



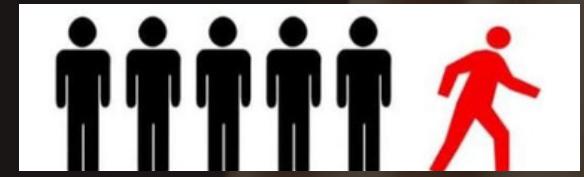
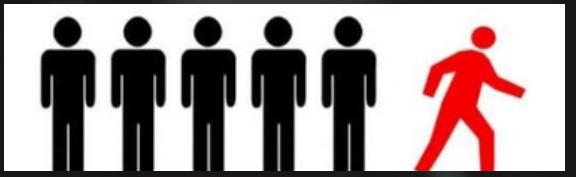
Telco Customer Churn Prediction and Analysis

Introduction



In the highly competitive telecommunications industry, customer retention is a critical factor for success. Customer churn, which refers to the phenomenon of customers leaving a service provider, can significantly impact a company's revenue and profitability. Understanding why customers churn and predicting which customers are at risk of leaving can help telecom companies implement effective retention strategies.

This project focuses on analyzing customer data to explore patterns and trends associated with churn. Through various data analysis techniques and predictive modeling, the project seeks to uncover the drivers of churn, providing actionable insights that can be used to enhance customer loyalty and reduce churn rates. The findings from this analysis will support the development of data-driven strategies that can be employed to retain valuable customers and improve overall business performance.



Objective

The objective of this project is to analyze customer data from a telecommunications company to identify the key factors that contribute to customer churn. By building predictive models, the aim is to accurately forecast which customers are likely to churn, enabling the company to take proactive measures to retain them. This analysis will also provide insights into customer behavior, helping the company develop targeted strategies to improve customer satisfaction and reduce churn rates.

Telco Customer Churn Dataset Information

customerID	gender	SeniorCitizen	Partner	Dependents	tenure	PhoneService	MultipleLines	InternetService	OnlineSecurity	... Churn	DeviceProtection
7590-VHVEG	Female	0	Yes	No	1	No	No phone service	DSL	No	No	No
5575-GNVDE	Male	0	No	No	34	Yes	No	DSL	Yes	...	Yes
3668-QPYBK	Male	0	No	No	2	Yes	No	DSL	Yes	...	No
7795-CFOCW	Male	0	No	No	45	No	No phone service	DSL	Yes	...	Yes
9237-HQITU	Female	0	No	No	2	Yes	No	Fiber optic	No	...	No
TechSupport	StreamingTV	StreamingMovies	Contract	PaperlessBilling	PaymentMethod	MonthlyCharges	TotalCharges	Churn			
No	No	No	Month-to-month	Yes	Electronic check	29.85	29.85	No			
No	No	No	One year	No	Mailed check	56.95	1889.5	No			
No	No	No	Month-to-month	Yes	Mailed check	53.85	108.15	Yes			
Yes	No	No	One year	No	Bank transfer (automatic)	42.30	1840.75	No			
No	No	No	Month-to-month	Yes	Electronic check	70.70	151.65	Yes			

Shape of the Dataset:
(7043,21)

customerID	object
gender	object
SeniorCitizen	int64
Partner	object
Dependents	object
tenure	int64
PhoneService	object
MultipleLines	object
InternetService	object
OnlineSecurity	object
OnlineBackup	object
DeviceProtection	object
TechSupport	object
StreamingTV	object
StreamingMovies	object
Contract	object
PaperlessBilling	object
PaymentMethod	object
MonthlyCharges	float64
TotalCharges	object
Churn	object
dtype: object	

