Customer Churn Analysis Summary

1. Dataset Overview

- **Source**: The dataset focuses on customer churn analysis in a telecommunications context. It includes demographic information, service usage, billing, and payment details.
- **Shape**: 7,043 records and 21 variables.
- **Target Variable**: `Churn` indicates whether a customer left the service (`Yes`) or stayed (`No`).

2. Data Cleaning

- **Handling Missing/Invalid Data**:
  - The `TotalCharges` column had invalid entries (spaces), replaced with `0.0`, and the column was converted to `float`.
  - The dataset is otherwise clean with no additional missing values.
- **Categorical and Numerical Split**:
  - **18 Categorical Variables**: Examples include `gender`, `InternetService`, `PaymentMethod`.
  - **3 Numerical Variables**: `tenure`, `MonthlyCharges`, `TotalCharges`.

3. Exploratory Data Analysis

Churn Distribution

- **Churn Rate**: Approximately 26.5% of customers have churned, while 73.5% have stayed.
  - **Churn Count**: 1,869 customers churned (`Yes`).
  - **Non-Churn Count**: 5,174 customers did not churn (`No`).

Demographic Insights:

- **Gender**: Male and female customers churn at almost equal rates, indicating gender is not a strong predictor of churn.
- **Senior Citizens**: A higher percentage of senior citizens (42%) churn compared to non-senior customers.

Service Insights:

- **Internet Service**: Fiber optic users have the highest churn rate (41%), while DSL and non-internet users churn less.
- **Streaming Services**: Customers using `StreamingTV` or `StreamingMovies` tend to churn more often.

- **Online Security & Tech Support**: Churn is significantly lower for customers who have subscribed to `OnlineSecurity` or `TechSupport`.

Financial Insights:

- **MonthlyCharges**: Customers who churn typically have higher monthly charges (average $74) compared to those who stay ($61).
- **Contract Type**:
  - Customers with month-to-month contracts have the highest churn rate (43%), whereas churn is drastically lower for customers on 1-year or 2-year contracts.
- **Payment Method**: Electronic checks are associated with the highest churn rate, whereas customers using credit cards or bank transfers churn less frequently.

Tenure Insights:

- **Tenure**: Customers with shorter tenure (<12 months) churn significantly more than long-term customers.
  - **Churn Rate for Tenure <12 months**: 42%.
  - **Churn Rate for Tenure >24 months**: Drops below 10%.

Percentage Breakdown of Key Variables

Variable	Value	% of Total	Churn Rate
Churn	Yes	26.5%	N/A
Internet Service	Fiber Optic	~44%	41%
	DSL	~34%	23%
Contract Type	Month-to-Month	~55%	43%
	One-Year	~25%	11%
	Two-Year	~20%	4%
Payment Method	Electronic Check	~35%	40%
	Credit Card/Bank Transfer	~45%	15%
Tenure	< 12 months	~30%	42%
	> 24 months	~50%	< 10%

Conclusions

- **Key Drivers of Churn**:
  - **Contract Type**: Month-to-month contracts contribute most significantly to churn.
  - **Service Type**: Fiber optic customers, particularly those using additional streaming services, are at higher risk.
  - **Payment Method**: Customers paying via electronic checks tend to churn more, likely due to dissatisfaction or payment challenges.
  - **Tenure**: Longer-tenured customers are significantly less likely to churn, emphasizing the value of retention efforts.