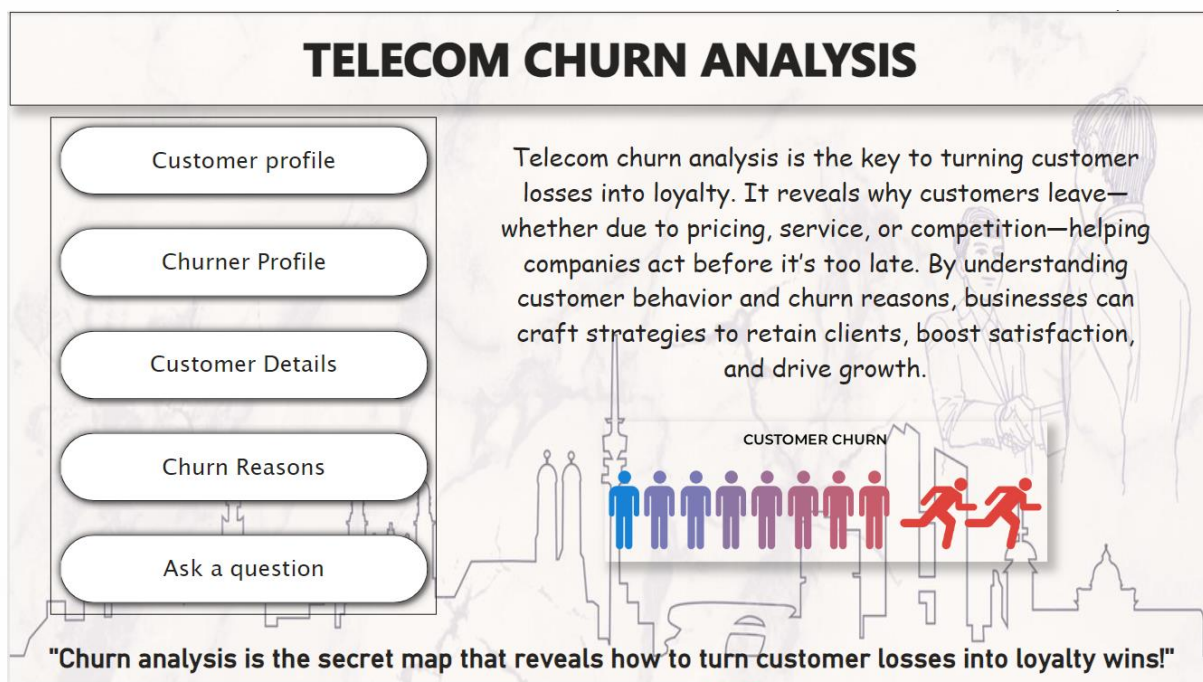
Charges:

Summary statistics for MonthlyCharges and TotalCharges, including mean, median, and standard deviation, can help identify pricing patterns among customers.

Dashboard Components

The **Telecom Churn Analysis Dashboard** is built with several components, each serving a unique purpose in understanding customer churn. Here, we provide a detailed explanation of each dashboard section and its functionality:

Home Page:



Customer Profile Dashboard:

The Customer Profile dashboard displays the demographic distribution of all active customers. This dashboard is essential for understanding the customer base and identifying which segments are more likely to churn. The key elements of the Customer Profile dashboard are:

