Customer Churn Report

This report will present insights and conclusions extracted from the analysis and work of a telecom dataset, focusing on customer churn. The objective is to identify patterns and factors contributing to churn and to provide well thought recommendations that can improve business performance and business strategies.

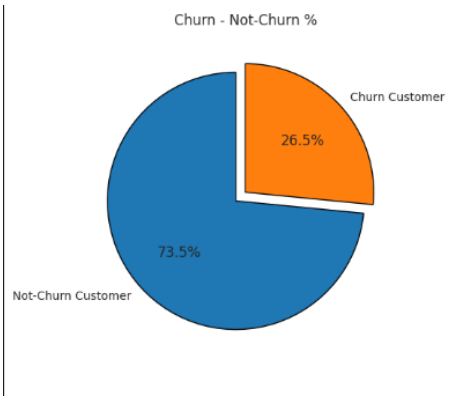
Background

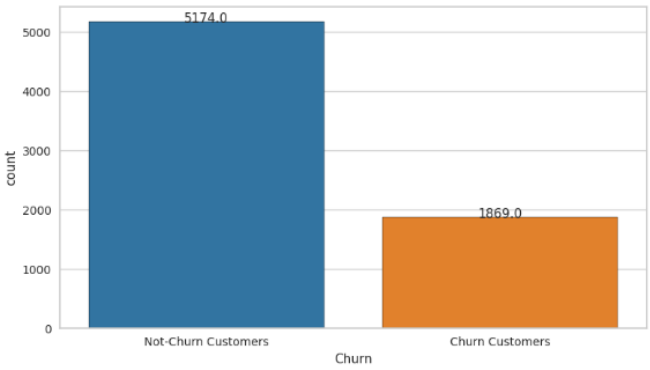
Customer churn is a big challenge in the telecom industry, directly affecting revenue and customer retention strategies. This report analyzes a telecom dataset to find patterns and factors affecting churn, improving the development of data-driven strategies to better customer loyalty and business operations.

Research Questions

1. What are the key demographic and behavioral factors contributing to customer churn?
2. How do service quality and contract types influence churn rates?
3. What actionable strategies can be derived to reduce churn effectively?

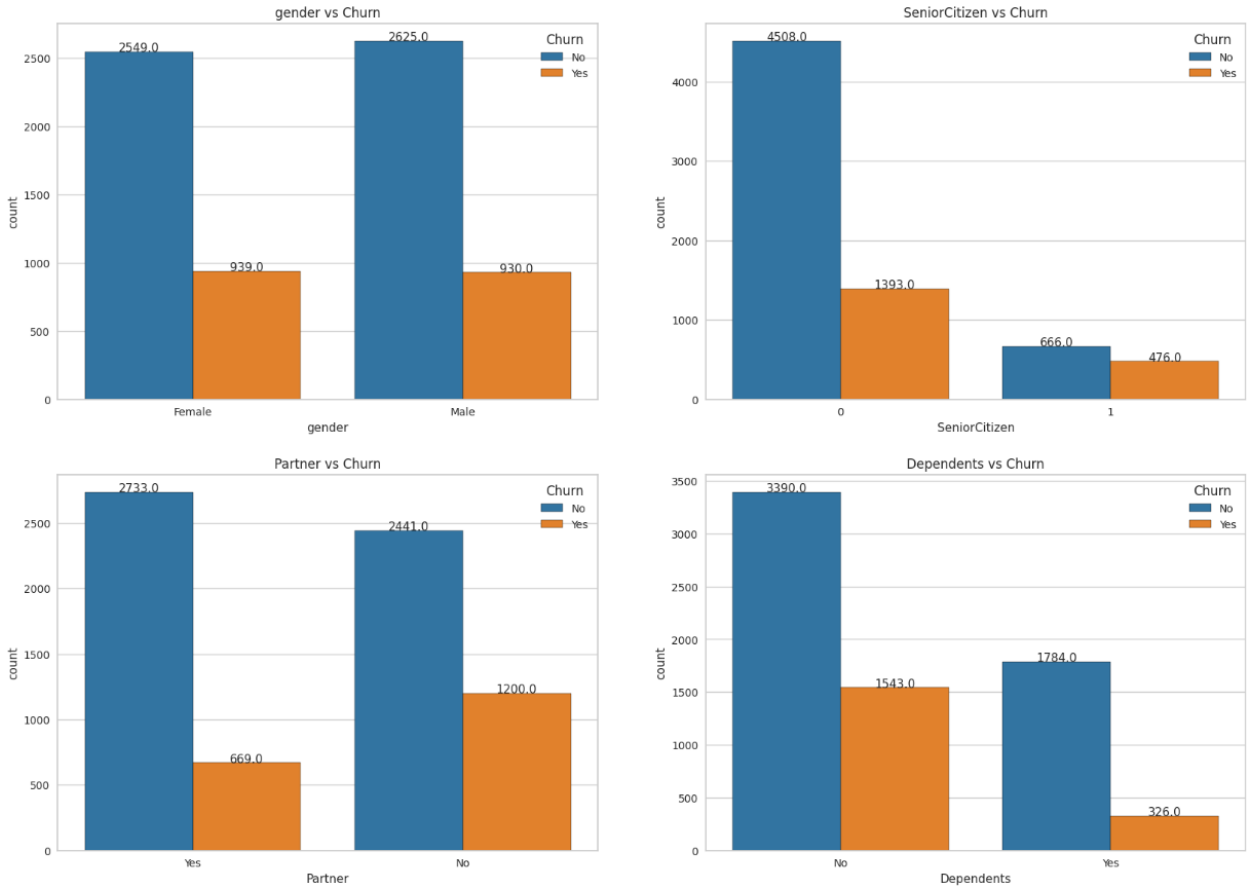
Exploratory data analysis and churn analysis:



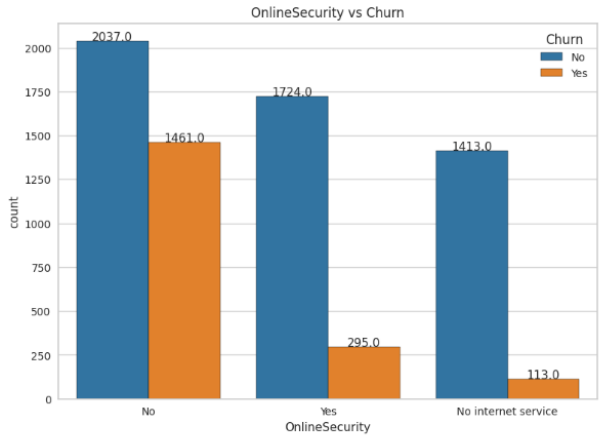


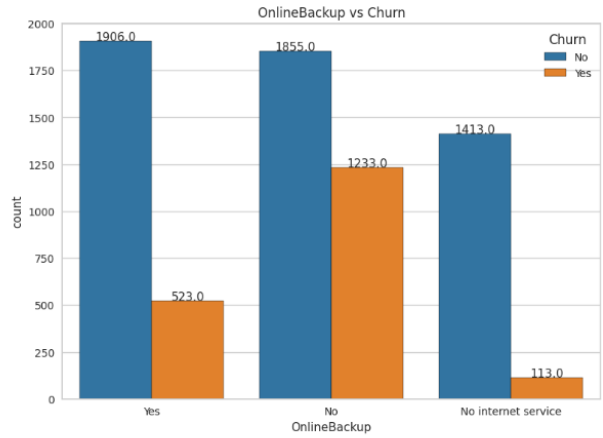
The dataset is unbalanced in a near about 3 : 1 ratio for Not-Churn : Churn customers!

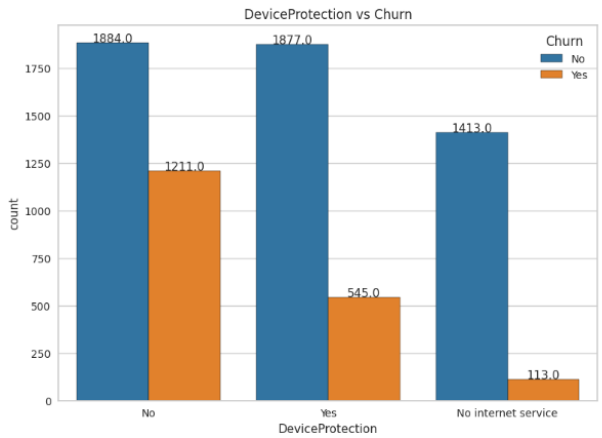
Due to this predictions will be biased towards Not-Churn customers.

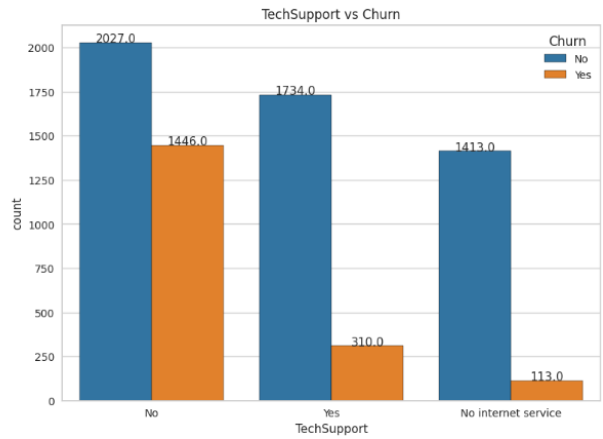


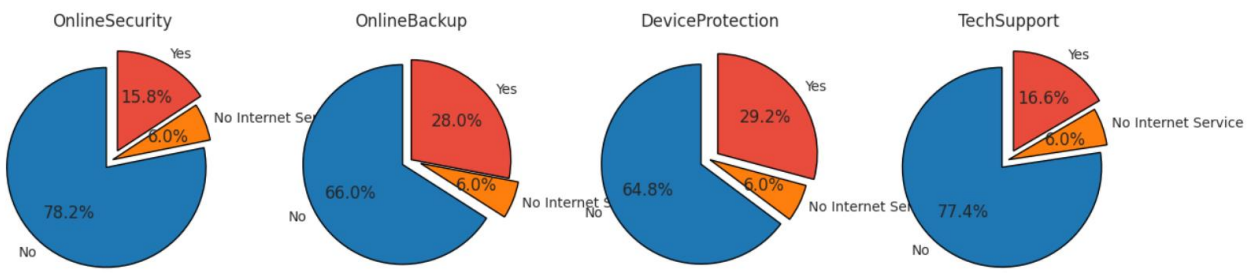
- Customer churning for **male** and **female** customers is very similar to each other!
- Similarly, number of **SeniorCitizen** customers is pretty low! Out of that, we can observe a near about 40% churn of **SeniorCitizen** customers. It accounts for a total of 476 customers out of 1142 **Senior Citizen** customers.
- Customers who are housing with a **Partner** churned less as compared to those not living with a **Partner**.
- Similary, churning is high for the customers that don't have **Dependents** with them!