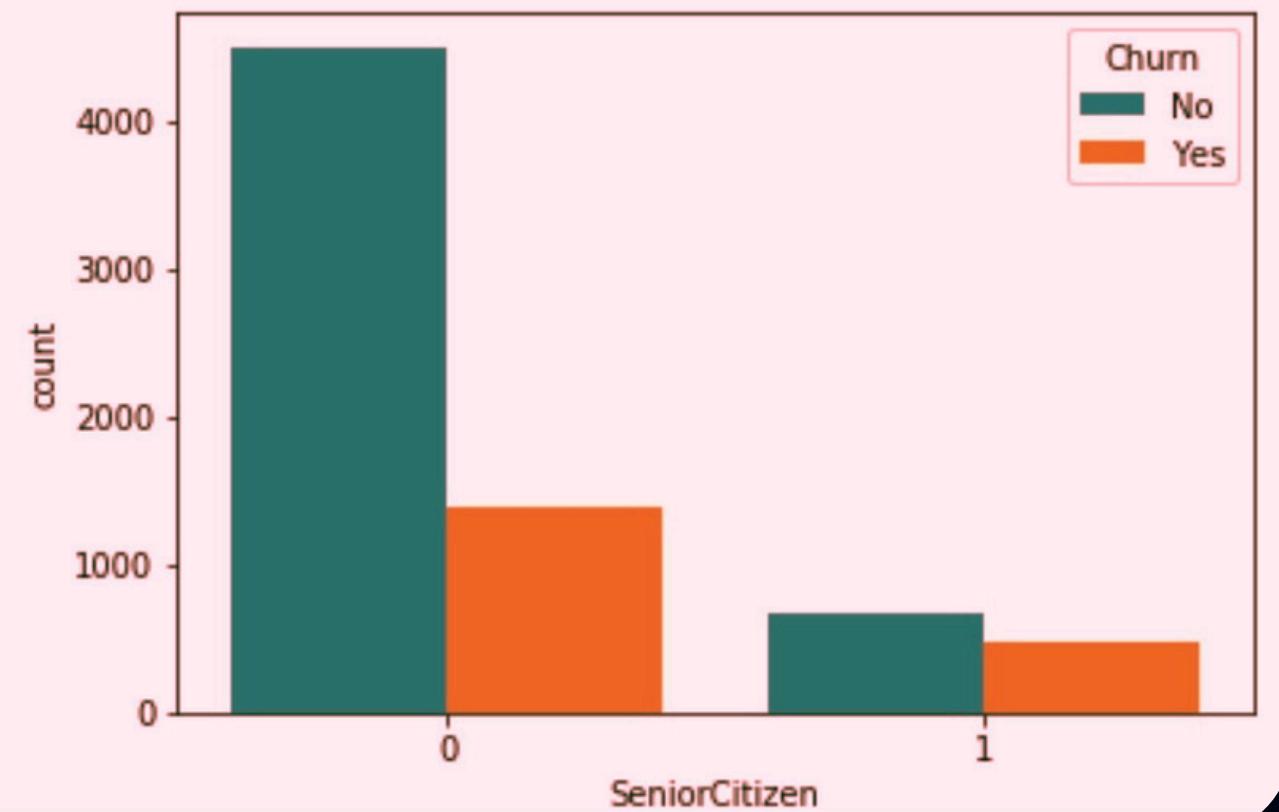
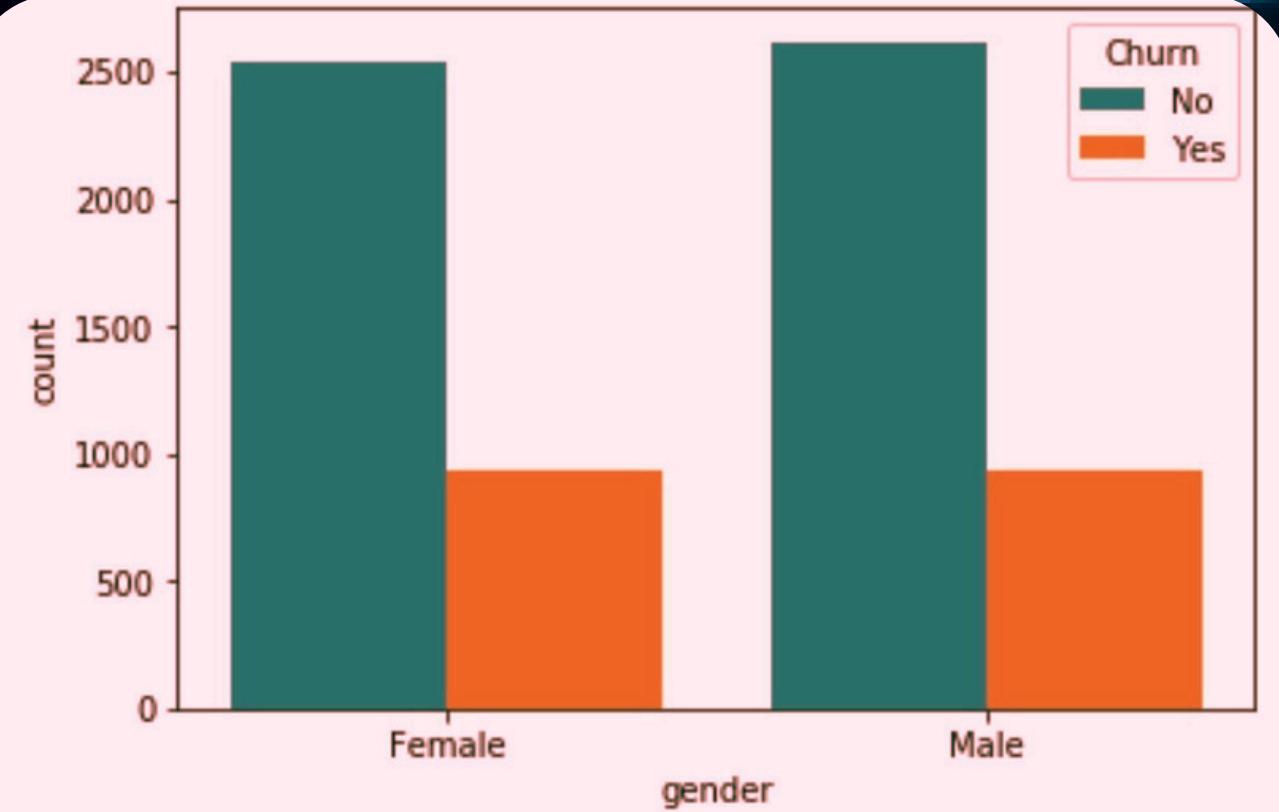
Statistical Analysis

	SeniorCitizen	tenure	MonthlyCharges
count	7043.000000	7043.000000	7043.000000
mean	0.162147	32.371149	64.761692
std	0.368612	24.559481	30.090047
min	0.000000	0.000000	18.250000
25%	0.000000	9.000000	35.500000
50%	0.000000	29.000000	70.350000
75%	0.000000	55.000000	89.850000
max	1.000000	72.000000	118.750000