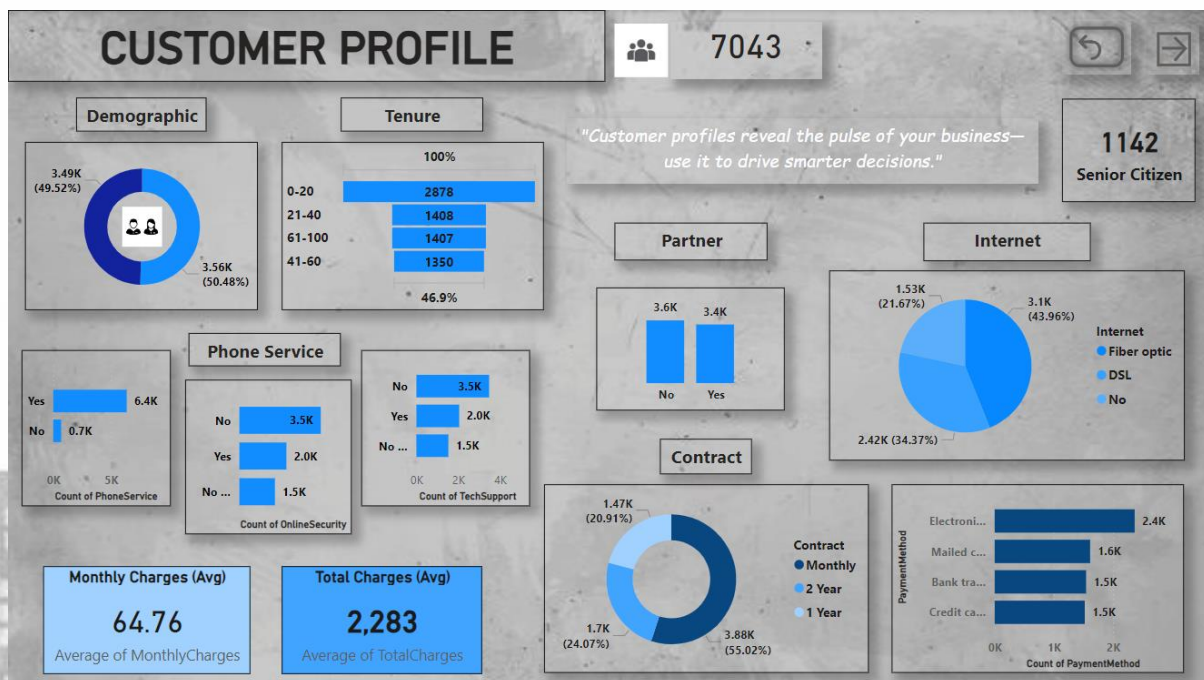
- **Demographic Filters:** Users can filter customers based on attributes such as gender, age group, region, and tenure. This provides insights into the different demographics and their respective churn risks.
- **Visual Representation:** The dashboard includes pie charts and bar graphs that show the percentage of customers by demographic

segments (e.g., gender distribution, age group distribution). These visuals help in understanding the broader customer base at a glance.

- **Insights into Churn Patterns:** By applying filters, the dashboard allows for the identification of demographic groups with higher churn rates. For example, if a particular age group has a disproportionately high churn rate, the telecom operator can design specific retention strategies for that group.

Working of the Dashboard:

- The **Age Group Distribution** bar chart dynamically adjusts when filters are applied (e.g., filtering for internet-only customers).
- **Gender-based Filters** can be applied to compare churn risk between male and female customers, giving insights into any gender-based differences in customer retention.



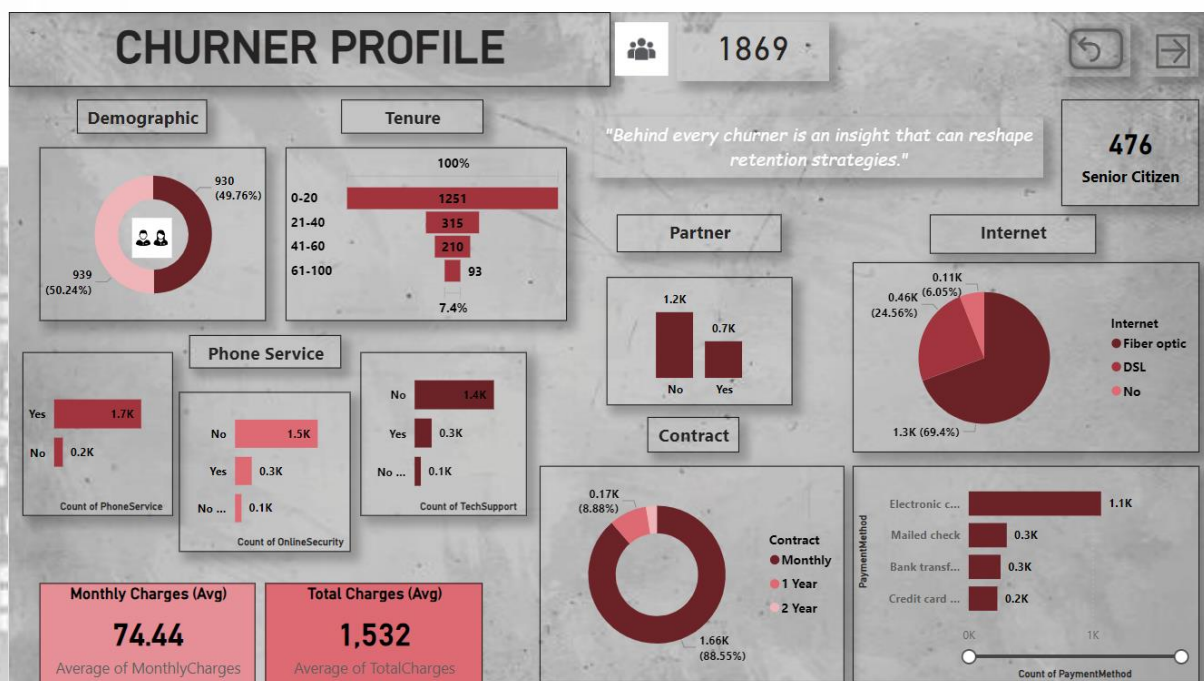
Churner Profile Dashboard:

This dashboard is crucial for identifying the characteristics of customers who have already churned. It provides detailed insights into the factors driving their decision to leave and helps the telecom company take corrective actions.

- **Customer Service Usage:** This section shows the service history of churned customers, including the type of services they used (e.g., broadband, mobile), their duration of usage, and whether they used any bundled services.
- **Tenure and Churn Rate Analysis:** Customers with shorter tenure are often more likely to churn. This part of the dashboard helps visualize the relationship between tenure and churn, providing clues on when customers are most at risk of leaving.
- **Churn Pattern Analysis:** The churner profile dashboard includes **slicer filters** that allow for narrowing down on specific customer groups, such as those with a specific type of subscription plan or a particular region.

Working of the Dashboard:

- The **Tenure-Based Churn Visualization** helps users identify customers with low tenure who might benefit from loyalty programs or discounts to encourage longer retention.
- Users can dynamically analyze **service-specific churn rates** by applying filters to focus on churners from specific service categories (e.g., broadband vs. mobile).

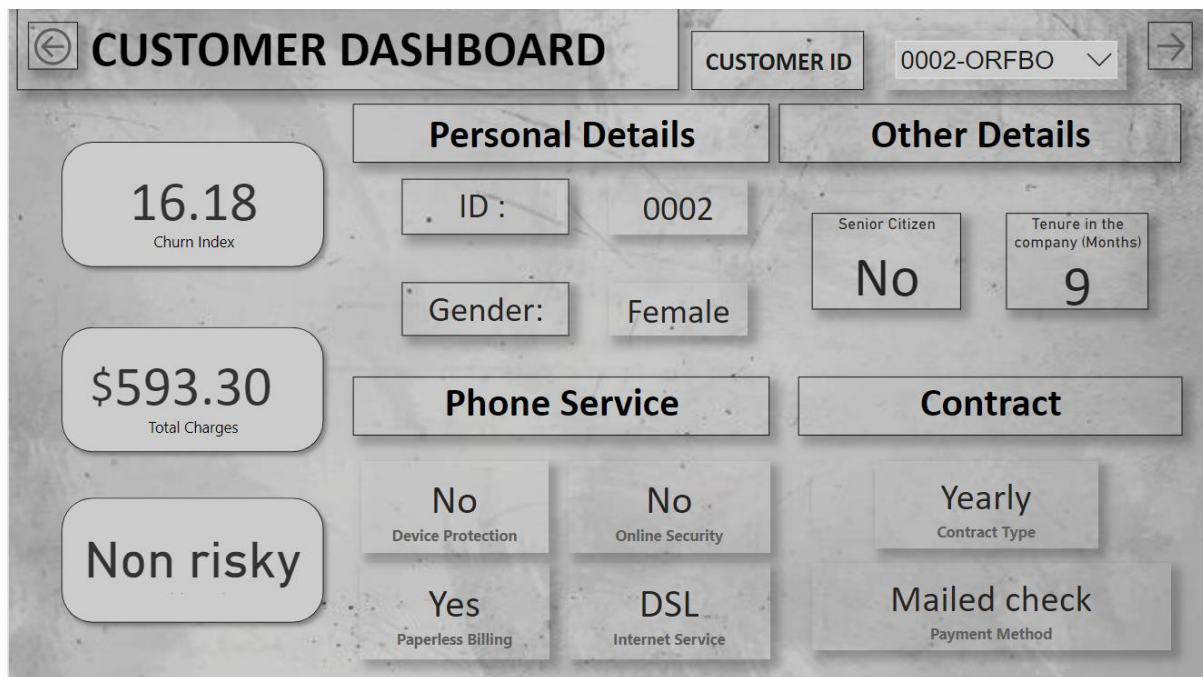


Customer Dashboard:

The **Customer Details Dashboard** provides a drill-down view of individual customer data, enabling telecom companies to analyze specific customer attributes, behaviors, and service histories. This dashboard is essential for personalizing customer support, resolving individual issues, and making data-driven decisions at the micro-level.