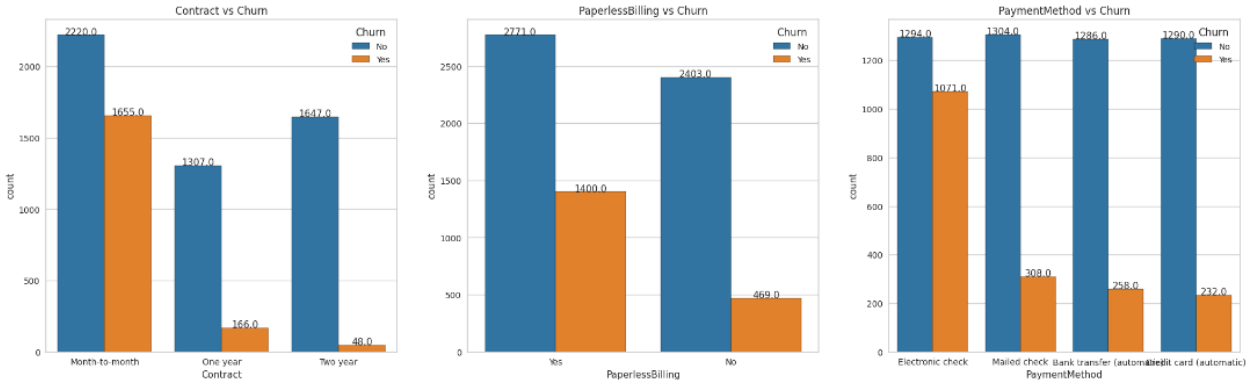




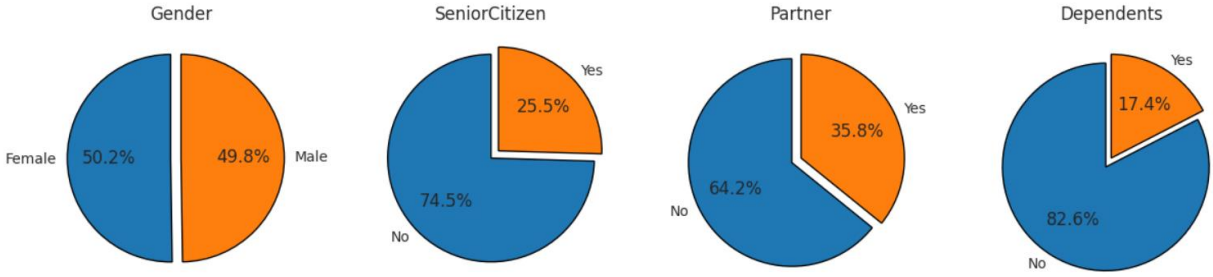


- A high number of customers have switched their service provider when it comes down poor services with the above mentioned features.

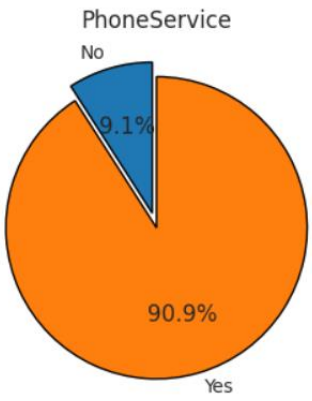
- Above pie charts stress out the significance of providing **OnlineSecurity**, **OnlineBackup**, **DeviceProtection** & **TechSupport** as an average of **71.6%** customers cutoff their services due to lack of these features!

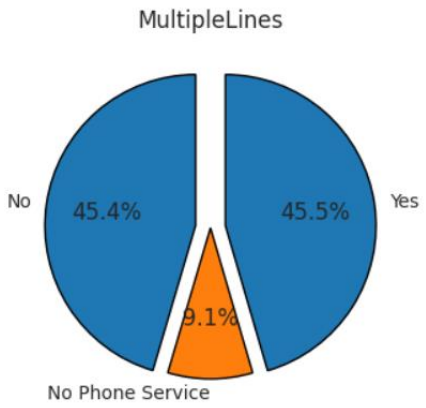


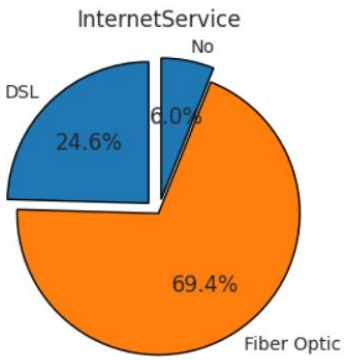
- The customer volatility of the contract on a **Month-to-Month** basis is very high. This is probably because customers test the various services available to them, and then, in order to save money, test the service for one month!
- In contrast to the customer volatility rate for the **two-year** contract, which is considered very low. This may be due to the customer's commitment for a long period of time
- **PaperlessBilling** displays a high number of customers being churned out. This is probably because of some payment issue or receipt issues.
- Customers clearly resented the **Electronic check PaymentMethod**. Out of the **2365** number of bills paid using **Electronic check**, a staggering 1071 customers exited the pool of service due to this payment method. Company definitely needs to either drop **Electronic check** method or make it hassle-free and user-friendly.

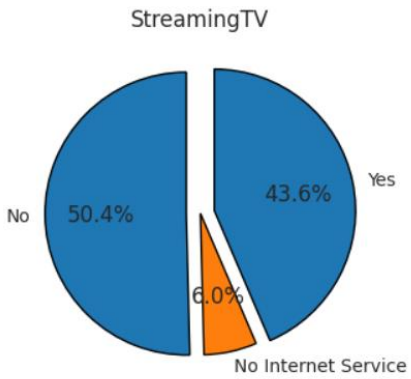


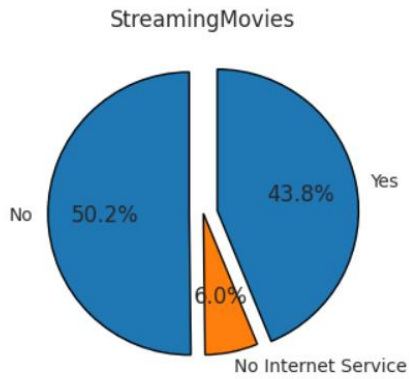
- We can observe a clear cut **50% - 50%** split between the **male** and **female** customers that have switched their services
- **75%** of the churned customers are **not SeniorCitizen**!
- Customers living by themselves have cutoff the services. From **Partners** & **Dependents** data, average of **73.4%** of customers churned out were living by themselves.



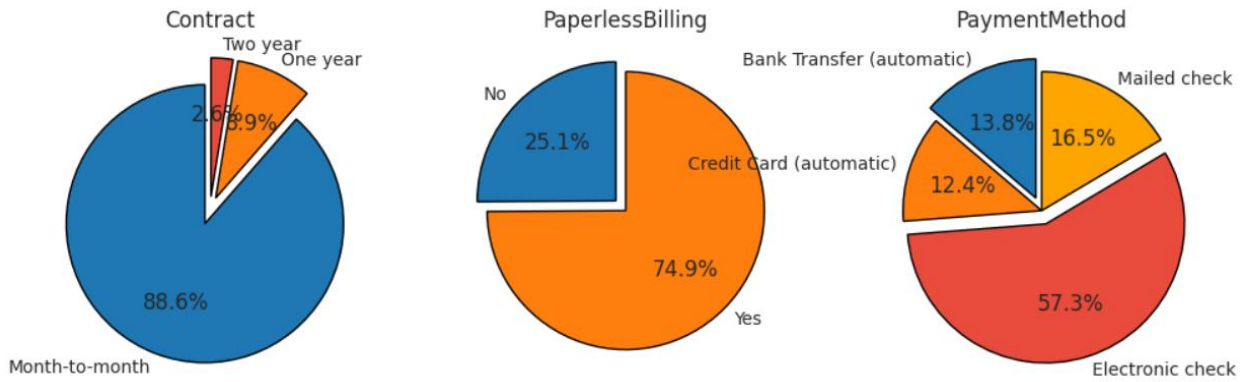








- Despite providing **PhoneService**, a high percentage of customers have switched!
- Similarly, availability of **MultipleLines** did not matter,Because they are approximately the same percentage
- We notice that customers are more interested in **Fiber Optic** than **DSL**
- For **StreamingTV** & **StreamingMovies**, customers without these services definitely cancelled their subscription