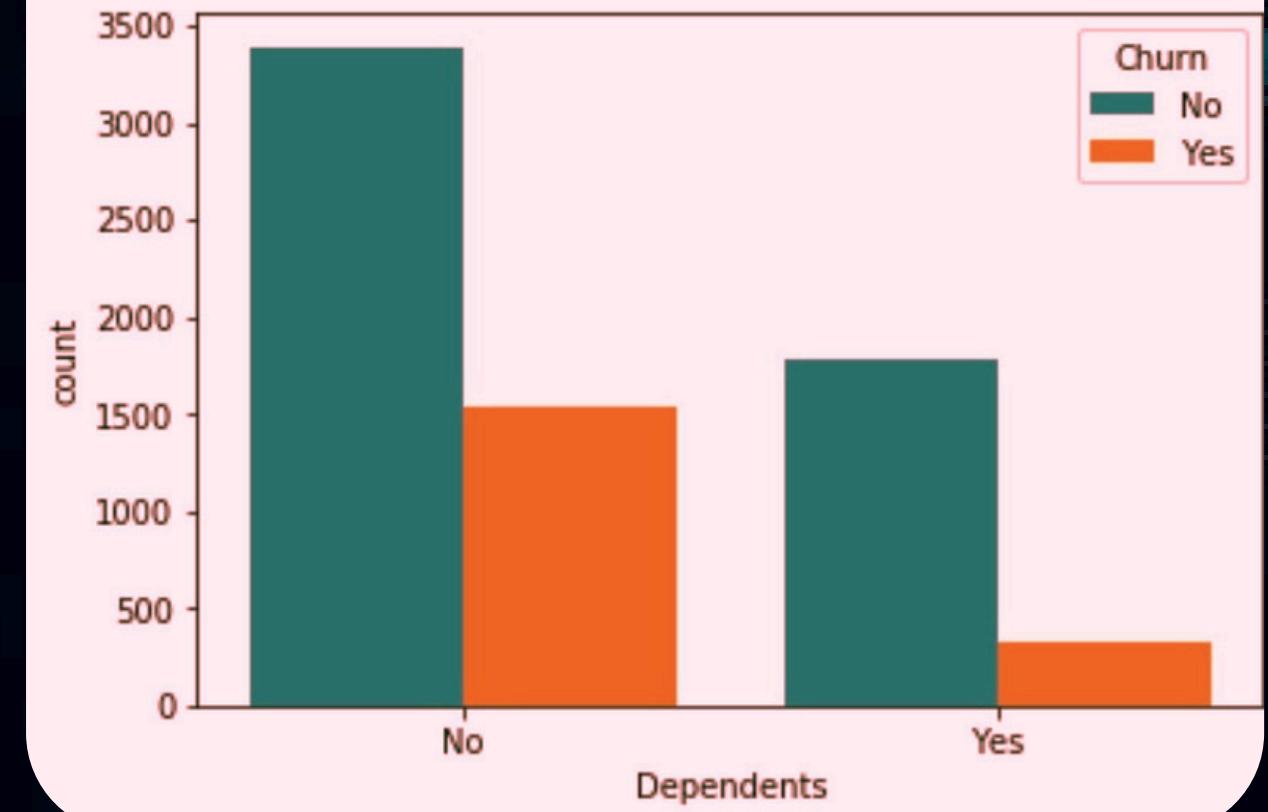
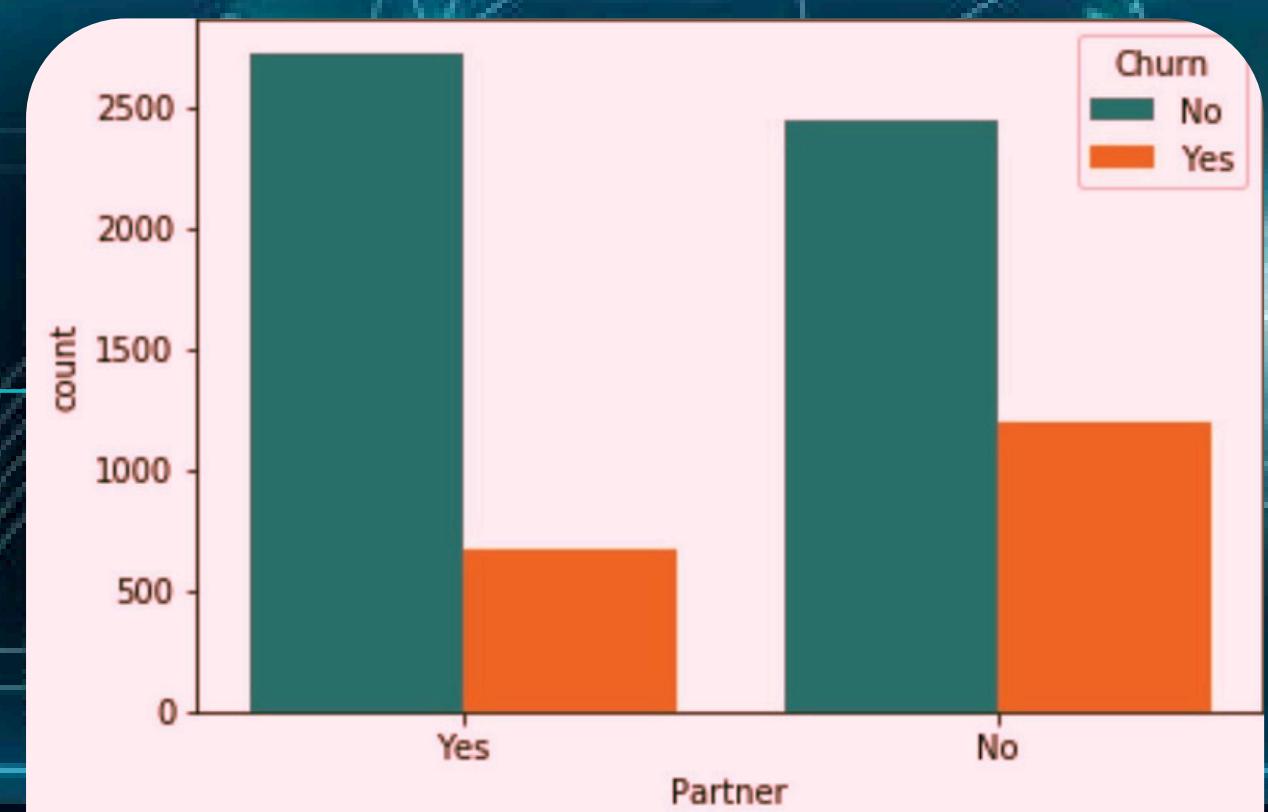
INFERENCES:

- Senior citizen is actually categorical hence the 25%-50%-75% distribution is not proper.
- We can also conclude that 75% of people have tenure.
- Average Monthly charges are USD 64.76 whereas 25% of customers pay more than USD 89.85 per month.