Key Features of the Customer Details Dashboard:

- **Individual Customer Insights:**
 - **Customer Profile:** Detailed information on each customer, including age, gender, region, and contract type, is provided, enabling a granular view of customer demographics.
 - **Service History:** A timeline or table showing the customer's interaction with telecom services, including changes in service packages, upgrades, and add-ons.
- **Billing and Payment Patterns:**
 - **Monthly and Total Charges:** Visualizations that display how much a customer is spending on telecom services each month and over time. This helps identify patterns, such as billing disputes or dissatisfaction with pricing, that may lead to churn.
 - **Payment Method:** A pie chart showing the customer's preferred payment method, which may provide insights into payment-related issues contributing to churn.
- **Churn Risk Indicator:**
 - **Behavioral Flags:** Indicators highlight key risk factors such as missed payments, reduced service usage, or frequent customer support inquiries that may signal an increased risk of churn.



Churn Reason Analysis:

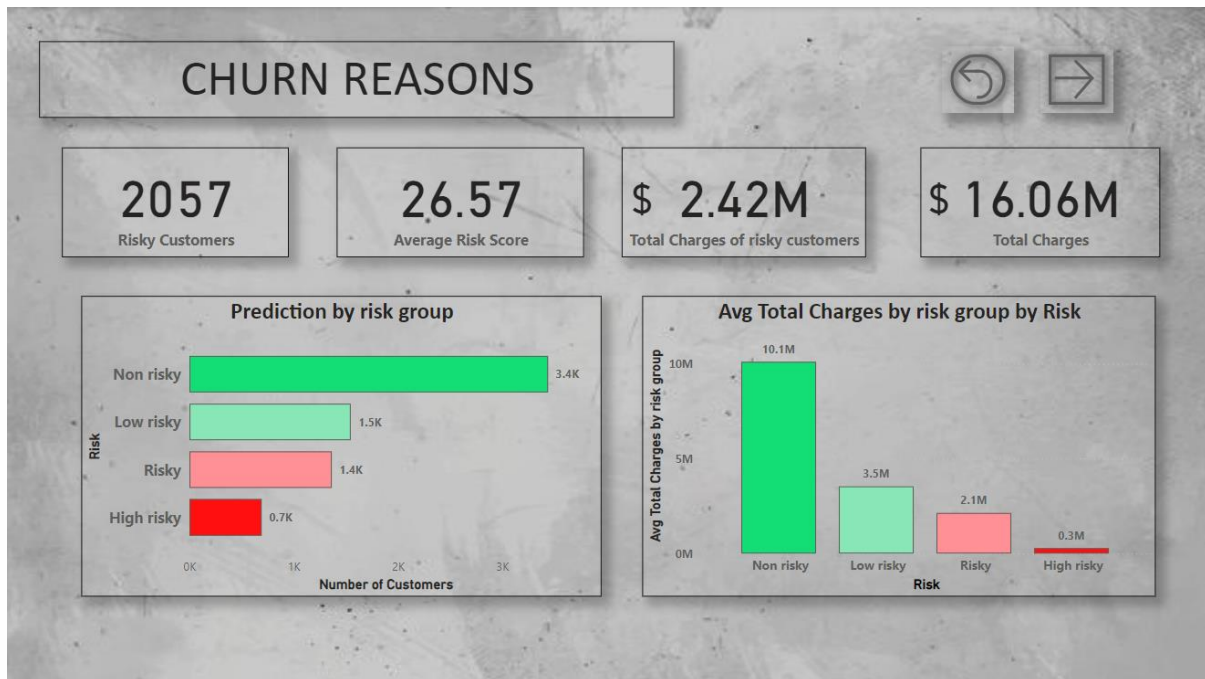
The **Churn Reason Dashboard** offers a visual breakdown of the reasons customers have provided for leaving. The WordCloud feature highlights the most common churn reasons, such as "**High Pricing**", "**Network Issues**", or "**Billing Errors**".