- **Month-to-Month Contract** duration has the dominating share when it comes churning with a massive **88.6%** customers!
- **PaperlessBilling** does not seemed to be cares by the customers!
- **Electronic check** definitely needs to be sorted as it accounts for **57.3%** of churn. It is then followed by **Mailed check**, **Bank Transfer (automatic)** & **Credit Card (automatic)**!

Methodologies and work:

Data preprocessing and feature engineering:

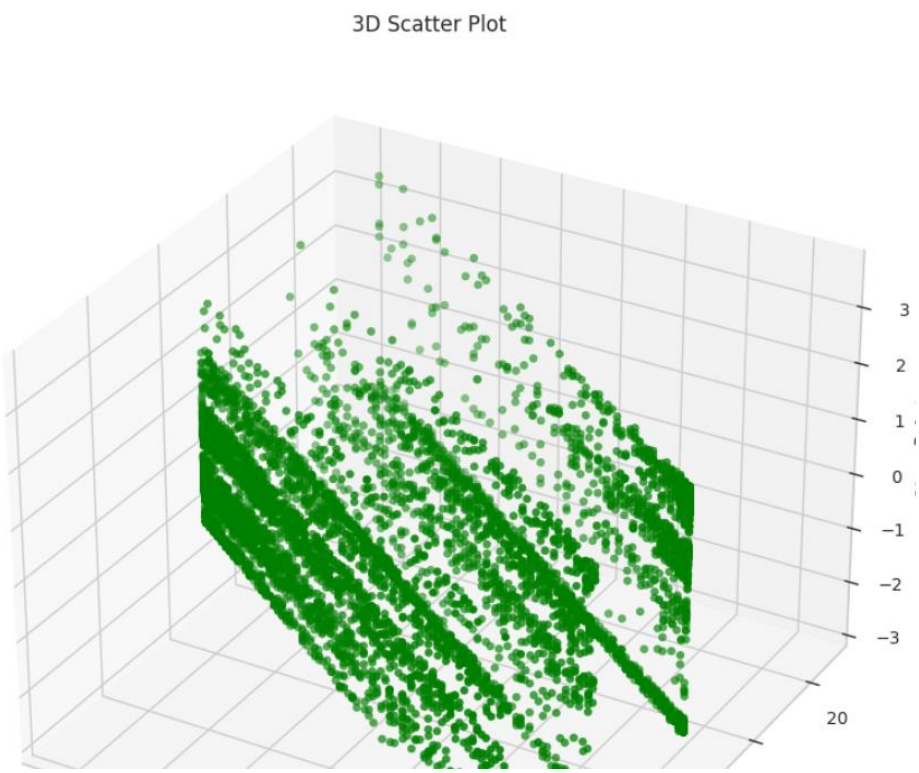
Data was checked for duplicates through customer ID and none was found then we replaced non scalar values with scalar values and fixed the data types that were of type objects and converted them to scalar. 11 missing values were found in the TotalCharges part and were filled with the following equation -> MonthlyCharges * Tenure + difference median, we didn't fill with mean because the data is skewed.

The distribution was checked through visualization and through Shapiro and kstest and was found to not be a normal distribution. We did this to find the most suitable ways to check for outliers and deal with them. Through visualization and IQR it was concluded that no outliers existed in the dataset.

A few features were added and they were as follow: senior_internet, charges_ratio, customer_score, LoyaltyScore, and tech_savvy. How did we know they are useful? We trained a basic logistic regression to check if it has any effect on the overall metrics, mainly the accuracy.

Customer segmentation and business strategies:

Using normalization and PCA we visualized the data as a 3d plane:



It's clear that there are 3 clusters but none the less we used kmeans clustering, and through trial and error we found out using the elbow method that 3 clusters are the best.

Top 3 Strategies to Improve Customer Retention

a) **Enhance Service Quality**

- **Why**: Many customers churn because of poor Online Security, Backup, Device Protection, and Tech Support, which affects 71.6% of the churned customers. Improving these features will address a significant pain point and improve overall satisfaction.

b) **Redesign Payment Processes**

- **Why**: The Electronic Check payment method is a major issue, accounting for 57.3% of churn. Simplifying payment options and making them user-friendly can significantly reduce frustration and retain customers.

c) **Encourage Long-Term Contracts**

- **Why**: Month-to-Month contracts lead to high churn rates (88.6%) due to minimal commitment. Offering incentives for long-term contracts, like discounts or added perks, can help lock in customers and reduce turnover.

These strategies address the most important churn causes identified in the analysis and offer insatnt, actionable improvements.

Churn prediction model:

The provided dataset was imbalanced, oversampling techniques like SMOTE were used and undersampling as well. Undersampling was better and made the model unbiased. MinMaxScaling was used as well.