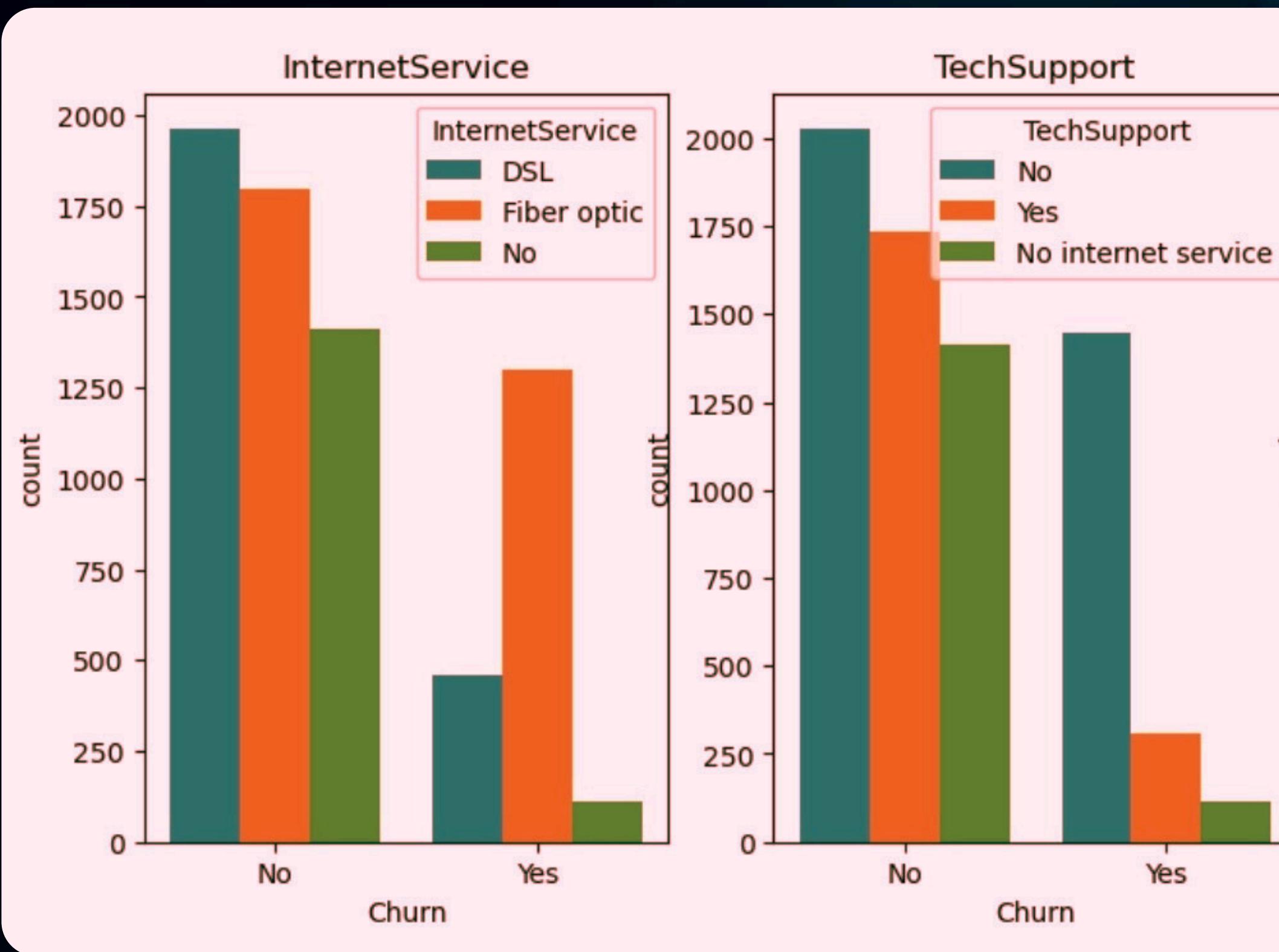
Analysis of Demographic Data Points



Most customers in the dataset are younger individuals without a dependent. There is an equal distribution of user gender and marital status.



Analysis of Internet Service and Tech Support

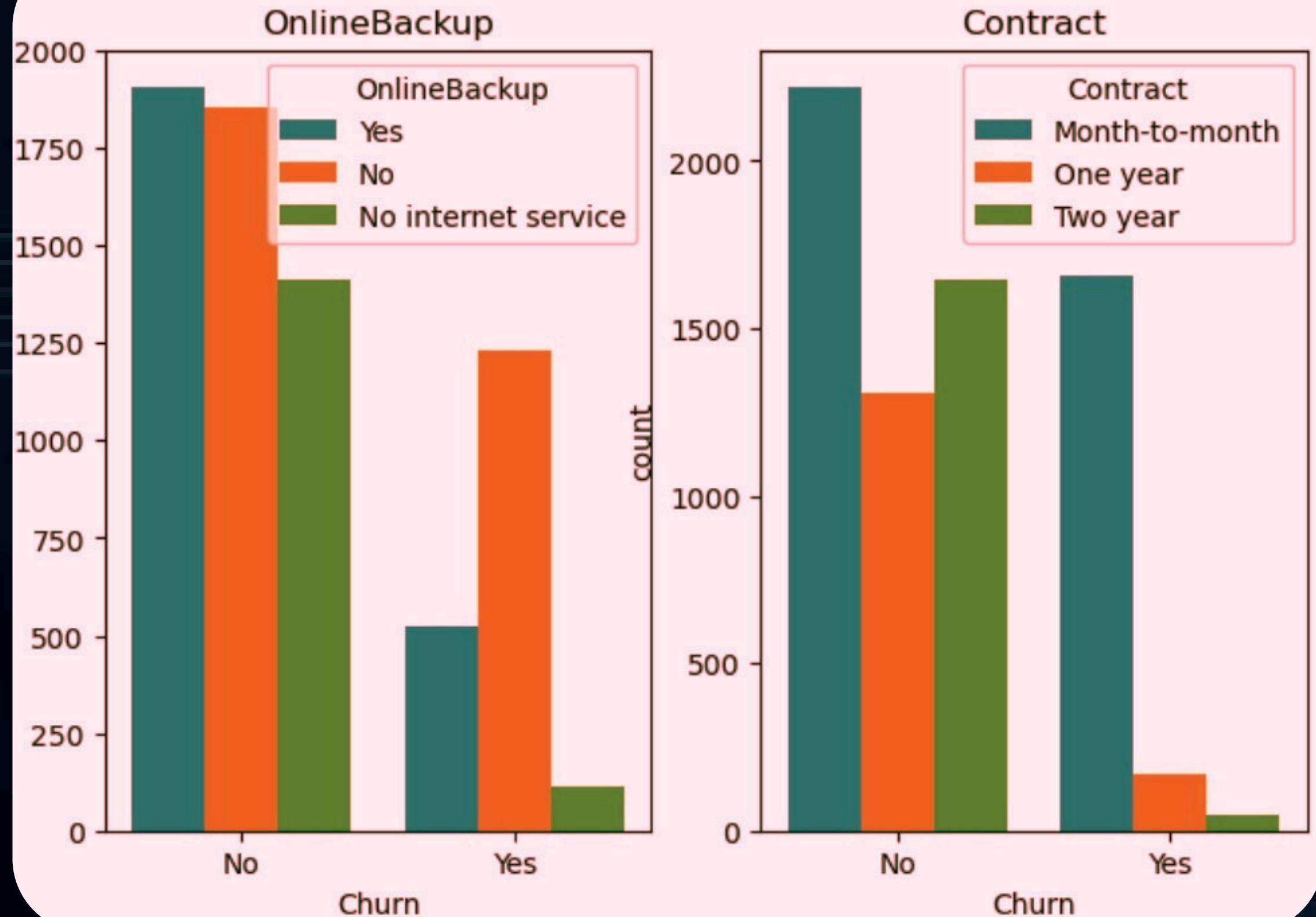


Inferences:

- **InternetService:** It is clear from the visual above that customers who use fiber optic Internet churn more often than other users. This might be because fiber Internet is a more expensive service, or this provider doesn't have good coverage.
- **TechSupport:** Many users who churned did not sign up for tech support. This might mean that these customers did not receive any guidance on fixing technical issues and decided to stop using the service.