- **WordCloud Visualization:** This is a custom visual where larger words represent the more frequent reasons for churn. It gives telecom operators a clear idea of which issues are most prevalent and need immediate attention.
- **Detailed Churn Reason Breakdown:** Alongside the WordCloud, bar charts show the percentage of customers citing each reason for churn. This provides a more granular view and helps in prioritizing problem areas.

Working of the Dashboard:

- The **WordCloud** dynamically updates based on user-applied filters, allowing telecom companies to explore churn reasons for different customer segments.

- **Drill-Down Capabilities:** Users can drill down into specific reasons, such as isolating the reasons provided by customers from a specific region or those using a particular service package.



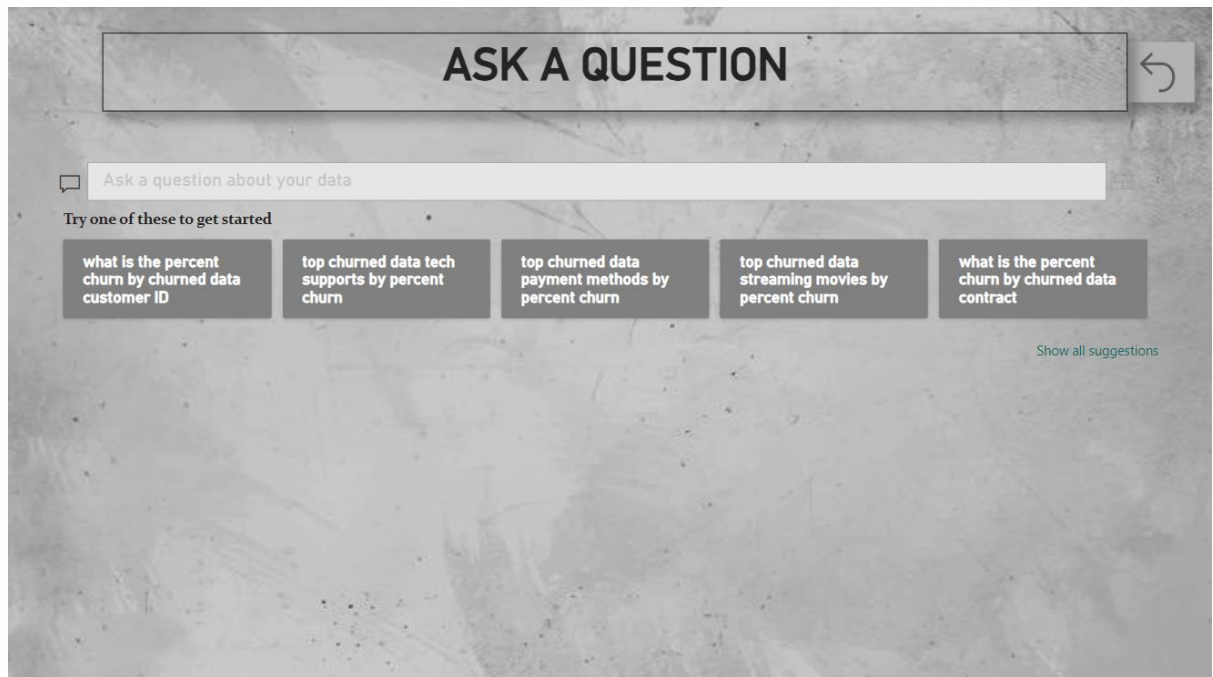
Ask a Question Feature:

This interactive feature uses Power BI's natural language query functionality, allowing users to type questions like, **"What is the churn rate for customers over 50 years old?"** and receive visual answers in the form of charts or graphs.