The highest performing algorithm was XGBoost.

```
Classification Report:
              precision    recall  f1-score   support

           0       0.80      0.75      0.78       379
           1       0.76      0.81      0.78       369

    accuracy                           0.78       748
   macro avg       0.78      0.78      0.78       748
weighted avg       0.78      0.78      0.78       748
```

Executive Summary

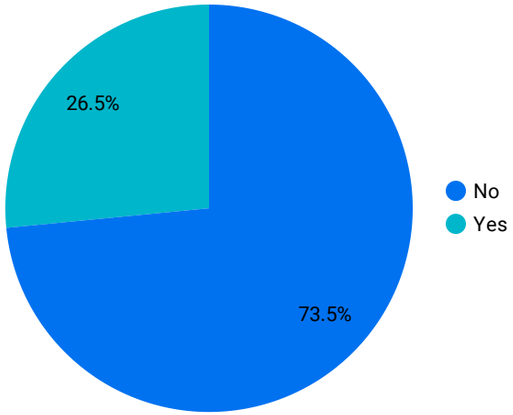
This report provides a comprehensive analysis of customer churn patterns within the telecom industry. Key findings reveal the following:

- **Customer Segments at Risk**: Senior citizens and customers without partners or dependents are more likely to churn.
- **Service Quality Concerns**: Poor services such as lack of Online Security, Backup, Device Protection, and Tech Support contribute to a 71.6% churn rate.
- **Contract and Payment Preferences**:
    - Month-to-Month contracts saw the highest churn (88.6%) due to minimal customer commitment.
    - The electronic check payment method accounts for 57.3% of churn, showing dissatisfaction with the process.
- **Recommendations**: Focus on improving service quality, redesigning payment processes, and incentivizing long-term contracts to boost customer retention.
- Data has all three Descriptive, predictive and prescriptive attributes.

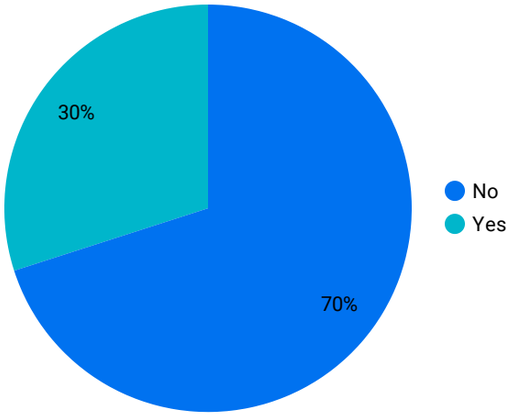
This analysis aims to provide actionable insights to enhance customer satisfaction and reduce churn rates effectively.

Kaggle notebook:

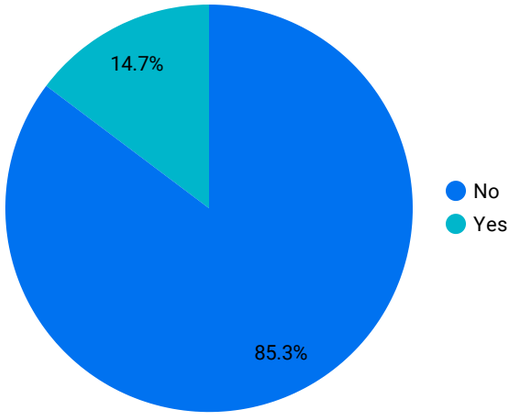
https://www.kaggle.com/code/omaralnajjarr/teleco-bussiness-analytics-project