Analysis of Online Backup and Contract

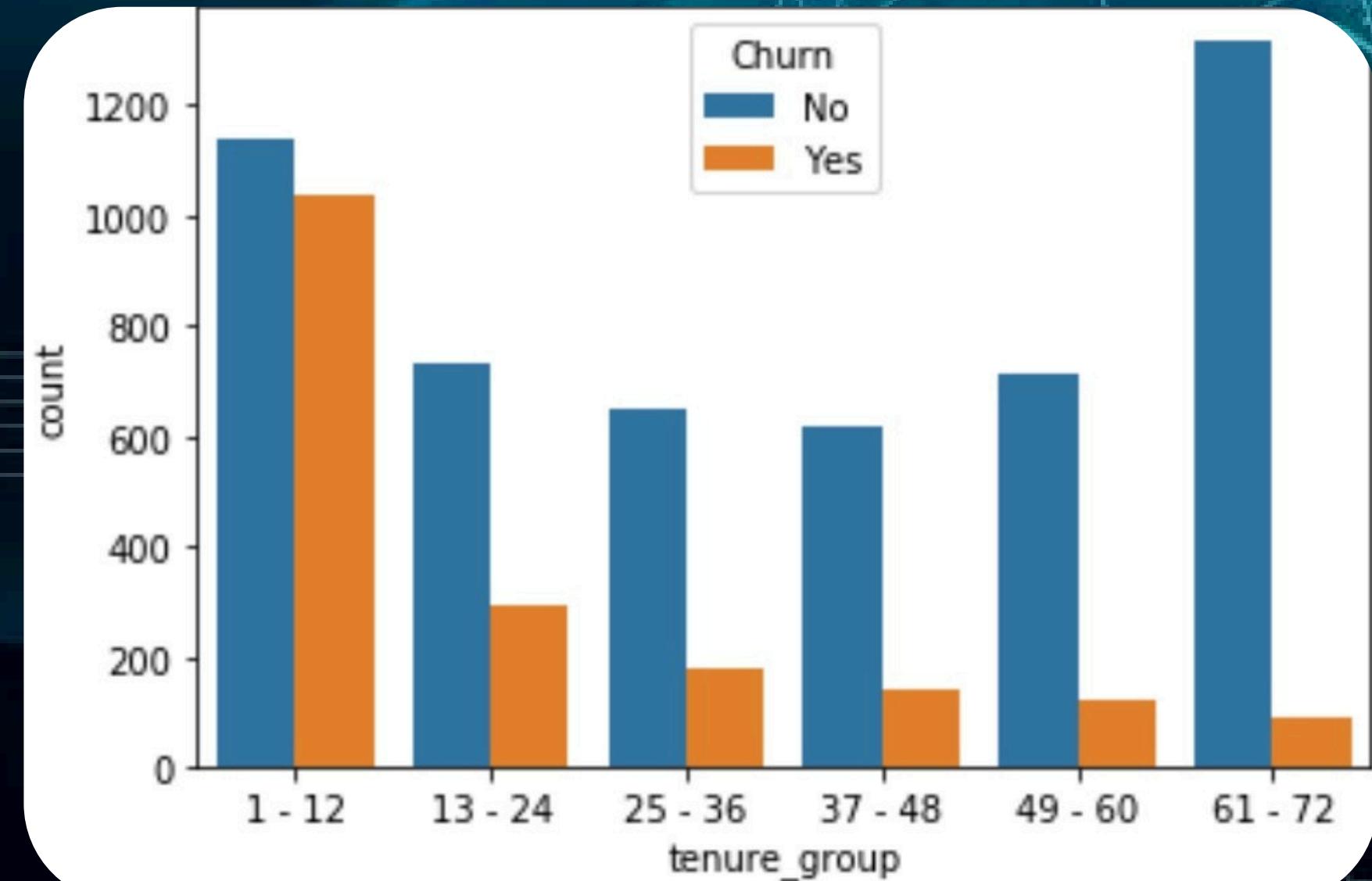
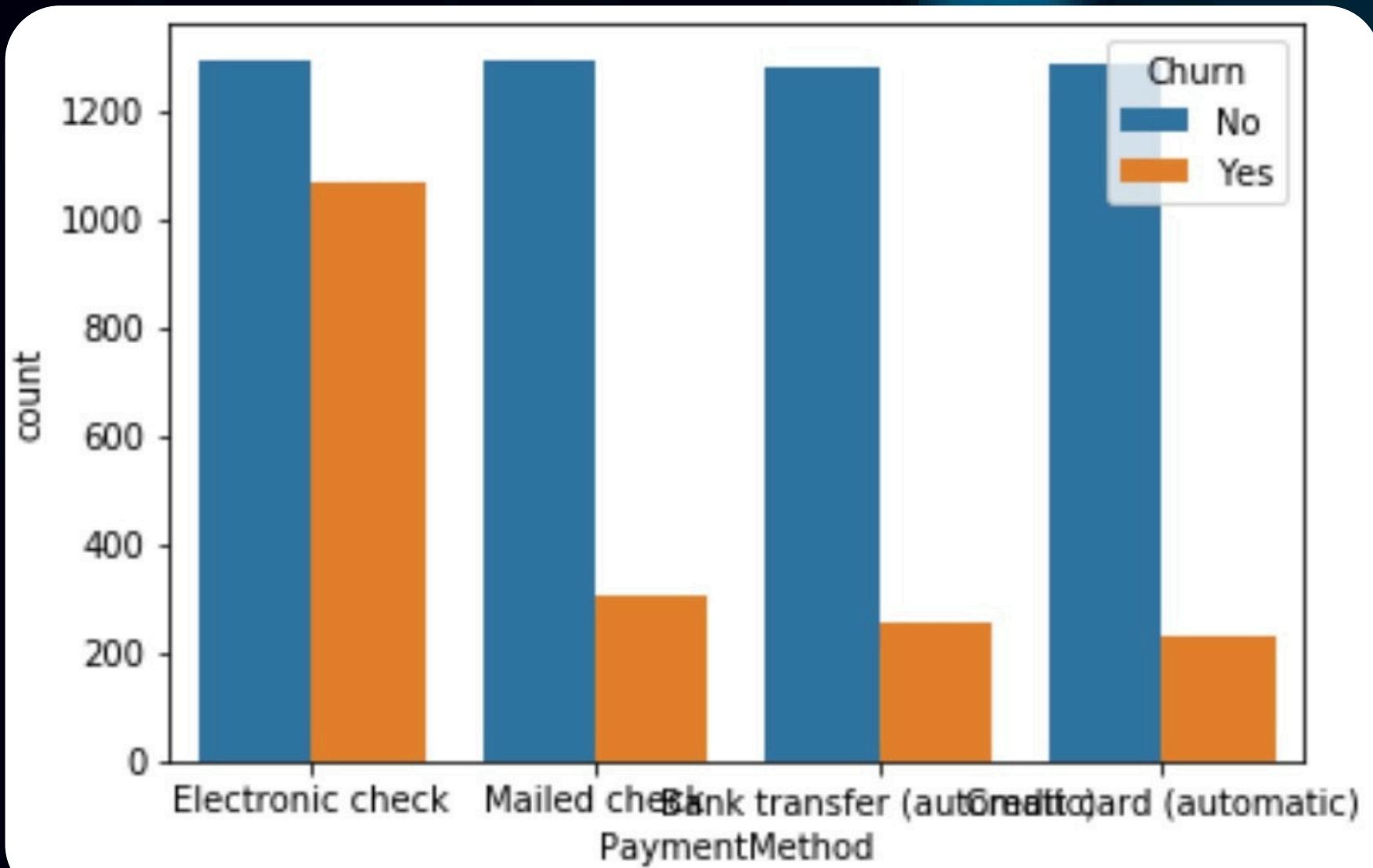