- **Usage in Exploration:** This feature empowers users to explore the dataset without needing technical knowledge of data queries or programming languages.
- **Real-Time Interactivity:** The visualizations update in real-time, making this feature useful for quick ad-hoc analysis or on-the-fly data exploration during meetings.

Working of the Dashboard:

- Users type their question in natural language into a search bar, and the dashboard responds with a visual representation based on the question's context.



Insights & Analysis

Major Factors Affecting Churn:

1. **Tenure:** Customers with shorter tenure (less than 1 year) are at a higher risk of churn. Retention strategies such as loyalty programs for new customers could mitigate this.
2. **Service Dissatisfaction:** A significant portion of churners cited issues with **network quality** and **customer support**. By addressing these key issues, telecom companies could significantly reduce churn rates.
3. **High Pricing:** Customers frequently mentioned high pricing as a reason for churn. Offering customized pricing plans and discounts to price-sensitive segments could reduce churn in this category.

Retention Strategies:

- **Personalized Offers:** For high-risk customer segments, providing personalized discounts, loyalty rewards, or service upgrades could improve retention.
- **Improving Service Quality:** Investing in network infrastructure and improving the efficiency of customer support could tackle two of the most commonly cited churn reasons.

Usage of the Dashboard and Its Importance

Necessity of the Dashboard in Decision-Making:

In today's data-driven business environment, the ability to make informed decisions quickly is crucial. Telecom companies operate in a highly competitive market, where customer retention is key to maintaining profitability. The **Telecom Churn Analysis Dashboard** offers several benefits that make it indispensable:

- **Real-Time Insights:** The dashboard enables business leaders to access real-time data and quickly identify trends in customer churn. This immediacy helps in responding to issues as they arise, rather than relying on retrospective data, which may be outdated by the time decisions are made.
- **Targeted Retention Campaigns:** By pinpointing the exact reasons why customers are leaving, telecom companies can craft targeted campaigns that address specific pain points. For instance, if pricing is a significant issue, offering tiered pricing options can directly mitigate churn.
- **Cross-Departmental Usage:** Different departments, such as marketing, customer service, and operations, can all benefit from using this dashboard. Marketing teams can use the insights to develop customer retention campaigns, while customer service departments can focus on resolving the most frequent complaints before they lead to churn.

Why It's Necessary:

- **Increased Revenue:** Reducing churn directly correlates with revenue growth. Acquiring new customers is typically more expensive than retaining existing ones, so minimizing churn can lead to higher profitability.
- **Improved Customer Experience:** By identifying and addressing the root causes of dissatisfaction, telecom companies can improve the overall customer experience, leading to higher loyalty and positive word-of-mouth referrals.
- **Data-Driven Decision Making:** This dashboard equips stakeholders with the tools they need to make data-driven decisions. Whether it's about restructuring pricing models or improving customer service, having data at your fingertips enhances the quality of decision-making.

Conclusion

The **Telecom Churn Analysis Dashboard** provides telecom companies with a comprehensive tool to better understand and manage customer churn. By leveraging customer demographic data, service usage patterns, and churn reasons, the dashboard offers actionable insights that can be used to implement targeted retention strategies.

The analysis reveals that **short tenure, service dissatisfaction, and high pricing** are the primary drivers of churn. Addressing these issues through loyalty programs, service quality improvements, and personalized offers can significantly reduce churn rates. Moreover, the ability to query data in real-time with the **Ask a Question** feature enables quick, informed decision-making that is critical in the fast-paced telecom industry.

This dashboard is not only a powerful analytical tool but also a strategic asset that allows telecom operators to shift from reactive to proactive customer retention efforts. By focusing on data-driven insights, companies can improve customer satisfaction, reduce churn, and ultimately enhance their profitability. Moving forward, the integration of predictive analytics could further refine retention strategies, ensuring that telecom companies stay competitive in an ever-evolving market.