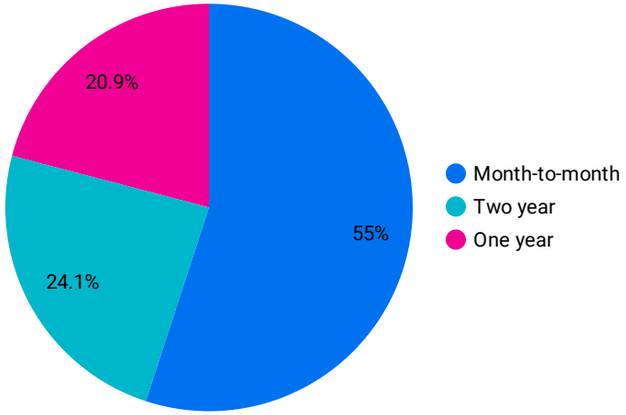
Churn



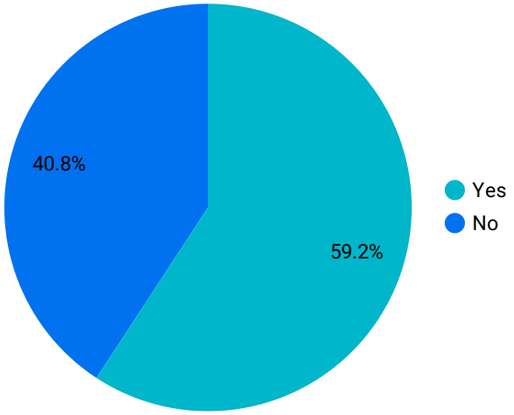
Dependents



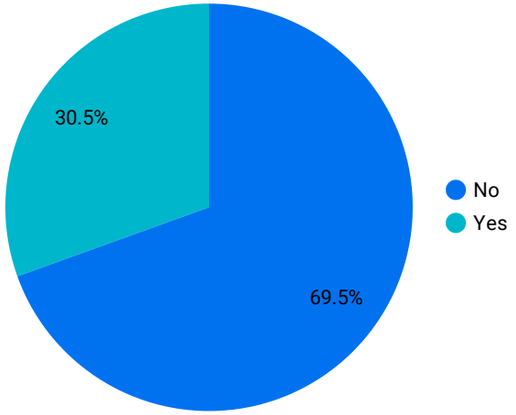
Tenure with respect to Churn



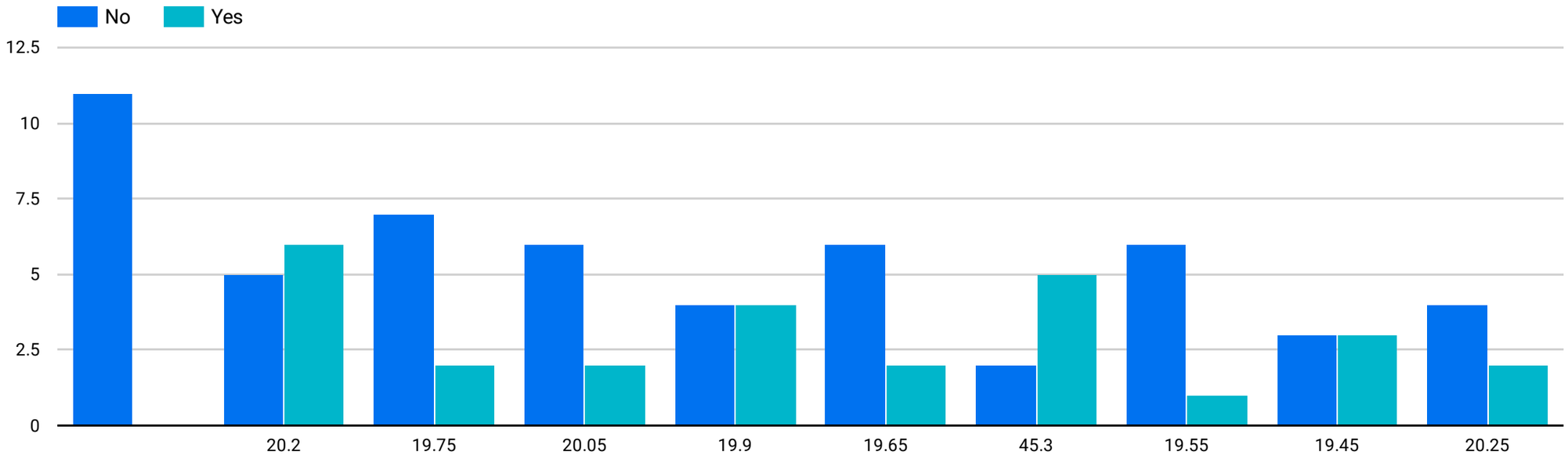
Contract



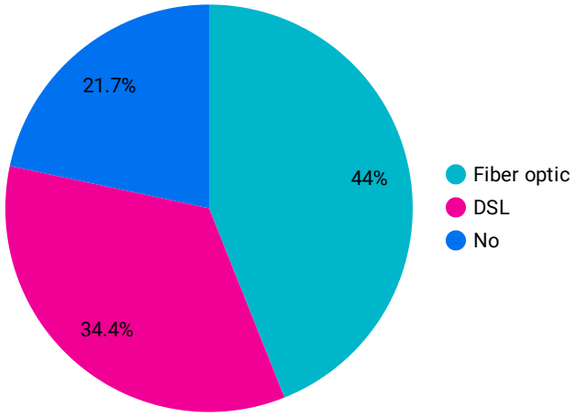
PaperlessBilling



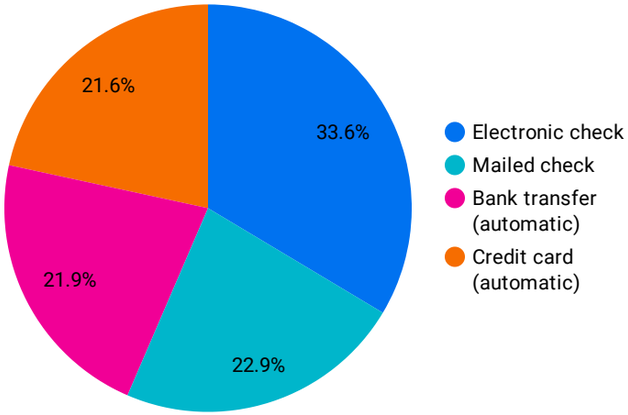
MonthlyCharges with respect to Churn