INFERENCES:

- **OnlineBackup:** Many customers who had churned did not sign up for an online backup service for data storage.

- **Contract:** Users who churned were almost on a monthly contract. This makes sense, since these customers pay for the service on a monthly basis and can easily cancel their subscription before the next payment cycle.

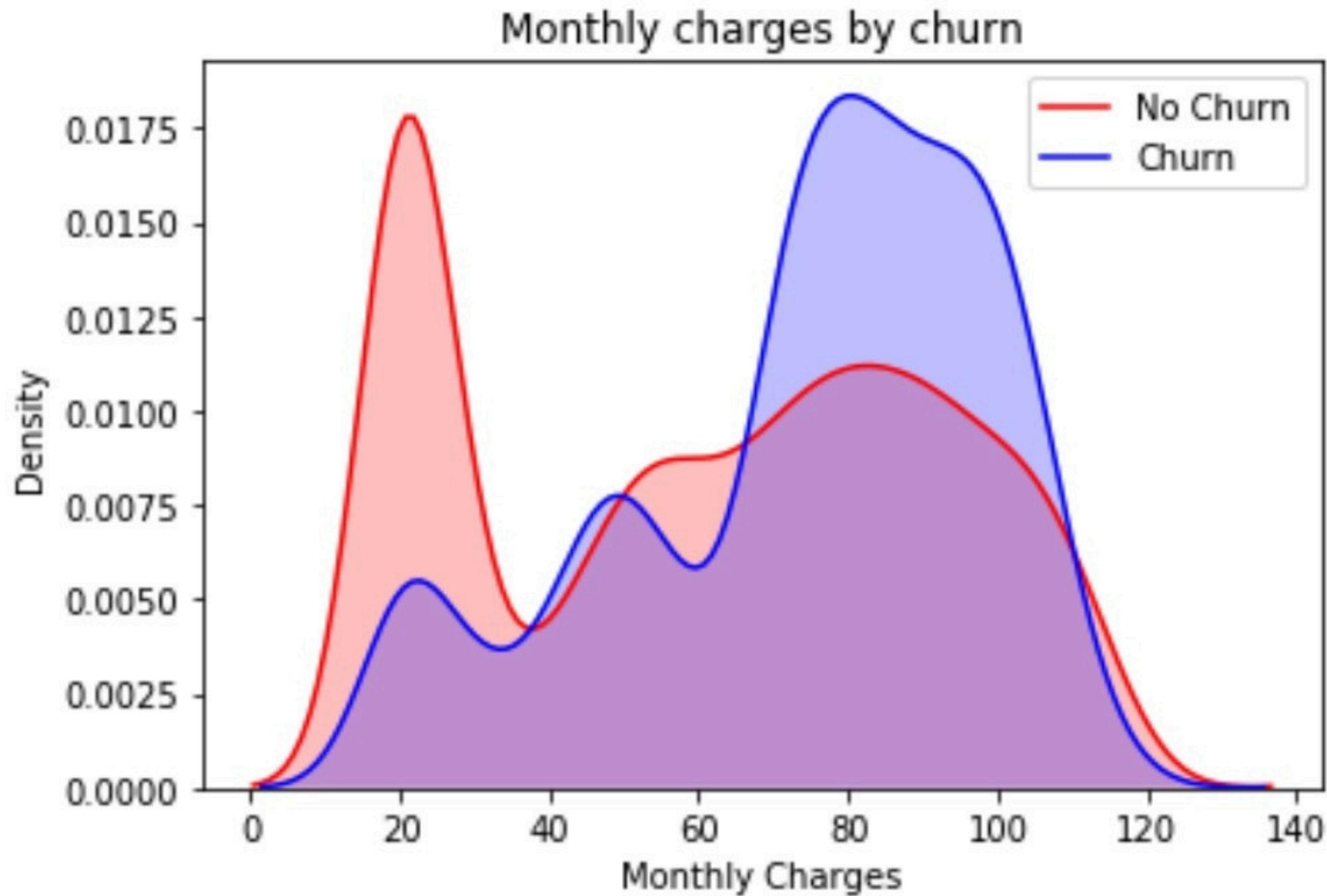
Analysis of Tenure and Payment Method



INFERENCES:

- **Payment method:** From the graph it is cleared that maximum Customers get's Churned due Electronic Check.
- **Tenure-Group:** From the graph it is cleared that there is a high number of customers who churn within the first 12 months. This could indicate that newer customers are more likely to leave.