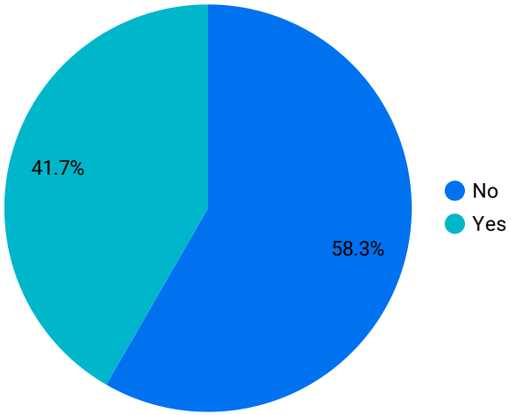
TotalCharges with respect to Churn



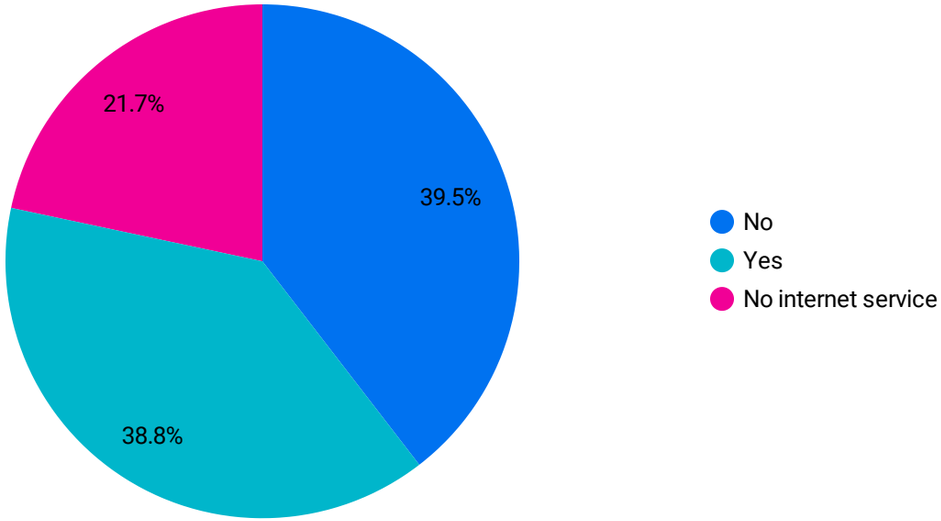
internet_service



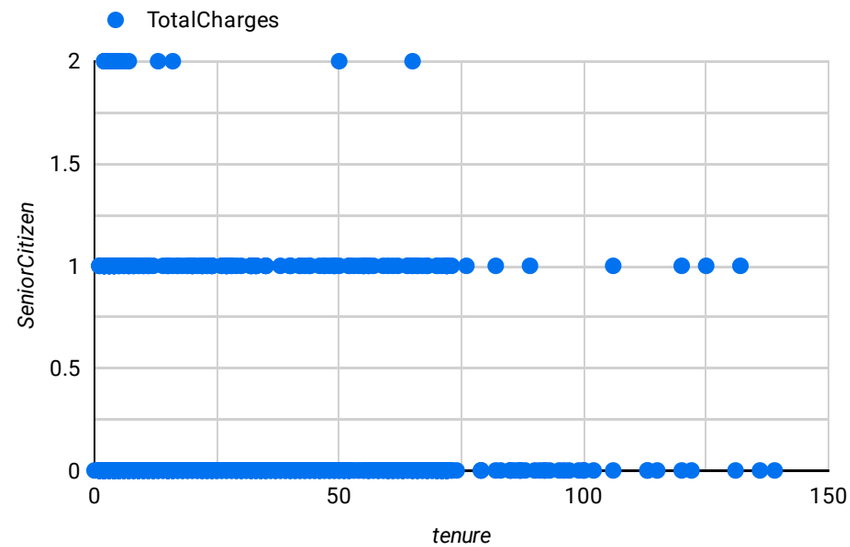
PaymentMethod



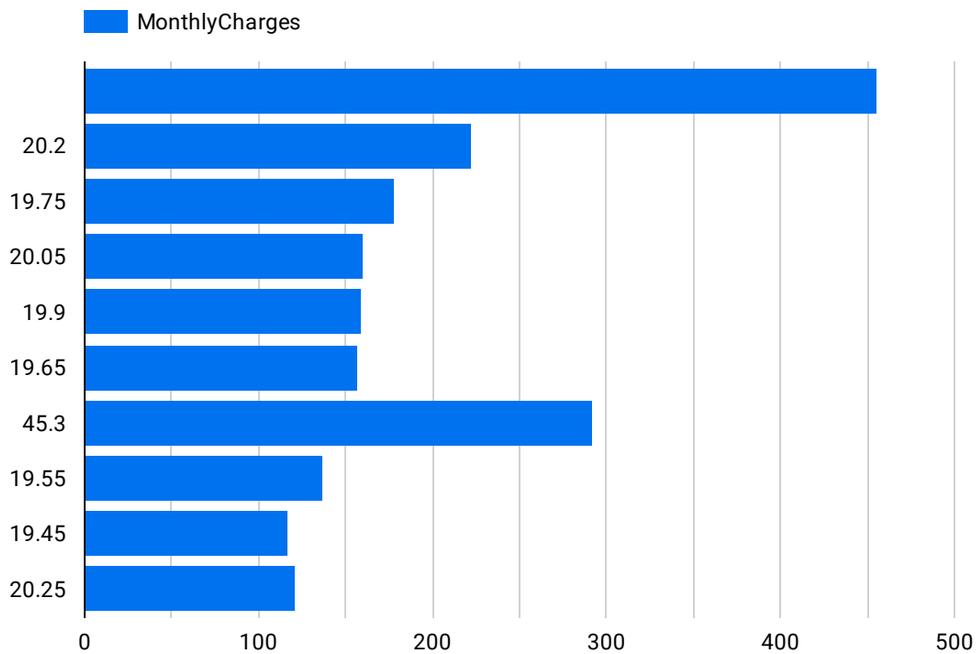
senior_internet with respect to churn



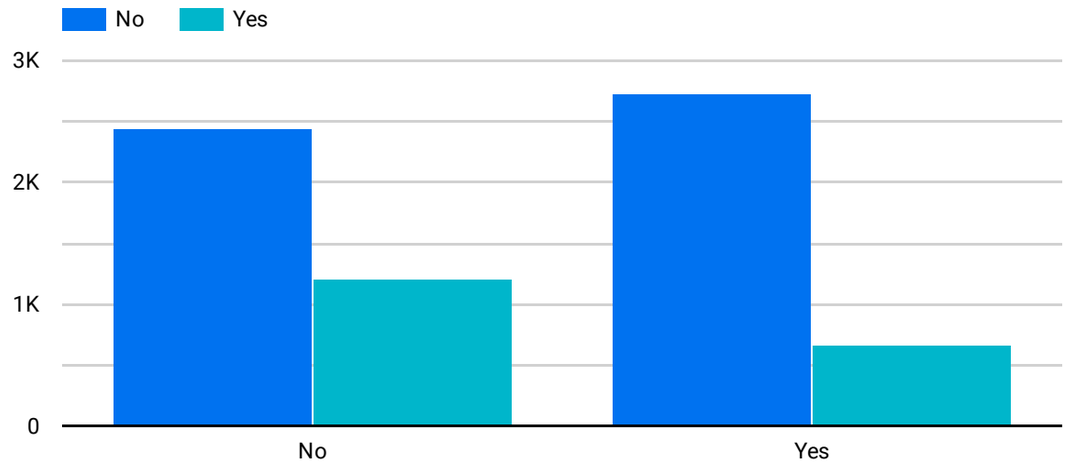
Streaming movie & TV



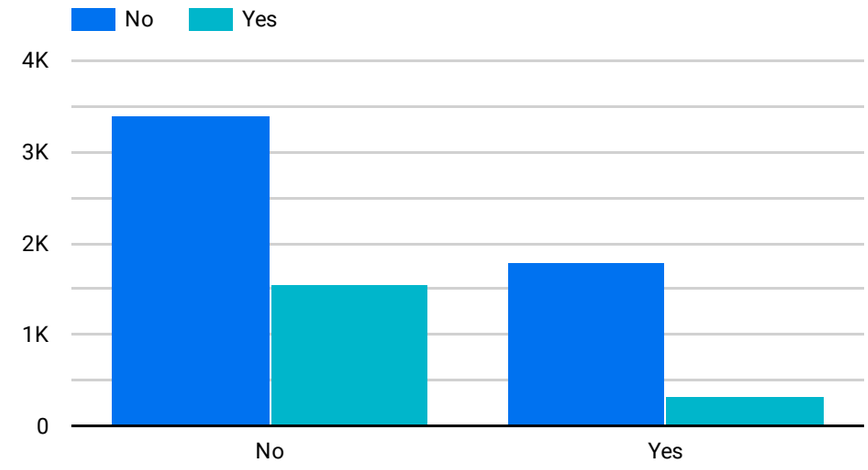
tenure vs. TotalCharges