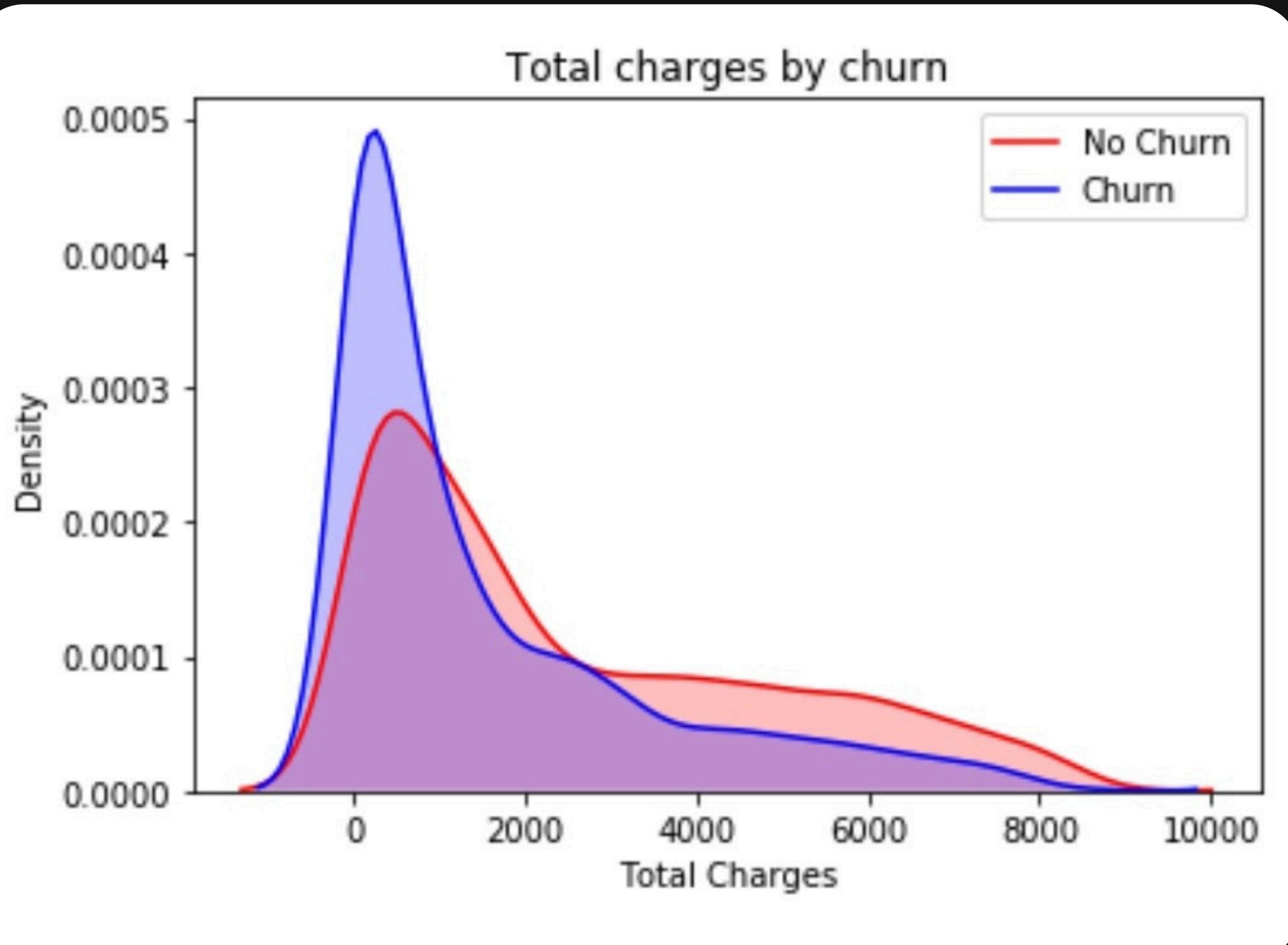
Analysis of Monthly Charges and Churn



INFERENCES :

Here it is evident that when the churn is high then the charges are high. So from here we can conclude that most of the customers churned due to high monthly charges.