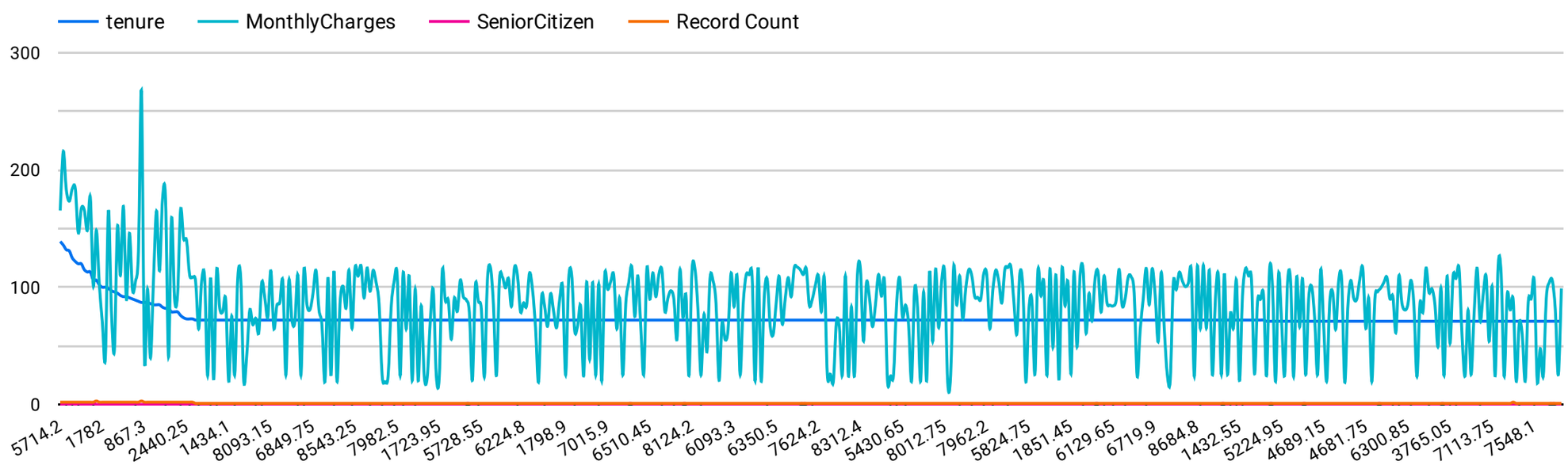
MonthlyCharges vs. TotalCharges

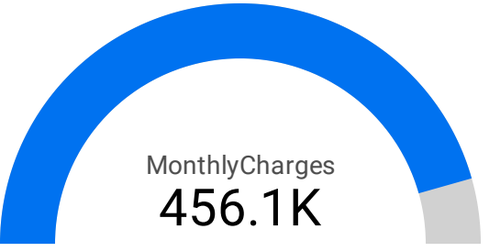


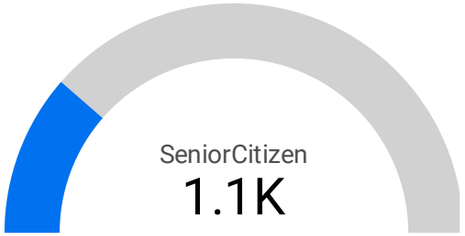
Partner with churn

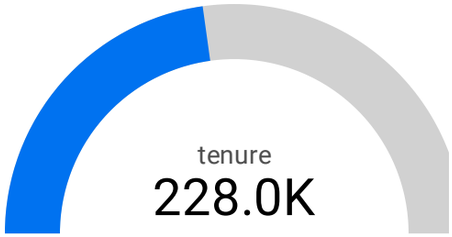


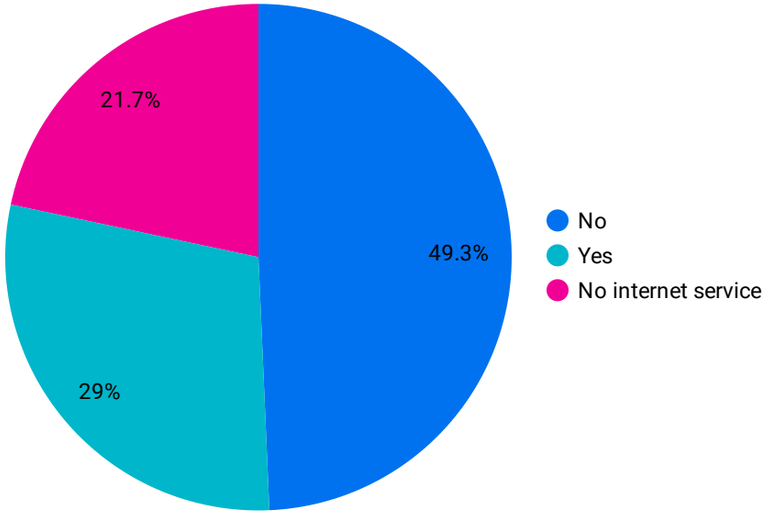
Dependents with Churn



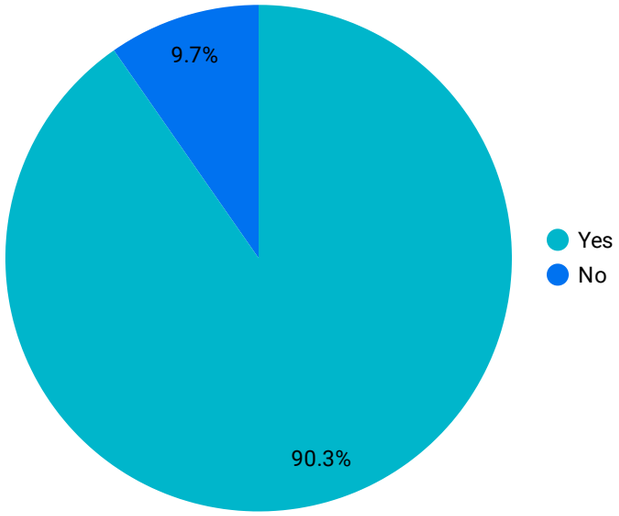








TechSupport



PhoneService with churn