Analysis of Total Charges and Churn

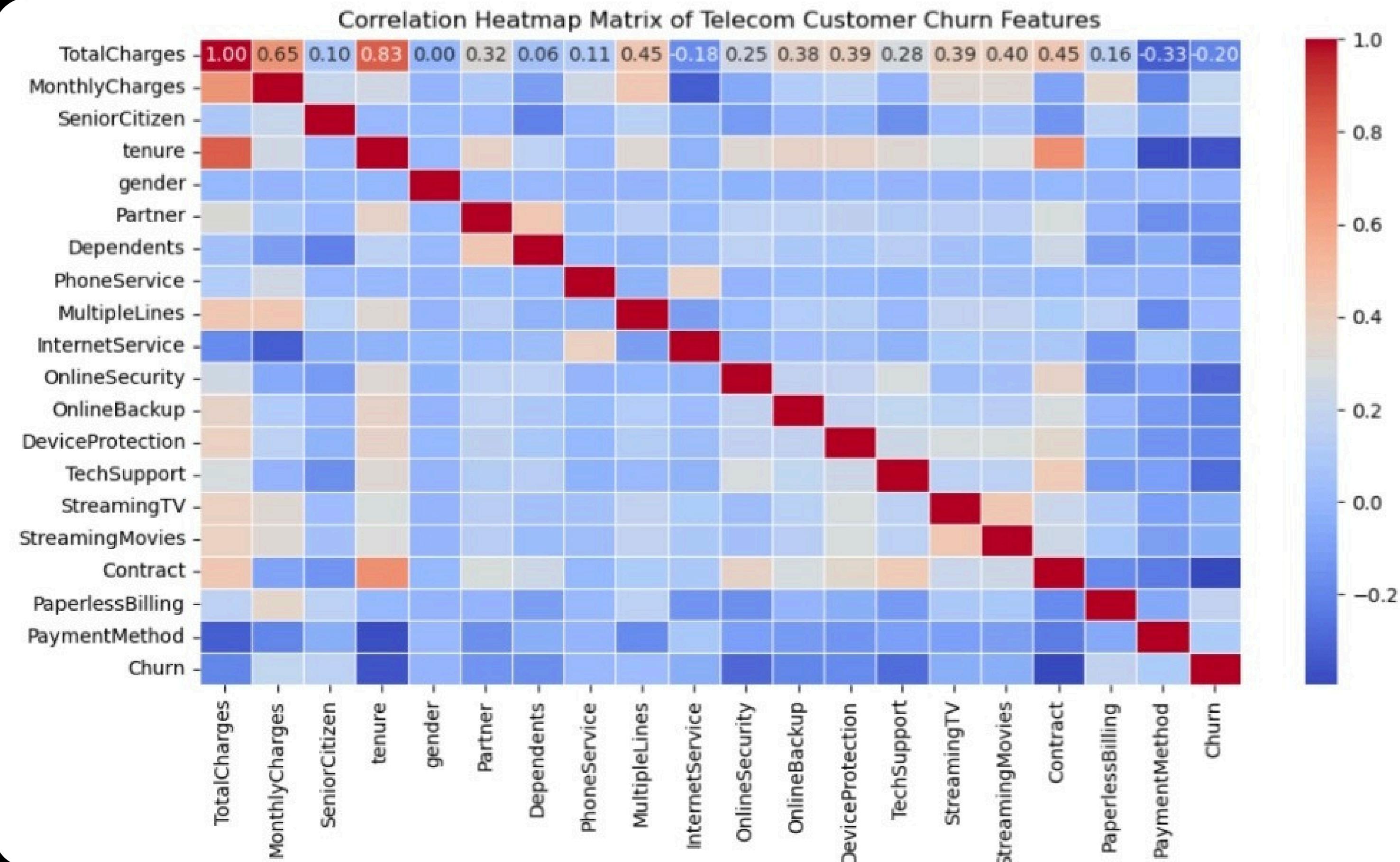


INFERENCES:

- Here we get the surprising insight that as we can see more churn is there with lower charges.
- So Both churned and non-churned customers have a peak in the range(0,2000), but the peak is higher for customers who churned. This indicates that a large portion of customers who churned had relatively low total charges.
- Non-churned customers have a relatively higher density across a broader range of total charges, indicating that customers with higher total charges are less likely to churn.



Correlation Matrix: Analysing Correlation between Independent and Dependent variables



Inferences of Correlation Matrix

- Strong Positive Correlations:

1. Internet Service (Fiber optic): Indicates customers with fiber optic internet are more likely to churn compared to other internet services.
2. Payment Method : Customers who pay via electronic check have a higher likelihood of churning.
3. Monthly Charges (0.193356): Higher monthly charges are moderately associated with a higher churn rate.

- Strong Negative Correlations:

1. Tenure Months (-0.354049): Customers with longer tenure are less likely to churn, indicating loyalty.
2. Contract (Two year) (-0.392253): Longer contracts (e.g., two-year contracts) are associated with lower churn.
3. Dependents (-0.163142): Customers with dependents are less likely to churn.
4. Internet Service (No Internet Service) (-0.047890): Not having internet service is associated with lower churn, possibly because these customers are less reliant on services where churn is relevant.

Churn	1.000000
MonthlyCharges	0.192858
PaperlessBilling	0.191454
SeniorCitizen	0.150541
PaymentMethod	0.107852
MultipleLines	0.038043
PhoneService	0.011691
gender	-0.008545
StreamingTV	-0.036303
StreamingMovies	-0.038802
InternetService	-0.047097
Partner	-0.149982
Dependents	-0.163128
DeviceProtection	-0.177883
OnlineBackup	-0.195290
TotalCharges	-0.199484
TechSupport	-0.282232
OnlineSecurity	-0.289050
tenure	-0.354049
Contract	-0.396150
Name: Churn, dtype: float64	

Customer Churn Prediction Models

```
from sklearn.ensemble import RandomForestClassifier  
rf = RandomForestClassifier(random_state=46)  
rf.fit(x_train,y_train)
```

RandomForestClassifier

```
RandomForestClassifier(random_state=46)
```

2. Building LogisticRegression Model:

```
from sklearn.linear_model import LogisticRegression  
from sklearn.metrics import classification_report, confusion_matrix
```

```
model1 = LogisticRegression(max_iter=1000)  
model1.fit(x_train, y_train)
```

Accuracy: Overall accuracy of model: 78%

- Churned Customers:

1. F1 Score: 0.57
2. Recall: 0.58
3. Precision: 0.57

- Not Churned Customers:

1. F1 Score : 0.85
2. Recall: 0.84
3. Precision: 0.85

Accuracy: Overall accuracy of model: 77%

- Churned Customers:

1. F1 Score: 0.61
2. Recall: 0.73
3. Precision: 0.52

- Not Churned Customers:

1. F1 Score : 0.82
2. Recall: 0.76
3. Precision: 0.89

Strategies to Reduce Customer Churn Rate

- **Offer Bundled Plans:** Create new service bundles that include tech support with fiber optic services. Promote these bundles as offering peace of mind, ensuring customers can get help whenever they encounter issues.

- **Online Troubleshooting Tools:** Develop and promote easy-to-use online troubleshooting tools specifically for fiber optic services. These could help customers resolve common issues on their own without the need for direct tech support.

- **Educational Campaigns:** Run campaigns to educate customers on the importance of online backup.

- **One-Click Signup:** Implement a one-click signup option within your customer portal or mobile app, making it easy for customers to add online backup to their current plan.

- **Bundle Long-Term Contracts with Online Backup:** Offer customers on monthly contracts an attractive bundle that includes a long-term commitment and the online backup service at a discounted rate.

- **Simplified Payment Method :** Provide an easy and seamless way for customers to switch their payment method from electronic checks to other, more secure options.

- **Dedicated Early Support Team:** Create a dedicated support team focused on assisting new customers during their first 12 months. This team can proactively reach out to address issues before they lead to churn.

- **Usage-Based Pricing:** Offer usage-based pricing for services where customers only pay for what they use. This approach can help reduce costs for customers with lower usage, making the service more attractive.

Thank You

